YEARBOOK, 1917

YEARBOOK

OF THE

UNITED STATES DEPARTMENT OF AGRICULTURE

1917

WASHINGTON
GOVERNMENT PRINTING OFFICE
1918

[CHAPTER 23, STAT. L., 1895.]

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[AN ACT Providing for the public printing and binding and the distribution of public documents.]

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Section 73, paragraph 2:

The Annual Report of the Secretary of Agriculture shall hereafter be submitted and printed in two parts, as follows: Part One, which shall contain purely business and executive matter which it is necessary for the Secretary to submit to the President and Congress; Part Two, which shall contain such reports from the different Bureaus and Divisions, and such papers prepared by their special agents, accompanied by suitable illustrations, as shall, in the opinion of the Secretary, be specially suited to interest and instruct the farmers of the country, and to include a general report of the operations of the Department for their information. There shall be printed of Part One, one thousand copies for the Senate, two thousand copies for the House, and three thousand copies for the Department of Agriculture; and of Part Two, one hundred and ten thousand copies for the use of the Senate, three hundred and sixty thousand copies for the use of the House of Representatives, and thirty thousand copies for the use of the Department of Agriculture, the illustrations for the same to be executed under the supervision of the Public Printer, in accordance with directions of the Joint Committee on Printing, said illustrations to be subject to the approval of the Secretary of Agriculture; and the title of each of the said parts shall be such as to show that such part is complete in itself.

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[1] These positions were created by the food production act for the period of the war.

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YEARBOOK OF THE U.S. DEPARTMENT OF AGRICULTURE

REPORT OF THE SECRETARY OF AGRICULTURE.

WASHINGTON, D. C., *November 15, 1917.*

SIR: When, on April 6, 1917, the existence of a state of war with Germany was declared by Congress, this country was facing an unsatisfactory situation in respect to its supply of foods and feedstuffs. The production in 1916 of the leading cereals, corn, wheat, oats, barley, rye, buckwheat, rice, and kafirs was comparatively low, aggregating 4,806,000,000 bushels, as against 6,010,000,000 for 1915, 4,983,000,000 for 1914, and 4,884,000,000 the annual average for 1910–1914. The wheat crop of 1916 especially was strikingly small. It was only 639,886,000 bushels, as compared with the record production for 1915 of 1,026,000,000, with 891,000,000 for 1914, and with the average for the five years 1910–1914 of 728,000,000. It was certain, too, that on account of adverse weather conditions, the output of winter wheat for 1917 would be greatly curtailed. The world production of wheat for 1916 also was unsatisfactory, and the prospects for the ensuing year were not good. The situation was no better in respect to another conspicuously important food commodity, the Irish potato. The yield of this crop for 1916 in the United States was only 285,437,000 bushels, while for 1915 and 1914, respectively, it was 359,721,000 and 409,921,000. For the period 1910–1914 it averaged 360,772,000.

Even in normal times public attention fixes itself particularly on the supply of wheat and potatoes. In time of war it does so much more intensely, especially on the supply of wheat, which is peculiarly important from a military point of view. Because of their shortage here and elsewhere and of the large foreign demand, apprehension and, in some quarters, hysteria developed. The supply of meats and of poultry and dairy products was somewhat larger than in the years immediately preceding, but the foreign demand was great and increasing and exports were steadily rising. It was obvious that the supply of feedstuffs would not be normally abundant, and that it would be difficult to maintain the usual number of live stock and practically impossible within a reasonable time to increase it. Then, too, competitive purchasing by foreign agencies on a large scale of all food products was prevalent, and manipulation and speculation were rife. Prices were mounting rapidly and conditions of living were becoming more difficult.

INITIAL EFFORTS TO INCREASE PRODUCTION.

It was recognized even before the war that the food problem was serious and that constructive action was necessary. This Department accordingly had taken steps to allay unnecessary apprehension, to promote economy and thrift, to secure fuller conservation of farm products and of foods, and to insure increased production of all essential agricultural commodities. The many agricultural agencies of the Nation began to direct attention to these problems and to cooperate effectively with the Department. The increased need of this Nation and of the world for food from our farms and the importance of greatly increasing production were emphasized. In the South, in particular, where effective work had been done for years to secure a diversified agriculture and greatly to increase yields of staple commodities and where unusual opportunities to increase food products were presented, a special campaign was conducted by the Department in cooperation with agricultural colleges and other agencies, with the effective aid of the daily press, agricultural journals, farmers' associations, bankers, and other business men. Many pertinent bulletins and circulars were distributed. The farm-demonstration machinery was fully utilized. More energetic action everywhere was taken to combat plant and animal diseases.

In January, 1917, appeals were sent to the South to help feed the Nation, to supply its own necessities so far as possible, and to produce a surplus of foodstuffs. It was urged especially that each farm family make a home garden, plant enough corn to last the family and the live stock for a year, raise sufficient oats and other small grain to supplement the corn, as well as the necessary hay and forage crops for the live stock, and produce the meat, poultry, and dairy products required by the family; and also to devote adequate attention to cotton as the main money crop.

In February special emphasis was laid on the necessity of raising beet seed on a large scale to make certain a larger supply of sugar beets. It was pointed out that before the war the beet-sugar industry had been almost wholly dependent on Europe for its seed supply, and that superior seed could be produced in this country, which could be further improved by selection and breeding. About the same time a warning was issued to cattle owners to make arrangements for the proper feeding of their cattle until spring, in order to prevent heavy losses in breeding animals. In each instance suggestions as to the methods to be followed were offered.

In March it became certain that a large percentage of wheat in the West and Pacific Northwest had been winter-killed. Information as to the course to be pursued was issued to the farmers of the winter-wheat section. It was suggested that where the crop had been not more than half killed it might be advisable to let the remainder grow, but that some other food crop should be started without delay.

In the meantime, I had appointed a committee of specialists of the department to study the whole agricultural situation and to make recommendations. On the 27th of March I issued a statement urging farmers to adopt measures to secure maximum returns from the farms. Special attention was directed to the necessity of careful seed selection, of controlling plant and animal diseases, and of conserving farm products through proper storage, canning, drying, and preserving. On the 5th of April a special plea was made for an increased production of corn and hogs, and on the 7th of April I appealed to the farmers to increase the output of staple commodities as well as of perishables.

THE ST. LOUIS CONFERENCE.

On April 4, two days before a state of war with Germany was declared, I telegraphed to the State commissioners of agriculture and presidents of the land-grant colleges—the official agricultural representatives of the several States—inviting them to a conference in St. Louis on April 9 and 10, 1917. Editors of farm journals were asked to meet at the same place on April 11. It was thought to be highly desirable to secure the views of the official agricultural representatives of the States and of other leaders of agricultural opinion. There was a generous response to the invitation. Very many of the State commissioners of agriculture and representatives of nearly all the agricultural colleges east of the Rocky Mountains were present at the two days' meeting. Sixty-five officials represented 32 States. On the third day about 75 representatives of the agricultural press were present. A similar conference for the States west of the Rocky Mountains was held at my request at Berkeley, Cal., on April 13, under the leadership of President Benjamin Ide Wheeler, of the University of California.

At the St. Louis conference the entire agricultural situation presented by the emergency was thoroughly discussed. The major problems considered were the production of sufficient foods and feedstuffs not only for this country but also for the nations of Europe with which we are associated in this war, the conservation of farm products and of foods, the mobilization of farm labor, the regulation of storage and distributing agencies, and the further organization of all the Nation's agricultural instrumentalities—National, State, and local. A comprehensive program for execution under existing law and for additional legislation was unanimously adopted. This program was communicated to the Berkeley conference, which concurred in it. It is noteworthy that in two days the agricultural leaders of the country drew up a program the wisdom of the essential features of which has not been successfully questioned and the substantial part of which has been embodied in the Food Production and Food Control Acts. The prompt and effective handling of the situation was made possible by reason of the fact that the American people, generations before, had wisely laid the foundations of many agricultural institutions and had increasingly liberally supported their agricultural agencies. The Nation was fortunate in having had in existence for many years, for the purpose of promoting scientific and practical agriculture, its Federal Department of Agriculture, and a department of agriculture and a land-grant college in each State, as well as great farmers' organizations. It is interesting to note that two of these agencies, the Federal department and the land-grant colleges, had their National official recognition and their real origin in another period of stress—in 1862—in two acts of Congress approved by Abraham Lincoln.

It was recognized as of special importance that the views and cooperation of the great farmers' organizations of the Nation and of leading individual farmers be secured. I therefore invited representative farmers to come to Washington on April 23 to give advice and to make recommendations. They included mainly officials of the National

Grange, the Farmers' Educational and Cooperative Union, the Gleaners, and the Farmers' National Congress. The American Society of Equity was invited to send a representative. It was unable to do so, but proffered its cooperation. At this conference the agricultural problems confronting the Nation were again thoroughly canvassed. In general, the suggestions and recommendations officially made to the Senate in my communication of April 18 were indorsed.

ORGANIZATION.

In the meantime, pending action by Congress, the Federal Department of Agriculture, the State departments, the land-grant colleges, and other agencies actively devoted their attention to the immediate task in hand. Working in close cooperation with one another and with the farmers' organizations throughout the Nation, they immediately took steps to execute that part of the plan which had reference to a more perfect organization and coordination of the Nation's agricultural activities. The task was promptly undertaken of promoting in each State, in connection with the State council of safety, the organization of a small central division of food production and conservation composed of representatives of the State board of agriculture, of the land-grant college, of farmers' organizations, and of business agencies. It was suggested also that similar bodies should be provided for each local subdivision, and all were requested to devote their energies to the problem of increasing the production and conservation of food supplies and of promoting more orderly and economical marketing. Copies of the recommendations of the St. Louis conference and of those made to the Senate on April 18 were sent to the Governor of each State. It was urged that attention be given immediately to the perfecting of agricultural organizations along the lines indicated.

INAUGURATION OF FOOD ADMINISTRATION.

As a further step in organization, the Council of National Defense on April 5 invited Mr. Herbert Hoover to return to this country to advise with the council in reference to the domestic handling of food supplies and the most effective ways of assisting the European nations with which we are cooperating to satisfy their food necessities. Subsequently, on May 20, after the Food Production and Food Control bills had been outlined substantially in the form in which they were finally adopted, the President issued a statement indicating that he had asked Mr. Hoover to undertake the important task of food administration. The purposes of the proposed Food Administration and the necessity for it were set forth. It was stated that a sharp distinction would be drawn between the normal and emergency activities of the Government represented in the Department of Agriculture in reference to food production, conservation, and marketing on the one hand, and the special activities necessitated by the war relating to the regulation of food distribution and consumption on the other. "All measures," it was explained, "intended directly to extend the normal activities of the Department of Agriculture in reference to the production, conservation, and the marketing of farm crops will be administered, as in normal times, through that department, and the powers asked for (in the Food Control bill) over distribution and consumption, over exports, imports, prices, purchase and requisition of commodities, storing, and the like which may require regulation during the war will be placed in the hands of a Commissioner of Food Administration appointed by the President and directly responsible to him."

On June 12 the President, in a letter to Mr. Hoover, expressed the opinion that the inauguration of that portion of the plan for food administration which contemplates a National mobilization of the great voluntary forces of the country which are ready to work toward saving food and eliminating waste admitted of no further delay. It was pointed out that while in many ways it would be desirable to await complete legislation establishing the Food Administration, it seemed that, so far as volunteer effort could be assembled, there should be immediate action. Accordingly, Mr. Hoover was authorized to proceed in this direction at once.

LEGISLATION.

In compliance with a resolution of the Senate, on April 18 I transmitted to it certain proposals for increasing the production, improving the distribution, and promoting the conservation of farm products and foods. The suggestions were based in large measure upon the program adopted at the St. Louis and Berkeley conferences. The Committee on Agriculture in each House soon afterward took the matter in hand, held extensive hearings, and finally formulated two measures. In the preparation of these, there were two leading thoughts in mind. One was to speed up and add to the activities of the Federal Department of Agriculture and its cooperating forces, so that they might attack aggressively the larger problems of production, conservation of farm and ranch products, home economics, and farm marketing. The other was to vest in the President regulatory powers, in considerable part of a commercial nature, to be exercised through an emergency agency rather than through any existing department, to deal with special and urgent National and international food problems growing out of the war. After an extended debate the two bills—the Food Production and the Food Control—were passed by Congress and approved by the President on August 10. Immediately upon the approval of the Food Control act, Mr. Hoover was formally appointed Food Administrator to execute the provisions of the act as far as they relate to food and feedstuffs.

THE FOOD PRODUCTION ACT.

The Food Production Act—"an act to provide further for the national security and defense by stimulating agriculture and facilitating the distribution of agricultural products"—is administered by the Department of Agriculture, and carries an appropriation of $11,346,400 for the following purposes:

1. The prevention, control, and eradication of the diseases and pests of live stock; the enlargement of live-stock production; and the conservation and utilization of meat, poultry, dairy, and other animal products, $885,000.

2. Procuring, storing, and furnishing seeds for cash at cost to farmers in restricted areas where emergency conditions prevail, $2,500,000.

3. The prevention, control, and eradication of insects and plant diseases injurious to agriculture, and the conservation and utilization of plant products, $441,000.

4. The further development of the Extension Service which is conducted in cooperation with the agricultural colleges in the various States, $4,348,400.

5. Surveys of the food supply of the United States, gathering and disseminating information concerning farm products, extending and enlarging the market news services, preventing waste of food in storage, in transit, or held for sale, giving advice concerning the market movement or distribution of perishable products, and investigating and certifying to shippers the condition as to soundness of fruits, vegetables, and other food products received at important central markets, $2,522,000.

6. The development of the information work of the Department, enlarging the facilities for dealing with the farm-labor problem, and extending the work of the Bureaus of Crop Estimates and Chemistry, $650,000.

While the Food Production bill was pending in Congress, detailed plans were formulated for carrying out its provisions as soon as it should become law. The Department therefore was ready to proceed promptly and effectively with their execution.

RELATION TO FOOD ADMINISTRATION.

It was apparent that the Food Production and the Food Control Acts dealt with very closely related matters, that effective cooperation between the Department of Agriculture and the Food Administration was essential, and that needless duplication of effort should be avoided. It was recognized that the relation between the two agencies was intimate and fundamental; that it was impossible completely to disassociate them and undesirable to do so. After a full conference a satisfactory working agreement was reached.

In a broad way, the Food Administration has as its prime functions the control and regulation of the commerical distribution of foods and feedstuffs, that is, of products which have reached the markets and are in the channels of distribution or in the hands of consumers, their conservation by consumers, and the elimination of waste, through the employment of regular official as well as volunteer agencies.

The Department of Agriculture continues to administer the laws placed under its jurisdiction and to direct its activities in reference to production. It also continues to make the investigations authorized by Congress and to furnish assistance to farmers and live-stock men in the marketing of their products; to stimulate organization among producers for the distribution of their products to the markets; and to promote the conservation of farm and animal products, especially of perishables through canning, drying, preserving, pickling, and the like. It retains its work in home economics, as provided by law, and cooperates in this field as heretofore with the agricultural colleges, through the Extension Service. It directs all these undertakings in greatly expanded form under the authority and with the funds provided by the Food Production Act. In their promotion it utilizes its own official machinery and enlists the aid of volunteers.

In the main, the Department of Agriculture deals with all the processes of farming and follows the products through the markets to the point where they are available, and are in requisite form, for actual consumption. It aids in these processes through investigation, advice, and demonstration; only in the case of certain products and processes has it regulatory authority. The Food Administration, however, has wide powers of regulation and direction of food materials and food products. Where the Food Administration through its powers can be of assistance to the Department of Agriculture in its field, it is at liberty freely to make suggestions, and, when necessary, to cooperate in execution; and the same relation obtains as to the Department's participation in Food Administration matters in which it has a vital interest and toward the promotion of which it can be of assistance.

ADDITIONAL MACHINERY DEVELOPED.

It early became apparent that there would be no little delay in framing and passing the necessary legislation. Time was the essence of the situation. Prompt action was necessary. It was essential that many of the recommendations included in the St. Louis program should be put into effect. Farmers already were in the field or had made their plans for the season. The Department and the State agencies therefore speeded up their work along the most promising lines with the forces and funds at their command. Projects not having an immediate bearing on the emergency were set aside in order that the energies of the workers might be concentrated on the main problems.

Assuming that Congress would enact, in part at least, the legislation desired to stimulate production and to promote conservation, the Department of Agriculture, in cooperation with the land-grant colleges, undertook the preliminary work of developing additional machinery and agencies; and, in a number of States, these additional agencies, including especially an extension of the farm demonstration force, actually were put into operation.

It was recognized that the Cooperative Extension System, with its combination of Federal and State administrative officers and specialists, county agents, home-demonstration agents, farm bureaus, and other local organizations, furnished a ready and effective means for the Nation-wide dissemination of the needed facts, as well as for practical demonstrations of the best methods of increasing agricultural production and securing the most economical utilization of the products of the farm. With remarkable promptness and unanimity, these agencies addressed themselves to the important problems of increasing and conserving the food supply and cordially furthered the Department's efforts in this direction. Fortunately, as the result of the investigations and experiments of the Department and of the State experiment stations, extending over many years, there was already available a large accumulation of scientific information ready to be put into practical use.

To supplement the work of the county agents, special pains were taken further to enlist the services of the specialists of the Department and of the land-grant colleges. They serve as the connecting link between the research workers and the Extension Divisions of the several States. The efforts of each specialist were directed immediately toward methods of food production and conservation. For example, the crop specialist centered his efforts on questions of soil improvement and profitable rotations for food and feed production, the horticultural specialist sought especially to increase the planting and yield of vegetables, and the animal-husbandry specialist assisted in the formation of pig clubs, baby-beef clubs, and poultry clubs, and in disseminating information concerning egg and poultry production.

EXTENSION WORK EXPANDED.

An appropriation of $4,348,400 was made by the Food Production Act for the further development of the Extension Service. By the end of October more than 1,600 emergency demonstration agents, men and women, had been appointed, making a total of approximately 5,000 cooperative extension workers, including the specialists performing extension work, employed through both State and Federal regular and emergency funds. This number will be further increased as soon as men and women with the requisite training and experience can be secured. Nearly 750 additional counties are cooperating with the Department under the Food Production Act in employing county agents. The total number of men in the service now acting as county agents is about 2,000, and many district agents have been designated to supervise their activities. About 1,300 State, district, county, and urban women home-demonstration agents are now at work. Of the 600 women now employed as emergency agents under the Food Production Act, 500 are working in counties, principally among farm women, and 100 have been assigned exclusively to urban communities. Over 100 additional assistants in boys' and girls' club work have been placed in the field.

When the plans are fully developed there will be at least one demonstration agent—possibly two, a man and a woman—in nearly every agricultural county in the Nation, and a woman in each of the large cities of the country to give advice regarding the production, conservation, and utilization of food products. These agents not only are performing the normal and emergency demonstration and educational work, but they are also assisting other branches of the Government in special directions, such as the Treasury Department in its Liberty loan campaigns and the Food Administration in its food-conservation activities.

LOCAL ORGANIZATIONS DEVELOPED.

Conditions growing out of the war gave added impetus to the already well-established policy of extending and promoting local organizations to support, aid, and extend the influence of the county-agent work. The number of such organizations was rapidly increased throughout the country. In the 15 Southern States the number of community organizations of farmers formed to aid the county agents increased from 1,654, with a membership of 44,548, to 2,508, with a membership of 78,660. As in the South, so in the North and West, impetus was given to the organization movement already under way, and there has been an emphatic demonstration of the increased usefulness of the county agent when backed by a supporting local organization. In the 33 Northern and Western States the number of farm bureaus and similar local organizations was increased to 374, with a membership of 98,654.

Many thousands of farmers throughout the country were shown how to increase their producing power and place their farms on a business basis, with the result that their farm practice has been better balanced, soil fertility has been maintained, and production has been increased.

There was a notable development of the work among women along the line of productive activities, such as poultry raising, home butter making, gardening, and canning, and of household convenience, comfort, economy, and efficiency. The number of community clubs organized among rural women in the South increased from 250 to 1,042, and 1,635,000 women and girls actually participated in some form of emergency work.

The enrollment in the regular boys' clubs in the South was largely increased, and the total membership is now approximately 100,000. In addition, 20,000 boys were enrolled to assist in war emergency activities. These clubs have been a very important factor in the campaigns for improved farming and increased food production. The boys' and girls' clubs in the Northern and Western States, through their regular membership of 406,000 and an additional emergency enrollment of 400,000, drawn largely from cities and towns, have been an active and efficient agency in the campaigns for promoting food production and conservation, not only through such regular work as canning, drying, pickling, preserving, and the like, but also through various emergency projects, such as gardening, poultry raising, bread making, and other activities.

HOME GARDENING STIMULATED.

Special attention was directed to the importance of home gardens in all parts of the Nation. A series of 27 brief popular articles containing instructions for the preparation of soil, for garden planting, and for the care of vegetables was prepared and distributed. A special Farmers' Bulletin, The Small Vegetable Garden, was quickly printed and more than a million copies were promptly distributed. Throughout the growing season the Department continued to supply the press regularly with practical timely information designed to encourage a second and even a third crop of vegetables. This campaign, supported by the efforts of county agents, other field workers of the Department, the staffs of the agricultural colleges, and private workers, stimulated, it is estimated, the planting of from two hundred to three hundred per cent more gardens than had ever before produced food in the United States in one season. This was particularly true in the South, where the work was a logical development of the "Safe Farming" program which has been advocated for several years.

SAVING FARM PRODUCTS AND FOODS.

The home-demonstration activities were immediately intensified. Early in the summer all home-economics extension workers turned aside from their regular activities and aided in special campaigns for food conservation. Canning, drying, salting, and storing were emphasized in every State, and special stress was laid upon the importance of using perishable products in such a way that the home might support itself and make as little demand as possible on the transportation facilities for supplies from other sections of the country. Many demonstrations were given on methods of conserving wheat, sugar, fats, and the like. Excessive use of butter, meats, and sugars was discouraged and the use of substitutes was taught. Definite conservation campaigns were undertaken through the daily and weekly papers; many women's clubs were organized for the sole purpose of promoting home-economics extension work; community kitchens and community drying plants were increased in number and efficiency; many educational exhibits were made; and short and intensive training courses were held in 10 agricultural colleges for the preparation of emergency food agents and local volunteer workers.

The Department gave particular attention to problems of selecting and combining foods in such manner that the diet would be satisfactory and adequate and at the same time the consumption of commodities in which there was a shortage would be reduced. Data derived from experimental work on the rational and economical use of foods were promptly made available. A simple method for applying the results of the food investigations in a practical way was worked out and published.

To enlist the women of the Nation in a food-saving campaign, attention was called on March 3 to the fact that at least $700,000,000 worth of food was being wasted annually in the United States. Subsequently, six separate appeals to the people to feed themselves, to watch kitchen waste, to prevent spoilage, and to conserve meat, milk, butter, and bread were issued through the press. These were followed by more than 65 simple circulars dealing with the effective use of foods and with economical and nourishing diets. Special efforts were made through press items to familiarize the Nation with the use of such foods as corn, rice, soy beans, rye, various legumes, cottage cheese, and skimmed milk. Many of the articles thus prepared were published as Food Thrift Series Nos. 1 to 5 and reached a direct circulation of more than a million and a quarter.

The services of an expert in home economics were placed at the disposal of the Woman's Committee of the Council of National Defense, and the Department has cooperated with the committee in many directions. Jointly with the Food Administration, a series of leaflets on foods, designed especially for extension workers in home economics, was prepared. As a part of the general survey of the food resources of the country a dietary survey of selected families in different parts of the United States was undertaken. Dietary studies also were made in selected families of the District of Columbia as a part of the study of living conditions carried on by the Department of Labor.

CONSERVATION OF PERISHABLES.

When it became apparent that the truck farms, home gardens, and orchards of the Nation would produce a large surplus, the Department, supplementing the activities of the extension forces and aided by a large number of emergency agents, conducted an intensive publicity campaign, under the immediate direction of a special assistant, to promote the canning, preserving, pickling, and drying of surplus perishables and to stimulate the consumption of fresh fruits and vegetables. Mr. A. D. Lasker, of Chicago, and Mr. John Callan O'Laughlin, of Washington, D. C., volunteered to organize and supervise the work for the Department. Practically every newspaper in the 28 States which reported a heavy surplus agreed to devote space to the campaign. Within two weeks 110 articles teaching in a brief, simple way the household methods of conserving fruits and vegetables were supplied to the newspapers and promptly published by them. Special Farmers' Bulletins dealing with these subjects were quickly prepared and circulated to the number of 3,400,000 copies. The response to this campaign was immediate. Not only were perishables put up for winter use in greatly enlarged quantities, but the increased consumption, stimulated by the campaign, steadied the truck markets and undoubtedly prevented a considerable waste of valuable foodstuffs. In this way also the drain on the staple products was lessened. While there is no way of determining accurately how much food was put up in individual homes for later use, there is every reason to believe that thousands of families canned and preserved perishable products this year for the first time.

Steps had been taken early in the year to make sure that there would be a sufficient supply of containers. The price of tin cans had increased to such an extent as practically to prohibit their use by the individual canner. At the suggestion of the Departments of Commerce and Agriculture manufacturers agreed to restrict the canning of nonperishable foods for several months in order to conserve the supply for perishable products. The States Relations Service also, in cooperation with the Bureau of Chemistry, the Council of National Defense, railroads, and manufacturers of tin cans, perfected an arrangement by which more than 10,000,000 cans were shipped in carload lots from certain factories direct to counties in the South and sold at cost, plus freight and handling charges. The net saving through this activity alone is estimated at more than a quarter of a million dollars.

MARKETING ACTIVITIES.

The work of the Bureau of Markets was greatly expanded. The market news service for fruits and vegetables, inaugurated during the fiscal year 1915, as well as that for live stock and meats, which was begun in the fiscal year 1917, was developed as rapidly as possible with available funds. Many of the projects of the Bureau were redirected in order to deal more effectively with emergency problems. The reports were particularly valuable in connection with the shipment of perishable products, and large numbers took advantage of the timely information furnished by them. During the fiscal year 1917 approximately 3,000,000 bulletins regarding car-lot shipments and jobbing prices of fruits and vegetables were distributed to over 52,000 individuals, including shippers, jobbers, distributors, and receivers. Market reporting stations were opened during the year at several important points, and the number of commodities covered was greatly increased. The first quarterly report of the supply of wool was issued on July 30 and represents the most complete inventory ever compiled of the wool supply in the United States. The reporting service for cold-storage holdings was rapidly enlarged and now includes 43 commodities.

From representatives stationed at important transfer points during harvest periods the Bureau of Markets secured telegraphic information on the car situation. These reports made it possible to place before the Commission on Car Service accurate information regarding the prospective movement of different crops and the need for cars. The Bureau also, through all available channels, has endeavored to secure close cooperation between carriers and producers, shippers and distributors in the more efficient utilization of railroad equipment used in transporting food products.

MARKET NEWS SERVICES EXTENDED.

The passage of the Food Production Act made possible a marked expansion of the machinery of the Bureau of Markets. An appropriation of $2,522,000 was provided for this purpose. The news services for fruits and vegetables and for live stock and meats were still further developed and were extended to include hay, grain, and seeds, and dairy and poultry products. Three general reporting services, one daily and two weekly, are conducted for perishables at 25 stations, as well as a local service for truck crops in certain cities.

Branch offices are now maintained at twelve important market centers for the purpose of collecting and distributing current information relative to supplies of live stock and meats, demands, prices, and other market conditions. Two daily and one monthly report for live stock and meats are issued. Data on wholesale meat trade conditions are secured daily from several of the largest eastern meat consuming and distributing centers, and a summary is immediately forwarded to the central live-stock markets in the West. Bulletins also are issued at the various branch offices before the day's trading in live stock begins, and this information is distributed throughout the United States. More than 60 stockyard companies report their current live-stock receipts and shipments, and a summary of the figures is issued after the first of each month.

Biweekly reports are made on hay and grain for certain sections. A semiweekly statement of bean prices, demand, and movement is made, and plans have been completed for issuing one each month on farm and garden seeds. Reports of daily car-lot shipments and jobbing prices of fruits and vegetables, as well as weekly summaries of car-lot shipments and a weekly market review, are made. Data on the carload movements of fruits and vegetables and of live stock, embracing returns from approximately 1,000 officials, are telegraphed daily by more than 400 different railroads.

A cooperative experimental reporting service was begun early in the year in the large wholesale farmers' market at Providence, R. I., on fruits and vegetables grown in the neighborhood. This service is conducted in cooperation with local truck-gardeners' associations and the city authorities. It has demonstrated its usefulness in stabilizing local prices, and has been extended, under the Food Production Act, to the markets at Boston and Springfield, Mass.; Albany, N. Y.; Cleveland, Ohio; Grand Rapids, Mich.; St. Paul, Minn., and Denver, Colorado.

INSPECTION OF FRUITS AND VEGETABLES.

The Food Production Act authorizes the Secretary of Agriculture to investigate and certify to shippers the condition as to soundness of fruits and vegetables and other food products when received at important central markets. Rules and regulations for carrying out this provision of the act were published on October 31, and the inspection service was inaugurated promptly in 24 of the large markets. This impartial and disinterested inspection service should lessen the uncertainty surrounding the marketing of perishables and stimulate economical production.

EMERGENCY FOOD AND FERTILIZER SURVEYS.

The most difficult undertakings of the Bureau of Markets under the Food Production Act are the war emergency food surveys. A preliminary survey, as of August 31, 1917, was planned and set in operation. This will be followed by one in more detail after the crops are gathered. The information sought covers 18 of the more important farm products and foods, in some instances groups of products, and falls into four heads, based on location and ownership, as follows: (1) Quantities of raw food products on the farms;

(2) stocks of food products nearer the consumption stage in manufacturing, storing, jobbing, wholesale, large retail, and other commercial establishments; (3) stocks in retail houses, particularly in the small establishments; and (4) supplies of food in the household and current family consumption. The latter survey will embrace many more items.

A determination of the quantity of food products on farms, particularly of cereals, live stock, and poultry, has been made by the Bureau of Crop Estimates. The holdings of manufacturing, storing, jobbing, wholesale, and other commercial establishments, including large retail houses, have been ascertained by the Bureau of Markets directly from each concern. Owing to the impossibility of covering all the smaller retail concerns, the survey, so far as these were concerned, was limited to the establishments in a number of representative cities and rural districts and was conducted by personal canvass instead of by mail. From the data secured the aggregate for the entire country will be estimated. Similarly, the supplies of food actually in the households will be determined by ascertaining the stocks in a large number of homes, and the returns will be checked by a careful record of the quantities of food purchased and consumed in them during the period of one week.

The Food Production Act provides also for the investigation of basic facts relating to fertilizers. An effort is being made to secure accurate information regarding the supply of fertilizer materials on hand, the probable production and consumption, and other pertinent facts. A special inquiry has been made through the Extension Service to ascertain the immediate requirements of farmers for nitrate of soda.

CONTROL OF PLANT DISEASES AND INSECTS.

Immediately after the outbreak of the war, the Bureaus of Plant Industry and Entomology directed their attention to plant diseases and insect pests and rendered very effective assistance with the resources at their command. With the additional funds made available by the Food Production Act, specialists of the Bureau of Plant Industry, familiar with the possibilities of seed treatment for the prevention of smuts of wheat, barley, oats, and rye, which alone cause losses of fifty to sixty million dollars a year, were placed in Oregon, Ohio, New York, Tennessee, Indiana, Illinois, Oklahoma, Texas, Washington, and California. These specialists conducted an active campaign to reduce these losses. Through cooperation with the county agents, farmers, farmers' organizations, and county and township schools, detailed suggestions for the protection of the wheat crop were given and were put into effect by many farmers. Similar work also has been undertaken in the Gulf and South Atlantic States.

Early in the spring the Bureau of Entomology made arrangements to secure systematic reports from various sections of the country regarding the prevalence of insects attacking food crops. It was essential to have readily available full and accurate knowledge of the exact conditions with reference to injurious insects, especially those threatening the staple crops. The reports received were promptly digested and transmitted to all State and station entomologists and others who were in a position to assist in reducing losses from insect attacks. In this way the field workers of the Bureau, in cooperation with the State authorities, were able to deal more effectively with insect problems in many sections of the country. Under the provisions of the Food Production Act the bureau has instituted an extensive campaign to disseminate information concerning means of preventing insect ravages and to demonstrate proper methods of control. It is planned to place 40 additional expert entomologists in the field to cooperate with the extension forces. Nineteen already have been appointed. They are dealing with the Hessian fly in the wheat areas, insects affecting truck crops—especially sweet potatoes—in the Gulf States, and those damaging deciduous fruits in the Appalachian region and citrus fruits in the South and in California. In the Northwest they propose to inaugurate an educational campaign directed against insects affecting cereal and forage crops. Six specialists in addition to the regular force have been assigned to the task of stimulating the production of honey.

CONSERVING POTATOES.

Sweet and Irish potatoes were planted more extensively than ever before. To reduce the losses resulting from improper handling and storage of the former, specialists were placed in the regions of large production, and their work, it is estimated, already has resulted in a saving of $3,000,000. The methods of storing and handling Irish potatoes are well understood and the commercial practice in this field is fairly satisfactory. There is room, however, for great improvement both in quality and yield. A special survey, therefore, was undertaken to locate desirable fields of potatoes, free from disease and of good quality, which could be utilized for seed stock. Experts are now working on the problem in Maine, Vermont, Massachusetts, New Hampshire. Minnesota, Wisconsin, and Colorado.

PURCHASE OF SEED CORN.

To relieve the situation caused by severe drought in certain sections of Texas, and especially to insure a sufficient supply of good seed for the next planting season, steps were promptly taken to purchase a stock of approximately 37,500 bushels of seed corn for sale to farmers for cash at cost, as provided in the Food Production Act. The Department also, with the cooperation of the Food Administration Grain Corporation, undertook to insure an adequate supply of seed wheat for planting this fall and next spring. The Grain Corporation permitted elevators to set aside special storage space and authorized them to charge a slight advance over the established price to cover extra charges. The Department located available stocks of seed, inspected them, certified to their soundness, and notified farmers where and on what terms they could secure such seed.

THE MEAT SUPPLY.

The task of increasing the meat supply, necessarily a slow one in its production phase, is particularly difficult. Hogs and poultry yield the quickest returns, and therefore urgent efforts were made to increase their production. Special campaigns were conducted by the specialists in animal husbandry, and the membership in the boys' and girls' pig and poultry clubs was greatly increased. Press notices designed to promote the raising of poultry were issued and later were incorporated in a special back-yard poultry leaflet, which was widely circulated. At the same time active steps were taken to stimulate the production of beef and dairy cattle, and several specialists in sheep husbandry were assigned to duty in the Eastern States to encourage the production of sheep on farms. Funds have been set aside from the appropriation made by the Food Production Act to employ a force of 32 additional men to give their entire time to the task of increasing the number of hogs, 39 to encourage poultry raising, and 6 to assist producers of beef cattle.

The transfer of cattle from regions where there was a shortage of feed to areas where feedstuffs were relatively plentiful has received special consideration. This work was begun late in June and is still under way. Field agents were assigned to Texas and Montana to locate cattle likely to be unwisely disposed of, and at the same time men were stationed in regions where there was an abundance of feedstuffs to locate prospective buyers. It is estimated that by the end of October this work had resulted in the transfer and saving to the Nation of more than 100,000 cattle.

On account of the severe winter and late spring in the West, the live-stock losses were very severe in every range State. It was urgent that the National Forest ranges be opened at the earliest possible date in order to prevent further losses, especially of lambs and calves. To meet this situation animals were admitted to the ranges earlier than usual and the number grazed was increased by approximately 350,000 over any previous year. Notwithstanding this action, the demand for grazing privileges could not fully be met. Obviously, the next important thing to be done was to provide for further utilization of the range in 1918. To study the effects of the increased use of the ranges this year, to discover in what particulars the present method of handling the stock and allotting the range might advantageously be modified as an emergency measure, and to secure the best available knowledge regarding the number of stock which the ranges can be made to carry with safety next year, a special inspection force has been organized. As a result of this study of the problem it will be possible to bring about a still further emergency use of the National Forest ranges for live-stock production in 1918.

CONTROL OF ANIMAL DISEASES.

The work connected with the suppression of animal diseases has been vigorously pressed. Special attention has been directed to the control of hog cholera and cattle ticks. Estimates show that the losses from hog cholera during the past fiscal year decreased by approximately 30 per cent and reached the lowest average per thousand head since 1894. More than 40,000 square miles were released from quarantine on account of the cattle tick during the past fiscal year and 1,788 on September 1, 1917. Sixty-five thousand five hundred and twenty square miles will be placed in the tick-free area on December 1. More than 51 per cent of the original infested territory has now been cleared of the tick. The work was greatly enlarged during the past summer, and many additional employees were assigned to it. The suppression of the tick makes possible the introduction of more and better beef and dairy cattle, and already thousands of fine breeding cattle have been procured by Southern farmers. Satisfactory progress has been made in the prevention or control of other destructive animal diseases.

Under the Food Production Act the facilities of the Bureau of Animal Industry for dealing with live-stock diseases have been further extended. Forty-six employees have been added to the tick-eradication forces in order that the work may be prosecuted more vigorously and additional areas be prepared for systematic effort next year. They have been assigned to duty in seven States. This force will be increased by 10 in the near future. In 12 States an inspector has been detailed to assist in combating tuberculosis of cattle and swine and abortion of cattle, and it is proposed to increase the number to 19. In the control of blackleg of cattle and anthrax of domestic animals, five men are regularly employed. From time to time, however, as occasion arises, employees regularly assigned to other duties are detailed to the work of fighting these diseases. These activities of the Department now cover 15 States and will be extended to 10 more as promptly as possible. Sixty-five additional veterinarians have been assigned to the hog-cholera work. Fifteen more will be appointed as soon as competent men can be obtained. The fight against the disease has been under way for some time in 28 States, and as soon as the necessary arrangements can be made with the State authorities it will be carried into the remaining 20 Commonwealths.

THE LIVE-STOCK CONFERENCE.

In the effort to increase the meat supply, it seemed of the highest importance that the cooperation of the live-stock men of the Nation should be secured. Having this in view, in August I decided to ask representatives of the various live-stock interests to attend a conference in Washington on September 5 and 6, 1917. Shortly after the call for the conference was issued, in view of the interest of the Food Administration in many phases of the same matter, it was determined to have a joint conference and to create a National live-stock industry committee. People representing not only the producers of the various kinds of live stock but also the farm journals were invited to become members of the committee and to attend the conference. It was pointed out that there had been a tremendous slaughter of animals abroad, and that the destruction would continue at an accelerated rate. The duty of this Nation to supply food for its own citizens and soldiers and also to help feed the civilian population and soldiers of the Allies was emphasized. It was especially suggested that attention should be given to the problem of redistributing cattle, sheep, and hogs from areas where feed supplies were short to those where they existed in greater abundance. One hundred and eighty-five men, including representatives of the Department of Agriculture and the Food Administration, attended the conference, which lasted for two days. Certain recommendations, with many of which the Department is in thorough accord, were made by the conference. Some of them had reference to undertakings which the Department and other agencies have had under way for some time and which have been enlarged in recent months. Among these are the following:

The extension of the live-stock reporting service of the Bureau of Markets; the vigorous prosecution of the work of eradicating the cattle tick; the encouragement of the boys' baby-beef clubs and pig clubs and the cow-testing associations; protective action against the stray dog, the enemy of the sheep; the extension of the work of education with reference to sheep raising and wool growing; and the redistribution of animals, to be promoted mainly through the county agents. Certain legislation was suggested, including, particularly, regulated grazing on the public domain, which this Department has earnestly favored for a number of years. It was urged also that steps be taken to control uneconomic speculation. It was understood that the United States Live Stock Industry Committee should continue in existence and cooperate with the Department and the Food Administration in bringing about the increased production, conservation, and orderly marketing of live stock.

PRODUCTION AND CONSERVATION OF DAIRY PRODUCTS.

Because of the large place that dairy products hold in food economics, efforts were made to conserve the supply by the elimination of waste and the more complete utilization of by-products. In many sections in the Southern and Western States the number of creameries and cheese factories was increased, resulting in large additions to the food supply and contributing to the welfare of the farming communities. In the settled sections of the Eastern and Middle Western States efforts were made to increase the efficiency of the operations on the farm and in the factory. The milk supply of many cities was improved and increased through the application of a few simple and efficient methods. In the South an active campaign for the greater production of feedstuffs, a necessary feature of dairy development, was conducted in cooperation with the extension authorities.

Every effort has been made to encourage the use of cottage cheese as a substitute for meat. A number of circulars and press notices explaining its food value and the ways in which it can be made in the home and in the factory were issued. Personal instruction also was given to creamery operators, home-economics workers, and farm women. Six experts have devoted their entire time to encouraging the production of cottage cheese on the farm and this number will be increased. In the mountainous sections of the South special efforts have been made to increase cheese production. The establishment of cheese factories was encouraged in localities where climatic and other conditions render their operation feasible. Work was begun in these regions in September, 1914, when the first cheese factory was established in North Carolina. Since that time the number of factories has increased rapidly until at present there are 34, of which 26 were established during the last fiscal year. All have been successful. They furnish outlets for milk in localities far distant from railroads and centers of population, and in this way are of great benefit to isolated regions. While the work in this field is relatively new in the West, the results have been no less striking. Nine men were employed during the summer to promote the utilization of by-products of creameries and milk plants. The work was conducted in eight States and plans are under way for its further development.

WHEAT AND OTHER CEREALS.

When a state of war was declared it was clear that spring wheat offered the only opportunity, in part at least, to make good the prospective shortage of winter wheat indicated by heavy winterkilling. County-agent leaders, therefore, in cooperation with the Department, immediately put into effect plans for increasing the production of spring wheat, as well as of oats, barley, corn, potatoes, buckwheat, soy beans, grain sorghums, and other food crops, with the result that the total acreages planted were much larger than they would otherwise have been. For example, the seeding of spring wheat, which promised to be only one-half to two-thirds the normal, was increased to normal; seed corn was more carefully selected and tested; and oats were more extensively treated for smut with a consequent increase in yields. Many farmers who previously had not grown potatoes at all planted sufficient for their own use, and many who had never grown potatoes as a market crop planted a large acreage.

The special campaigns in the South for the increased production of foodstuffs through the extension forces were very successful and gave a remarkable demonstration of the value of such educational work, especially in an emergency like this. The net result was a marked increase in the planting of corn, soy beans, velvet beans, cowpeas, peanuts, sweet potatoes, Irish potatoes, and other food crops. The corn crop in the 15 Southern States was 964,504,000 bushels, or more than a fourth of the whole crop of the United States.

FALL PLANTING.

Realizing the importance of continued efforts to promote the production of staple commodities and of making plans promptly for the immediate future, in June I appointed a committee of experts of the Department to make suggestions for future action, especially with reference to winter-wheat planting. The committee considered the problem from every angle and reached the conclusion that a strenuous effort should be made to secure the planting of an area that would, under favorable conditions, produce a billion bushels of wheat in 1918—880,000,000 bushels through the winter crop and the remainder through increased spring planting. The committee also recommended that steps be taken to encourage the production of over 83,000,000 bushels of rye and that the production of winter oats in the South should be increased to the extent that seed was available. This program called for the planting of 44,634,000 acres of winter wheat and 5,522,000 acres of rye, and was submitted by telegraph to the leading agricultural authorities of various States concerned. As a result of their suggestions it was finally determined to propose the planting of 47,337,000 acres of winter wheat and 5,131,000 acres of rye.

In announcing the program it seemed desirable to place particular emphasis on the crops seeded in the fall and to make no specific suggestion as to the spring crops, such as corn, spring oats, rice, the grain sorghums, and buckwheat, until the acreages successfully sown to winter cereals could be determined. Similarly, action with regard to beans, soy beans, cowpeas, peanuts, and various other legumes, and the spring-planted forage crops, was left for final consideration until more complete data as to the 1917 harvest are available. It was suggested, however, that the acreages of fall-seeded hay crops should at least equal those of the present season. The need of husbanding seed supplies was pointed out, and the machinery of the Department's committee on seed stocks was set in motion to bring about an effective interchange of seeds from well-supplied regions to those reporting shortages.

Through a number of channels the Department proceeded to bring the program to the attention of the grain farmers of the country and to seek their cooperation in making the recommendations effective. It was published as a circular and also was given wide distribution through the press and the Weekly News Letter. A series of conferences immediately was held by representatives of the Department in several of the grain-growing sections of the country. They were held in Washington for the Eastern and Northeastern States; in Atlanta for the Southeastern States; in Indianapolis for Indiana, Ohio, Michigan, Wisconsin, Illinois, and Kentucky; in Kansas City for Missouri, Iowa, Minnesota, South Dakota, Wyoming, Colorado, Nebraska, Kansas, Oklahoma, New Mexico, Arizona, Texas, and Arkansas; and in Spokane, Wash., for the remaining States. The local problems likely to be encountered in increasing the grain acreage were discussed with farmers, agricultural leaders, bankers financing agricultural enterprises, and editors of agricultural journals.

Following the publication of the program and the holding of the conferences, the Department carried on an intensive campaign to emphasize the need for an increased production of grain and the best methods to be employed in obtaining the increases suggested. Several special bulletins and posters were prepared and distributed, and articles discussing various phases of grain production and handling were issued through the general press, agricultural press, and the publications of the Department. The extension workers throughout the grain-growing regions concentrated their attention upon the problem and urged farmers to cooperate with the Department.

THE FARM-LABOR SUPPLY.

It was early apparent that in certain sections of the country, particularly near the great industrial centers in the North and Northeast and especially in the vicinity of plants undertaking large war contracts for the Government, there would be a marked shortage of farm labor. It was obvious, too, that, on account of the abstraction of labor through enlistments in the Regular Army and through the operation of the draft law, difficulties would be experienced in many sections of the Union. The situation called for constructive action. A large army can not be constituted without causing inconvenience in many directions. It was clearly impossible to make exemptions by classes and to admit no farmers to the Army. Still, it was highly important that agricultural production be increased. Military failure could arise no less from shortage of foodstuffs than from shortage of ammunition or man power. The task was presented of making the labor remaining on farms more effective, of securing fuller cooperation among farmers, and of utilizing on the farms urban and rural labor not heretofore fully or regularly employed. Past experience made it clear that labor might be transferred from certain communities where the seasonal pressure had passed to others and where the need was immediate. It was known, too, that there were hundreds of thousands of boys in rural districts and villages who might render useful service, and that the army of boys and girls organized in agricultural clubs might be enlarged and its members employed in additional directions. It was assumed that there were more than 2,000,000 boys between the ages of 15 and 19 years in the cities and towns who were not engaged in productive work vital to the Nation, that many of these had had contact with rural life, and that their services might be utilized on the farms, especially in the harvest season.

The Departments of Agriculture and Labor and other agencies immediately after the outbreak of the war undertook to furnish assistance. The War Department itself held definitely in mind the thought of lightening the burden as far as possible by not calling to the colors those essential for leadership and direction. Under the pressure of the first draft it was difficult to work out satisfactorily the underlying principle of selection. For the future a system of classification was adopted which embodies the following features of special interest to farmers and agencies dealing with agriculture: The selectives are classified into five groups, indicating the order in which they will be called to service. Skilled farm labor is in class 2, highly specialized agricultural experts in agencies of the State or Nation in class 3, and heads of necessary agricultural enterprises in class 4. The operation of this new arrangement should remove many of the difficulties previously encountered and, in reasonable measure, meet the demands of the situation.

It was realized that after all was done there would be need of additional labor in many sections. The Department of Labor therefore undertook to study the available supplies in towns and cities and developed its system of employment agencies for this purpose. One object was to secure information, which could be conveyed to the Department of Agriculture and to State agencies, as to available labor in urban centers and to have it drawn upon for aid in farming operations in near-by communities. The Department of Agriculture assumed the task of studying the supplies and needs in rural districts. It arranged to place a man in each State in touch with the State council of safety with the special duty of assisting in the mobilization and organization of rural labor. Under the provisions of the Food Production Act, 38 farm-labor agents have been appointed and are devoting their entire energies to the problem.

The problem of the organization of labor remaining in agriculture is of the highest importance, and it is essential that, if possible, it be so perfected that there may be produced in this emergency as much as was formerly produced by the whole number of laborers, and, if possible, a greater quantity. The experience of the present year has been valuable. Constant attention is being given to the problem, and it is hoped that during the ensuing months even more useful work may be done. A conference of all the labor representatives of the Department and of agencies with which they have been cooperating in the various States was held in St. Louis on November 9 and 10, 1917, to discuss the whole problem, to canvass the activities and results up to that time, and to make more efficient plans for next season. Whether resort in the future must be had to more drastic action on the part of the State and Federal authorities will depend upon the necessities of the case. Conscription of labor for industrial purposes would necessarily present many difficulties. Powerful influences are operating to bring about the release of labor and capital from less essential enterprises and their diversion into more urgent undertakings. These will become increasingly compelling as the situation develops. They will be aided by the growing realization on the part of the people generally of the necessity of curtailing expenditures on nonessentials and of redirecting labor and capital into vital industries.

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CHEMICAL INVESTIGATIONS EXTENDED.

The Bureau of Chemistry has made considerable progress in demonstrating the processes devised by it for preparing sugar-cane and sorghum sirup that will not crystallize or ferment and for utilizing the by-products. The work already under way on methods of handling, packing, storing, shipping, and utilizing fish in order to make the supply more immediately available for food has been extended and developed. In connection with the efforts to increase the supply of poultry and eggs, plans have been made to stimulate the establishment of poultry and egg packing plants in accordance with the principles worked out by the Food Research Laboratory. Ten additional men are being assigned to this work. Arrangements have been completed with three small packing houses to serve as demonstrations for their communities and become centers for the distribution of information regarding better methods of handling, packing, and shipping. The work of determining the proper methods of drying fruits and vegetables on a commercial scale has been continued and extended. The Bureau of Plant Industry is also giving special attention to the drying of agricultural products under farm conditions.

PUBLICATION ACTIVITIES.

The information service, which furnishes timely articles to the press regarding the activities of the Department and the results of its investigations and experiments, has been enlarged in several directions. Plans have been perfected for supplying information to the weekly newspapers, women's magazines, agricultural press, and others in more available form. On October 15, 1917, a number of agricultural editors were asked to come to Washington to discuss the work of the Department in this field and to make suggestions for improvement. They promptly responded and made a number of recommendations of a helpful character.

There has been an unusually large demand for the publications of the Department. Over 22,000,000 emergency Farmers' Bulletins, circulars, leaflets, posters, and the like were published from April 1 to November 1 in connection with the efforts to increase production, to eliminate waste, and to promote conservation, and an equal number of publications dealing with the regular activities of the Department were issued in the same period, making a total since April 1 of approximately 44,000,000. The special circulars and posters were distributed largely through the county agents and other cooperating agencies. Copies also were supplied to official organizations, war committees, civic associations, and patriotic clubs throughout the United States.

The interest in the exhibit work of the Department has greatly increased. Additional equipment has been secured, and the Department has participated in a large number of educational fairs and expositions of regional or national importance. This work has been particularly useful in connection with the efforts to promote the better conservation and utilization of farm products.

THE RESPONSE OF THE FARMERS.

Imbued with patriotic motives, influenced by favorable market prices, and falling in with the suggestions of the Department of Agriculture and of State agricultural agencies, the farmers of the Nation manifested much interest in the campaign for increased production and displayed efficient activity in reference both to plant and animal foodstuffs and feedstuffs. The weather conditions during the spring were generally favorable and, according to the unrevised estimates, the Nation will have, as the result of the work of the farmers and of all the agricultural agencies, approximately 3,191,000,000 bushels of corn, 659,797,000 of wheat, 1,580,000,000 of oats, 201,659,000 of barley, 56,000,000 of rye, 16,813,000 of buckwheat, 33,256,000 of rice, 73,380,000 of kafir, 439,686,000 of Irish potatoes, 84,727,000 of sweet potatoes, 15,957,000 of commercial beans, 42,606,000 of peaches, 11,-419,000 of pears, 177,733,000 of apples and 7,621,000 tons of sugar beets. These figures represent increases of cereals in the aggregate over 1916 of 1,006,000,000 bushels, and over the average for 1910–1914 of approximately 1,000,000,000 bushels, but a decrease of production in comparison with 1915 of about 199,000,000 bushels. It should be borne in mind, however, that the carry-over of cereals from last year was much below the normal and that the percentage of soft corn of the 1917 crop was unusually high. The figures also reveal the record crop of Irish potatoes of 439,000,000 bushels, 154,-000,000 more than in 1916, and 79,000,000 more than the average for 1910–1914; an increased production of sweet potatoes over 1916 of 14,000,000, and of 24,000,000 over the five-year average; and of sugar beets of 950,000 tons over 1916, and 2,230,000 over the five-year average. There was also the largest production of perishables on record. While authentic figures for meat, poultry, dairy products, and vegetable oils are not available for 1917, it appears, from rough estimates, that the quantity of these commodities for this year is slightly greater than for either 1916 or 1915, and exceeds the five-year average by two or three billion pounds.

The number of milch cows and other cattle has shown an increase during the last four or five years, the estimate for the former for the present year being 23,906,000 as against 22,768,000 a year ago and 20,497,000 in 1913, before the European war began, while that for the cattle is 43,291,000 as against 40,849,000 a year ago and 36,030,000 in 1913. Unfortunately, the number of sheep continues to decline; the estimate for 1917 is only 46,059,000 as against 48,483,000 a year ago and 51,482,000 in 1913. It is estimated that the number of hogs, which during recent years has shown an upward tendency, decreased over 4,000,000, or from 67,-543,000 to 62,747,000. However, it is greater than it was at the beginning of the European war. The number of hogs varies from year to year more widely than that of the larger meat animals.

In considering the whole meat situation it should be kept in mind that there is a close relationship between the production of live stock and the supply of feedstuffs and that for more than a year past there has been a relative shortage of grains and of forage. The large production of these necessaries during the present crop season should conduce to more satisfactory conditions for the producers of live stock and should, other things being equal, tend to bring about an increase. But with the destruction of live stock in Europe and the great demands from there for meat and fats, with consequent greatly increased exports from this country, it is clear that the supply will not be adequate for the domestic needs and for those of the nations with which we are associated in the war. The mere statement that the population has steadily increased in this country—the gain in the 10 years from 1908 to 1917 being 13,000,000—with an absolute decrease in the live stock for the same period, would sufficiently emphasize the seriousness of the situation if conditions were normal and the demand for meats and fats were not so urgent. The great importance of doing everything possible economically to increase the meat supply of the Nation I have strongly emphasized in each previous annual report and in many addresses. This is one of the great problems to which the department persistently has given earnest and vigorous attention.

The actual increase in the acreage of fall-sown crops can not be accurately determined at this time. There is every indication, however, that the farmers in the sections where fall grains can be profitably raised have patriotically responded to the Nation's call for more breadstuffs. Reports made to the Bureau of Crop Estimates in August, before the campaign for increased acreages was well under way, indi-

The Bureau of Entomology has placed its experts in entomology, as well as all information on camp sanitation in its possession, at the disposal of the Medical Corps. The Bureau of Soils has cooperated effectively with the War Department in investigational work relating to fixed nitrogen and sulphuric acid. Experts of the Office of Public Roads and Rural Engineering have been detailed to assist the War Department in road building at the 16 cantonments, and valuable data have been placed by this Office at the disposal of the military authorities.

FOREST-PRODUCTS INVESTIGATIONS.

The emergency work in the field of forest products has assumed large proportions. The entrance of the United States into the war presented a host of new problems requiring solution. Standards and specifications had to be revised to meet the emergency conditions. In some cases it was necessary to locate new sources of supplies and, in many instances, to find satisfactory substitutes for the materials previously used. A very important part of the work relates to methods of conditioning rapidly, through artificial seasoning, woods used in the manufacture of rifles, airplanes, and vehicles. Assistance in these directions has been rendered by the Forest Service to the War and Navy Departments and also to the Shipping Board and the Emergency Fleet Corporation, to various committees of the Council of National Defense, and to manufacturers of war orders. To press this work effectively it has been necessary to discontinue most of the peace-time investigations of the Forest Products Laboratory at Madison and to devote its research facilities and staff mainly to the study of war problems.

At the request of the War Department the Forest Service assisted in the organization of a regiment—the Tenth Engineers (forest)—for forestry work abroad. It selected and recommended to the War Department a list of officers who were experienced practical foresters and lumbermen. It also made arrangements to secure recruits, mainly woodsmen, lumbermen, and sawmill hands, and the necessary equipment, fitted to meet the conditions which operating in France would involve, was devised. It is now cooperating with the War Department in the organization of another similar regiment—the Twentieth Engineers (forest).

AEROLOGICAL WORK DEVELOPED.

The Weather Bureau has placed at the disposal of the naval forces along the coasts of the United States and in the Army timely and accurate weather information. The work of the weather stations along the Atlantic, Gulf, and Pacific coasts has been closely coordinated with the coast-guard and coast-patrol services of the Navy Department. Some of the forecasters of the Weather Bureau have been commissioned by the War Department and, in this way, the cooperation between the two agencies will be rendered more effective.

An appropriation of $100,000 for extending the aerological work of the Weather Bureau in aid of aeronautics was included in the Army Appropriation Act of May 12, 1917. This sum became available on July 1, and steps immediately were taken to put into effect the plans previously formulated for the establishment of five aerological stations in addition to the one already maintained at Drexél. The rapid development of this work is, of course, a matter of great importance in connection with the aircraft production program. The Bureau also has made arrangements for furnishing accurate weather information at the various cantonments, and it has assisted the War Department in the organization of its aerological observation work and of a regiment for the gas and flame service.

NEED OF WATER-POWER LEGISLATION.

For several years attention has been directed to the necessity of enacting proper legislation relating to the devolopment of the water power of the Nation. It becomes increasingly urgent that amendments to existing law be made and that a well-rounded policy be decided upon. The present industrial situation, and particularly the scarcity and high cost of fuel and construction materials, have increased the cost of steam power and make it highly important that action be taken at the next session of Congress. Legislation which will make it possible to safeguard the public interests, and at the same time to protect private investors, should result in securing cheaper water power and in conserving the coal and fuel-oil supply. Since three departments of the Government are vitally concerned in water-power legislation and its possible terms and would be vitally affected by the administrative handling of matters under such legislation, it would seem desirable to consider whether it is feasible to devise an executive body on which the three departments will be represented and which will be able to utilize to the best advantage all their existing agencies.

THE FEDERAL AID ROAD ACT.

In the administration of the Federal Aid Road Act of July 11, 1916, very satisfactory progress has been made. The Office of Public Roads and Rural Engineering, which is intrusted with the burden of administering the act, has expanded its organization to provide the requisite machinery. Ten district offices with an engineer in charge, have been established in as many areas. The work in the Washington office has been divided into two branches, management and engineering. The management branch deals with all administrative, fiscal, legal, statistical, and economic questions, while the engineering branch has charge of all matters relating to construction and maintenance. This redirection of the work has greatly increased the efficiency of the office in the handling of Federal aid road projects and in maintaining close relations with State highway departments.

Probably the most significant result thus far of the operation of the Federal Aid Road Act has been the enactment by a number of State legislatures of effective road laws. Legislative action in some States was necessary to meet the requirements of the Federal act, but many of the States have gone further and have recast their highway policies entirely. All the States have assented to the provisions of the act—42 by their legislatures and 6 by their governors. Thirty-three had a highway department within the meaning of the act upon the date of its approval. The remaining 15 have since enacted legislation creating highway departments which comply with the terms of the law. The highway departments in 18 States have been greatly strengthened, specific appropriations to meet the Federal funds have been made by 10, and comprehensive maintenance legislation has been enacted in 9 States. Forty-two States now have satisfactory maintenance laws. Nearly all the States have submitted definite schemes or programs of work for the entire five-year period covered by the act or for the greater portion of it. The formulation of carefully prepared plans for the full period in advance of construction tends to prevent wasteful and haphazard undertakings.

Under the provisions of the act, 40 States have submitted 183 projects, involving a total of approximately 1,730 miles. Of this number, 139, embracing 1,182 miles and calling for an estimated expenditure, including Federal, State, and local funds, of $7,947,114.50, have been approved. These projects involve Federal funds to the extent of $3,455,573.76, or 23.75 per cent of the total allotment, $14,550,000, to the various States for the fiscal years 1917 and 1918. Six projects, covering 40 miles, have been disapproved. Agreements have been entered into or are in the course of preparation in the case of 34 projects, aggregating 197.74 miles and involving $990,600.84 of Federal funds and a total of $2,225,944.74.

The full effect of the Federal Aid Road Act can not be measured by any comparison of funds expended in 1916 and made available for 1917, as many of the legislatures did not meet until early in the calendar year 1917. It is significant, however, that while the expenditures of State funds in 1916 aggregated $40,969,000, it is estimated that the expenditure of State funds in 1917 will reach approximately $60,000,000, or an increase of nearly 50 per cent. These funds are distinct from local expenditures and indicate an advance in State participation in highway work.

THE GRAIN STANDARDS ACT.

The preliminary steps in connection with the Grain Standards Act were discussed in the last annual report and need not be repeated here. Progress has been made since that time in increasing the efficiency of the administrative machinery, and the work is now on a very satisfactory basis. Thirty-five supervision districts, with as many central headquarters have been fully equipped for the task. Forty-one supervisors, 10 assistant supervisors, and 80 grain samplers, together with the necessary clerks and other employees, have been appointed and assigned to duty.

On February 6, 1917, tentative official standards for wheat were made public and hearings immediately were begun in all the important wheat sections and wheat markets of the United States. The final hearing took place in Washington on March 7, and the standards were promulgated in final form on March 31. They became effective for winter wheat on July 1 and for spring wheat on August 1.

Licensing of inspectors proceeded throughout the month of November, 1916, and on December 21 a complete directory of persons licensed to inspect corn was issued. Seven hundred and four applications for licenses to inspect corn and wheat have been received, and three hundred and forty-three have been approved. The demand for inspection of grain by licensed inspectors is steadily increasing. Approximately, 569 appeals have been taken to the Secretary of Agriculture under the provisions of the act through the various field offices.

The supervision of inspection has not been confined to the determination of appeals and disputes. Ten thousand six hundred and fifty-six official samples of shelled corn have been secured and analyses made to determine their true grade. This was done in order to check the accuracy of inspection as carried on in various markets and inspection departments. From December 1, 1916, to May 30, 1917, 237,595 cars of shelled corn were inspected and graded by licensed inspectors according to the Federal standards.

A comparative study of the results of inspection of wheat received at the large marketing centers under the Federal standards and under the standards in use prior to their establishment is of interest. Of the Hard Red Spring wheat which arrived at Minneapolis and Duluth during the months of September and October, 1914 and 1915, and which was graded according to the previously used standards, 5.9 per cent received a numerical grade of No. 1 Hard, 37.5 per cent a grade of No. 1 Northern, 24.2 per cent a grade of No. 2 Northern, 14.8 per cent a grade of No. 3 Northern, or a total of 82.4 per cent of the receipts graded No. 3 or higher. During the month of September and the first 15 days of October, 1917, 88.5 per cent of the Hard Red Spring wheat received at Minneapolis and Duluth, which was graded according to the Federal standards, graded numerically No. 3 or higher, as follows: No. 1, 52.6 per cent; No. 2, 25.4 per cent; No. 3, 10.5 per cent. It should be noted in this connection that the quality of this year's crop is high and that four grades are included under the former State standards, namely, No. 1 Hard, No. 1 Northern, No. 2 Northern, and No. 3 Northern, while under the Federal standards there are but three grades.

The offices of Federal Grain Supervision have cooperated with the United States Food Administration in the supervision of the grading of wheat for the purposes of the Food Control act, and information and data secured in connection with the work under the Grain Standards Act have been placed at the disposal of the Food Administration and other branches of the Government.

THE PINK BOLLWORM OF COTTON.

A highly destructive cotton pest has made its appearance in Texas. Its presence there is a serious menace to the future successful growing of cotton in the Nation. During September, October, and November of this year the pink bollworm, for many years prevalent in Egypt, India, and Hawaii, and more recently in Mexico, was discovered at several points in Texas. It was found at two places in the vicinity of mills which received seed from Mexico in 1916. One of these was near Hearne, and the other at Beaumont. It was also discovered in fields 15 or 20 miles from the latter place. There appears to be no doubt that the insects were introduced through the imported seed. The other infestations, reported early in November, are on or near Trinity Bay, in the southeastern part of the State, and are much more serious on account of their intensity and the wide area involved.

Very few damaged bolls were found at Hearne and Beaumont. The cotton in the fields in the vicinity of the mills at these places was quickly uprooted and burned. In some cases the ground was subjected to blasts of fire. The cotton already picked was so handled as to prevent any insects it might contain from escaping. Similar steps are now being taken in the fields referred to 15 or 20 miles from Beaumont.

In the Trinity Bay region the insect was first discovered at Anahuac. The latest information indicates that it has spread along the northern and eastern shores of the bay for a distance of approximately 100 miles. One thousand acres of cotton are involved. Many of the fields are somewhat uniformly and heavily invaded. While no definite information is available as to the origin of the outbreak here, it is suspected that the infestation is of several years' standing. The community is remote from Mexico, has no railroad connections, and, so far as can be determined, has received no seed direct from Mexico or from the mills which had imported seed from that country. It is not impossible that the presence of the insect is due to seed imported several years ago from Egypt. Fortunately, cotton culture in this section is limited in the main to the area near the bay, between which and the great cotton-growing sections of the State there is interposed a stretch of country in which little or no cotton is grown. The crop is usually moved directly to Galveston and Houston, where it is ginned and where the seed is manufactured into oil and cake. The isolation of the region will facilitate the eradication of the insect, but the task will be a work of great magnitude, and will compel resort to the full powers of the recently enacted Texas law authorizing the establishment of cotton-free zones and the destruction of infested cotton. It is proposed to establish similar zones near Hearne and Beaumont.

The pink bollworm, so styled on account of the color of the larva, is perhaps the most serious known enemy of the cotton crop. It destroys not only the bolls and lint but also the seeds and greatly reduces the yield of oil. It hibernates in the larval stage in the seed and has been carried to practically all the cotton-producing countries of the world. The damage it is causing in Egypt, India, Hawaii, and other countries indicates the seriousness of the menace to cotton culture in this country.

The pest apparently was introduced into Mexico in 1911 through Egyptian cotton seed. Its existence there, however, was not brought to the attention of the Department until November 1, 1916, when some infested bolls were received from a resident of the Laguna district. This discovery was followed by the immediate issuance of an order prohibiting the further entry into the United States from Mexico, except from the Imperial Valley, State of Lower California, of all cotton seed, cottonseed hulls, and seed cotton, and bringing under regulation and restriction as to ports of entry Mexican cotton lint of all kinds.

Strict rules and regulations governing the importation of cottonseed cake, meal, and other cottonseed products into the United States from Mexico and other foreign countries also were issued with a view to prevent the introduction of the insect with these products in uncrushed seed. Accurate information was promptly obtained as to the disposition of the seed which had been brought across the border under permit for milling during the season of 1916. It was ascertained that a total of 436 cars of seed had entered the United States within the year prior to November 4, 1916, and had been distributed among mills in different parts of Texas. A campaign was begun immediately to expedite the milling or destruction of the seed. This work was carried out with great thoroughness under the direction of experts of the Department in cooperation with the Texas Department of Agriculture, the mills concerned, and the Cottonseed Crushers' Association of Texas. A border inspection and control service covering all car, freight, baggage, and other traffic between Mexico and the United States also was organized and is in full operation.

To enable the Department to deal more effectively with the situation, an estimate for an emergency appropriation of $50,000 was submitted to Congress on December 14, 1916. The appropriation, however, did not become available until March 4, 1917. In the meantime, the control work had been instituted as far as possible with available funds. During the growing season of 1917 all cotton fields in the vicinity of the mills which had received Mexican seed were frequently inspected to determine whether any pink bollworms had escaped to the adjacent fields. So far, the only evidences of such escape are the sporadic outbreaks at Hearne and at Beaumont. The fields will be kept under constant observation during the remainder of the year, and none of the locally grown seed will be used for planting next season. The portion of the crop which was not destroyed will be rigidly controlled, the lint shipped abroad or fumigated, and the seed promptly ground up at the mills. The old cotton plants over a wide area will be pulled up and burned to prevent overwintering of the insect in undeveloped or dead bolls.

As a result of a conference held by the Department in Washington in July and participated in by the Commissioner of Agriculture of Texas and other experts from the State, a bill was prepared giving the State authorities power to cooperate with this Department in the establishment of cotton-free zones and local quarantines. This bill was presented at the special session of the Texas Legislature and has since been enacted into law.

It is planned to establish a cotton-free zone in Texas, approximately 50 miles in breadth, along the Mexican border. It is proposed not only to eliminate cotton culture in this area but also to eradicate all volunteer cotton. Similar zones will be established to include any infested areas in Texas or the other Southern States. Furthermore, the cotton grown on the Mexican side will be kept under observation, and the Department will cooperate with the Mexican Government, local authorities, and plantation owners in stamping out any outbreaks within 50 miles of the border. If the assistance of the Mexican Government can be secured, a thorough survey will be made of all Mexican cotton regions to ascertain the present distribution of the insect. This survey ultimately would be the basis for determining the possibility of exterminating the pest in Mexico. It may appear that the most effective and economical method of preventing the further invasion of the United States by the pink bollworm will be to undertake this task. It would involve large expenditures, but the seriousness of the situation might amply justify them.

To make it possible to carry out these preliminary plans, an estimate of $500,000 was submitted to the Congress on June 22, 1917. On October 6 the sum of $250,000 was made available in the Urgent Deficiency Act.

The spirit revealed by the farmers and the results of their efforts during the present year indicate that they recognize the responsibility resting upon them in this emergency. I am confident that they will patriotically continue to assume and to bear their full share of the country's burden. The farmers of the Nation have always shown their devotion to the cause of freedom and have not been slow to respond to their country's call for men and means to defend its rights. They will not submit to Germany's dictation. They will not permit her to impose illegal restrictions on their privilege of going freely to any part of the world where they have a legal right to go or of sending their products into the open markets of the world. They will realize that the dictum of Germany that this country should not send its ships at will to the ports of great nations of Europe was not only unwarranted and impertinent, but also that, if it had been acquiesced in, it would have involved them very particularly in great direct financial loss and suffering. As the meaning of this struggle is more fully revealed, as it becomes increasingly clear that a contest is again being waged to determine whether the world shall be dominated by the will and policies of medieval despotisms or by those of free and enlightened modern States, and whether the mere right of might or the rule of law shall prevail in the world, and as it becomes more obvious that the surest way to force a righteous peace is to employ effectively all the resources of the Nation, the farmers will increasingly put forth their strength, send their sons to fight at the front, and see to it that neither this Nation nor those with which we are associated lack anything in the way of materials for food and clothing. It is incumbent upon them, as it is upon all other civilians, to work and to save, to seek no mere selfish advantage, and to reveal the same spirit of devotion and willingness to make sacrifices and to give all they are and have which animate the soldier in the trenches, if this struggle is to be brought to a satisfactory conclusion. Every facility that this Department can command to assist them will be freely placed at their service.

Respectfully,

D. F. Houston,
Secretary of Agriculture.

The President.

BRIEF REVIEW OF THE WORK OF THE BUREAUS AND OFFICES OF THE DEPARTMENT, 1917.

THE war in Europe, even before the United States entered the conflict as a principal, was making heavy demands upon every one of our industries, and upon none was the stress heavier than upon agriculture, the basic industry of the country. It is, therefore, not strange that the activities of the department had become intensified and every effort was being made to increase the production of food, feed, and fiber to meet the great foreign demand.

When we entered into the struggle, before additional appropriations had been furnished to permit increased efforts to be put forth, and even before the war declaration had actually been made, every bureau, office, and individual in the department was devoting every pound of energy to bringing about the production and conservation of greater crops than ever.

Naturally many of the minor activities of peaceful days were either abandoned or put aside, in order that the demands of these strenuous times might be met. Therefore, the brief reviews of the work of the different bureaus and offices here presented, deal more with the last three months of the fiscal year than with the previous nine months, as the interest in the work from April to July is paramount, dominating, and continuing.

Besides the great bureaus of the department there are several organizations actively engaged in the department's work, usually in a general administrative way serving all the bureaus and coordinated in the Office of the Secretary.

Consequently the reviews of the work of the Solicitor, the Office of Farm Management, the Office of Exhibits, the Information work, and the Publication work, together with the Insecticide and Fungicide Board and the Federal Horticultural Board, which assist the Secretary in the enforcement of the insecticide act of 1910 and the plant quarantine act of August 20, 1912, have been included under one general heading.

OFFICE OF THE SECRETARY.

BRIEF SUMMARY OF WORK OF THE SOLICITOR.

Fifty-eight bills and amendments relating to agricultural subjects were drawn or examined and commented on, including the Food Production and Food Control bills, the Migratory Bird Treaty bill, the Virus and Serum bill, the Cotton Standards bill, the Personal Rural Credits bill, and the River Regulation and Flood Control bill. A brief on the constitutional questions involved in the Food Control bill was printed as part 10 of the hearings before the House Committee on Agriculture. Aid was given in preparing the department's reports on Federal and State bills covering, among other subjects, grain standards, vegetable basket and container standards, preparation and manufacture of serums and toxins, interstate commerce in misbranded articles, and construction of public roads.

In cooperation with bureaus, regulations were prepared for administration of the Federal Aid Road Act, the United States Cotton Futures Act, the United States Grain Standards Act, the United States Warehouse Act, and the United States Standard Basket and Container Act. Forms required in the administration of these acts were also prepared.

The laws of each State were examined to ascertain whether the State had qualified to participate in the benefits of the Federal Aid Road Act. Aid was given some of the States in the preparation of legislation to qualify them for participation in the benefits of this act.

The office rendered 1,727 written opinions and prepared many briefs or memoranda for submission to officials of other departments in matters appertaining to the administration of the Department of Agriculture. There were 3,981 cases investigated and reported to the Department of Justice for prosecution. Fines and recoveries in litigated and nonlitigated cases amounted to $246,255.99 and decrees of condemnation and forfeiture were entered in 411 food and drug cases.

There were handled 687 land claims in the National Forests. Decisions in favor of the Government resulted in retention in the National Forests of lands supporting timber valued at more than $686,736. Titles to 152 tracts of land, to be purchased under the Weeks Forestry Law, were examined.

Forty-seven applications for patents on inventions of department employees were filed.

The office prepared 2,397 contracts, bonds, and similar papers.

OFFICE OF FARM MANAGEMENT.

The work of the Office of Farm Management for the year has been largely determined by the exigencies of the world war. Soon after the United States entered the struggle this Office, in cooperation with the Department of Labor, began to cope with the farm-labor problem. A comprehensive plan of action was worked out, and a representative of the department was placed at the disposal of each State to help State agencies in perfecting an organization, effecting a cooperative arrangement practically nation wide, that has been instrumental in doing much toward relieving labor shortages in various parts of the country. This organization is continuing, and will be in position to meet future shortages of farm labor as they may arise.

In cooperation with the Bureau of Animal Industry in the field of live-stock economics, investigations obtained significant results as to the better farm management practices in producing beef animals in the corn belt. It was found that in order profitably to maintain herds for the production of feeder cattle on the higher-priced lands, the farmer must depend largely upon the cheaper feeds, used in connection with abundant pasture and cheap roughage.

Further studies of methods employed in the production of farm crops continued during the year, particularly with reference to cotton, sugar beets, corn silage, potatoes, and hay, affording data as to farm practices which make for economy in production in the different regions.

Progress has been made in the study of farm organization, in the study of farm tenantry and lease contracts, in the preparation of an Atlas of American Agriulture, and in the field of farm bookkeeping and cost acounting.

THE OFFICE OF EXHIBITS.

During the past year 37 expositions or shows have been held in 15 States and the District of Columbia, ranging from

Massachusetts to California and from Florida to Texas. These have varied in extent from displays of a single activity occupying but a few square feet of space to shows embracing many lines of endeavor and filling thousands of square feet of floor space.

EXPOSITIONS PROVIDED FOR BY CONGRESS.

Two of the expositions held during the year were provided for by Congress; one in Springfield, Mass., in cooperation with the annual meeting of the National Dairy Show Association, having for its object the illustration of the work of the boys' and girls' clubs and cooperative agricultural extension work carried on in the North Atlantic States, and one at El Paso, Tex., in cooperation with the International Farm Congress and Soils Product Exposition. The exhibits for this latter exposition were selected with special reference to their educational value in illustrating the products and processes of dry-land agriculture.

LOANED EXHIBITS.

The department sometimes loans its exhibits to fairs of various kinds, and makes displays for which no appropriations have been made, when this can be done without expense to the Government and without interfering with more important work being carried on at the time. A cash deposit and a properly executed bond is required in every case, indemnifying the department against any loss and securing the safe return of the exhibits.

During the past year, loans have been made to 35 fairs and shows, all without loss or serious accident. This is noteworthy in view of the amount of material handled and the distances shipped.

FOOD PRODUCTION AND CONSERVATION SHOWS.

The stimulation of greater interest and activity in food production and conservation, made necessary by existing war conditions, has led to a concentration of effort in exposition work along these lines. An important show of this character was made in New York City during August, in cooperation with a corporation of that city. The exhibits selected illustrated food production and food conservation, either by prevention of loss from disease, the ravages of insects and fungous pests, or by the prevention of waste through the preservation of foodstuffs by canning and drying. In connection with this exhibit, demonstrations were carried on daily, teaching methods of canning and drying which could be conducted by a family under ordinary home conditions.

A similar exhibit was made in connection with the home canning and food conservation exhibit by a firm in Washington, D. C. This display included a particularly attractive window show on the street floor and a number of exhibits relating to foodstuffs in the auditorium, where the canning exposition was held and the demonstration carried on.

Food exhibits have largely taken the form of window displays in department stores on prominent streets, where they are seen by shoppers and others passing. Displays of this character have been made in Washington, D. C., Baltimore, Md., Lancaster and York, Pa., and New York City and Brooklyn, N. Y.

The displays made by the department during the past year in nearly every section of the United States have brought its activities before hundreds of thousands of people in an attractive, instructive, and forceful way, which will result in great and lasting benefits to the country at large.

OFFICE OF INFORMATION.

Since war was declared the Office of Information has been engaged chiefly in the preparation and issuance of material relating to the production, conservation, and distribution of foodstuffs. Through effective cooperation on the part of farm journals and daily newspapers, this information has been very widely circulated. From the date of the Nation's entry into the European war to June 30, 1917, statements had been furnished to the press. These articles, based on data furnished by the department's specialists, dealt primarily with the canning, drying, and preserving of fruits and vegetables, poultry raising, and increased production of corn, oats, wheat, rye, and live stock.

The office assisted in the preparation of a number of pamphlets known as the "Food Thrift Series" of which over a million copies have been distributed. Thirty-three poster bulletins were designed, the editions of which ranged from 1,000 to 300,000.

The Weekly News Letter, prepared in the Office of Information, has been increasingly used by the department's scientists as a medium for conveying to the rural districts practical advice on better cultural and marketing methods. It has been necessary to increase the size of this publication from four to eight pages.

From five to ten columns of illustrated matter were furnished each week for syndicate use.

PUBLICATION WORK.

The publication work of the department comprised 1,132 new bulletins, reports, separates, periodicals, and miscellaneous documents, the editions of which aggregated 22,987,335 copies. The total number of documents, new and reprints of earlier issues, was 47,023,635 copies, exceeding the record of any previous year. Of new department bulletins there were 172, the editions of which aggregated 1,320,000 copies; of new Farmers' Bulletins, 84 were issued, of which 4,515,000 copies were printed.

During the last quarter of the year certain Farmers' Bulletins were utilized by the department to stimulate crop production and to conserve the food supply of the country. Among them, in the order of their distribution, were No. 818, Plans for a Small Vegetable Garden, of which 1,000,000 copies were distributed; No. 255, The Home Vegetable Garden, of which 260,000 copies were distributed; No. 839, Home Canning by the One-Period Cold-Pack Method, edition 1,250,000 copies; and No. 841, Home and Community Drying of Fruits and Vegetables, edition 1,100,000 copies.

There was an active demand for all publications relating to the cultivation of crops, indicating a widespread interest in the subject.

An effective feature in the department's work for increased crop production was the printing, and distribution through its own agencies and through civic and patriotic organizations, of posters, food-thrift circulars, and leaflets, the editions of which amounted to more than 3,000,000 copies.

INSECTICIDE AND FUNGICIDE BOARD.

Under the Insecticide Act of 1910 and the annual appropriations the department regulated the interstate shipment and the importation and exportation of insecticides and fungicides, and also the manufacture and sale of such products in the Territories and the District of Columbia. Farmers, fruit growers, market gardners, and stock and poultry raisers were protected from fraudulent, misbranded, and adulterated insecticides and fungicides by the board's action during the year. Products to rid the household of insects, and disinfectants, germicides, etc., also were examined and controlled.

Materials used in spraying plants, such as fruit trees, vines, cotton, truck crops, in treating seed wheat and other cereals, to combat insect pests and fungous diseases, and for various purposes on poultry and on horses, cattle, sheep, swine, goats, and certain other domestic animals, were collected and examined. During the year 984 samples were collected by inspectors operating throughout the United States, and 35 samples were taken from consignments offered for importation at the various ports of entry. The samples collected cover a wide range of materials, and it was found that many new articles were being sold.

The results of several years' investigational work by the chemists of the board, to determine how lead arsenates on the market should be labeled and to obtain scientific information relative to the preparation and properties of various lead arsenates, were published during the year in four papers, and a fifth paper was prepared and accepted for publication.

The investigation started sometime ago to discover a chemical method to determine stems in adulterated insect powder, establish standards, and study the process of manufacture of insect powder and the composition of raw materials as well as the finished product, prepared under known conditions, was completed. Work was begun to determine the composition and methods of preparation of tobacco dust sold on the American market. The results of this work will be of great service in recognizing adulteration and misbranding of these classes of goods.

In cooperation with the Bureaus of Entomology and Plant Industry the field tests of the value of dust mixtures were continued and information of much value in connection with the enforcement of the act was obtained. The scope of the work has been materially widened this year in order to cover a larger list of fruits and vegetables.

The entomologists and plant pathologists of the board in connection with the testing of the efficacy of proprietary insecticides and fungicides have continued the field and laboratory investigations relative to the practical value of a number of substances in the control of certain insects and diseases, including pyrethrum powders, tobacco powders, and nicotine solutions; and exhaustive tests and studies to obtain basic facts to aid in the enforcement of the law were made of the effect of a large number of chemicals on roaches, bedbugs, clothes moths, chicken lice, dog fleas, aphids, and red spiders.

THE PLANT QUARANTINE ACT.

In relation to domestic quarantines the Plant Quarantine Act was amended by the last Congress to give broader powers and to include in addition to plants and plant products, stone or quarry products, and any other articles which may be the means of disseminating diseases or insect enemies of plants.

The further entry of current and gooseberry plants from Europe and Asia has been prohibited, these plants being alternate hosts of white-pine blister rust. A domestic quarantine has been established in relation to this disease prohibiting the movement of five-leafed pines and currant and gooseberry plants from the eastern to the western United States in order to protect the important western pine forests; and New England and New York, as representing the region in this country most seriously infested with this disease, have been placed under a supplemental quarantine. The quarantine in relation to oriental corn has been modified to permit the entry of such corn after sterilization. The restrictions on the entry of potatoes from Canada and Bermuda have been entirely removed. In relation to citrus canker, the entry of oriental citrus fruit has been prohibited, with the exception of oranges of the mandarin class, which are permitted entry at certain ports under regulation. The Mediterranean fruit fly quarantine has been modified so as to extend the list of fruits and other plant products which may be shipped from Hawaii to the United States.

As a result of the discovery in November, 1916, of the establishment of the pink bollworm enemy of cotton in Mexico, the further entry of cotton seed from Mexico was prohibited and the entry of Mexican cotton lint was brought under restriction. In addition, the entry of manufactured cottonseed products from Mexico and other foreign countries was brought under restriction. Clean-up work was immediately instituted in relation to all the mills in Texas which had imported Mexican cotton seed for milling purposes during the year, and a very strict border control of all railroad freight and other traffic between Mexico and the United States was established. For the conduct of this work an additional appropriation of $50,000 was made immediately available in the appropriation act for this department for the fiscal year 1918.

ACTIVITIES OF THE WEATHER BUREAU.

The activities of the Weather Bureau during the fiscal year ended June 30, 1917, were mainly as follows:

The daily collection of the meteorological observations representing the United States and the West Indies and the preparation and distribution of the weather forecasts and warnings of injurious weather conditions based thereon and of the daily maps and bulletins containing the data thus obtained; the collection and publication of data representing the climatology of the United States and the meteorology of the adjacent oceans; the preparation and distribution of the daily, weekly, and monthly river, weather, and crop bulletins; the preparation and issue of the Monthly Weather Review; the continuation of the aerological, seismological, and solar-radiation investigations, with the publication of results; the maintenance and care of the various telegraph lines owned and operated by the bureau and of the other extensive equipment required for the various observations; the extension and improvement of the weather service in the West Indies and Caribbean Sea region; and the administrative and clerical duties required in the maintenance of the personnel, the keeping of the accounts, and the furnishing of the necessary supplies.

SPECIAL ACTIVITIES INCIDENT TO THE WAR.

The aerological work of the bureau was extended in the aid of aeronautics, as contemplated under the special appropriation of $100,000 in the Army bill, including free air observations at six primary stations to be established in connection with the Aviation Service. One of the principal forecasters and an assistant, commissioned as major and first lieutenant, respectively, were sent to France to organize a weather-forecast service for the benefit of our military operations there, in cooperation with the French Meteorological Service.

The chief of the aerological work, with an assistant, commissioned as major and first lieutenant respectively, went to France to facilitate the closest possible coordination of the aerological work of the bureau with that done in the Army. Trained meteorologists were furnished as commissioned officers in the regiment composing the gas and flame service. An arrangement was made for the securing of meteorological observations at and in the vicinity of the military camps, for use in connection with the health and sanitation service of the Army. The coordination of the vessel-reporting service and the forecast service with the Coast Guard and Coastal Patrol Services of the Navy Department was effected. In connection with the conservation of food, instructions were issued to Weather Bureau employees enjoining alertness in the dissemination of warnings of weather conditions injurious to perishable foods and other products during transportation, and urging the collection of data to be used in the publication of a bulletin giving advice to shippers of perishable products as to the precautions to be taken in connection with shipments during the winter season.

SUMMARY OF WORK OF THE BUREAU OF ANIMAL INDUSTRY.

As a part of the department's special efforts to increase and conserve food and other agricultural products to meet war conditions, the Bureau of Animal Industry has directed its energies toward stimulating the production of meat and dairy and poultry products, suppressing animal diseases, pointing out the wisest use of available feedstuffs for live stock, and encouraging the more general raising of farm animals. Special campaigns were begun to enlarge the production of hogs and poultry, which yield quicker returns than other animals.

Animal diseases were combated in a more intensive way than ever before. The greater efforts in eradicating the southern cattle tick in the summer of 1917 resulted in freeing more territory than in any year since the beginning of the work. The total area released amounts to 379,312 square miles, or 52 per cent of the territory originally infested. This tick-free territory is now open to successful cattle raising and dairying. The more active work against hog cholera has been rewarded by a marked decline in the prevalence of that plague and the placing of hog raising on a relatively safe basis in sections where heavy losses usually occurred. Work for the eradication of scabies of sheep and cattle and dourine of horses was continued and good progress made in reducing the extent of those diseases. The warfare against tuberculosis of animals was continued and plans were made for greatly extending this work through a newly organized division of the bureau.

Investigations in breeding and feeding live stock were continued, with results useful to the live-stock industry of the country.

The membership of the boys' and girls' pig clubs reached 21,673, nearly double the number at the beginning of the year. The girls' and boys' poultry clubs at the end of the fiscal year had 11,224 members. Of these, 1,987 sent in full reports, which showed that their total receipts and value of stock on hand amounted to $39,546.25, with an average profit of $14.72 for each member reporting.

Work for the development of dairying in the South and West has led to marked improvement and to the introduction of some good dairy cattle in those regions as well as to the establishment of a number of creameries and cheese factories. Cow-testing and bull associations have grown in numbers and results. There are now 472 active cow-testing associations composed of 12,088 dairymen owning 216,831 cows, while the active bull associations number 36, with a membership of 1,158, owning 189 pure-bred bulls. In the older settled sections of the Eastern and Middle Western States efforts have been directed toward more efficient operations for both farm and factory. Cooperation with city health officers for the improvement of milk supplies has led to better milk for many cities. A simple steam sterilizer for farm dairy utensils was devised and demonstrated, and this is having a marked effect in improving the sanitary quality of milk.

The output of meat under Government inspection broke all previous records. The inspection was conducted at 883 establishments in 253 cities and towns. There were slaughtered under this inspection 63,708,148 animals, and the inspection also covered 7,663,633,957 pounds of meat and meat food products, derived from the inspected and passed carcasses and later reinspected during canning, curing, and other processes. Condemnations amounted to 271,732 animals or carcasses, 781,307 parts, and 19,857,270 pounds of the reinspected products. Nearly 2,000,000,000 pounds of meat and meat food products were certified for export, and over 29,000,000 pounds of imported meat products were inspected.

In the inspection and quarantine service for preventing the introduction of contagious diseases with imported animals there were inspected 580,855 imported animals, of which 6,552 were quarantined. Live animals to the number of 354,991 were inspected for export.

The scientific investigation of diseases and parasites of live stock was continued both in the laboratories and in the field. Some of the diseases which have been made subjects of special study are contagious abortion, anthrax, vesicular stomatitis, and hog cholera. The study of internal parasites of sheep has yielded information useful in preventing losses from that cause.

SUMMARY OF WORK OF THE BUREAU OF PLANT INDUSTRY.

In cooperation with all National and State agencies available, a campaign has been inaugurated to secure a planting of wheat sufficiently extensive to supply our domestic and export needs of the coming year. Recent estimates indicate that this combined effort will be successful only by a material expansion of the acreage planted in spring wheat. A large number of special agents have worked in the principal winter-wheat districts during seeding time, endeavoring to extend the acreage, to increase the utilization of the best standard varieties of wheat, and to bring about a more general treatment of seed to prevent wheat smut. A vigorous campaign has been under way for the eradication, by treatment with formalin, of the stinking smut of wheat, covered smut of barley, oat smut, and stem smut of rye. This work has been conducted in cooperation with the county agents in the several States where cereal production is important. It is certain that this work will materially decrease these diseases during the coming year and therefore both improve the quality of the grain and also increase the yield. The work of the year also shows that the stripe disease of barley can be almost completely prevented by seed treatment. The field studies, especially in the spring-wheat areas of the country, during the past year have shown that the common barberry plant is largely responsible for the severe epidemics of black rust or stem rust of wheat, and in order to safeguard the wheat production of these areas it will be necessary to completely eradicate the native barberry plant from this entire region. A new bacterial disease of wheat causing moderate although widespread damage during the past year has been carefully studied. Owing to the fact that the bacteria attack not only the leaves and stems but also the head of the growing wheat, the danger of the spread of the disease through infected seed is great. Plump wheat kernels do not contain bacteria and the disease can be largely prevented if the shriveled kernels are carefully screened out from wheat to be used for seed. The study of the best methods for the production and improvement of cereal crops has been actively continued. The development and distribution of the Kherson oats, which outyields other varieties by about 4 bushels to the acre, and the Trebi variety of barley, which is the best variety of barley for the irrigated regions of the Great Basin, are other striking achievements.

Work has been started in cooperation with the Philippine bureau of agriculture in Manila to encourage an increased production of the Philippine fiber suitable for binder twine. Fiber-cleaning machines were introduced to demonstrate methods for the production of better fiber than the retted Manila maguey, cleaned heretofore be retting in salt water. Sisal production in Porto Rico has also been developed.

Under the stimulus of continued high prices, cotton farming is extending rapidly in many of the irrigated valleys of the Southwest beyond the supposed limits of the cotton belt where the possibility of developing a new cotton industry has been clearly demonstrated in recent years by the work of this bureau. The area under Egyptian cotton in the Salt River Valley in Arizona is now approximately 35,000 acres, where in 1912 only a few acres were planted as experiments in cooperation with farmers. This season experiments carried on by the bureau in other valleys of the Southwest have shown that the growing of Egyptian cotton might easily be extended 200,000 acres or more. The single-stalk system of controlling the branching habits of the cotton plant has made possible another special method of culture for irrigated districts. The rows are planted in pairs, one on each side of a large furrow. Irrigation is confined to the furrows, which are separated by broader ridges that remain as a permanent mulch of dry soil. The water is applied more effectively, germination and growth of the young plants are more uniform, and less labor is required for cultivation and the control of weeds.

Previous to the war in Europe there was practically no sugar-beet seed produced commercially in this country. This bureau, in cooperation with the beet-sugar companies and with the beet-seed companies, has succeeded in building up the commercial production of sugar-beet seed, and this work will produce about 25 per cent of the annual planting requirement of the sugar-beet growers. The industry is rapidly increasing and the indications are that the production of sugar-beet seed will be nearly doubled in the year 1918, producing at least one-third of the quantity required for the following season's planting.

Early maturing varieties of velvet beans developed by the bureau have made possible the extension of this crop over a much larger area than has heretofore been considered adapted to this plant. As a result of this work, velvet beans were so commonly grown this year and so abundant that mills have been established to grind the beans in pods for concentrated stock feed.

The seed-testing work, comprising the determination of purity and vitality of samples submitted by seed firms and by farmers, has been continued, approximately the same number of samples being tested as in the previous year. Of the seed subject to the Seed Importation Act, 1,817,000 pounds were prohibited entry into this country and 26,519,000 were permitted entry either in the original condition or after recleaning in bond.

Practical measures of control have been worked out for many truck-crop diseases, notably those of the potato, cucumber, and watermelon. In Wisconsin and in the Burley section of Kentucky types of tobacco have been developed which are highly resistant to root rot, a disease causing heavy loss to growers every year, and in North Carolina it has been demonstrated that the tobacco wilt can be effectively controlled by systematic rotation of crops and keeping down certain weeds. The germ causing the bacterial wilt of cucumber has been found to be carried over winter in the bodies of certain striped cucumber beetles.

Many improvements in orchard spraying have been developed; for example, it has been found that apple bitter rot and blotch can be successfully checked by late summer spraying, and continued spraying schedules for the apple and peach have been perfected for various sections.

Encouraging progress has been made in the eradication of the citrus canker disease of orange, grapefruit, lemon, and lime trees. Many localities formerly infected have been free of the disease for many months, and are officially reported as free of canker. In the regions not yet cleaned, vigorous work, in cooperation with State officials, will be continued to eradicate infections and prevent further spread of the disease. An important result of the citrus-breeding work has been the discovery of the decided canker resistance of the Japanese and other Asiatic pomelos and certain new hybrids originated by the bureau.

In cooperation with States in which five-leaved white pines occur, a campaign for the location of all cases of white-pine blister rust has been inaugurated in order that the eradication or control of the disease where found may be attempted. The information obtained indicates that the western forests are free of the disease and with the existing quarantine restrictions are unlikely to be infected. The infections from the Mississippi River to the Hudson River are more or less scattering in character and show promise of being eradicated at an early date. East of the Hudson River in many regions the blister rust is so widely disseminated that its complete eradication does not appear practicable, but tests of the feasibility of control measures sufficient to insure the continuation of lumbering operations have been inaugurated.

Special stress has been placed upon the making of home vegetable gardens, the production and storage of sweet potatoes, and the growing of staple canning crops to contribute to the extraordinary needs of the country during the present crisis. The peanut work has been decidedly enlarged and greatly extended, and special emphasis was placed upon the harvesting and curing of the crop and upon the manufacture of edible oil from the peanut. The Irish potato work has received earnest consideration from the point of maintaining production under very adverse conditions, particularly as regards seed supply available for the crop of 1917. Before and at the time of harvesting the crop of 1917 special emphasis was placed upon the importance of husbanding the crop through provision of proper storage houses in order to prevent loss through lack of transportation facilities or from inadequate protection. At this time also special efforts were made to determine fields true to variety and free from disease, the product of which would be suitable for seed purposes. Much was accomplished in this line, and the largest crop of potatoes ever produced has been harvested and stored.

Field representatives stationed upon the Government reclamation projects worked in direct cooperation with the settlers in the development of local agricultural industries and in the formation and development of farmers' cooperative organizations. This year such work was under way upon the following reclamation projects: North Platte, Truckee-Carson, Minidoka, Tieton, Shoshone, Huntley, Uncompahgre, Boise, and Umatilla.

The results of the systematic investigations that have been conducted in the Great Plains during the past 10 years provide information from which it is now possible to direct the agricultural developments in this region along the safest and most fruitful lines. It has been shown that some crops can not be profitably produced in certain portions of the plains by any method of culture; some soils also do not respond to differences in tillage methods. No method of cultivation has proved its ability to overcome the extremely unfavorable climatic conditions that occasionally occur. Small grains are best adapted to the northern, and sorghum crops to the southern portion of the plains, and the production of live stock is essential for the best development.

During the year there were distributed on congressional and miscellaneous requests 12,170,448 packages of vegetable seed and 3,812,467 packages of flower seed, or a total of 15,982,915 packages, each containing five packets of different kinds of seed. There were also distributed 12,735 packages of lawn-grass seed, 650 packets of tobacco seed, and 11,159 boxes of imported narcissus and tulip bulbs. The seeds and bulbs were purchased on competitive bids as heretofore and each lot of seed was thoroughly tested for purity and viability before acceptance for distribution by the department, and tests of each lot of seed were conducted on the department's trial grounds to determine trueness to type. Approximately 35 per cent of the seed was secured from "surplus" stocks, the remainder being grown for the department under contract. The contract of last year for packeting, assembling, and mailing vegetable and flower seed was continued in effect, the price being 94½ cents per 1,000 packets, which included hauling to the city post office or to the mail cars on track. There were also distributed during the year 244,463 packages of new and rare field seeds, including 90,067 packages of cotton seed. This distribution enables the farmers to secure seed of new and improved crops in sufficient quantities to produce stocks for future seeding, the general effect of which is very gradually to improve the crops of the country.

FOREST SERVICE ACTIVITIES.

The usual activities of the Forest Service were materially affected by the entrance of the United States into the war.

The field force of the service assisted in the protection of public works and transportation lines in the National Forest regions, and in the gathering of military reconnaissance information valuable to the War Department. The number of live stock permitted to graze on the National Forests was increased up to the limit of safety for the range. Crop production in and near the forests was stimulated wherever possible. At the request of the War Department the service assisted in raising a regiment of skilled woodsmen and millmen, officered by trained foresters and men experienced in the lumber industry, for woods service in France. A number of members of the Forest Service have been commissioned by the War Department in connection with forest work in France and with other activities relating to the national defense.

The net area of the National Forests, or, in other words, the area actually owned by the public, was reduced during the year by 253,661 acres, making the total net area 155,166,619 acres on June 30, 1917. Owing to the consolidation in several cases of two or more forests into one, the number of National Forests at the close of the fiscal year was 147, as against 152 on July 1, 1916.

Receipts from the National Forests touched a new high level in the year, when they reached a total of $3,457,028.41, an increase over the previous year of $633,487.70. The chief increases were in receipts from timber sales, with a total of $1,692,520.21, and in those from grazing, with a total of $1,549,794.76. The total amount of timber cut from the National Forests in 1917 was 840,615,000 board feet, as against 714,505,000 board feet in 1916, while the amount of timber sold (mostly to be cut later) was more than double that in 1916. An increase of 25 per cent in the charge for grazing permits was made in the spring of 1917 in order that the charge may more nearly represent the actual value of the grazing privilege.

In the calendar year 1916, which includes one-half of the fiscal year, the National Forests protective force fought 5,665 fires, 5,405 of which were extinguished before $100 damage was done. The total damage chargeable to all the fires was only $198,599, as against $353,389 in 1915. Seven thousand four hundred and ninety acres in the National Forests were planted to young trees during the fiscal year.

The year brought a greater demand than ever for permits to graze live stock in the National Forests. On the ranges were 7,586,034 sheep, 1,953,198 cattle, 98,880 horses, 49,939 goats, and 2,306 swine.

New permits put in force for the operation of power plants and power-transmission lines in the National Forests brought the total minimum discharge capacity of plants operating under permit up to 570,959 horsepower. A recent decision of the United States Supreme Court in the case of a Utah power company fully upholds the right of the Secretary of Agriculture to regulate water-power development on National Forest lands.

Permanent improvements constructed in the National Forests during the year included 130 miles of road, 1,153 miles of trail, and 1,414 miles of telephone line. Preliminary work was begun under section 8 of the Federal Aid Road Act, which appropriates $1,000,000 a year for 10 years for roads in or partly within National Forests, built in cooperation with the States or counties concerned.

On recommendation of the Forest Service, the National Forest Reservation Commission approved for purchase during the year, under the terms of the Weeks law, 175,463 acres in the Southern Appalachian and White Mountains for new National Forests. This brings the total amount of land approved for purchase in the two regions up to 1,455,563 acres.

Cooperation, in the form of a money allotment used chiefly for the hire of men to patrol the woods, was given 21 States in protecting the forested watersheds of navigable streams. The total allotment amounted to $100,000, and the cooperating States contributed a total of $434,667 more toward the work.

Investigative work on the National Forests brought some important results affecting range management. On high mountain lands it was found that erosion and decrease in soil fertility following range depletion materially lengthens the period necessary for revegetation. Another study brought out the hitherto unrecognized importance of erosion in its earlier and less severe stages, and of leaching, as a cause of range deterioration through the loss of soil fertility. A study of methods of handling cattle made at the Jornada Range Reserve demonstrated the importance of proper care and supplemental feed in saving the calf crop.

Investigative work outside the National Forests covered a broad field. A summary of the study of the lumber industry was published. Studies to aid the farmer in marketing the products of his woodland were completed for Georgia, South Carolina, and Maine. An economic survey of farm woodlands in the eastern United States, in cooperation with the Office of Farm Management, was practically completed. At the Forest Products Laboratory investigative projects progressed to the stage of commercial demonstrations in the use of waste hemlock bark for roofing and for various paper products; in the treatment of timber to prevent sap stain; in the kiln drying of southern pine; and in the production of ethyl alcohol from wood waste. Over 500 tests were made upon Sitka spruce, white oak, and yellow birch to determine the influence of drying and steaming on strength, with particular reference to use in airplanes. In the course of kiln-drying tests methods were perfected by which many species of wood can be dried in a much shorter time than is now required, and with less loss of material. Work was largely completed on spruce and ash for airplanes, the problem being to dry the material artificially in the minimum time without loss of strength and toughness as compared with air-dried stock.

SUMMARY OF THE WORK OF THE BUREAU OF CHEMISTRY.

WORK DONE IN CONNECTION WITH THE ENFORCEMENT OF THE FOOD AND DRUGS ACT.

The enforcement of the Food and Drugs Act constitutes the largest part of the work of the Bureau of Chemistry. The disposition of the foodstuff and drug industries to cooperate with the bureau continues to grow, with a resulting improvement in the quality of their products and the elimination of spoilage and wastes.

Special attention has been given to shipments of polluted or spoiled food. The canning of decomposed navy beans has been suppressed. The interstate shipment of oysters from polluted waters and the practice of adulterating oysters and scallops with water have been almost entirely checked. Cooperation with the State officials in improving the egg and milk supply has continued, with most satisfactory results. Action has been taken against the shipment of worthless citrus fruit, evaporated apples, and canned tomatoes adulterated with water, and mixtures of cider vinegar with distilled vinegar or dilute acetic acid simulating genuine cider vinegar.

Much educational work has been done to secure a strict compliance with the requirements of the net-weight amendment, and a number of prosecutions for violating the amendment have been brought with success. Work has been in progress to establish tolerances in filling packages of tea, coffee, cocoa, spices, and similar free-flowing materials.

With the aid of State officials, the inspection of low-protein meal and cake made from delinted cotton seed, reported last year, was repeated and extended to the Pacific coast.

The chief contribution of the Food and Drugs Act to the safeguarding of the people's health has been its effect upon the drug and patent-medicine industry; upon the control of the traffic in polluted, decomposed, or filthy foods; and upon the elimination from foodstuffs of contamination with poisons such as lead and arsenic entering the product through the use of impure reagents in the process of manufacture, or of utensils made from improper materials.

RESEARCH ON FOOD AND DRUG MATERIALS.

Studies upon the effect of fertilizing wheat with nitrates and potash at different stages of growth have demonstrated that nitrates applied when the wheat is beginning to head affect the composition of the wheat, but not the yield, while application when the plant is 3 or 4 inches high affects the yield, but not the composition.

The results of the study of the proteins of the peanut have been published, and, in cooperation with the Bureau of Animal Industry, it has been shown that peanut meal is a valuable feed for dairy cows. The chemical and physical properties of the different parts of the kafir kernel have been studied.

A bulletin on the by-products of rice mills has been published, and an investigation on the pearling of barley and the use of barley as food has been conducted.

The changes in chemical composition which occur in the ripening of olives, oranges, grapefruit, and cantaloupes have been investigated. The relation between the properties of tomato products and the quality of the raw material from which they are made has been studied.

Further work has been done upon the preparation of cane and sorghum sirups, and upon the isolation and preparation of new sugars from various sources. The pollution of oysters, methods of self-purification, and the general sanitary handling of oysters have been studied.

CONSERVATION OF FOODSTUFFS.

Experiments were conducted to demonstrate that wheat is not necessary in fleshening poultry. An economical ration which will cause chickens to gain over 35 per cent of their initial weight in 14 days has been found.

A bulletin on fish meal and one on the handling, transportation, and uses of shrimp has been published. A bulletin on the methods of preserving fish by freezing has been finished.

Work on potato silage as cattle food has been continued. Studies on the fermentation of sauerkraut have been extended to the household preservation of corn, beets, and string beans, using vinegar or soured corn meal as a starter.

Progress in improving the methods of drying apricots and peaches has been made. It will soon be possible to conduct the drying of potatoes and the manufacture of starch from potatoes on a commercial scale large enough to determine the question of costs.

WORK RELATING TO THE WAR EMERGENCY.

Specifications for food products to be used in the Army and Navy have been prepared, and products offered to the military establishments have been analyzed and investigated. Chemical experiments relating to other supplies are under way.

COLOR INVESTIGATIONS.

A new method of manufacturing phthalic anhydrid, of great value in the manufacture of dyes, has been devised, and one for the production of chlorin substances is now being tried out on a large scale. The utilization in the manufacture of dyes of a number of products, which are either waste products of agriculture or products of agricultural origin obtainable in large quantities, has been investigated.

A new and accurate method for the separation and identification of oil-soluble colors in food products has been devised.

BUREAU OF SOILS.

SOIL SURVEY.

The Bureau of Soils mapped and classified the soils in 81 areas of a total extent of 46,407 square miles, classified the land in 35 National Forest projects, and studied the soil conditions in seven miscellaneous projects.

FERTILIZER INVESTIGATIONS.

At the Arlington Farm factory-scale experiments on the fixation of atmospheric nitrogen and kindred problems and on the production of phosphoric acid by a new process were successfully prosecuted. The work on nitrogen was done in cooperation with the Ordnance Bureau of the War Department. The feasibility of cheapening the cost of production of sulphuric acid was also demonstrated.

The work on potash has consisted mainly in a survey of the cement industry of this country and Canada, with a view to determine the amount of potash recoverable as a by-product, and in the kelp work on the Pacific coast.

The results of the survey show that with the installation of proper equipment and with certain slight changes in the process of cement manufacture it will be possible to produce 100,000 tons of potash annually in cement mills, nearly all of which is now wasted. This represents nearly one-half the normal domestic consumption. The factory for experimental work in the production of potash from kelp was erected and equipped so far that of the money appropriated for the purpose sufficient funds remained for operative expenses during the ensuing year. The factory will begin operations as soon as the condition of the kelp beds warrants.

CHEMICAL AND PHYSICAL LABORATORIES.

The chemical laboratories, in addition to routine analytical work, continued research work on the problems of liming and on the inorganic constituents of soils. The efforts of the physical laboratory have been largely absorbed in solving the physical problems connected with the fertilizer investigations at Arlington Farm, but time has been found to continue research work on soil erosion, on the movement of water in soils, and on the colloidal condition of clay soils. Systematic study of the physical properties of the important soil types of the country is also being prosecuted.

THE MORE IMPORTANT CONSTRUCTIVE DEVELOPMENTS IN THE WORK OF THE BUREAU OF ENTOMOLOGY DURING THE FISCAL YEAR 1917.

As a primary requisite to the most effective work under war conditions would be an extremely accurate knowledge of the exact conditions relative to the increase of injurious insects, and especially those threatening staple crops, over the whole productive area of the United States, the Bureau of Entomology, coincident with the declaration of war, and before the growing season, made arrangements with all of its field agents, with all of the State entomologists, with the professors of entomology in the agricultural colleges, and with all other prominent entomologists within the area of the United States, to begin a system of prompt reporting of prospective insect damage and of the increase from day to day of injurious species. This service was extended, with the cooperation of the men in charge of the Forest Service, the Bureau of Animal Industry, the Weather Bureau, the Bureau of Plant Industry, and of the Demonstration Service, to the field corps of all of these branches of the department. Reports as received were digested, formulated, and published as a series of emergency circulars, which were sent to all of the State and station entomologists and to every one in position to help by practical work. The first of this series of emergency circulars was issued on May 1, and subsequent issues have been distributed on the first of each succeeding month.

The second line of emergency work was the perfection of plans for a large amount of practical instruction in insect-control methods and for the suppression of insect outbreaks, as authorized by the Emergency Food Production Act. These plans have been made in cooperation with the States Relations Service of the Department of Agriculture and the extension divisions of the various States. Specialists of the Bureau of Entomology have been sent to the various States where their knowledge of species and their training and experience in field conditions make them most useful. They have given lectures and demonstrations in the most improved methods of insect control to groups of farmers, stockmen, fruit growers, and others. The work planned covers effectively such important fields in economic entomology as insects injurious to cereal and forage crops; insects injurious to stored products in granaries, mills, and warehouses; insects attacking truck and garden crops; insects injurious to orchard fruits, citrus fruits, cotton, rice, sugar cane, and domestic animals. Numerous emergency publications have been prepared, as farmers' bulletins, posters, charts, etc., relative to injurious insects.

The shortage in sugar has made it highly desirable that honey production be increased as rapidly as possible. Therefore, a vigorous campaign was instituted to stimulate beekeepers to increased honey production. In cooperation with the States Relations Service, circulars were sent to every county agent in the country for distribution, letters were mailed to individual beekeepers, and the effort has met with an enthusiastic response. At the request of the bureau, a honey market news service has been begun by the Bureau of Markets.

The bureau has placed at the disposal of the Medical Corps of the Army its men trained in medical entomology and all of the information in its possession which the Army may need in connection with its important work in regard to camp sanitation.

This comprises about all of the work undertaken by the bureau after and because of the entrance of the United States into the war. Yet, with regard to the other work of the bureau, not so directly called forth by the war emergency, but which nevertheless has a distinct bearing on war conditions, the following should be stated.

As the result of the work of the past two years, and especially as the result of extended field experimentation in Louisiana and Mississippi, it appears that important results in the use of certain arsenicals applied in a certain way against the cotton boll weevil may be secured.

Important contributions were made to our knowledge of the screw-worm and the nose bot, which are very important pests of domestic animals.

Extensive experiments in northern Ohio against the grape berrymoth established conclusively the efficacy of two early sprayings of arsenate of lead applied by the "trailer" method—that is, by hand, with short leads of hose from the spraying outfit. Heretofore vineyardists have found it necessary to make applications of poisons so late in the season that the fruit at picking time was coated with the spray to an extent that greatly reduced its value.

Effective control measures have been developed for many of the insect enemies of the pecan, and distinct advance has been made in the control of the codling moth by the development of an automatic band trap placed around the trunk of the tree.

Notable progress has been made in the development of calcium arsenate, a substitute for arsenate of lead. This product may be readily and cheaply made at home. It has been taken up by manufacturers also, and is rapidly being adopted by orchardists on account of the economy in its use as compared with other arsenical insecticides.

The beetles that were killing timber in the yellow and sugar pine areas of the Yosemite National Park have been almost completely eliminated. The methods recommended by the bureau, as the result of long experimentation, to prevent losses by white ants, are being adopted, so that American manufacturers can now compete for foreign trade. The methods developed by the bureau, applied to stored shipbuilding lumber and the large Army and Navy stores of handles, tent-poles, wheelbarrows, cars, and other hardwood articles are preventing damage by powder-post beetles, which is often extremely serious. In previous wars, large Army supplies accumulated and held for some time have been found practically ruined by these insects.

With regard to insects affecting truck crops, the principal accomplishments of the year have been the discovery of the place of hibernation of the striped cucumber beetle, a successful study of the sweet potato weevil, and the completion of a comprehensive work on the potato tuber moth.

It has been shown that the reason why the Angoumois grain moth has been so injurious to stored wheat in Pennsylvania is because of a wrong system of storage in tightly built barns and a thrashing at any time convenient to the owner. Early thrashing, with an entirely changed method of storing, the employment of fumigants, and clean methods will lessen the damage enormously. Nearly a dozen species of weevils affecting stored beans, peas, cowpeas, and other edible legumes have been studied, and new facts have been learned in regard to their life histories and the effect of cold as a remedy. Observations were made on the successful heating of a flour mill in Kansas to destroy the Mediterranean flour moth.

As late in the fiscal year an extensive flight of May beetles threatened the Northern States with a severe infestation of white grubs, an illustrated poster giving the most up-to-date control measures for the pest, based upon intensive investigations carried on during the previous three years, was distributed throughout the threatened region.

Special intensive investigations of the Hessian fly were begun in Illinois, Kansas, Nebraska, and Missouri, in cooperation with State experts. This is the beginning of a large experimental research which will probably continue for several years. The great general outbreak of the Hessian fly has abated very perceptibly, excepting in eastern Kansas, where serious infestation of the 1917 crop threatens severe injury to the winter-wheat crop of 1918. Energetic steps have been taken to induce the wheat growers to plow down their 1917 stubble, to plant their wheat at the fly-free date, and to undertake other preventive measures.

It has been discovered that the Argentine ant, now widely distributed in the citrus region of that State, is largely responsible for the severity of infestation by various scale insects of California citrus trees, chiefly by deterring the helpful action of parasitic or beneficial insects. Several effective means of controlling the ants or preventing their access to citrus trees have been devised.

Means of preventing much of the loss hitherto occasioned by insects to plants grown in greenhouses have been worked out, and this information is now available.

Extension work in bee culture was carried on, in connection with the Office of Extension Work South, in several States. Work on the wintering of bees has been continued, chiefly in testing various methods of packing for colonies wintered indoors, indicating that colonies heavily packed will produce this year an average crop of more than 50 pounds, and possibly 100 pounds, greater than those insufficiently packed.

The most important new results of the work on the gipsy moth and the brown-tail moth have been the adoption of a new method of banding trees and the development of a tree-banding material prepared by the bureau in cooperation with the Bureau of Chemistry, resulting in a decrease in the cost; an increased effectiveness of the parasites imported from Europe and Japan and established in the infested regions in New England; new discoveries concerning the wilt disease of the gipsy moth; and the finding of a new caterpillar disease of this insect.

BUREAU OF BIOLOGICAL SURVEY.

The work of the Bureau of Biological Survey relates to the control and conservation of wild birds and mammals and the investigation of their life histories and relation to agriculture.

ECONOMIC INVESTIGATIONS.

Efforts have been directed primarily against predatory animals and noxious rodents. Great saving of live stock has been effected through the destruction of more than 100,000 predatory animals, about 75,000 of them through poisoning campaigns. The epidemic of rabies which has endangered western live stock as well as human life has been reduced to sporadic outbreaks. Campaigns against ground squirrels, prairie-dogs, and jack rabbits in the West have saved vast quantities of hay, forage, and grain crops. Efforts have been continued against pocket gophers, field mice, and moles, and initial steps have been taken for a nation-wide campaign against house rats and mice. Experiments in the domestication of native fur-bearing animals have developed information of great value to the fur-producing industry.

Special attention to instances of damage by birds to crops has demonstrated that certain birds are too abundant in some localities for the best interests of agriculture. Damages to fruits in Arizona and to rice in Louisiana were investigated and such remedies applied as were possible under existing law. Field investigations of the European starling were made and a report partially completed. Alkaline poisoning was found to be the cause of a sickness among wild ducks about Great Salt Lake. Studies on the attraction and protection of birds and methods of increasing the food supply of wild ducks resulted in the publication of two bulletins and the preparation of five others.

BIOLOGICAL INVESTIGATIONS.

To ascertain the conditions most favorable for species useful to the farmer, additional data have been assembled on the distribution, abundance, and habits of birds and mammals, including reports from about 50 voluntary observers on migration and on enumerations of birds nesting on certain areas. Field work on biological surveys was conducted in several States and investigations were made of the breeding areas and wintering grounds of migratory wild fowl. Reports on these projects, as well as technical revisions of several genera of mammals, are in various stages of completeness.

MAMMAL AND BIRD RESERVATIONS.

Five national mammal and 69 national bird reservations are administered in order to maintain wild life in the proper ratio to safeguard agricultural and recreational interests.

The feeding of the elk at the winter refuge in Wyoming greatly reduced the losses of these animals. Those which now occur are due chiefly to lack of food before reaching the refuge, the killing of cows with unweaned calves, and illegal slaughter by tusk hunters. Elk were transferred from Yellowstone Park to widely separated forests and preserves.

INTERSTATE COMMERCE IN GAME.

Activities of officials are each year reducing the number of violations of the act regulating interstate commerce in game. The war's interference with exportations of mammals and birds from Europe has compelled importers to look to South America and the Orient. Only about a fourth as many canaries were entered as last year, only 6 per cent of the number of pheasants as in 1912, and no European partridges. Importations of quail from Mexico increased fourfold over 1916. Losses from quail disease during quarantine at the border were comparatively few, but were heavy from other causes after the birds reached their destinations.

MIGRATORY-BIRD LAW.

Violations of the migratory-bird regulations in 805 cases are withheld from prosecution pending decision of the Supreme Court on the constitutionality of the law. Widespread observance, however, has resulted in a greater protection for insectivorous birds, a marked increase of waterfowl and shorebirds, and the coming of thousands of these birds to localities where they had not nested for years.

BUREAU OF CROP ESTIMATES.

The Bureau of Crop Estimates prepares the Government crop reports, which are issued monthly and relate to estimates of acreages planted, growing condition, yield per acre, total production, numbers, prices, and value of about 70 different crops and classes of live stock in the United States.

For collecting data in the field the bureau maintains a trained field agent in each State, crop specialists for cotton, tobacco, rice, truck, and fruit crops; and approximately

175,000 voluntary crop reporters, mostly farmers, one in each agricultural township, one or more in every county, and large numbers who report upon special crops or classes of live stock. All of these report monthly directly to the bureau, where the reports are tabulated and averaged separately for each class, crop, and State.

The bureau also utilizes all other sources of information on crop conditions.

The estimates for each crop and State are made by the Crop Reporting Board, which is composed of the principal administrative officials of the bureau and one or more field agents. Every step in the preparation and issuance of the crop reports is properly safeguarded, and all employees of the Department of Agriculture are prohibited by law, under penalty of a fine of $10,000, or imprisonment for ten years, or both, from giving out advance information, or from speculating in any product of the soil, or from compiling or issuing any false statistics relating to crops.

The accuracy of the crop reports is indicated by the fact that for the last five years the December estimates of the cotton crop have come within less than 1 per cent of the total ginnings as reported in the following March by the Bureau of the Census, and for the last two years the estimates have come within less than one-half of 1 per cent of the total ginnings.

The monthly crop reports enable farmers to plant and market their crops intelligently, transportation companies to provide cars to move the crops after harvest, bankers to provide funds for financing crop production and marketing, and manufacturers to estimate in advance the probable needs of farmers for implements, fertilizers, and other supplies. The Government crop reports also benefit farmers and consumers alike in that they tend to stabilize prices and prevent the issuance of erroneous and misleading crop reports by private speculators.

The organization and facilities of the Bureau of Crop Estimates have been utilized freely since the entrance of the United States into the war to estimate stocks of food and feed on farms, surpluses available for export, and the needs of allied and neutral countries in Europe. These estimates were an important factor in formulating the department's program for increased food production and conservation in 1917 and 1918.

STATES RELATIONS SERVICE.

The States Relations Service represented the Secretary of Agriculture in his relations with the State agricultural colleges and experiment stations under the acts of Congress granting funds in support of the stations and of cooperative extension work in agriculture and home economics; conducted investigations relating to agricultural schools, farmers' institutes, and home economics; and supervised the work of the agricultural experiment stations in Alaska, Hawaii, Porto Rico, and Guam. Its usual work was, however, modified and extended for the special purpose of coordinating the activities of the various agencies with which it cooperates and maintains administrative and advisory relations in a united effort to meet more effectively the conditions created by the war, more particularly in promoting food production and conservation.

The work and expenditures of each of the State experiment stations were examined and reported upon by a representative of the service, and various questions of general policy and future development of the stations were considered. Research projects, especially those under the Adams fund, received careful scrutiny and constructive criticism. As a whole the projects under this fund, as well as other work of the stations, are steadily becoming more thorough and more competent to yield definite answers to specific agricultural problems. Working in connection with the agriculture committee of the National Research Council, the service aided in enlisting a large number of the experiment stations in studies of various practical emergency questions. The experiment stations in Alaska, Hawaii, Porto Rico, and Guam maintained the more important of their usual lines of work, but concentrated their efforts on increasing the local production of food supplies.

In the development of the cooperative extension work progress was made in the more exact determination of the scope and limitations of the work and relationships imposed by the Cooperative Extension Act and related Federal and State legislation, and a more complete and satisfactory understanding of mutual privileges and obligations involved in cooperative enterprises was arrived at both with State institutions and organizations and with bureaus of the department. An added impetus was given to the already well-established policy of promoting local organizations to aid the county-agent and home-demonstration work. Extension workers conducted successful campaigns for increasing the acreage and yield of staple food crops, encouraging home gardening, promoting various forms of household thrift, especially canning and other means of preserving perishable foods, increasing the production of foodstuffs in the South without injury to cotton growing, securing an adequate supply of suitable containers for canning, and aiding farmers to secure labor, labor-saving machinery (tractors), seeds, and fertilizers.

Studies of the digestibility of cereal foods, fats, and oils, and of methods of cleaning textiles, were continued. The general campaign for food conservation was aided especially by supplying information in the form of brief popular bulletins, leaflets, and press articles regarding the rational and economical use of foods. A dietary survey of selected families in different parts of the United States was undertaken as a part of a general survey of the food resources of the country. Studies of various emergency and service rations were made in cooperation with or at the request of other departments of the Government.

Studies of the methods and subject-matter of instruction in agriculture, especially in secondary and elementary rural schools, with a view to improving such instruction and making it more practically useful, were continued as heretofore. Information regarding farmers' institute work was collected, tabulated, and published as usual. The collection of illustrative material for use in visual instruction was enlarged and improved.

OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING.

This office began the administration of the Federal Aid Road act, by which the Government appropriated $75,000,000 to be expended in the construction of post roads in connection with an equal amount to be provided by the States, and $10,-

000,000 to be expended in forest road improvement, by a reorganization which included the establishment of 10 districts. As a result of the Federal act, all States now have adequate legislation to enable them to participate in the appropriation. Forty States submitted 143 projects, involving a total approximate length of 1,730 miles. One hundred and thirty-nine of these projects, aggregating 1,182 miles, have been approved, involving the expenditure of $3,455,573.76 of Federal funds; 34 projects, 197.74 miles in length, involving $990,684 in Federal funds and $2,225,944.74 total of all funds, have been completed, are under construction, or are ready for construction.

On National Forest roads there have been 1,245 miles of reconnaissance surveys, 202 miles location surveys, 652 miles preliminary investigations, 119 miles maintenance work, and 37 miles construction. The Kamas-Stockmore project, 38 miles long, extending from Kamas, Summit County, to Stockmore and Hanna, Duchesne County, Utah, is one of the projects completed. The Questa-Elizabethtown, in Carson National Forest, New Mexico, the Blewett Pass in Washington, and the Rabbit Ears Road in Colorado, also were completed.

The following experimental roads were completed: A bituminous gravel-concrete road $4\frac{3}{4}$ miles long between Alexandria and Gum Spring, Fairfax County, Va., and a surface-treated gravel road, about 2 miles, from Gum Spring to Mount Vernon, in the same county. Construction of the top-soil road through Chapawamsic Swamp, in Prince William County, Va., was nearing completion at the end of the fiscal year.

Two more of the post-road projects, 14 of which had been constructed, were completed—the Licking and Muskingum Counties, Ohio, 24 miles, and the McDowell County, N. C., 13.3 miles. The last of these roads, at Dubuque, Iowa, 19.2 miles, was nearing completion at the close of the fiscal year.

This Office continued educational work in supervising and constructing object-lesson roads, making surveys, and preparing plans of roads to serve as models for highway officials, planning model county highway systems, cooperating in improvement of national park and forest roads, collecting and disseminating information pertaining to road building and maintenance, giving maintenance object lessons, advising in bridge work, furnishing engineers to supervise construction of object-lesson roads in the various States, making surveys, and preparing plans in a number of States.

The office published in a series of five bulletins the results of the 1914 census relating to mileage of improved and unimproved roads, taxation, revenues, and bond issues; published data relating to State highway mileage and expenditures, to automobile registration, and to the disposition of revenues derived therefrom; collected data in about100 counties and townships to ascertain cost of operation, procedure in construction, types of road, character of materials used, systems, and methods of maintenance, to determine the weakness in local systems of management, and to form a basis for a series of publications dealing with local road construction, maintenance, and administration.

It published a bulletin upon the management, operation, and discipline and the results obtained in convict road camps, and another upon the results of the studies of an experimental road convict camp conducted in Georgia, to determine the efficiency, economy, and practicability of applying modern methods of penology, sanitation, health, and dietetics to the management of concist labor camps.

In the laboratories of the office, 1,345 samples of road material were analyzed or tested, and in a conference of State highway testing engineers and chemists called to meet in the office, standard forms of specifications for materials to be used in various types of road construction were recommended, as also were standard methods of sampling, testing, and reporting test results.

Experiments were conducted to determine the best methods of using water in irrigation, advice was given to farmers on engineering features of pumping equipment for irrigation, experiments were conducted for improvement of irrigation equipment, and a general campaign for the proper utilization and economy of water was instrumental in adding 100,000 acres to the irrigated area of California, the newly irrigated land producing good crops of wheat and barley.

A widespread campaign was conducted to reach individual landowners and induce them to improve by drainage lands which had produced only from 10 to 75 per cent of what they could be made to yield. Particular attention was given to small wet areas on farms. Plans for eliminating such wet areas were made for 259 individual tracts, scattered in 19 States.

There were made ready for distribution plans of farm houses, a community building for use in rural communities, hollow-tile dairy barns, a hollow-tile general barn, a tile barn to suit northern conditions, milk houses, brick silos, wooden-hoop silos, hog houses, a cattle-feeding shed for northern and western conditions, a reinforced-concrete water tank, root and potato storage cellars, and sweet-potato curing and storage houses.

THE WORK OF THE BUREAU OF MARKETS.

Through the investigational and demonstrational work of the Bureau of Markets, extensive studies of the existing methods of marketing and distributing farm products, with a view to suggesting improvements and economies, were made. These studies include the methods of marketing such farm products as cotton and cotton seed; live stock, meats, wool, dairy products, and other animal by-products; grain, seeds, and hay; and the various fruits and vegetables. Investigations are made of the possibilities of cooperative purchasing and marketing organizations, uniform systems of accounts are devised and demonstrated, and many questions regarding the transportation of farm products and the more efficient utilization of cars receive attention. Reports were received and tabulated from practically all boat lines and express companies handling perishable fruits and vegetables regarding the number of shipments handled by them. Investigations covering the handling, grading, and packing of various farm crops also were made. Assistance was given to cities in improving local marketing conditions. Studies of the economic value of cold storage in the conservation of foodstuffs and methods of eliminating wastes both in storage and at the markets were conducted. The possibilities of foreign markets for American farm products under normal conditions were studied.

The bureau cooperated with the States in the employment of agents to study methods of marketing and distributing farm products and to assist in coordinating marketing activities.

Studies of agencies which loan on mortgages and extend personal credit to farmers and studies of organized activity among farmers for credit improvement and other means of increasing farm credit also were made by the bureau. Investigations were made and assistance given in organizing various other cooperative associations.

In its service work the Bureau of Markets issued several series of daily and other reports. These have increased rapidly in number and in their usefulness to all engaged in the marketing of farm products. The scope of many of these reports has been enlarged greatly through the provisions contained in the food production act. They may be classified as follows:

1. Market news service on perishable fruits and vegetables (one daily and two weekly reports).
2. Market news service on live stock and meats (three daily, one weekly, and two monthly reports).
3. Market news service on honey (biweekly reports).
4. Market news service on grain and hay (biweekly reports).
5. The Seed Reporter (monthly).
6. Reports on the supply of wool (quarterly).
7. Reports on manufactured dairy products and oleomargarine (monthly).
8. Cold-storage holdings of apples, eggs, dairy products, meats, and fish (monthly).
9. Daily market reports on locally grown truck products, issued in cooperation with local agencies in different cities.

The enforcement or administration of three Federal laws has been intrusted to the Bureau of Markets: (1) Under the United States Cotton Futures Act, which became a law August 18, 1914, standards have been established for nine grades of white cotton, five grades of yellow-tinged cotton, and three grades of yellow-stained and blue-stained cotton. (2) The United States Grain Standards Act was enacted August 11, 1916. Under this act, official standards of the United States for shelled corn and wheat have been established and promulgated by the Secretary of Agriculture, and tentative grades are being considered for oats. The work of the inspectors licensed under the act is reviewed by a supervisor in each of the 35 districts into which the country has been divided. (3) The main purpose of the United States Warehouse Act, which became a law on August 11, 1916, is to establish a form of warehouse receipts for cotton, grain, wool, tobacco, and flaxseed, and to make these receipts negotiable as delivery orders or as collateral for loans. Thus far, rules and regulations for administering this act in respect to cotton have been issued.

THE SOY-BEAN INDUSTRY IN THE UNITED STATES.

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EARLY HISTORY OF THE SOY-BEAN INDUSTRY.

THE rapid rise of the soy bean (also called soya and soja bean) to a crop of special importance in the world's commerce in the past few years is one of the most remarkable agricultural developments of recent times. It is a plant of ancient cultivation in China, Japan, and Chosen (Korea). (Pl. I, fig. 1.) The annals of Old China set forth the fact that the soy bean was an important food with the Chinese fully 5,000 years ago. When the ports of China were first opened to foreign commerce, the trade in beans and bean products was found to have been a long-established and flourishing institution. In value and in extent and variety of uses the soy bean is the most important legume grown in Asiatic countries. In addition to a very considerable utilization for human food in various ways in the Orient, large quantities are utilized by first extracting the oil and then using the cake for stock feed and as a fertilizer.

Near the close of the eighteenth century the soy bean found its way to Europe, its cultivation being recorded in England in 1790. It is mentioned in the United States as early as 1804. For several decades, however, it was regarded more as a botanical curiosity than as a plant of much economic importance. In 1875, Prof. Haberlandt began an extensive series of experiments in Austria with the soy bean and strongly urged its use as a food for both man and beast. Although considerable interest was aroused during the experiments, the soy bean failed to attain the success hoped for by the experimenter.

Previous to the Russian-Japanese war China and Japan were not only the greatest producers but also the greatest consumers of the soy bean and its products. During the war the production of the crop was greatly increased throughout Manchuria. After the war, however, it became necessary to find new markets for the surplus beans, and trial shipments were made to Europe. The first attempts to introduce the soy bean and its products into European markets were generally unsuccessful because of the unsatisfactory condition in which the beans and cake were received, owing to poor shipping facilities. About 1908 a large trial shipment made to English oil mills was received in much better condition than previous shipments, and the results obtained were so satisfactory that larger imports were made.

Following this marked success in the utilization of the soy bean as an oil seed, its use extended rapidly to the Continent, and the importations of beans from Manchuria and Japan soon reached enormous proportions. The beans were utilized by extracting the oil, which was found valuable for various industrial purposes, leaving the bean cake for a cattle food. As the value of the oil and cake came to be recognized, new uses and markets were found, and the trade assumed such large proportions that the soy bean has become an important competitor of other oil seeds.

SOY BEANS IN THE UNITED STATES.

As previously stated, the soy bean was introduced as early as 1804, but it is only within recent years that it has become a crop of much importance in the United States. (Pl. I, fig. 2.) Until the present season it has been grown primarily as a forage crop, though a constantly increasing demand for seed for food and planting has led to the development of a very profitable soy-bean seed industry in many sections of the South and the corn belt. The large yield of seed, the ease of growing and handling the crop, the value of the beans for both human and animal food, and the value of the oil and meal all tend to make this crop one of great potential importance and to assure its greater agricultural development in America.

CULTURAL REQUIREMENTS.

The soy bean has about the same range of climatic adaptation as corn and can be grown successfully on nearly all types of soil. The cotton belt and the southern part of the corn belt are most favorably situated for the production of seed, although fairly profitable yields of seed have been produced farther north by some of the new improved early varieties. The yields of seed to the acre in various sections of the country range from about 15 to 25 bushels in the Northern States and from 25 to 40 bushels in the Southern States. The cultivation and handling of the crop are accomplished almost entirely by machinery in this country, the ordinary farm equipment meeting all requirements of the crop.

VARIETIES.

Varieties of soy beans are differentiated largely by the color and size of seed (Pl. II), though they differ in time required to mature, habit of growth, etc. At the present time about 20 varieties are handled commercially by growers and seedsmen, although more than 500 distinct varieties are known and have been grown by the Department of Agriculture on its testing grounds. The yellow-seeded sorts are preferred for food and the production of oil and meal and include the following: Mammoth (late), Tokyo (late), Hollybrook (medium late), Haberlandt (medium late), Medium Yellow (medium), Mikado (medium), Ito San (early), Manchu (early), and Elton (early). For forage, the black and brown seeded varieties are most suitable and include Barchet (late), Biloxi (late), Peking (medium), Wilson-Five (medium), Virginia (medium late), Early Brown (early), and Black Eyebrow (early).

SOY BEANS AS FORAGE.

As already noted, the soy bean has been grown in the United States primarily as a forage plant, and as such it is a valuable crop in many ways. When cut for hay, one of its most common uses, the soy bean makes a very nutritious forage relished by all kinds of stock. Feeding experiments indicate that soy-bean hay is comparable to alfalfa or red-clover hay. As an ensilage crop combined with corn, the soy bean is grown to a very considerable extent in the Northern States. This silage keeps well, is readily eaten by stock, and animals fed on it show good gains in flesh and milk production. One of the most profitable methods of utilizing the soy bean is as pasture for hogs, supplementing a corn ration. As a pasture crop, the soy bean is extensively grown in the Central and Southern States. Although not widely used as such, the soy bean has an important place among soiling crops. Having a high protein value, the crop is fed to good advantage with less nitrogenous crops, such as corn, sorghum, and millet.

The soy bean has many points of superiority over the cowpea. As forage it has a higher feeding value and is much easier to handle. In those sections where the cowpea has long been grown, the soy bean is gradually increasing in acreage and is taking the place of the cowpea in the farming systems to a greater extent.

SOY BEANS FOR OIL.

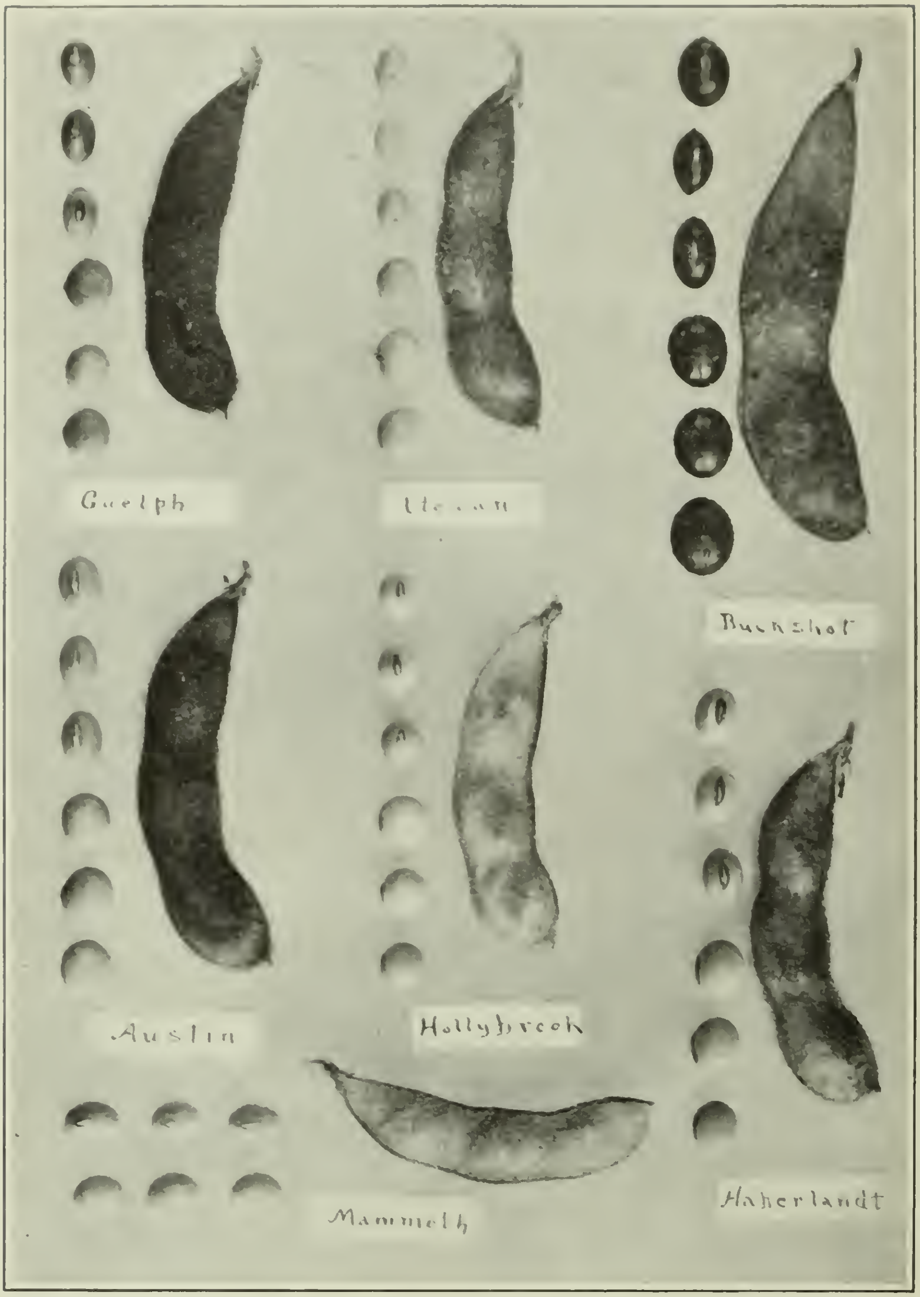
The soy bean was first utilized for the production of oil and meal in the United States about 1910 by an oil mill on the Pacific coast. The beans were imported from Manchuria, and the success of the industry is indicated by the continued production of the oil and meal and the increasing imports of soy-bean seed from Manchuria.

American-grown seed was first crushed for oil the latter part of 1915 by a few cottonseed-oil mills in North Carolina. A shortage of cottonseed and a surplus of soy-bean seed led to a rather extensive use of domestic-grown seed for this purpose. However, during the season of 1916–17 no domestic-grown beans were utilized for oil, owing to the extremely high price of seed. The cottonseed-oil mills of the South saw the possibilities of the soy bean as an oil seed, and many mills throughout the cotton belt contracted with planters for seed of the 1917 crop. This led to a considerable increase of acreage. Large quantities of Manchurian beans have been imported during the past few months and utilized by southern mills in the production of oil and meal.

The utilization of the soy bean as an oil seed has not required any extensive changes in the equipment of the modern oil mills. The methods are similar to those employed with

FIG. 1.—TYPICAL SOY-BEAN PLANT.

FIG. 2.—A FIELD OF THE BILOXI VARIETY OF SOY BEANS GROWN AT BILOXI, MISS.



PODS AND SEEDS OF THE MOST GENERALLY GROWN VARIETIES OF SOY BEANS.

FIG. 1.—LARGE BLOCKS OF FRESHLY MADE BEAN CURD, "TOFU," READY TO BE CUT UP INTO SQUARES AND SOLD TO THE HOUSEWIFE.

Photographed by F. N. Meyer, Agricultural Explorer, U. S. Department of Agriculture.

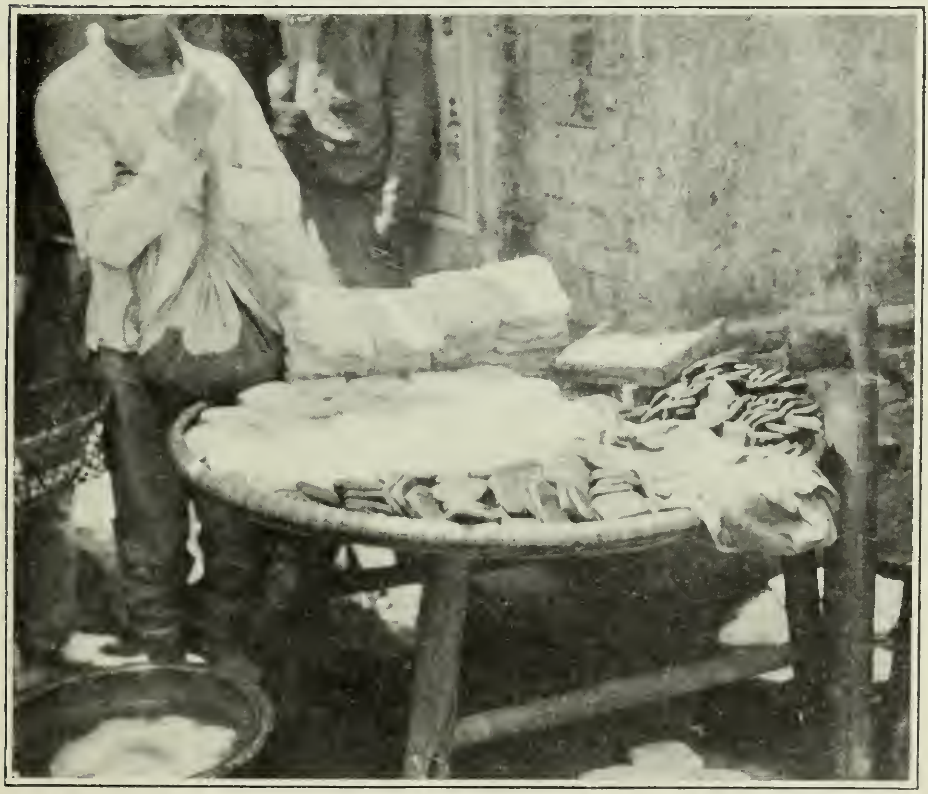


FIG. 2.—LARGE BAMBOO TRAY OF VARIOUS KINDS OF SOY-BEAN CHEESE OF THE DRIER TYPE.

Photographed by F. N. Meyer, Agricultural Explorer, U. S. Department of Agriculture.

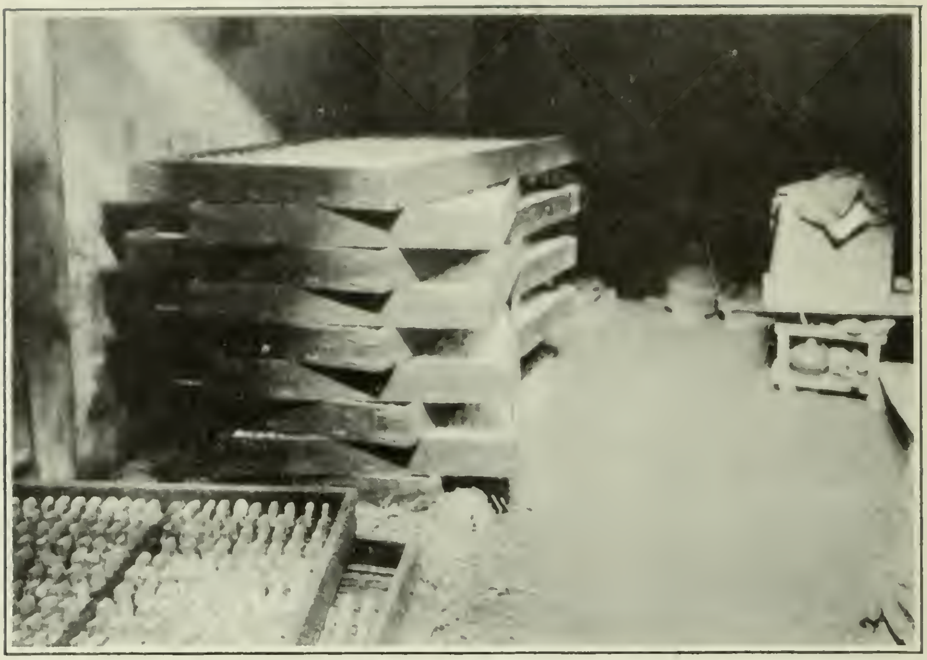


FIG. 1.—A DARK ROOM OF EVEN TEMPERATURE WHERE WOODEN TRAYS, FULL OF BEAN CURD, ARE PILED.

This is another method of preparing soy-bean cheese. Photographed by F. N. Meyer, Agricultural Explorer, U. S. Department of Agriculture.

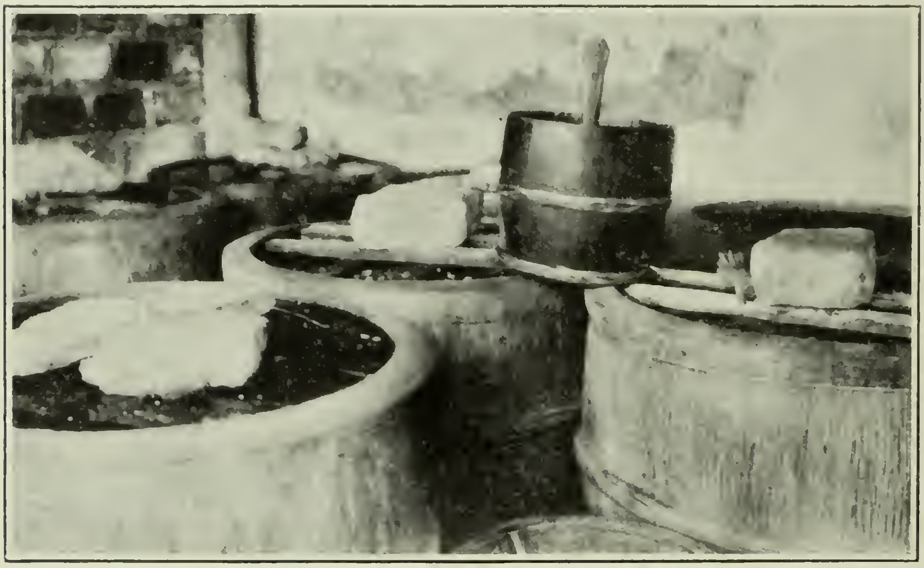
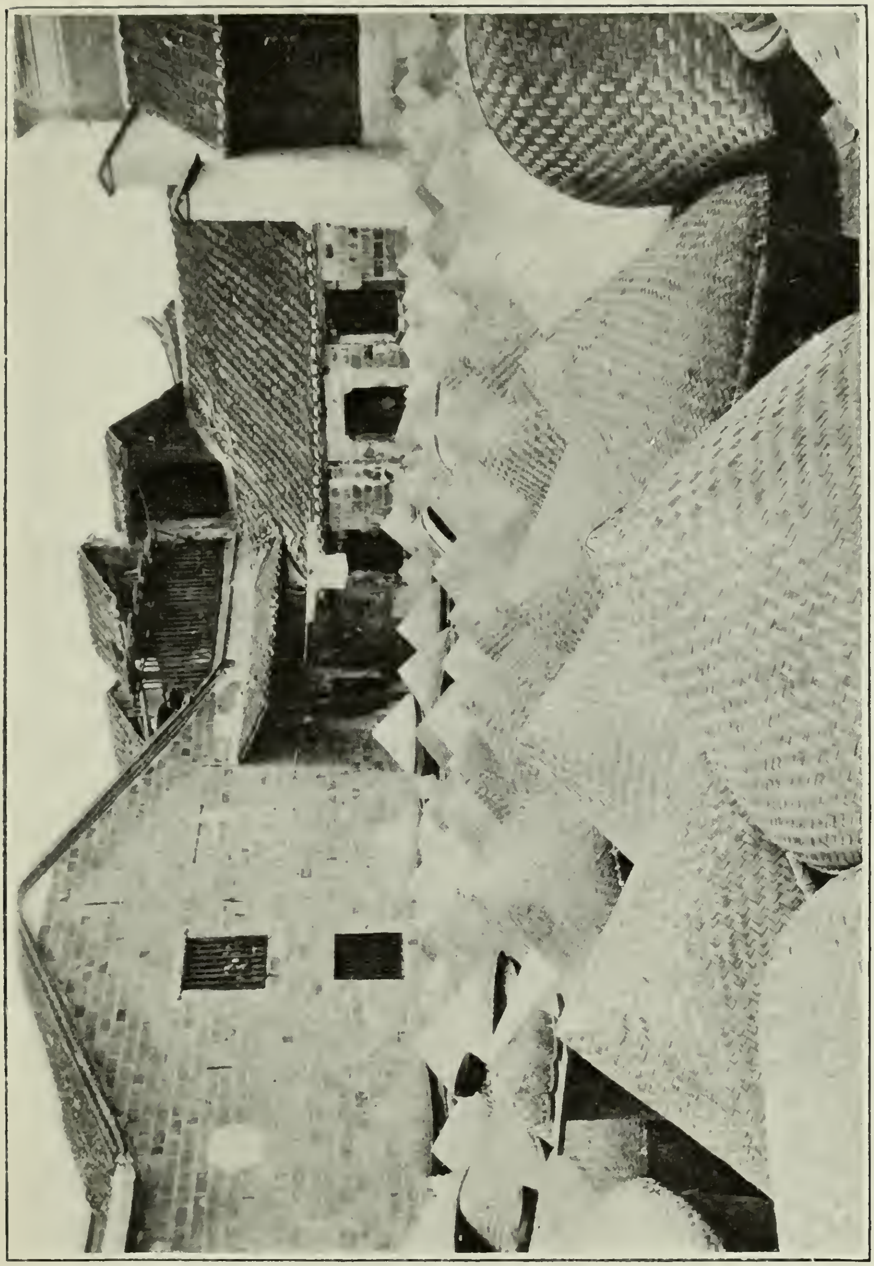


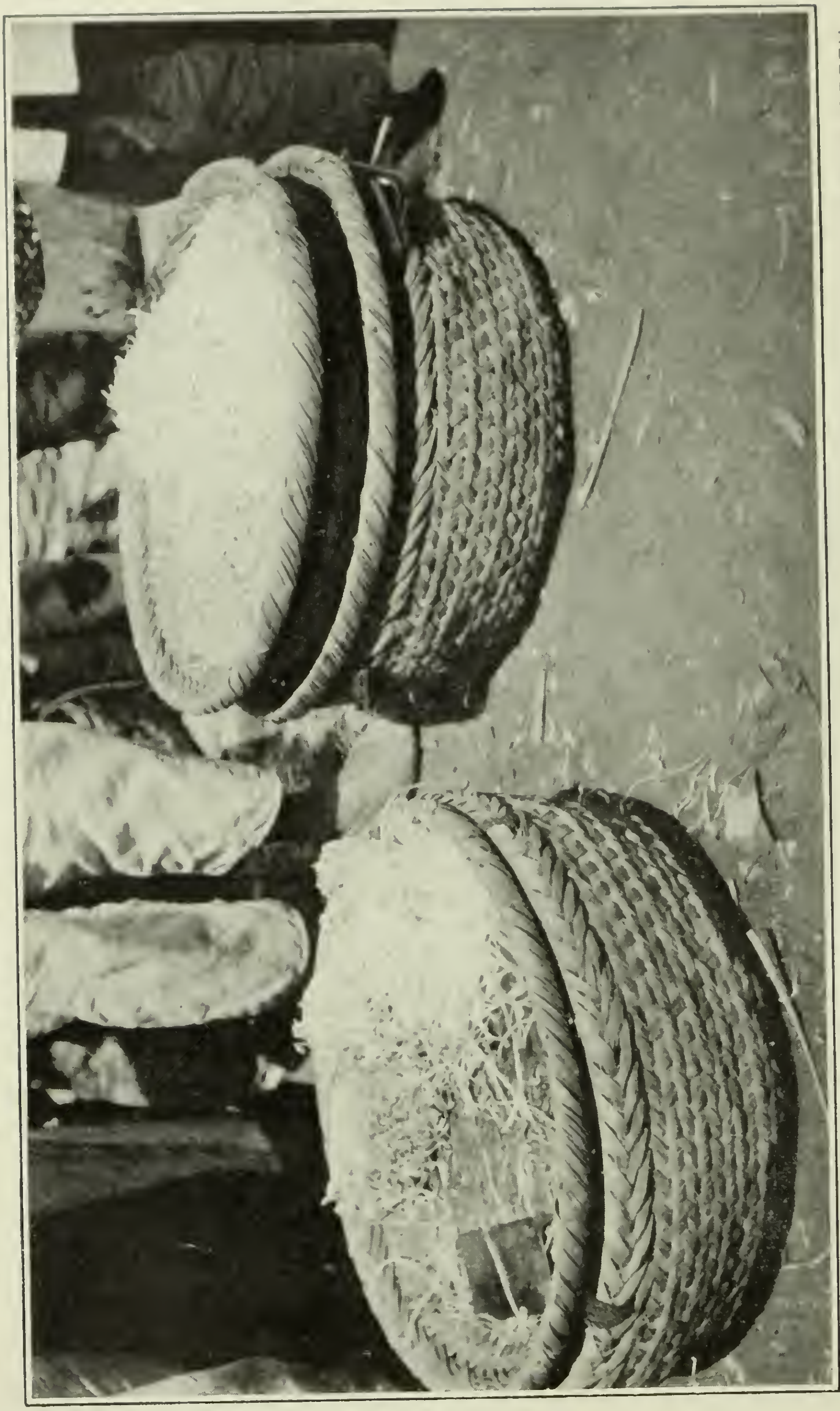
FIG. 2.—LARGE EARTHEN JARS FULL OF SQUARES OF BEAN CURD, WHICH ARE COVERED OVER WITH SPICED BRINE AND SOY SAUCE.

After several months' curing a bean cheese is formed, which can be kept for many years. Photographed by F. N. Meyer, Agricultural Explorer, U. S. Department of Agriculture.



VIEW OF A COURTYARD FULL OF COVERED POTS OF FERMENTED SOY BEANS AND BRINE, FROM WHICH SOY SAUCE IS MADE.

Photographed by F. N. Meyer, Agricultural Explorer, U. S. Department of Agriculture.



THE BASKET ON THE LEFT CONTAINS SPROUTED SOY BEANS WHICH ARE SOLD AND USED AS A GREEN VEGETABLE.

Photographed by F. N. Meyer, Agricultural Explorer, U. S. Department of Agriculture.

other oil seeds, such as cottonseed and linseed. According to data obtained from different mills, 1 ton of soy-bean seed yields from 28 to 31 gallons of oil and about 1,600 pounds of meal.

The oil extracted from the soy bean in many respects resembles cottonseed oil, though it dries more rapidly. This oil has a good color, has but a faint odor, and is rather palatable. New trade uses are being constantly found for soy-bean oil, and it has become an important competitor of other vegetable oils. It was first used in the United States in its crude state, principally in the manufacture of soft soaps. In the search for new oils to replace linseed oil for paint purposes, partly or wholly, soy-bean oil was found most suitable. Paint grinders are using successfully large quantities of this oil in the manufacture of certain types of paint. Manufacturers of butter and lard substitutes are using considerable amounts of soy-bean oil in their products. Other uses for which this oil is employed are in the manufacture of explosives, linoleum, varnish, and foodstuffs.

Soy-bean oil has been studied with other oils by the Office of Home Economics and found to compare favorably with the more common table oils with respect to digestibility. In view of the rapid improvement in the process of refining this oil, there seems to be scarcely any use to which oil is put in the manufacture of foodstuffs in which soy-bean oil may not eventually be found to have an important place.

SOY-BEAN MEAL.

The soy-bean cake, remaining after the oil is expressed, is ground into meal and used in the manufacture of foodstuffs, for cattle feed, and as a fertilizer. The meal or flour produced from American-grown yellow varieties is bright yellow in color when fresh and has a sweet, nutty flavor. Samples of meal from different sources range from 46 to 52 per cent protein and from 5 to 8 per cent oil.

As a human food, soy-bean flour has been used in the United States principally as a special article of diet and sold by companies manufacturing special foods of low starch content. The flour or meal can be successfully used as a constituent of bread, muffins, biscuits, or pastry. Extensive tests have been conducted by the United States Department of Agriculture with soy-bean flour in the making of bread and pastry. In these various food products about one-fourth soy flour and three-fourths wheat flour has been found to be the proper proportion. In some of the pastry products, however, as much as one-half soy flour can be used. During the past year the use of soy-bean meal has gained in popularity on account of the many palatable products that may be made from it.

The value of soy-bean meal as a stock feed for producing meat, milk, and butter is well established by practical experience, supplemented by carefully conducted experiments made in both Europe and America. In European countries soy-bean cake ground into meal is used largely for feeding cattle. It is one of the cheaper of the highly nitrogenous feeding stuffs and is therefore one of the more economical feeds for balancing rations deficient in nitrogen. Owing to its high content of protein, the meal should be used with the same precautions as are observed with other highly concentrated feeds, to avoid digestive troubles. As yet, soy-bean meal is not used extensively in the United States as stock feed. When the value of the meal in the production of beef, milk, and butter becomes properly recognized, there will doubtless be a large market for it as feed.

Although large quantities of soy-bean cake have been imported into the United States during the last few years, little has been heard of its use in the manufacture of commercial fertilizers. Considerable quantities of meal produced from crushing American-grown beans in 1915–16 were utilized by manufacturers of fertilizers, and during the past few months meal from imported beans has been taken in large quantities for this purpose. While soy-bean meal has a high value as a fertilizing material, a more economical practice would be to feed the meal to live stock and apply the resulting manure to the soil.

SOY BEANS FOR HUMAN FOOD.

In Asiatic countries, especially China and Japan, the soy bean and the various food products made from it are so largely consumed that it is second only to rice in importance as a food crop. The soy bean is eaten to only a very small extent like other beans; but in China and Japan it is elaborated into a great variety of products, all having a high percentage of protein and making a well-balanced diet when eaten in connection with the staple food, rice. Some of these products are said to be eaten at every meal and by rich and poor alike. Of these numerous preparations, only one, "shoyu," or "soy sauce," has been introduced to any extent in other countries. It is quite possible that some of these products would appeal to the American taste and with proper exploitation become established on the American market.

Although the soy bean as an article of human food has attracted attention from time to time in the United States, thus far it has been used but little except as a special food for invalids. The beans contain only a trace of starch and are highly recommended as a food for persons requiring a diet of low starch content. During the past year, however, much interest has been manifested in the possibilities of the soy bean as a staple food. Many schools of cookery and domestic science throughout the country have conducted experiments rather successfully, utilizing the dried beans in the manner of the navy bean. As a result, the dried beans can now be purchased in the markets in nearly all of the large cities. The variety and palatability of the forms in which the bean can be served make it a very desirable article of food, and it may be expected to grow in favor as it becomes better known.

DRIED BEANS.

The mature or dried beans of the yellow-seeded varieties may be utilized in making numerous palatable and nourishing dishes. When prepared like the ordinary field or navy beans, the soy beans should be boiled slowly, with a small amount of soda added to the water; otherwise they tend to become hard and tough. The boiled beans may be used in bean loaf and bean croquettes; in fact, in the same recipes as boiled navy or field beans. During the season of 1916 about 100,000 bushels of American-grown soy beans were packed as baked beans by several canning companies in the Central and Eastern States. The soy beans may be mixed to good advantage with the field or navy beans for baking, using two-thirds soy beans and one-third navy beans.

When properly roasted and prepared, the dried beans of any of the varieties make a good coffee substitute. Those fond of cereal beverages pronounce it equal to many of the preparations on the market.

In China the beans are soaked in water and roasted, the product being eaten after the manner of roasted peanuts. This method of preparing the beans is improved by soaking the beans for about 12 hours in a 10 per cent salt solution, boiling slowly for about 30 minutes, and then roasting to a light-brown color. The yellow-seeded and green-seeded varieties are preferable, as they make a product of better appearance.

GREEN BEANS.

When soy beans are three-fourths or more grown, the seed makes a most palatable and nutritious green vegetable. As such it may be used much as is the green pea or the Lima bean. The pods are somewhat tough and not desirable to eat. The green beans are rather difficult to shell, but after cooking in the pods for about five minutes they shell out very easily. These beans may also be canned, like green peas, and they thus make an excellent green vegetable for the winter. One large canning company has successfully packed the green soy beans.

A few hills of either the green-seeded or the yellow-seeded varieties, in successive plantings, may be grown in the garden as a green vegetable for the summer and fall and for canning.

SOY-BEAN MILK.

If the dried beans (yellow or yellowish green varieties) are soaked for a few hours, then finely crushed (as in a meat grinder) and boiled in three times the amount of water as of bean material for about 30 minutes, a milky emulsion is obtained which is very similar in appearance and properties to cow's milk. This liquid, separated out by means of a very fine sieve or through a cloth filter, is the soy-bean or "vegetable" milk used so extensively in China. Soy-bean cake, after the oil is expressed, or whole soy-bean meal can be utilized quite as well as the whole bean in the manufacture of the milk. When the meal is used, about seven times as much water is added as there is meal, and the mixture is boiled for about 10 minutes.

Soy-bean milk has a rather strong characteristic taste and odor which may be masked by the addition of a small quantity of coumarin or vanillin. This "vegetable milk" can be used successfully in numerous preparations, such as breads and cakes, in creaming vegetables, in milk chocolate, and in custards. If allowed to remain in a warm place the milk becomes sour, like animal milk, and in that form may be employed just as is sour milk or buttermilk. In Japan a concentrated or condensed milk is obtained by evaporating the soy-bean milk in a vacuum. This condensed vegetable milk, though not so light in color, resembles in nutritive value and keeping qualities condensed cow's milk.

After separating the milk from the solid material, the residue is still very rich in nutritive substances. It can be dried and used for cattle feed or possibly made into a meal or flour for human consumption.

SOY-BEAN CHEESE.

The addition of magnesium or calcium salts (about a 1 per cent solution) to soy-bean milk when hot precipitates some of the proteid substances, forming a grayish white curd which settles out, leaving a yellowish watery liquid. This curd, after being drained and pressed, represents the tofu, or bean curd, which is so extensively eaten and forms the basis of numerous fermented, smoked, and dried cheeses in China and Japan. (Pls. III and IV.) Tofu is made fresh daily and is a staple article of diet of oriental peoples. In many cities of the United States having a large Asiatic population, fresh bean curd generally may be found in the Chinese markets. Although the fresh curd, or tofu, is tasteless, it is a highly nutritious food and no doubt could be elaborated by the American housewife into a variety of palatable dishes.

SOY SAUCE.

Soy or shoyu sauce is a dark-brown liquid prepared from a mixture of cooked and ground soy beans, roasted and pulverized wheat (barley is sometimes used), salt, and water.

This mass is inoculated with a culture known as rice ferment (*Aspergillus oryzae*) and left in casks to ferment from six months to a year or sometimes longer. (Pl. V.)

In odor and taste this sauce suggests a good quality of meat extract, though perhaps more salty and a trifle more pungent. Soy sauce is largely consumed by the Chinese and Japanese, being used in cooking and as a relish or condiment to increase the flavor and palatibility of the diet. This product may well serve as the basis of sauces of the Worcestershire type and as a flavor with many American vegetable dishes.

The manufacture of soy sauce is conducted on a large scale in China and Japan, and to some extent in India. The yearly production of Japan is said to amount to nearly 2,000,000 barrels. The brewing of this sauce has also become a well-established industry in Hawaii. Although there are no factories in the United States, considerable quantities of the sauce are imported annually, and it can be obtained at Chinese stores in most of our cities.

SOY-BEAN SPROUTS.

Several species of beans are sprouted and used as a green vegetable by the Chinese. (Pl. VI.) Soy beans are used to a very considerable extent for this purpose, as these sprouts are larger and firmer than those of most other legumes. Bean sprouts can be used as a home winter vegetable, for the dried beans are sprouted easily in a short time under proper conditions of heat and moisture. It is quite possible that sprouted soy beans utilized in various vegetable dishes would appeal to the American taste.

POSSIBILITIES OF THE SOY-BEAN INDUSTRY IN THE UNITED STATES.

The large annual importations of soy beans, soy-bean oil, and soy-bean cake into the United States during the last few years, as shown in the following table, indicate a condition favorable to the establishment of various industries utilizing the soy bean and its products.

Quantity and value of soy beans, soy-bean cake, and soy-bean oil imported into the United States, 1910 to 1917, inclusive.[a]

Year.	Soy beans.		Soy-bean cake.		Soy-bean oil.	
	Quantity (pounds).	Value.	Quantity (pounds).	Value.	Quantity (pounds).	Value.
1910	....	....	....	....	Not stated.	$1,019,842
1911	....	....	[b] 2,115,422	$59,626	41,105,920	2,555,707
1912	....	....	[b] 2,416,052	64,350	28,019,560	1,576,968
1913	....	....	7,004,833	93,002	12,340,185	635,882
1914	1,929,435	$49,507	3,163,260	38,255	16,369,452	830,790
1915	3,837,865	87,306	5,975,592	64,307	19,206,521	899,819
1916	3,003,065	78,963	10,468,001	103,081	98,119,695	5,128,200
1917	5,344,334	132,572	11,760,935	136,064	162,690,235	11,410,636

[a] Compiled from reports of Department of Commerce, Bureaus of Foreign and Domestic Commerce and Navigation, U. S., 1910–1917.

[b] Includes bean cake or bean stick, miso, or similar products, with duty, 40 per cent.

The demand for soy-bean oil, especially in the manufacture of soap and of butter and lard substitutes, is keen, and its possibilities in the manufacture of varnish and paints are very great. It is now a strong competitor of other vegetable oils, and the demand for it is constantly increasing, both in this country and in Europe. When the meal becomes properly recognized as a feed material in the dairy and stock sections, there will be practically an unlimited market for it, while as an oil seed the soy bean offers an excellent opportunity to the South as a cash crop for the planters and a source of oil and meal for the cotton-oil mills, especially in the boll-weevil sections.

The importance of legumes as a source of protein for human food is becoming more generally recognized each year. In view of its richness in nutrients and the extent to which it is assimilated, and in view of its low cost in comparison with other foods, it would seem that the soy bean, with its products, should take high rank among our leguminous food crops and be more generally known and utilized as a staple food throughout the United States.

PRESENT STATUS OF THE PEANUT INDUSTRY.

By H. C. Thompson,

Horticulturist, Office of Horticultural and Pomological Investigations, Bureau of Plant Industry.

THE rapid growth of the peanut industry during recent years is one of the striking developments that have taken place in the agriculture of the South. While peanuts were introduced into the United States in the early days of colonization, they did not become of commercial importance until about 1870. From that time until about 1900 the growth of the industry was gradual, but since then the production of peanuts has increased by leaps and bounds. In 1889 the production was 3,588,143 bushels, while the Twelfth Census shows that in 1899, 516,654 acres were planted to peanuts, with a yield of 11,964,109 bushels of nuts valued at $7,270,515. In 1909, 869,887 acres were planted to peanuts and the yield was 19,415,816 bushels valued at $18,271,929. From these figures it will be seen that as the production increased, the value per bushel also increased. Since 1910 the acreage planted to peanuts has increased at an even more rapid rate than in the preceding 10 years. From figures secured by the Bureau of Crop Estimates it is evident that over 2,000,000 acres of land were planted to this crop in 1917. The crop of 1916 was double that of 1909, and even with this large increase the price paid for peanuts produced in 1916 was higher than in any previous year of normal production.

The very rapid increase in the acreage and production of peanuts has been due to the development and improvement of machinery used in growing and handling the crop, to increase in the knowledge of the value of the peanut as food for man and beast, to the development of new uses for the crop, and to the need for money crops to take the place of part of the cotton crop in regions seriously infested with the boll weevil.

GROWING THE CROP.

In the early days of peanut growing the crop was planted in the garden or in small patches in the field and the work of planting was done almost entirely by hand. With the increase in demand for peanuts the acreage increased and attention was given to the development of labor-saving implements and machinery. At the present time a large part of the planting is done by means of peanut planters. These machines open the furrow and drop the peanuts and cover them at the same operation, while with the hand-planting method it is necessary to open the furrow with a plow or other implement, drop the nuts by hand, and then cover them with a cultivator or some similar implement.

The method of cultivation of the peanut has also undergone some changes which have reduced the cost of the operation. The greatest reduction in the cost of cultivation has been brought about by the use of the weeder and large cultivating implements. Many large growers run a weeder over the peanut field before the plants come up and again just after they break through the surface. This reduces the work of cultivation, as it destroys the weeds before they have become established and allows the peanuts to get ahead of the weeds. Instead of using the small one-horse cultivator many growers now use a two-horse implement which cultivates one or two rows at a time. The old method of cultivating with a one-horse cultivator entails a wasteful expenditure of time and man and horse labor and should be discontinued where it is practicable to use larger implements. One man with two horses and a gang cultivator will do as much work as two men and two mules or two horses using one-horse cultivators. When it is realized that peanuts are cultivated from three to six times it can be readily seen that a great saving may be effected by using large implements.

HARVESTING.

Even greater improvements have been made in harvesting and thrashing peanuts than in the growing of the crop. In the early days of the industry the plants were pulled by hand or plowed out with a one-horse plow. The plow is still used to a large extent, but many large growers employ a machine similar to the potato digger. One of these machines, pulled by three or four work animals, will dig 8 to 12 acres a day. In addition to lifting the plants, the machine shakes off most of the soil and leaves the peanuts lying on the surface of the ground. With the plow it is necessary to free the plants of soil by hand, which adds to the expense of harvesting.

There has been less change in the method of stacking peanuts than in most other operations. In fact, the method now commonly used by the best growers has been employed for many years. The main points to be kept in mind in stacking peanuts are to keep them off the ground, to protect them from rains, and to cure them slowly. In new regions peanut growers often try a different method of curing peanuts, but after one or two failures they adopt the practices of the best growers. Many farmers, new to peanut culture, dig the peanuts and leave them to dry thoroughly on the ground; then rake them up with a horse-rake and stack them in the same way as cowpeas. This method is a poor one, because many of the leaves are broken off in handling after the peanuts are dry, thus losing the most valuable part of the hay, and when the vines are dried quickly the nuts wither and the pods discolor. When peanuts are stacked within a few hours after being dug, the nuts continue to draw nourishment from the vine and fill out properly and both the nuts and hay cure with a good color.

PICKING AND THRASHING.

Formerly all peanuts put on the market were picked from the vines by hand. This was tedious and expensive work, as a man or woman could pick only a few bushels per day and the nuts had to be separated from the trash. As long as peanuts had to be picked by hand the industry remained small, but with the invention and use of the mechanical picker and the adaptation of the grain thrasher for thrashing peanuts the development was very rapid. A picking machine will pick 200 to 400 bushels of peanuts per day. In addition to removing the nuts from the vines the machine has stemming and cleaning attachments which remove the small stem and separate the nuts from the soil and trash

In these machines the picking is done by dragging the vines over a horizontal frame covered with wire mesh. As the vines are dragged back over the frame the nuts drop through the meshes, and rubber brushes attached to an endless belt acting on the under side of the frame brush the peanuts off. The bottom of the machine is made of slats, to allow the soil to sift through. After the nuts are removed from the vines they pass through the stemming device, where the stems are cut off; then they go through the cleaning attachment and into the bagger. This type of machine removes the nuts from the vines with a minimum of breakage. The picking machine is rather frail, however, and many of the parts are easily broken; furthermore, the capacity is limited and the machine can not be used for other crops.

The ordinary thrashing machine will thrash 400 to 600 bushels of peanuts a day, but unless equipped with a special cylinder and run very slowly many of the pods are cracked and broken. However, with the Spanish peanut, which is sold mostly as shelled goods, the cracking of the pods is not very serious. In regions where oats, wheat, and rye are grown, the thrashing machine is quite often used for peanuts, because this machine can also be used for thrashing the grain crops.

CLEANING AND SHELLING.

The development of machinery for the cleaning, grading, and shelling of peanuts has been a very important factor in the growth of the peanut industry. Until machinery was available, the peanut market was largely restricted to the sale of roasted peanuts, and as these were not properly graded and cleaned the demand was limited. At the present time practically all of the peanuts put on the market in any form, except those sold to the oil mills, go from the farm to the cleaning and shelling factory, where they are prepared for sale for roasting or for the manufacture of peanut products. The large nuts, represented by the Virginia Bunch and Virginia Runner varieties, are thoroughly cleaned, graded, and polished, and the best grades are sold for roasting in the shell. The smaller pods of these varieties and those that are discolored are usually shelled and the nuts put on the market in that form. The percentage of nuts of the large varieties put on the market in the shell depends on the relative demand for shelled and unshelled nuts. As the demand for shelled nuts increases, a larger proportion of the peanuts are shelled. The so-called "Jumbo" peanuts are those picked out by hand as they pass over the picking tables.

The small-podded varieties, represented by the Spanish and African, are practically all shelled before being put on the market, except those used in oil mills. In the cleaning and shelling factory the nuts are first cleaned to remove the soil adhering to the pods and to get rid of the sticks and trash. After the cleaning, the pods are separated with reference to size, for convenience in shelling. The nuts are then shelled and run through machinery to separate the shells from the peas. The cleaned shelled nuts are separated into three grades, known as No. 1, No. 2, and No. 3. The No. 1 grade consists of the large unbroken kernels, the No. 2 of the split and broken kernels, and the No. 3 of the finely broken and badly shriveled kernels commonly known as "pegs."

The cleaning and shelling of peanuts is an industry which is most economically carried on in large, well-equipped factories. At the present time most of the cleaning and shelling is done in a small number of factories, which, however, represent a valuation of millions of dollars in buildings and equipment. Most of these factories are located in Virginia, but with the development of commercial peanut production in other regions plants are being built elsewhere. It is desirable to have plants located as near as practicable to the producing areas in order to reduce the transportation costs. At the present time Texas, Alabama, Georgia, and Florida are each producing more peanuts than Virginia, so it would seem that shelling and cleaning plants should be located in those States. During the past few years several factories have been built in Texas, but no large ones have been erected in the other States.

A ton of farmers' stock Spanish peanuts will yield 1,300 to 1,400 pounds of shelled goods. In shipping peanuts from the farm to the cleaning and shelling factory the producer and the consumer pay freight charges on 600 to 700 pounds of hulls which are of no special commercial value. With the

Virginia Bunch and Virginia Runner varieties the percentage of hulls is still larger. In many cases peanuts are shipped from the farm to factories hundreds of miles away, and some of the nuts after being cleaned and shelled are sent back into the same territory. This adds materially to the cost to the ultimate consumer.

PEANUTS USED FOR ROASTING.

Roasted peanuts are sold in every city, town, and village in the country, and for this reason this is the best known form of use. By many this is thought to be the only form in which peanuts are sold in large quantities. While enormous quantities of peanuts are sold for roasting in the shell, probably less than 25 per cent of the total crop grown is used in this way. The Virginia Bunch and Virginia Runner are the only varieties used to any great extent as roasted peanuts, and these two varieties constituted only about 44 per cent of the total crop in 1916. Large quantities of these two varieties are used in making salted peanuts, peanut candy, and peanut butter, and in the manufacture of various kinds of confectioners' and bakers' goods. During the past few years some of the low-grade shelled nuts of the Virginia varieties have been used for making oil. However, it is probable that more peanuts are sold for roasting in the shell than for any other single peanut product.

In addition to the roasted peanuts sold in the shell, large quantities are marketed in the form of salted peanuts. In practically every city, town, and village salted peanuts are for sale in 5 and 10 cent packages or in penny slot machines. While salted peanuts are nearly always sold in small quantities, the aggregate amount is very large and is increasing rapidly.

THE PEANUT-BUTTER INDUSTRY.

There are no statistics available on the total amount of peanut butter made in this country, but the quantity is large and increasing every year. Three of the large peanut-butter factories made in 1916 over 7,000,000 pounds. One of these factories, which made a little over 4,000,00C pounds of peanut butter in 1916, increased its output 50 per cent in 1917. In addition to the three factories mentioned, there are several other large ones and several hundred small factories making peanut butter in this country. It is probable that 4,000,000 or more bushels of peanuts were used in this way in 1916.

In the manufacture of peanut butter only the best-grade nuts should be used and the work should be done in a sanitary manner. Most manufacturers secure shelled nuts from the cleaning and shelling factories. These nuts are roasted in specially built machines, similar to those used for roasting coffee. From the roaster the nuts are dumped on a carrier or truck, the hopper of which has a perforated bottom for receiving and cooling the roasted nuts. No definite rules are followed in the roasting, but for shelled nuts the temperature should be about 320° F. The time required to roast a batch is about 30 to 35 minutes, but the stage of roasting must be determined by the judgment and experience of the operator. As a rule the nuts are not given as high a roast for peanut butter as for roasted peanuts. If the roasting process is continued too long or the temperature is too high, the butter will have a dark-brown color and a burned or bitter taste.

After the peanuts are roasted and cooled they are blanched. The blanching consists of removing the red skins and is done by machines, having a set of brushes revolving against a corrugated plate. After passing through the blanching machine the nuts are carried over screens in front of a fan in order to separate the skins and germs from the clean meats. The clean meats are then run over picking tables on a canvas belt. Women seated beside the tables remove any decayed or discolored nuts. Some factories are equipped with a mechanical stoner which removes small pebbles and pieces of stone that may have escaped the process in the cleaning factory.

After the peanuts are blanched and cleaned they are fed through chutes to a supply hopper above the grinder. Where two grades or varieties of peanuts are used, they are usually mixed as the peanuts are fed into the hopper. Some factories use a blend of Virginia and Spanish in equal parts or 2 to 3 parts Spanish to 1 part Virginia, depending on the judgment of the man in charge. It is believed that a blend of the two types of peanuts mentioned makes a better product than either variety alone.

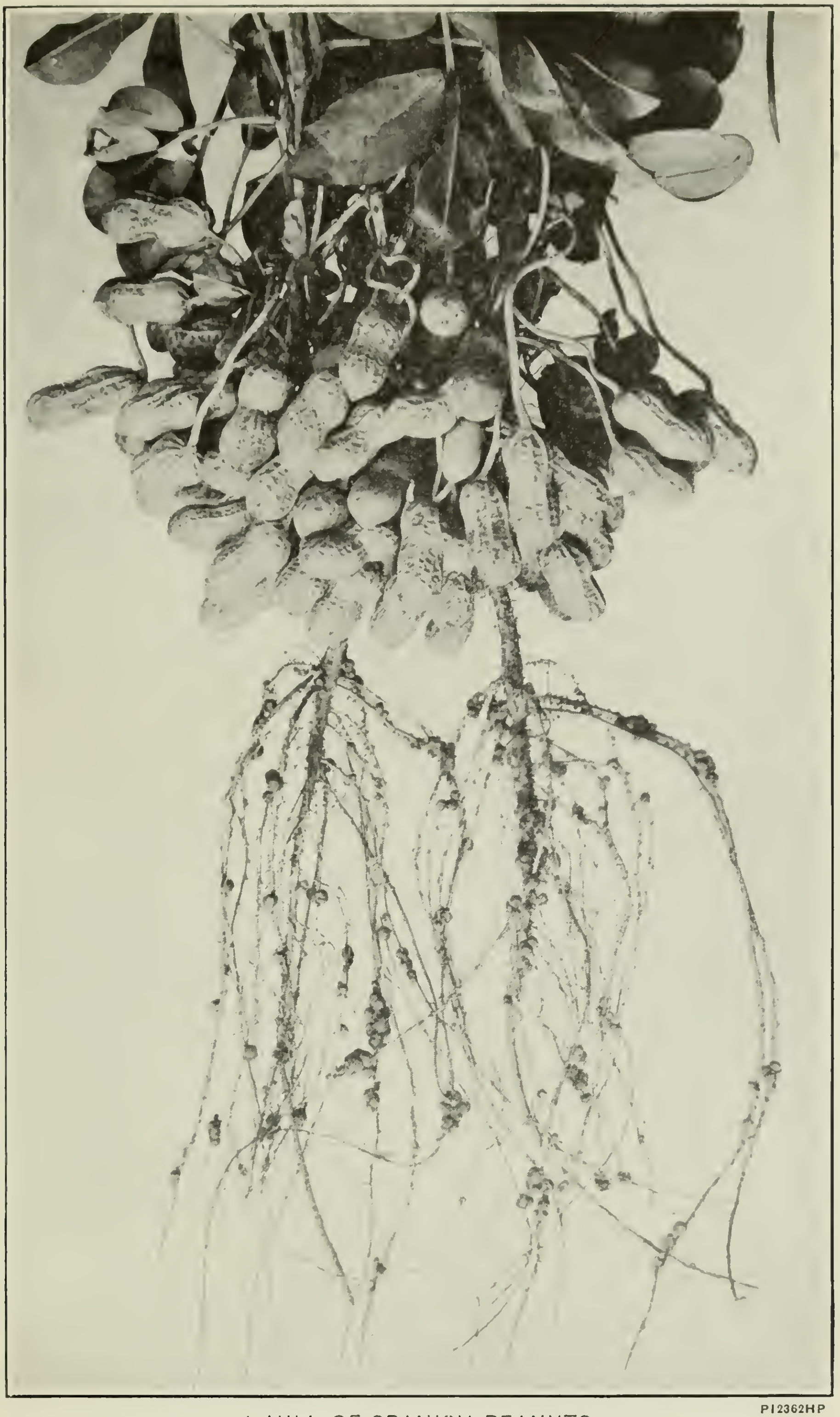
As the peanuts are fed into the grinder 1½ to 3 pounds of a good grade of dairy salt are added to every 100 pounds of nuts. The peanuts should be ground to a fine granular form rather than to a pasty consistency. If too coarse, the butter is thought to be gritty; if too fine, it is pasty and the oil settles out to some extent.

Peanut butter can be made in the home by using a good food grinder. The nuts may be bought already roasted or they may be roasted at home. If roasted at home, care should be used to prevent scorching. After roasting, the nuts should be shelled and blanched. The blanching can be accomplished by rubbing the nuts over a fine-mesh screen, in order to loosen the skins. The meats can be cleaned by pouring them from one vessel to another in the open where the wind will blow out the red skins. The rubbing of the nuts to loosen the skins will also loosen the germ from the kernel. The germs may then be sifted out by using a screen with small round holes. The germs are taken out because they cause the butter to get rancid quicker than it would without them. After the meats are blanched and cleaned they are passed through a food chopper and ground as fine as possible. The meats are often ground twice, the salt being added either before or after the first grinding. When made at home, the actual cost of peanut butter will not exceed 15 cents a pound even at the present high cost of peanuts.

Peanut butter is a wholesome and highly nutritious food, and as this fact becomes better known the product is increasing in popularity. Peanut butter contains one and a half times as much protein, over three times as much fat, and three times as much fuel value as round steak. In addition to this, peanut butter contains about 17 per cent of carbohydrates, mostly starch, while steak contains no carbohydrates. These figures show that, pound for pound, peanut butter has a much greater food value than round steak.

MANUFACTURE OF PEANUT OIL.

While peanut oil is one of the more important of the world's food oils, until very recently it has not been an important article of food in the United States. During the



P12362HP

A HILL OF SPANISH PEANUTS.

The peanut, in common with other plants of the bean family, has the power to gather nitrogen from the air in the soil and store it in the nodules on the roots. In harvesting, effort should be made to leave as much of the root in the ground as possible.

P11093HP

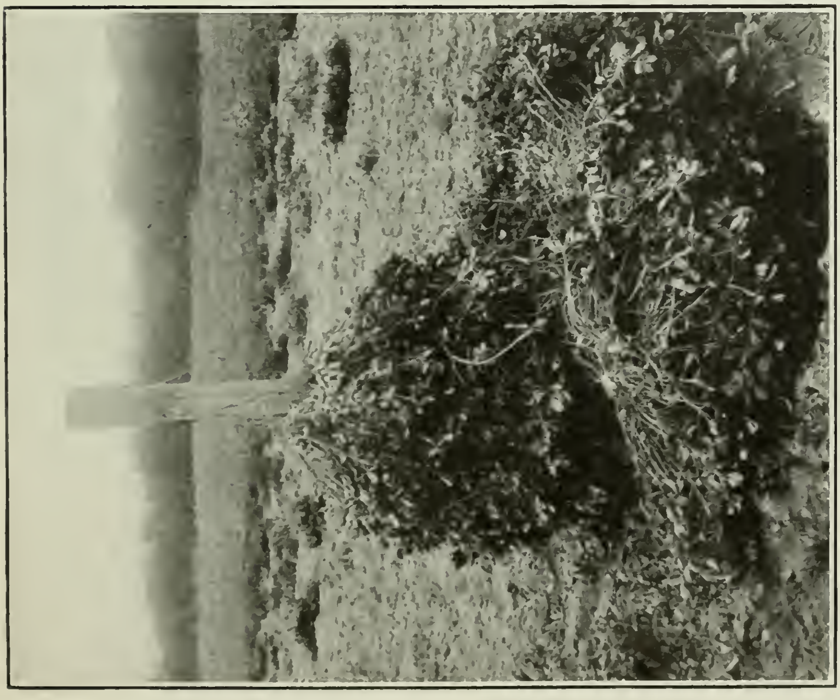
FIG. 1.—PEANUT DIGGER.

Many of the large producers of peanuts use a machine digger for harvesting peanuts. This machine is a great labor saver, as it will dig 8 to 12 acres per day.

P11463HP

FIG. 2.—STAKES USED IN STACKING PEANUTS.

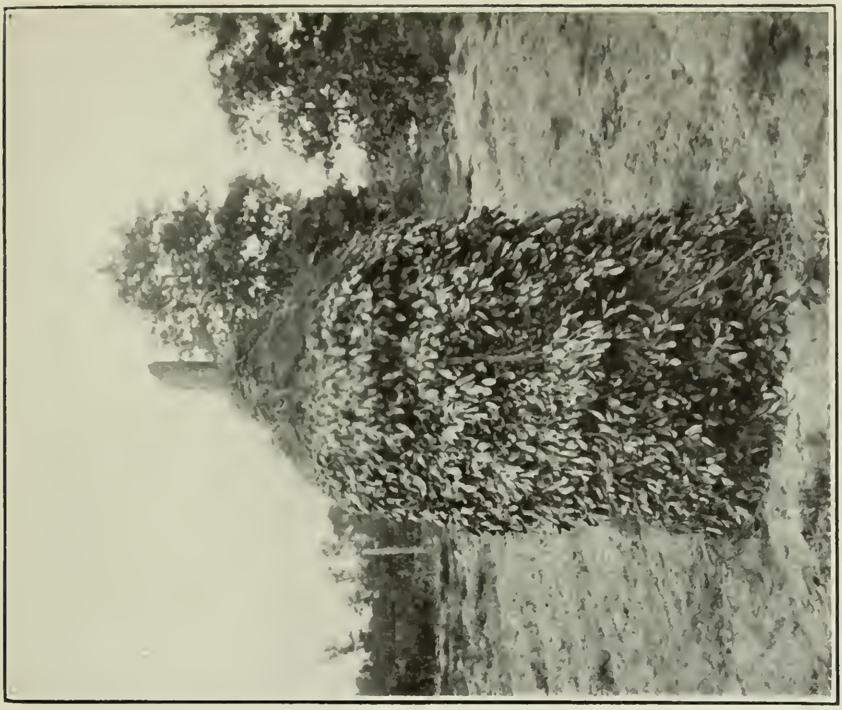
In stacking peanuts it is important to keep them off the ground. This is accomplished by starting the stack on the cleats nailed to the stake 8 to 12 inches from the ground.



P11468HP

FIG. 1.—PEANUT STACK ABOUT HALF COMPLETED.

The peanut stack is built up of successive layers of vines, the pods kept well to the center against the stake. The center of the stack is kept higher than the outer edge, to shed the rain.



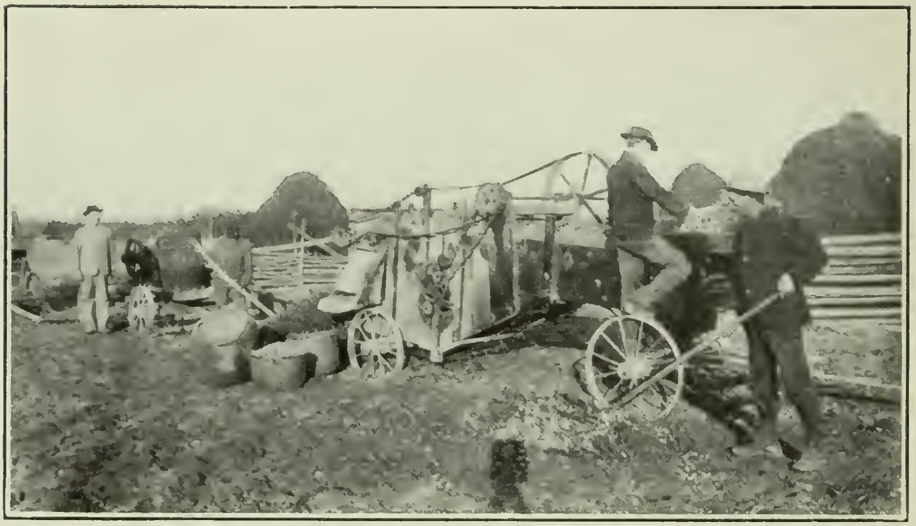
P11968HP

FIG. 2.—A COMPLETE STACK.

The stack is built up as high as a man can conveniently reach and is then topped off with a bunch of dry grass or weeds.

P10348HP

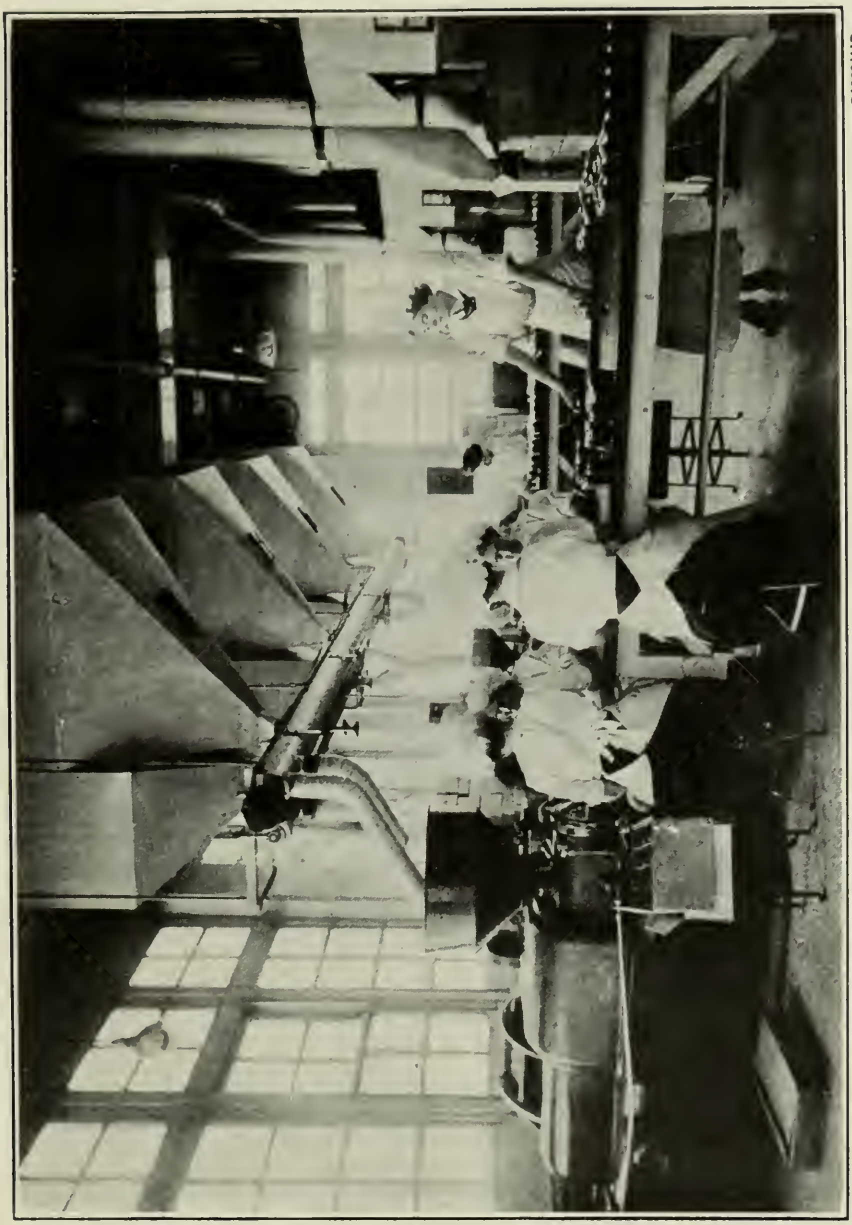
FIG. 1.—THE OLD WAY—PICKING PEANUTS BY HAND.



P11099HP

FIG. 2.—THE NEW WAY—PICKING PEANUTS BY MACHINERY.

The peanut picking and thrashing machines have been important factors in the development of the peanut industry. One of these machines will turn out from 200 to 600 bushels in a day, depending upon the type and size.



P13691HP

SCENE IN A PEANUT-BUTTER FACTORY.

In the room shown in this illustration over 10,000,000 jars of peanut butter are put up annually.

year ended June 30, 1914, the United States imported 1,332,108 gallons of peanut oil, which was valued at $915,939. Prior to that time very little peanut oil had been manufactured in this country. Because of the shortage of animal fats and vegetable oils created by the war, both the importation and manufacture of peanut oil have increased. In the year ended December 30, 1916, the United States imported 2,089,801 gallons of peanut oil and manufactured 3,488,649 gallons. This is the largest amount ever used in this country. In all probability, with the increasing world shortage of fats and oils and with the large crop of peanuts grown in this country in 1917, the output of 1917–18 will be much larger than that of any previous season.

In the United States most of the peanut oil has been made from unshelled nuts. This oil, unless refined, has an earthy taste and is not desired as a table oil. In addition to this, when the unshelled nuts are pressed, besides a refining loss there is a considerable loss of oil due to absorption by the shells. The peanut shells contain practically no oil, but after pressing with the peanut meats the cake, including the hulls, contains 6 to 9 per cent, depending upon the efficiency of the mill. This represents a considerable loss of oil, as a ton of farmer's stock Spanish peanuts contains about 600 pounds of hulls. If these hulls absorb 6 per cent of oil there will be a loss of 36 pounds, or nearly 5 gallons of oil, for every ton of peanuts crushed without shelling. It is claimed by oil millers that it is impossible to press the shelled nuts and make a cake containing as low as 6 or 7 per cent of oil, but this is done in Europe with less efficient presses than are used in this country.

In Europe peanut oil is made from shelled nuts which are blanched, degermed, and thoroughly cleaned before being pressed. This makes it possible to manufacture a high-grade edible oil which does not need to be refined. The unrefined oil has a good color and a distinct peanut flavor, while the refined product is almost colorless and has a bland taste.

The method of making peanut oil in Europe is different from that employed in this country. In Europe the shelled, blanched nuts are ground and pressed without heating, so as to secure a high-grade edible oil. After about half of the oil has been squeezed out, the cakes are taken out of the cloths, reground, heated for a few minutes, and again pressed. This second pressing yields an oil of lower grade than that secured from the first pressing, and it is sold as a low-grade edible oil or a high-grade soap oil. A third pressing is often made, and in some mills a fourth. After each pressing the cake is reground and reheated before the next pressing. The European method of manufacture might be adopted by a few mills in this country in order to put a high-grade edible oil on the market and at the same time produce a cake which could be used as feed. This is especially desirable at the present time. It is doubtful whether it will be necessary to make more than two pressings in American presses—the first a cold press and the second pressing made after grinding and heating the cake from the first pressing. The demand for high-grade edible oil is limited, but it would be worth while to make a special effort to supply this demand and to stimulate the consumption of oil. It is believed that the consumption of peanut oil could be greatly increased by placing on the market a high-grade edible oil at a price slightly lower than that commanded by the best brands of olive oil.

In the further manufacture of peanut oil in this country the cotton-oil mills will undoubtedly be used to a large extent, as they are already equipped with much of the necessary machinery and do not get enough cottonseed to keep them working throughout the year. These mills should be employed in making peanut oil before capital is invested in building and equipping new mills. The mills now in existence are ample to take care of the present supply of cottonseed and the peanuts and soy beans grown for oil purposes. In addition to the equipment used in cotton-oil mills, it is important to add machinery for cleaning peanuts, even if they are to be pressed without shelling. If the nuts are to be shelled and blanched, it will be necessary to add shelling and blanching machinery as well as conveyors, fans, graders, etc. The same kind of machines used in peanut cleaning and shelling factories would be satisfactory for the work in the oil mills.

The manufacture of peanut oil has had a wholesome effect on the peanut market, as many dealers have disposed of their low-grade shelled nuts to oil mills. This has forced buyers of peanuts for other purposes to take the better grades, and the price and quality have been raised. Any old nuts that have become rancid or injured by insects can be used in making a high-grade soap oil, thereby taking these goods off the market. In addition to this, the manufacturers of peanut butter and other products are able to sell to the oil mills at a good price the germs and the red skins separated in the blanching process.

USE OF PEANUTS BY CONFECTIONERS AND BAKERS.

While no figures are available to show the quantity of peanuts used in the making of candies and cakes, this amount is undoubtedly larger than that used for any single product except roasted peanuts. Practically all confectioners and bakers use peanuts in making their products. Peanuts are used in peanut bars, peanut brittle, chocolate-coated peanuts, and chocolate bars, as well as in other types of confections, and also large quantities for salted peanuts. Bakers use peanuts in considerable quantities in making fancy cakes of various kinds. A large part of the shelled peanuts sold by cleaning and shelling factories goes to confectioners and bakers.

USE OF PEANUTS AS FEED FOR LIVE STOCK.

The peanut is one of the more important crops grown in the South for feeding to hogs, thousands of acres being grown for that purpose. Few, if any, crops will produce more pounds of pork on an acre of land or produce it at a lower cost per pound. A good crop of peanuts will produce at least 400 pounds of pork per acre, and if the hay is harvested before turning the hogs into the patch it will practically pay the cost of growing. In addition to the profit on the pork, the crop-producing capacity of the soil will be materially increased, due to the addition of humus and nitrogen. This is very important, as much of the land in the peanut-growing sections is deficient in both. By making successive plantings of peanuts at intervals of 15 to 30 days it is possible in most sections of the South to have peanuts available for the hogs from midsummer until the end of November. In pasturing hogs on peanuts it is best to confine them to small areas by using portable fences, rather than to let them have the run of the whole field.

In some sections of the Southern States the peanut is planted between the rows of corn, either at the time the corn is planted or at the last cultivation. After the corn is harvested cattle are turned in to eat the fodder and peanut tops. Hogs are then turned in to eat the peanuts. In this way the stubble and roots of the peanuts supply humus, and most of the nitrogen stored in the nodules on the roots is left in the soil.

Hogs fattened exclusively on peanuts do not yield a very desirable grade of meat and lard, as the meat is soft and the lard oily. This can be remedied to a large extent, however, by feeding corn and other feeds along with the peanuts.

In addition to growing peanuts to be fed in the field, the crop can be cured and stored in barns or sheds for winter feeding. The entire plant is a very valuable feed for nearly all classes of live stock. Peanut hay, consisting of the entire plant after the nuts are removed, has a much higher feeding value than the grass hays and about the same value as clover hay. The average yield of peanut hay is about two-thirds of a ton per acre. With 2,000,000 acres of peanuts, the estimated acreage for 1917, there would be produced about 1,333,000 tons of peanut hay with a value of at least $20,000,000.

The peanut is especially valuable as a crop to be grown for feed in the drier sections of the Southwest, where it is impossible to grow corn to advantage. Peanuts will withstand drought better than most farm crops. In some regions where corn will not produce 5 bushels per acre, peanuts have proved very satisfactory. The crop is of value also on land carrying a considerable percentage of alkali.

Peanut meal, a by-product from peanut-oil manufacture, is a highly concentrated feed. The meal made from shelled nuts contains about 45 per cent protein, 6 to 9 per cent fat, and 23 to 24 per cent carbohydrates. Meal made from the unshelled nuts contains about 30 per cent protein, 6 to 9 per cent fat, and 21 to 22 per cent carbohydrates. The meal from shelled nuts has about the same feeding value as cottonseed meal and can be used for the same purpose. With the shortage of feeds high in protein the demand for peanut meal at a good price will probably exceed the supply. It is especially valuable for dairy cattle and hogs and has been used to furnish a large percentage of the protein in a home-mixed horse feed. In fact, one large farmer has been using peanut meal for several years for feeding work horses and claims that it is the cheapest protein feed he has ever used. It can be used in quite large quantity in connection with other feeds without injurious effects. When fed to hogs peanut meal does not produce soft pork, and for this reason it is preferable to raw peanuts.

Peanut shells, which accumulate in large quantities at cleaning and shelling factories, are sometimes ground with low-grade peanuts and sold for feed. The shells, however, have practically no feeding value, as they consist largely of crude fiber.

All peanut feeds should be sold on the basis of their protein, fat, and carbohydrate content rather than on the ton basis. For example, 750 pounds of meal made from shelled peanuts has practically the same feeding value as 1,350 pounds of meal made from unshelled nuts. These amounts represent the meal left as a by-product from peanut oil manufactured from a ton of farmers' stock Spanish peanuts. Dealers selling peanut meal should show on the label whether it is made from shelled or unshelled nuts; in fact, this is required by law in some States.

FUTURE OF THE INDUSTRY.

The future of the peanut industry is very bright, as the demand for peanuts for all purposes is increasing very rapidly. This is especially true of peanut oil, owing to the shortage of fats and the decrease in cotton production as a result of the spread of the boll weevil. Probably the greatest opportunity for increasing the acreage of peanuts is for stock-feeding purposes. Nearly every farm in the peanut-growing section could grow to advantage an acre or several acres, depending on the size of the farm, for feeding to hogs. With the urgent demand for pork and pork products and the present high prices paid, there is every incentive for the southern farmer to increase his production of hogs. It is not suggested that farmers restrict the planting of other crops for hog-feeding purposes but supplement these with peanuts for use during the latter part of the season.

As the peanut is coming to be considered a standard farm crop in most of the Southern States and as the consuming public is learning to appreciate its value as a food, there is every reason to believe that production will continue to increase. It is believed that in the near future the production will be reckoned in hundreds of millions of bushels. This statement is based on the fact that production increased from about 3,500,000 bushels in 1899 to over 40,000,000 in 1916, and at the same time the price per bushel increased.

FEDERAL AID TO HIGHWAYS.

By J. E. Pennybacker, *Chief of Management*, and L. E. Boykin, *Assistant in Road Economic Investigations, Office of Public Roads and Rural Engineering.*

ROAD construction and maintenance in the United States involve an annual outlay of over $300,000,000, a sum which, if capitalized at 5 per cent, would represent an investment of $6,000,000,000. Even in this day of amazing figures this sum is not unimpressive. There are to-day something over 4,000,000 motor vehicles and some 25,000,000 horses and mules making use of the public roads more or less, so that on a conservative estimate the motive power available for highway transport far exceeds 100,000,000 horsepower. The tonnage haul on the public roads is estimated at 1,500,000,000 to 2,000,000,000 ton-miles. That this latter figure is not excessive can easily be gathered from a study of the freight-traffic movement on railroads, which now amounts to upward of 1,000,000,000 tons annually. A six-mile haul for 250,000,000 tons would produce the minimum of the ton-mileage thus estimated for the public roads. It is well known that the railroads are unable to carry the enormous traffic now offered for transportation, and it is to be expected that the public roads will from now on have added to their present traffic burdens such freight as may be shifted to them to relieve railway congestion. It is beyond question that for passenger haul the public roads are used to a greater extent than the railroads. These impressive conditions have been created within the span of a single generation. As recently as 1906 there were only 100,000 motor vehicles in the United States, compared with the 4,983,000 of 1917, while in 1904 the total outlay in money and labor on the public roads aggregated only $80,000,000, compared with some $300,000,000 for 1917. Thus, the public roads have been changed with bewildering rapidity from the status of the purely local utility to that of the utility of national importance and scope.

NEW PROBLEMS TO BE MET.

This astonishing development brought in its train many perplexing problems. The types of construction long standard were found wholly unable to sustain motor traffic; maintenance provisions, both as to amount of funds and methods, were pitifully inadequate; the local system of taxation was found to be not only inadequate, but wholly inequitable. In short, it has been necessary to relegate to the scrap heap in a measure the method of construction and maintenance and the systems of management which have prevailed since the days of MacAdam. Skilled engineers and other specialists were needed to devise new methods of construction and maintenance; classification was necessary to insure the construction of those main channels through which it was found that traffic tended to flow, and steps had to be taken to obtain more funds and effect a readjustment of the cost burdens. These necessities could not be provided by counties and townships, and it became essential that they pool their facilities and look to the State for direction.

STATE HIGHWAY MANAGEMENT.

As far back as the early nineties the State governments had begun in a small way to help the counties solve their highway problems. This State participation first took the form of small State appropriations to aid the counties in road construction and at the same time to provide them with engineering advice through the maintenance of State highway departments. In 1893 the Federal Government also began an educational work for road betterment by establishing the Office of Road Inquiry in the Department of Agriculture to investigate systems of road management and to give advice on the subject. The State governments soon found that the difficulties were multiplying too rapidly to be met by small measures, and gradually State highway departments have been strengthened and given supervisory in lieu of merely advisory powers, while the trend has been toward the making of larger State appropriations, the designation of definite State highway systems, the control of such systems by the State, and, finally, the creation of State funds for the maintenance of State highway systems under State control. Most of this development has come within the past 10 years. Although the trend in all of the States is toward a policy of centralization in the handling of their road problems, at present, almost every stage of progress from extreme localization to a highly centralized control is represented in the 48 State systems of highway management.

FEDERAL COOPERATION.

The Federal Government, coincident with this development in the several States, gradually broadened its investigatory and educational field as indicated by the fact that, while the appropriation for the work amounted to only $10,000 in 1893, the appropriation for the fiscal year 1918 is $405,400, exclusive of amounts to be expended for irrigation, drainage, and rural engineering investigations, and an appropriation for a road laboratory building.

Soon after the general adoption of the State-aid policy became assured, the agitation for Federal aid to highway construction became more pronounced and led to the introduction at each session of Congress of hundreds of measures calling for Federal appropriations. In 1912 a joint committee of the Senate and House of Representatives was created for the purpose of investigating the subject of Federal participation in highway work, and that committee made an exhaustive report to Congress in the following year. In 1913 a standing committee on roads was established in the United States House of Representatives.

On July 11, 1916, President Wilson approved a measure generally known as the Federal Aid Road Act, which carried an appropriation of $75,000,000 to aid the States in the construction of rural post roads and $10,000,000 to be expended for the construction and maintenance of forest roads. The enactment of this measure rounds out the most comprehensive scheme of cooperation in road building ever put into effect by any nation.

PROVISIONS OF FEDERAL AID ROAD ACT.

The appropriation of $75,000,000 for rural post-road construction was made available at the rate of $5,000,000 for the fiscal year that began July 1, 1916, $10,000,000 for the next year, $15,000,000 for the third, and so on for five years, ending June 30, 1921. The $10,000,000 for forest roads was made available at the rate of $1,000,000 pear year, beginning July 1, 1916. A sum not to exceed 3 per cent of the post-road appropriation may be used by the Secretary of Agriculture for administering the provisions of the act.

The apportionment of the post-road appropriations to the States, after deducting the administration fund, is based upon area, population, and the mileage of rural delivery and star routes, each of these factors having a weight of one-third.

The Federal funds may be expended only for construction, must not exceed 50 per cent of the total estimated cost of the road, and in no case be more than $10,000 per mile, exclusive of bridges of more than 20-foot clear span.

In order that a State may receive the benefits of the post-road provisions of the Federal act, it must have a State highway department, and the construction on which Federal funds are expended must be done under the direct supervision of that department. An amount at least equal to the Federal funds must be made available by or on behalf of the State. The Federal act requires as a condition precedent to participation by any State that the legislature of that State shall assent to the terms of the Federal act. The respective States in their turn customarily require certain conditions to be met by the counties. These conditions usually involve raising of county funds, the establishment of certain guaranties as to road maintenance, and the taking of certain administrative steps contemplated by the State highway law. In most cases the State highway department deals directly with the counties, but in some States the highway department also cooperates with the township. The counties require certain action by the township as a result of the county cooperation with the State. Thus the Federal act directly or indirectly involves, in some degree at least, the exercise by each governmental unit from the township to the National

Government of some function in the general scheme of cooperation. The Secretary of Agriculture, however, who is charged with the administration of the Federal act, deals only with the State highway department, and thus the State, in meeting the Federal requirements, acts for the counties wherever their interests are involved.

A considerable amount of misunderstanding seems to prevail as to the means by which Federal aid may be secured. Many county officers and private citizens submit to the Department of Agriculture inquiries or applications looking to the obtaining of Federal aid for a local highway. To these inquiries and applications the answer is invariably made that under the terms of the Federal act itself the Secretary of Agriculture may deal only with the State highway department and that the initial power of selection of roads upon which Federal aid is to be expended rests with the State highway department.

OPERATION OF THE ACT.

That immediately following the passage of the Federal Aid Road Act money would begin to flow from the National Treasury into the States with a resultant widespread activity in the actual construction of roads seemed to be a somewhat general expectation. That such a result was not possible could easily have been ascertained by the most casual consideration of the terms of the act itself, which necessitated an immense amount of preliminary work. First, the Secretary of Agriculture was required to apportion the Federal funds for the first fiscal year to all of the States, and in doing this it was necessary that he ascertain from the Postmaster General the mileage of rural delivery and star routes, as these formed one of the factors of apportionment. Next the act required the establishment of rules and regulations. This task called for careful preparation in which the views of each of the State highway departments should be given due consideration. The act was approved July 11, 1916, and 10 days later, July 21, 1916, the certificate of apportionment was issued. The rules and regulations, prepared after a conference held in Washington with the State highway commisioners, were issued on September 1, 1916.

It was necessary to ascertain which of the States were equipped with highway departments within the meaning of the Federal act, as cooperation could be only with States so equipped. This necessitated a most exhaustive investigation of State highway laws and a great deal of correspondence with State officials. When the investigation was completed it was found that 11 States were not equipped with highway departments and that the status of 5 others was doubtful. It was thus evident that new basic legislation was necessary in probably 16 States, while in many of the other States cooperation was impracticable without the passage of enabling State laws, since in some States direct supervision could not be exercised by the highway departments, and in others the requisite funds were not available nor could adequate maintenance assurances be given. In all of the States assent by the legislature was essential, except that the governor might assent pending the adjournment of the first regular session of the legislature held after the passage of the Federal act. It is therefore apparent that actual road construction could hardly have begun under the most favorable conditions before the opening of the season of 1917.

INCENTIVE TO CONSTRUCTIVE STATE LEGISLATION.

Results of far-reaching importance and of even greater potential value than the appropriation of Federal funds have already been accomplished by the Federal act through its influence upon State legislation. During the past winter more constructive State highway legislation has been placed upon the statute books than has ever been enacted in any similar period since the Republic was founded. The very conditions laid down by the Federal act as necessary to participation in its benefits operated most powerfully to bring about the establishment and strengthening of State highway departments, the placing of a vast amount of road construction under skilled supervision, the systematizing and correlation of road work so as to provide the improvements most needed to meet the requirements of traffic, the creation of large funds for construction and for maintenance, and the establishment in many of the States of definite provisions insuring maintenance of highways from the date of their completion.

It is impossible to set forth within the limits of this article the salient features of the State legislation enacted as a result of the passage of the Federal Aid Road Act, but among the impressive results obtained may be mentioned the establishment outright of State highway departments in the States of Delaware, South Carolina, Texas, Indiana, and Nevada, and the strengthening of other State highway departments so as to remove all question as to the 16 States which were not qualified at the time of the passage of the Federal act. To-day every State in the Union is in a position to cooperate with the Federal Government under the Federal Road Act.

ORGANIZATION AND PROCEDURE.

To administer the provisions of the Federal act 10 district offices, each directed by a district engineer, reporting to the Director of the Office of Public Roads, were established. The 10 districts with the location of the district offices, the apportionment of post-road and forest-road funds, and a list of the district engineers are shown in figure 1.

The headquarters office has been divided into two branches, known as the engineering branch and the management branch. All of the activities of the organization, including the Federal aid post-road work, the forest-road work, the investigatory and educational road work conducted under the items forming part of the Agricultural appropriation act, and the irrigation, drainage, and rural engineering investigations are arranged under these two branches.

The procedure adopted calls for the submission of an application, known as a project statement, by the State highway department to the district engineer, who examines the road that it is proposed to improve and transmits the project statement with his recommendations to the Washington office. If the Secretary of Agriculture approves the project statement, the plans, specifications, and estimates are then submitted by the State highway department to the district engineer, who transmits them with his recommendation to the Washington office, and when they are found to be suitable for approval, a formal certificate to that effect is issued by the Secretary of Agriculture to the Secretary of the Treasury and the State highway department, and a formal project agreement is entered into between the Secretary of Agriculture and the State highway department. As the work progresses, or upon its completion, payment on a special voucher, approved by the Comptroller of the Treasury, is made of the Federal funds to the depository named in the project agreement.

Under the rules and regulations as adopted, a standard as to form and arrangement of plans, specifications, and estimates was required to be promulgated by the Secretary of Agriculture. This standard was prescribed and the date upon which it was to go into effect was set forward by several amendments, so that it applied only to projects for which project statements were submitted after September 30, 1917.

The testing engineers of the various State highway departments met with the representatives of the Office of Public Roads at Washington and tentatively agreed upon standard forms of specifications for materials, standard methods of sampling and testing materials, and reporting test results. A committee of the American Association of State Highway Officials, working in conjunction with the Federal representatives, prepared and submitted to the State highway departments standard specifications for the various types of highway, so that by voluntary cooperation marked progress has been made toward bringing about the adoption of efficient methods and the standardization of highway work so as to reduce the possibilities of inefficiency and of unproductive expenditure. This progress follows most logically the excellent and far-reaching results in the form of road legislation which has already been mentioned.

ACTUAL ROAD CONSTRUCTION.

The working season of 1917 marked the opening of the actual construction work under the terms of the post-road provision of the Federal act, as the necessary legislative and administrative work which has already been described made it impracticable to get construction projects under way at an earlier date. At the close of January 31, 1918, there had been approved by the Secretary of Agriculture 253 individual projects, aggregating 2,849.48 miles and calling for an expenditure of Federal funds of $7,324,721.72, and of State and local funds of $9,917,143.70, making a total estimated cost of $17,241,865.42. These projects represented applications from 44 of the States, so that up to that date only 4 States had not reached the stage of actual construction. Unquestionably the spring of 1918 will see Federal aid projects ready for construction in every State in the Union.

Every type of construction recognized by highway engineers as practicable is represented in the projects already approved. Of the total mileage of road involved in projects approved up to the close of January the percentages of the types of construction represented were approximately as follows: Brick, 2.62 per cent; cement concrete, 8.9; water-bound macadam, 2.95; bituminous macadam, 5.63; sand clay, 15.6; earth, 32.1; and gravel, 32.1 per cent. Somehow the impression prevailed in some sections of the country that the Secretary of Agriculture would only approve the higher types of road surfaces, such, for example, as brick, concrete, and bituminous macadam. The Secretary corrected this impression in a specific statement, issued to the public on February 17, 1917.

"There is not the slightest truth in such a report," said Secretary Houston. "This department, which is charged with the administration of the Federal Aid Road Act, has placed absolutely no restrictions, either direct or implied, upon the kinds of highways to be constructed. States may submit for approval any kind of road, even an earth road, and approval will be given if the construction be substantial in character, suitable for traffic needs, and meets the terms of the Federal act. To give State legislators and highway officials the impression that this department favors only costly types of road or discriminates in favor of any particular material, results not only in spreading misinformation, but in placing barriers in the way of States which wish to avail themselves of Federal aid in road construction."

DIFFICULTIES WHICH HAVE BEEN OVERCOME.

Many difficult questions have arisen from time to time in the administration of the Federal act. The question which has given most concern and has been most difficult of solution has been in connection with establishing the status of each project as a rural post road within the meaning of the Federal act. As a result of the consideration of a large number of typical cases it has been ascertained that the four following classes may safely be considered post roads within the meaning of the Federal act: (1) Where the mails are actually carried on the road comprised in the project; (2) where the mails are not actually carried, but a reasonable prospect exists that they will be carried on the road comprised in the project within a reasonable time after its completion; (3) where an entirely new road on a new location is proposed to be constructed and where there exists a reasonable prospect that it will be used for the carrying of the mails within a reasonable time after its completion; (4) where the portion of a road not used for carrying the mails is composed of several or a number of short stretches constituting an unsubstantial or relatively small portion of the whole, and where it is determined that it would be uneconomical to build the portion of the road used for carrying the mails without at the same time constructing these small stretches not so used even though there is no prospect that they will soon be used for transporting the mails.

One of the difficult questions involved a determination of what basis of payment could be adopted by which the States

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Explanation of figure 1.—Small vertical numerals, Federal aid post-road allotment, 1917; small slanting numerals, forest-road allotment, 1917; medium vertical numerals, total Federal aid post-road allotment for 5 years; medium slanting numerals, total forest-road allotment for 10 years; large vertical numerals, Federal road district numbers; • Federal road district headquarters; —— Federal road district boundary.

District engineers and addresses.—1.—L. I. Hewes, Broadway-Yamhill Building, Portland, Oreg. 2.—C. H. Sweetser, Mills Building, San Francisco, Cal. 3.—J. A. Whittaker, 301 Tramway Building, Denver, Colo. 4.—E. O. Hathaway, Post Office Building, Minneapolis, Minn. 5.—J. C. Wonders, Douglas County Court House, Omaha, Nebr. 6.—J. D. Fauntleroy, Wheat Building, Fort Worth, Tex. 7.—J. T. Voshell, Post Office Building, South Chicago, Ill. 8.—J. T. Bullen, Bell Building, Montgomery, Ala. 9.—G. H. Miller, Federal Building, Troy, N. Y. 10.—H. K. Bishop, 515 Fourteenth Street NW., Washington, D. C. (Office of Public Roads and Rural Engineering).

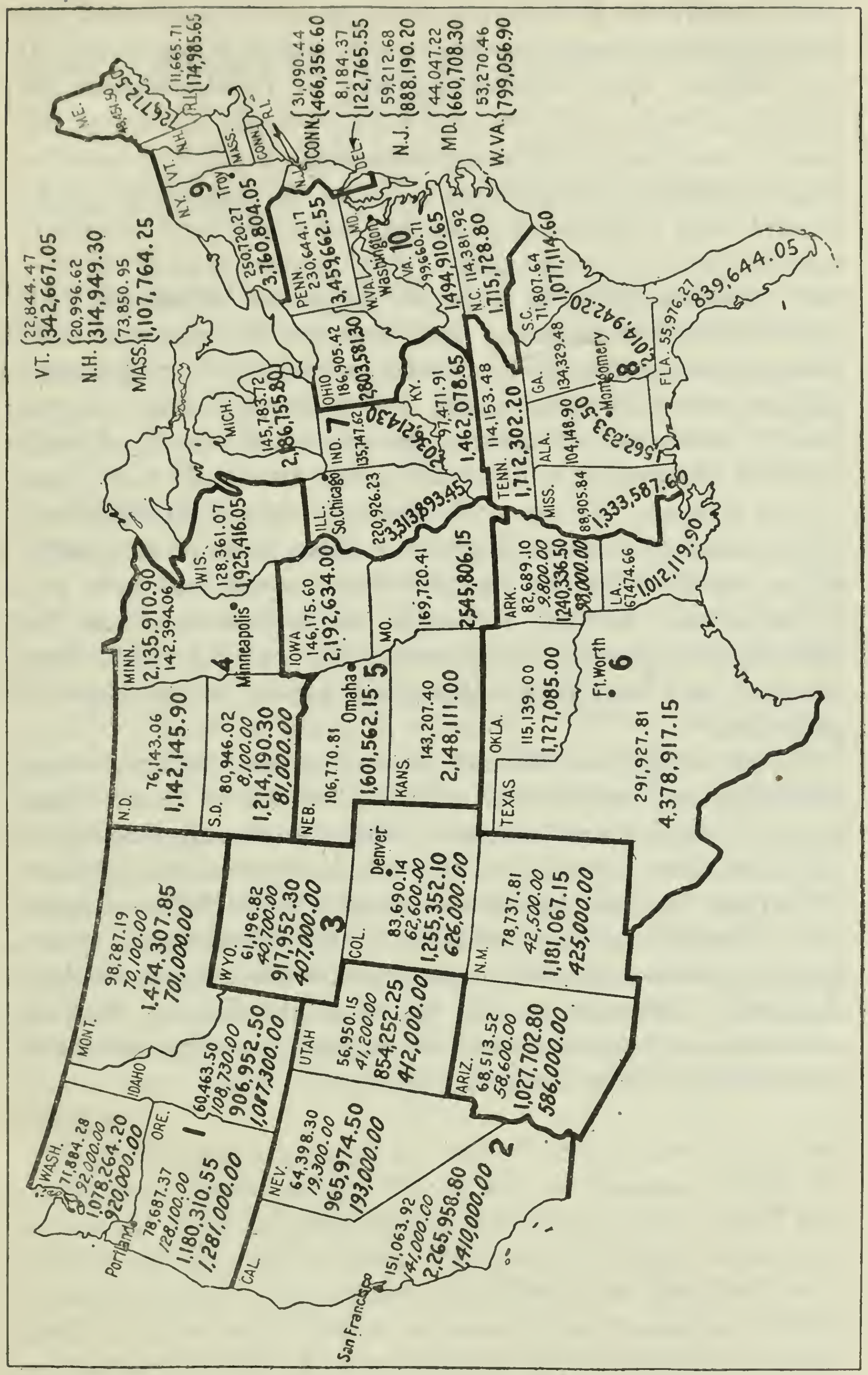


Fig. 1.—Map showing apportionment of Federal appropriation among the States.
[For explanation of map, see bottom of opposite page.]

could receive the Federal aid not only on contract work, but also on force account, day labor, and convict labor work. It was realized that payment by way of reimbursement for amounts actually paid out by the States would involve an excessive examination of the accounts of the States and counties and burdensome requirements as to the showing of subvouchers and other evidence of payment, and would tend to embarrass the States in the making of final payments on projects if they were compelled to make the payments before the Federal aid could be secured. Furthermore, the reimbursement plan gave no assurance that actual results were being accomplished, but only that money had been paid out. It was finally determined to make payments on the basis of units of work performed at the unit prices set forth in the approved estimate. If the work should be awarded to contract, the contract prices would govern. This basis of settlement makes certain that the Federal Government will only pay for an actual showing of results accomplished and at the same time will avoid all necessity for passing upon State accounts and requiring supporting papers as evidence of payments.

On the whole, the Federal act now appears to be working smoothly, and cooperation with each of the 48 States along practical lines seems assured. Whether the application of the cooperative principle to this vast enterprise will produce the largest possible measure of benefit to the Nation can not yet be determined, but certainly if the difficulties of operation may be surmounted it should follow that the tremendous cumulative effort of all the forces of the Nation working to a common purpose should accomplish amazing results in the building of the Nation's highways.

THE SOURCES OF OUR NITROGENOUS FERTILIZERS.

By Frederick W. Brown,

Assistant in Charge, Investigation of Fertilizer Resources, Bureau of Soils.

NITROGEN is one of the most abundant elements on earth and at the same time normally by far the most costly of our fertilizer ingredients. This apparent paradox is explained by the facts that free nitrogen—that is to say, nitrogen uncombined with other elements—is of no use to plants, and that only with difficulty can it be made to combine artificially so as to be useful.

The existing emergency has served to bring sharply home to us our dependence upon fixed, or combined, nitrogen. We find ourselves confronted with the necessity of waging a great war and for that purpose producing vast quantities of powerful explosives. For the making of almost all modern explosives fixed nitrogen is essential. At the present moment tremendous tonnages of combined nitrogen are thus being used for munitions, to be released on the battlefield and pass back into the atmosphere as free nitrogen.

At the same time with this demand comes the necessity of raising more foodstuffs than ever before, that we may have a large export surplus to supply the needs of Europe. Increased acreage of food crops and increased bushels per acre are both essential in meeting this emergency. Increased bushels per acre require applications of fertilizer, and fertilizers are composed of phosphates, potash, and fixed nitrogen.

We have, then, at present an unprecedented demand on the nitrogenous materials of the world, a demand which is increasing daily and which the resources of the world are already being taxed to meet. Sources of supply which in normal times are used almost exclusively for fertilizer purposes are now being drawn on heavily for munitions, while our farmers, in the effort to produce up to the limit of their fields' capabilities, are calling for increased tonnages of nitrogenous materials. This desire of our farmers to use more fertilizer should receive every possible encouragement. Unfortunately at present the abnormal demands by munition makers on the world's supply make it difficult to furnish the farmer with nitrogenous materials at reasonable prices. This condition is further accentuated by the high freight rates on imported materials.

USE AND EXTENT OF NATURAL DEPOSITS.

The only important natural deposits of nitrogenous material are the extensive beds of nitrate of soda occurring in the arid regions on the west coast of South America, mainly in Chile. This is the source of our Chilean nitrate, Chile saltpeter, nitre, or "soda," as it is called in some parts of the United States. The preservation of the nitrate salt in these beds is due to the fact that the country is practically without rain, since the salt is readily soluble in water and in a humid climate would long ago have been leached out of the rock.

The recovery of the nitrate is simple. The overburden of low-grade and worthless material is removed, and the richer, underlying rock is blasted out and then crushed, the nitrate salt is leached out with water, the resulting brine is evaporated, and the nitrate separated from the sodium chloride and other impurities in the rock and crystallized. Commercial sodium nitrate contains about 15 per cent of nitrogen; it is quickly soluble in water and, consequently, is almost immediately available for plants upon application to the soil. For this reason it is used as a top-dressing for the purpose of giving plants a quick start. It also enters extensively into mixed fertilizers as one of our most important nitrogen carriers. A considerable amount is also used in the production of sulphuric acid, which in turn is used to treat phosphate rock to give superphosphates.

In 1914, the latest year of normal consumption, 564,000 tons of nitrate of soda were imported, of which 162,000 tons were used for fertilizer purposes. In 1916, 1,200,000 tons came into the country and about 250,000 tons entered into agriculture. The greatly increased importations were due to demands by makers of munitions.

Only a small portion of the nitrate fields of Chile have been carefully explored and surveyed, and of known and surveyed deposits probably not more than a quarter have been mined. It is likely, therefore, that the Chilean deposits will be able to furnish nitrate in large quantities for many years to come.

PRODUCTION OF AMMONIUM SULPHATE.

A second great source of quickly available nitrogen is ammonium sulphate. All coal contains a small percentage of nitrogen. When coal is burned or when it is coked in the beehive oven, this escapes into the air as free nitrogen. When coal is coked in modern retort ovens, this nitrogen is recovered as a by-product combined with hydrogen in the form of ammonia. This by-product ammonia is then treated with sulphuric acid, and ammonium sulphate results. This is a dry, grayish powder, containing about 20 per cent of readily available nitrogen. Ammonium sulphate is one of our most important fertilizer ingredients. It is largely used in the preparation of mixed fertilizers, but in view of its solubility it could probably be advantageously used as a substitute for sodium nitrate as a top-dressing.

If all the coal now coked in this country were coked in by-product retorts we should have a supply of ammonium sulphate amounting to nearly 900,000 tons annually. In fact, we produced in 1916 only about 325,000 tons, since nearly two-thirds of our coke was produced in the wasteful beehive oven. It is gratifying to record, however, that the transition from beehive to by-product ovens has been proceeding rapidly in recent years, and a steadily increasing percentage of our coke is being made in a way which permits of the recovery of the valuable minor constituents in the coal. At present large quantities of by-product ammonia, as in the case of sodium nitrate, are going into the manufacture of explosives and the price has advanced very sharply.

USE OF ORGANIC AMMONIATES.

In point of tonnage one of our largest single sources of nitrogen for fertilizer purposes is cottonseed meal. This is the dried residue of the cotton seed after the oil has been extracted. It contains between 5 and 8 per cent of available nitrogen as well as small percentages of phosphoric acid and potash. It is used very extensively throughout the South as a fertilizer material and 325,000 tons were used in 1914 by fertilizer manufacturers. In addition, a large tonnage was undoubtedly applied by the farmers direct.

In recent years the practice of feeding organic ammoniates, like cottonseed meal and tankage, has increased, and this reduces the amount available for fertilizer. The use of these organic substances as a feed for cattle should be encouraged, however, as in this way they are made to serve a double purpose, since a very large proportion of the fertilizing elements reappear in the manure. The value of cottonseed meal as a feeding stuff has long been recognized by European cattle raisers, and normally large quantities of this material are exported to countries like Denmark and Holland, where intensive dairying is practiced.

Any decided increase in the use by our farmers of organic nitrogen carriers will force us to look elsewhere for nitrogen for fertilizer purposes, and this fact lends additional importance to the investigations now being carried on looking to the fixation of atmospheric nitrogen.

Two important nitrogenous fertilizer materials, dried blood and tankage, are derived from slaughterhouse waste. Dried blood is precisely what its name implies. It carries from 10 to 13 per cent of readily available nitrogen, and has long been recognized as a valuable fertilizer ingredient. Tankage is the dried residue after the grease has been extracted from slaughterhouse wastes. Such materials as can not be used in the meat, leather, soap, glue, or bone industries find their way ultimately to tanks, where they are thoroughly cooked with steam. The grease is removed and the residue pressed, dried, and marketed as tankage, which contains from 6 to 12 per cent of nitrogen in readily available form.

Another important organic ammoniate is fish scrap. The capture and utilization of menhaden for fish oil and fish scrap has become an established industry on the Atlantic coast. The fish are taken in immense quantities in nets carried by steam trawlers and are treated in much the same way as slaughterhouse wastes, being cooked, freed from oil, and the residue pressed and dried. Fish scrap contains, in addition to about 8 per cent of nitrogen, about 5 per cent of phosphoric acid. On the Pacific coast considerable fish scrap is manufactured as a by-product by using the wastes from fish-canning factories. In 1914 approximately 63,000 tons of fish scrap entered into fertilizer manufacture.

Such materials as fur, wool, hair, leather, hoofs, and horns all contain percentages of nitrogen, and in the industries using these materials large quantities of waste accumulate. The nitrogen in these materials is not readily available, so that they are not used in the raw state for fertilizer purposes. They are, however, treated by mixing with acid phosphate, the action of the acid rendering the nitrogen available. This mixture is known to the trade as base goods, and furnishes a considerable quantity of the nitrogen in mixed fertilizers. Bone, ground or steamed, though primarily a phosphate carrier, also contains varying percentages of nitrogen.

FIXATION OF ATMOSPHERIC NITROGEN.

Chemists have long recognized in the atmosphere about us a huge reservoir which must ultimately supply our increasing needs in the way of fixed nitrogen. A tremendous amount of research has been done on the problem of fixing this atmospheric nitrogen in useful form. Nature accomplishes the result by means of bacteria, particularly those forms which cause the nodules on the roots of leguminous plants. The Romans knew the value of legumes in a rotation and put the knowledge in practice without knowing why. We understand why soil conditions are improved by legumes, but are still confronted with the unanswered question of how bacteria fix the nitrogen.

The artificial fixation by chemical or electrochemical means is difficult and costly. Several methods are in actual operation and others are in the experimental stage of development. That the problem will be solved and cheap fixed nitrogen be made available for our farmers is as nearly certain as anything in the future can be called certain.

The three general processes now in operation are the arc, the cyanamid, and the synthetic ammonia processes.

The principle of the arc furnace is based upon the well-known fact that if the nitrogen and oxygen in the air are subjected to the action of an electric arc portions of the two gases combine to form nitric oxide. Thus traces of nitric oxide can be detected in the air after a severe lightning flash.

Using this fact as a basis, electric furnaces of various types have been constructed for producing either a broad or a long electric arc and passing air through it.

Three types of such furnaces are now being commercially operated. The Birkeland-Eyde furnace draws out the arc by the action of magnets into a broad sheet of flame through which the air is passed. The Schoenherr type employs a long arc produced by the blast of the passing air driven at high pressure up a steel cylinder. The Pauling furnace produces a fan-shaped flame by the action of the air under pressure between two diverging electrodes. A fourth type, the Kilbourn-Scott, employs three electrodes, and the air, entering under pressure below the arc, produces a cone-shaped flame. This last type is reported to be in operation on an experimental scale in England.

Unfortunately the reaction of the nitrogen and oxygen in the electric arc is a reversible one, and unless the temperature of the gases is immediately dropped from about 3,000° C., the temperature of the arc, to about 1,200° C. the nitric oxide again reverts to free nitrogen and oxygen. This sudden drop in temperature is difficult to accomplish, and under the best operating conditions no arc process recovers more than 2½ per cent of the entering air in the form of nitric oxide. For this reason large amounts of electric current are necessary per unit of nitrogen fixed, and arc processes can be operated commercially only where current can be generated in large amounts and very cheaply.

Owing to the topography of the country these conditions can be met in Norway, where both the Birkeland-Eyde and the Schoenherr processes are in operation on a large scale, the power being furnished by hydroelectric installations. The nitric-oxide gas is drawn into large towers, where it reacts further with oxygen and forms other oxides of nitrogen, after which it is blown through absorption towers, where it encounters water or dilute acid, and in this way weak nitric acid is formed. This is neutralized with lime and calcium nitrate formed. As marketed it contains about 9 per cent of nitrogen, and prior to the present war small amounts were exported to this country from Norway.

The Pauling process has been installed in several places in Europe where power is available at a cheap rate. A small installation for using this process was erected some years ago in South Carolina, but nitrate of lime from this plant has never entered the market in any quantity.

It is doubtful whether the arc processes in their present stage of development can be used successfully in this country, owing to the high cost of power. To develop the power in most of our streams is a very expensive undertaking, and even where conditions permit of the production of power at low cost, as at Niagara Falls, other industries as a rule stand ready to buy it at a price that makes its use for the arc process of nitrogen fixation impracticable.

The cyanamid process for fixing nitrogen involves the production of calcium carbide by melting a mixture of lime and coke in an electric furnace. The carbide is ground and again heated and pure nitrogen is forced through the mass. At about 1,000° C. a reaction takes place and calcium cyanamid is formed, containing about 20 per cent of fixed nitrogen. Upon treatment with superheated steam, cyanamid gives up its nitrogen in the form of ammonia, which may then be oxidized to nitric acid or treated with sulphuric acid to produce ammonium sulphate.

The cyanamid process requires large amounts of cheap power, and so far has never been used commercially in this country. A plant on the Canadian side of Niagara Falls, operating under a long-term contract which insures it a limited amount of power at a cheap rate, has produced cyanamid commercially for some years, most of which has found a market in the United States.

The Haber process of nitrogen fixation involves the production of ammonia directly from its elements, hydrogen and nitrogen. If the two gases be compressed to 1,500 pounds to the square inch, heated to 600° C., and passed over spongy iron, a certain percentage of the mixture is combined as ammonia. This process and the cyanamid process have had very wide development in Europe, and especially in Germany, since 1914, owing to the demand for fixed nitrogen for explosives. Though the mechanical difficulties involved in the Haber process are great, the power cost is small, and it seems to offer possibilities for development in this country more attractive than either the arc or the cyanamid process. The Bureau of Soils has installed a synthetic ammonia plant at its Arlington laboratory, and is at present experimenting with the process, with the object of reducing the mechanical problems to the simplest form and determining the best conditions of pressure and temperature, and the most efficient catalyzers.

In addition to the above there are several processes which are not as yet operating commercially but which seem likely to be of importance in nitrogen fixation in the near future.

The Bucher process, which fixes nitrogen as cyanide, involves heating a mixture of carbonate of soda, coke, and iron in an atmosphere of nitrogen. Laboratory experiment has demonstrated the chemical feasibility of the process, but up to the present no satisfactory furnace for continuous large-scale operation has been devised.

Recently attention has been called to a new process, involving the use of carbide, which appears to have advantages over the cyanamid method. This is the Reid process, in which the carbide is produced by coking a mixture of ground coal and lime and reducing this lime-coke to carbide in a type of electric furnace which permits of the use of "off peak" power. By this is meant power available at most electric plants during that portion of each 24 hours when part of the power which the plant is capable of producing is not being taken by its regular consumers. Such power can always be had at very cheap rates. The Reid process nitrifies the carbide at a lower temperature than the cyanamid method, and by the use of a catalyzer reduces the time required for the nitrification process. Finally the nitrified product differs from cyanamid in that it gives off its nitrogen as ammonia under the action of waste or wet steam. It seems probable that by the economies effected this process may be able to operate successfully under American conditions.

CHEESEMAKING BRINGS PROSPERITY TO FARMERS OF SOUTHERN MOUNTAINS.

By C. F. Doane, *Dairy Manufacturing Specialist*, and A. J. Reed, *Dairy Husbandman and Cooperative Extension Agent in North Carolina for the Dairy Division, Bureau of Animal Industry.*

AGRICULTURAL development is often delayed in isolated communities. Where communication with the outside world is difficult, farm practice changes very slowly. Until recently such was the case in many of the mountain districts of Virginia, West Virginia, North Carolina, South Carolina, Georgia, Tennessee, and Kentucky. These districts have a total area of about 50,000 square miles, or a little less than that of the State of Wisconsin. Throughout large

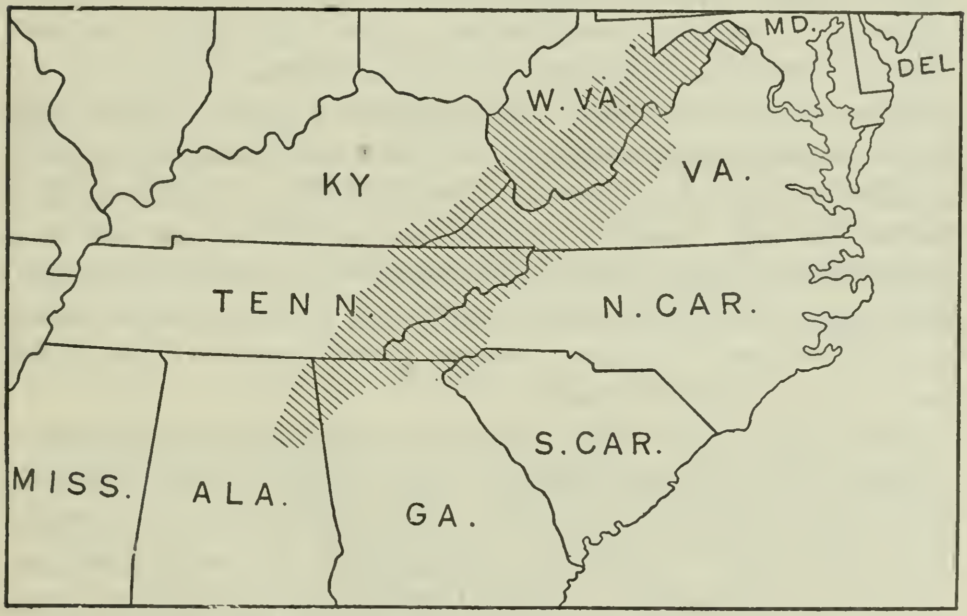


Fig. 2.—Southern Mountain District suitable for cheesemaking (shaded area).

areas of the mountain districts agricultural development has been very slow. Cheese production and the improvement of cows, however, appear to point the way toward financial and industrial independence for many parts of this area. (See Pl. XII.)

The wood and the land on which it grew were the only natural resources of many parts of the district, and there has not been sufficient business to encourage the building of railroads, which, in such a mountainous region, can be constructed only at great expense. As a result many mountain communities are still remote from railroads and without ready access to city markets. Because of low cash income and poor transportation facilities, the people have traveled little and many of them have but a vague idea of the development of other districts. Being naturally a home-loving people, they have been loath to leave their mountain homes, and the country is now heavily populated. Unfortunately, until recently, the cash income has not kept pace with the gain in population.

AGRICULTURAL CONDITIONS.

On most farms the acreage of tillable land is small and the larger areas of rough and stony land are kept in grass and used as permanent pasture. Because of the large percentage of permanent pasture, cattle raising has been the principal industry. In a few localities very good beef cattle are produced, but ordinarily the cattle are a mixture of breeds, including many small and very inferior types. The largest farms contain about 160 acres, and only the best of them will support a herd of 20 cows. (See Pl. XIII.) On the smaller farms the only items of cash income are from the sale of a few dozens of eggs, small quantities of butter, and a few calves. The larger farms sell a little more and do a somewhat more varied business, but the average gross income of even the best of them is very small.

Forty years ago, when land was cheap, the population smaller, and the farms larger, living conditions were different. For each family there was then more land than is now available from which to make a living, and new land could be opened up at any time. Since then many of the farms have been divided among heirs, and as a rule the smaller farms now produce so little that there is no surplus to provide for education, road improvement, better live stock, or for rapid progress of any kind.

Where beef cattle of even an inferior quality are kept, conditions are much better than where the living is derived from crops alone. Feeding the crops to beef cattle has conserved soil fertility and made larger crop yields possible, but in many places present farming methods must be changed before much progress can be made. No progress can be made without an increased income. There must be a greater income per man, per acre, and per cow. A change from an inferior type of beef cattle to a good quality of dairy cattle and the making of the milk into first-class cheese seems to offer the best solution of the problem.

CONDITIONS FAVORABLE TO CHEESEMAKING.

The first consideration of the adaptability of dairying to the southern mountain districts was given in 1913 by the cooperative extension agent of North Carolina.[1] In a study of that territory it was found that the production of home-made cheese was an important industry in some of the mountain districts 25 years ago, and that many of the farmers still made small quantities of a poor quality of skim-milk cheese. As a rule the cows were low-producing scrubs, and the calves, which were allowed to run with them, did most of the milking. The calves were weaned at about three months of age, but the quantity of the milk was so small and the milk products had so little cash value that the cows were usually dried off as soon as convenient. Climatic conditions were found to be very favorable for the production of cheese, and as practically every house was built near a spring, facilities for cooling the milk were easily available. The fact that dairying requires more labor than the raising of stock cattle presented no serious problem, because labor was plentiful and cheap.

COOPERATIVE PLAN ADOPTED.

After a thorough study of conditions it was decided that the cooperative factory plan was best adapted to existing conditions, and a cooperative extension man qualified in cheesemaking was employed in October, 1914, to work among the mountain farmers of North Carolina.

Before the establishment of factories the problem of obtaining cheesemakers had to be met. It was at once apparent that thoroughly trained, high-priced cheesemakers could not be employed, because the supply of milk would not justify payment of the wages demanded. It was decided, therefore, to hire and train a bright young man from each neighborhood where a factory was to be built. In a very short time each man had received training enough to enable

[1] The extension men are cooperatively employed by the North Carolina College of Agriculture and Mechanic Arts and the United States Department of Agriculture.

him to manage a factory with what assistance the field agent could give him. This plan made it possible to get cheesemakers at wages that were not prohibitive and made each factory a purely local enterprise.

The method of making commercial cheese was presented to the farmers, but most of them were quite skeptical until demonstrations were given and the quality of cheese proved to be equal to that of "store cheese." This aroused some interest and the extension men received many insistent requests that the work be extended.

ESTABLISHMENT OF FACTORIES.

In the spring of 1915 the first cooperative company was organized at Cove Creek, Watauga County, N.C. The factory was completed and cheesemaking was begun June 5. The building was very small, being 14 by 16 feet, and the cost, complete with equipment, was only $400. (See Pl. XIV, fig. 1.) About six weeks later another factory, fully equipped, was completed at Grassy Creek, N. C., at a cost of $375. Though both factories were completed late in the season, each returned almost $1,500 to the patrons before the end of the year. This was a net gain of more than $1,200 in each case, because in previous years the total income from the sale of butter averaged less than $300. Before the end of the year two other cheese factories were built. (See Pl. XIV, fig. 2.) Both proved to be successful, and the work soon spread to other sections of the State and to other States. To organize the first community required much work, but since that time it has been impossible to meet the demand for assistance and no solicitation has been needed to induce the people to put up new factories. At the present time larger factories are being built at a cost of from $800 to $1,000 each, which is subscribed jointly by 30 or 40 local stockholders. (See Pl. XV, fig. 1.) The salary of the cheesemaker and all other expenses connected with the running of the factory are met by the income from the sale of the cheese.

IMPROVEMENT IN DAIRYING METHODS.

Better care and more skillful feeding have resulted in a greatly increased milk production, while in some cases profits have been increased through the purchase of better cows. Though provision has been made for the better housing of dairy cattle, very few new dairy barns have been built. The greatest improvement in this respect has been brought about through the remodeling of old barns, which, being well built, will last for many years. In most cases all they needed were new floors, more light, and better ventilation. So far as possible the improvements were made by the farmers themselves from supplies on hand or from materials produced in the neighborhood.

Cold springs cool the milk and keep it cool, enabling the farmers to deliver sweet milk to the factories. This makes it possible to manufacture cheese that compares favorably with that produced in any other section. Because of the good quality of cheese no difficulty has been experienced in disposing of it at satisfactory prices. The Southern States consume large quantities of cheese, thus insuring a ready market near by for the product of the mountain factories. This gives an advantage in freight rates that is more than sufficient to pay the cost of delivering cheese from remote mountain districts to railroad shipping points.

In converting the milk into cheese great care is taken to prevent waste, and the whey is now much in demand for feeding hogs. (See Pl. XV, fig. 2, and Pl. XVI, fig. 1.) When the cheese factories were first established the farmers considered the whey a worthless by-product, but finally they have come to realize its great feeding value and are doing what they can to see that its distribution is fair. Over the neatly arranged whey barrels at one factory the following sign may be read:

> "Don't spill the whey. Spilled whey creates filth, filth breeds germs, germs cause disease, disease sometimes results in death, and death will lead to eternal hell for the man who takes more whey than belongs to him."

FACTORIES PROVING TO BE SUCCESSFUL.

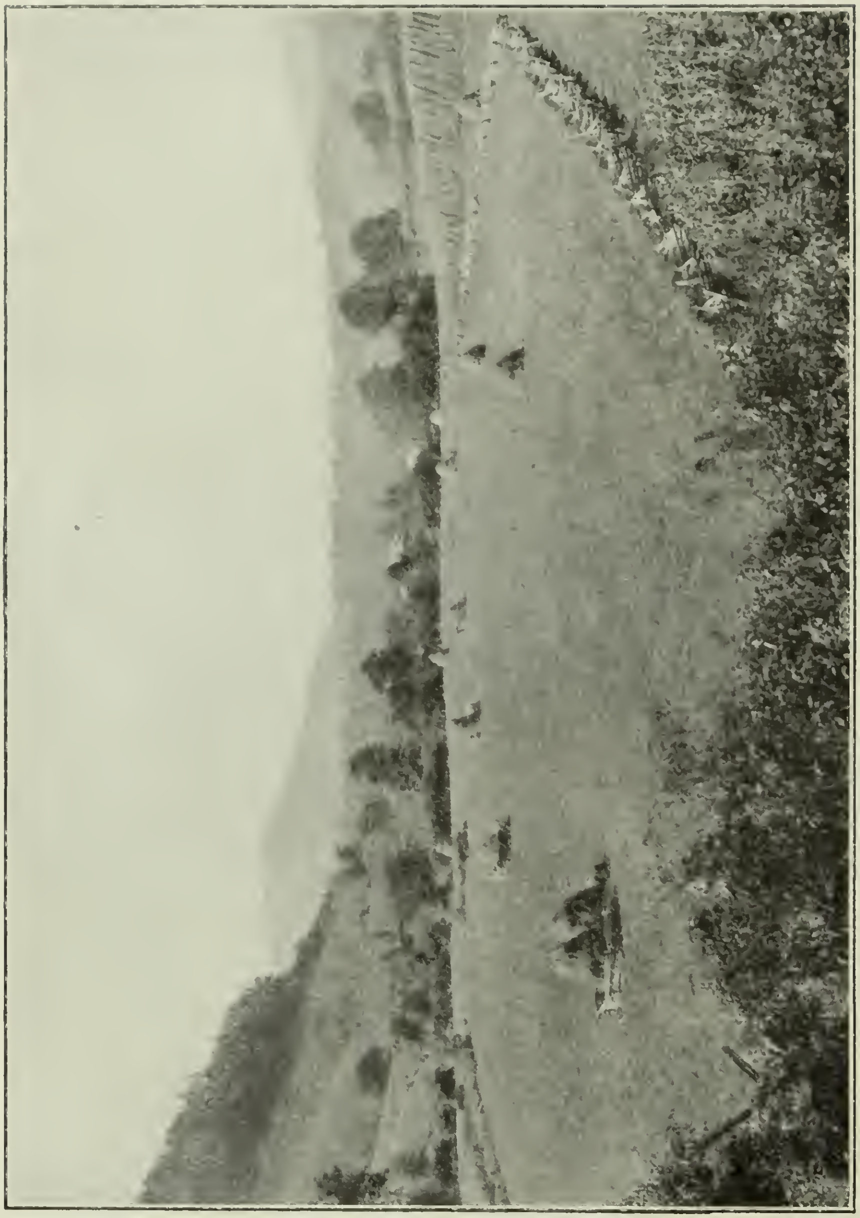
As indicated in the rapid increase in the number of factories, the cheese industry in the mountain districts has received a good start and shows every indication of continued growth. The effort to increase cheese production has been along conservative and rational lines, and the building of factories has been encouraged only in regions where climatic and other conditions render their operation feasible. The first year the factories were opened about $3,000 worth of cheese was made and sold. In 1916 about $30,000 worth of cheese was made in North Carolina alone, and during the year 1917 more than $125,000 worth of cheese was made in the 34 factories now in operation in the mountain districts of North Carolina, Virginia, Tennessee, and West Virginia. Twenty-six of these factories were organized in 1916. All have been successful and each has shown a rapid growth from the day it opened. The cost of operation, added to what the farmers would probably have received for the milk if there had been no cheese factories, would amount to about one-fourth of the gross receipts; therefore it is fair to infer that three-fourths of the $125,000, or a little more than $90,000, is newly created wealth.

From ten grade dairy cows one farmer sold $750 worth of milk and calves in seven months. This would be nothing unusual in a great dairy district, but before the introduction of cheese factories such incomes were not common in this section. A check for $12 was sent to the wife of one of the directors for milk sold during the first month the factory was in operation. She could not understand how this could be, because formerly she had received less than $2 a month, in trade, for the butter made and sold to the local stores. To get so large a check made her think there must be some mistake—otherwise she could not account for so much more money from so much less work.

STANDARD OF LIVING RISING.

The effect of the increased income from the mountain farms is already shown in a higher standard of living. (See Pl. XVI, fig. 2.) Farmhouses are being remodeled, better farm equipment of all kinds is being introduced, road improvement is already begun in many sections, and more interest is taken in educational work of all kinds. The introduction of cheese factories was only the first step forward, but these factories furnished the financial support for the movement that is slowly but certainly transforming many isolated mountain districts into prosperous farming communities.

IN THE HEART OF THE SOUTHERN MOUNTAINS.



A GOOD TYPE OF MOUNTAIN FARM.

FIG. 1.—FIRST CHEESE FACTORY IN THE SOUTHERN MOUNTAINS, AT COVE CREEK, N. C.

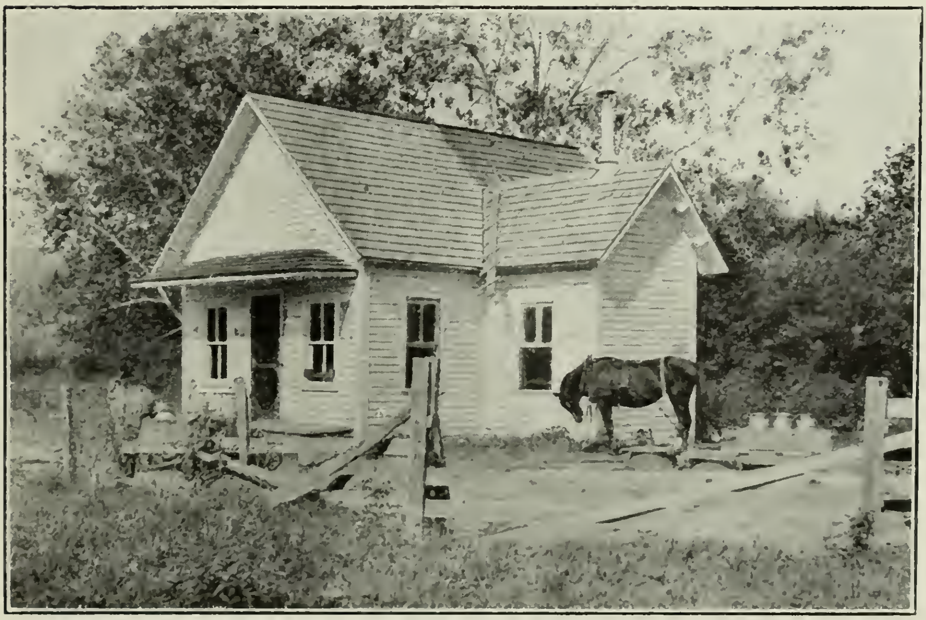


FIG. 2.—BEAVER DAM CHEESE FACTORY, SWEETWATER, N. C.

FIG. 1.—ONE OF THE EARLIER COOPERATIVE CHEESE FACTORIES IN SOUTH MOUNTAINS, NEAR SPARTA, N. C.

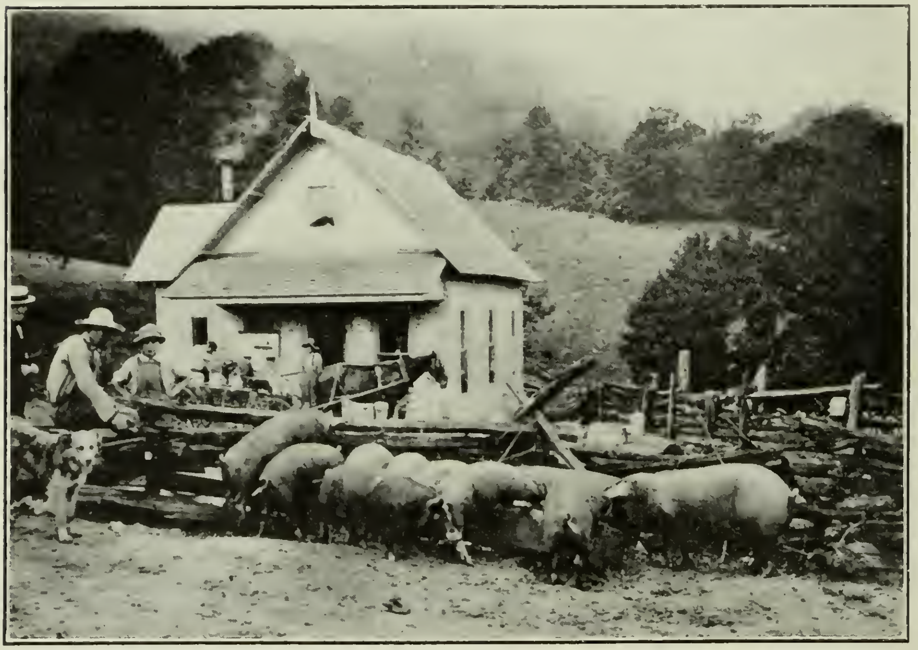


FIG. 2.—HOGS RAISED ON WHEY FROM TWIN OAKS FACTORY

FIG. 1.—WHEY BARRELS IN DOORYARD OF MOUNTAIN CHEESE FACTORY.

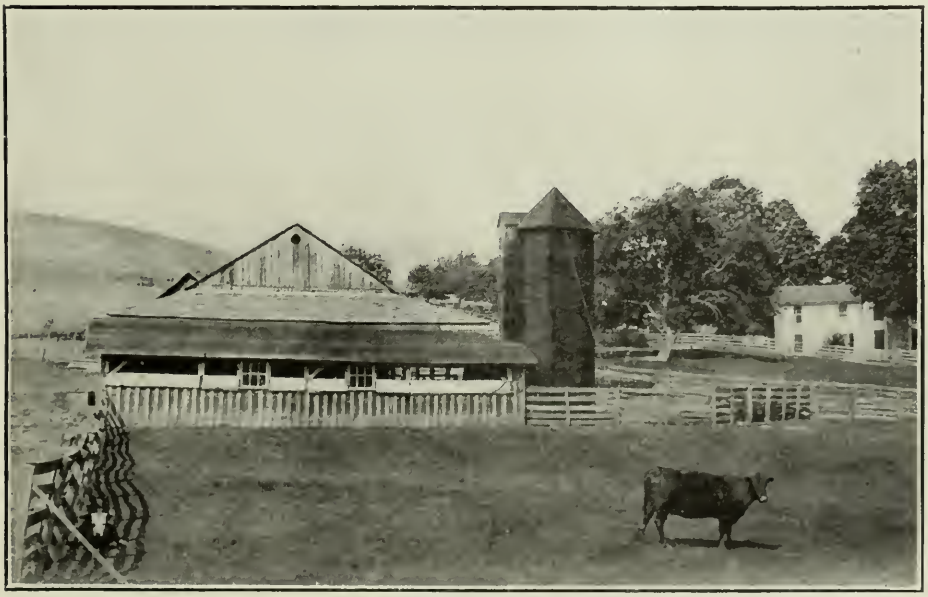


FIG. 2.—A MOUNTAIN FARM TO WHICH CHEESEMAKING HAS BROUGHT PROSPERITY.

VALUE OF RECORDS TO THE FARMER.

By J. S. Ball,

Assistant, Office of Farm Management.

THE subject of farm accounts is one about which there are many misconceptions. We have been too prone to lay stress upon the mere formality; to make it appear that farmers were expected to believe that if they only had certain special kinds of books and forms the accounting would be easy and fruitful in results. Practically all farmers keep records of one kind or another, and the average farmer is not easily impressed with the notion that there is any special virtue in merely setting down columns of figures, yet there remains a class of writers on this subject who seem to think that if all farmers could only be persuaded to practice double-entry bookkeeping, all the problems of agriculture would be solved as by magic.

No one knows better than the practical farmer that there is nothing of the cure-all in the keeping of accounts on the farm. The practice will not of itself turn a poor farm into a rich one, a poor farmer into a good one, or losses into profits. Farm records, if accurately kept and intelligently utilized, are an aid to a better understanding and insight into one's business affairs, and are worth while in exact proportion to the accuracy and completeness of their recording and the pertinence of the use that is made of them. These are facts well known to thousands of farmers who keep accurate accounts and make good use of them.

FUNDAMENTAL PRINCIPLES.

In beginning record keeping it is of vital importance to have a clear understanding as to just what facts about the farm business should be shown by the records day by day and at the end of the year. It is as useless to start record keeping without having thought over and decided on what you intend to have the records show, as to begin digging a foundation and hauling lumber for a building without first deciding on the kind and size of structure to be erected. No farmer would be so foolish as to start his téams to a field to work without first making up his mind what crop he intended to grow thereon. It would be just as foolish to begin record keeping without a definite idea of what facts about the farm business the accounts are designed to bring out.

When this is thought over and decided upon the next step is to secure this information with the least amount of work and in the simplest way. The kind of books and forms used does not matter in the least, providing the records are complete and accurately kept—but a method is desirable that will promote facility in summarizing the records at the end of the year. The continued keeping of the accounts will often develop the most convenient form.

USEFULNESS OF ACCOUNTS.

Usefulness is the test of value. The use that is made of farm accounts is the measure of their value to the farmer, and the simpler the accounts kept by the beginner, the greater the chance for them to prove of use.

Among the oldest examples of farm records may be mentioned the practice of shepherds in ancient times, who counted their flocks by dropping pebbles in a bag. A primitive method, but an example in many instances well worth the time it took, for by its means definite facts were gained and losses avoided.

In sections of the country where corn is husked from the shock in the field, it is a common practice when hauling it in to keep tally of the number of bushels or barrels by marks on the side of the wagon box. This is another instance of a primitive record from which full benefit is realized, since the tally is used in divisions between landlord and tenant and is also the record by which the huskers are paid. (See Pl. XVII, fig. 1.)

SIMPLE ACCOUNTS.

Farm records may be roughly divided into two heads:

1. Records of happenings.
2. Records of money transactions.

Simple accounts of everyday happenings are often of great use. Every farmer makes a note when a calf is born or a sow farrows. Many do so mentally only, but it is none the less a note. If such notes are written down in a way that makes reference to them easy, they become of much use in supplying needed information when memory fails. Notes recording other everyday happenings often prove useful. Among these may be mentioned the dates when animals are bred, men hired or discharged, accidents occur, pasture season begins and ends, first and last frosts occur, incubators are set, spring work begins and fall work ends, seed time and harvest occur, etc. Such notes as these when systematically recorded and constantly referred to are of much value. They enable one to take proper precautions as to feed and care of animals prior to the birth of young, thereby often saving both mother and offspring. Disputes with hired men as to wages are avoided by recording when they are hired, a wage agreement, and all amounts subsequently paid them. Accident records are of value when seeking redress for damages, pasture data when figuring on feed supply, and frost and other weather data in planning the year's work.

RECORDS OF MONEY TRANSACTIONS.

A record of the cash received and paid out is made by many farmers, but all the benefits to be derived from such records are seldom realized. The most important use made of them in many cases is as a means of checking up bills when sent in, to see whether all payments have been duly credited. The realization of even this small part of their full value sometimes makes such records well worth while. There is no reason why every farmer should not have such a check on his business dealings, and losses can often be avoided by proving credits that have been overlooked by the storekeeper.

The cash account may be kept in any convenient form, but perhaps the simplest and most interesting way for a beginner is to use a diary. If this be done, part of the page may be used to record the daily happenings and the cash record made on another part of it, thus giving a complete record of the day,[1] and in addition to the foregoing daily notes of personal affairs, ideas, and events may be jotted down, thus giving

[1] The use of a diary for farm accounts is fully illustrated and described in Farmers' Bulletin No. 782.

such records a personal touch, making them of more than mere business significance, and giving them color that will

Thursday Nov 1st

Weather, Heavy frost, Clear, Cool.
Holstien heifer had a fine calf last night.
a heifer, most all white.
I went to town today, took in hog.
Saw Judge Nelson and paid deposit
on the Sanborn property.
The sorrel mare stepped through hole
in bridge coming back. She's pretty lame.
Hired Fred Halley to work by the year
for $37.50 per month and use of house
near Webster's Corner.
Joe is hauling corn in today about as
fast as three men can husk it.
Got in 210 bushels today.
Wheat is looking good. Late planting
didnt hurt it any.
Hiram Smith got word today his
boy had got to France O.K.

Money Spent =	Deposit on Sanborn Property	$100.00
	Paid Fred Holley on a/c	5.00
	Sack flour 2.10 tobacco 5	2.15
	Total	107.15

Sold hog 179 lbs @ 18½ cents $33.11

FIG. 3.—Sample page of the diary type of farm record book. Many items of farm, personal, and neighborhood interest, as well as the farm and family cash account, recorded in such a way as to give desired data and make the record not only of value in a practical accounting way, but also as a reference book of farm and neighborhood happenings.

make them of interest in the years to come. (See fig. 3.) Any information wanted at the end of the year may be assembled from a diary account book in a few hours.

TABLE I.—*An example of farm cash records summarized for a year's business on an eastern North Carolina diversified farm.*

Source of income or expense.	Amount.		Per cent of total.
RECEIPTS.			
Dairy herd:			
Milk sold	$2,185.24		
Cows sold (5)	198.20		
Calves sold (4)	80.00		
Breeding fees	10.00		
Beef and hide	27.16		
Total from dairy herd		$2,500.60	53
Hogs and pigs sold		242.16	5
Chickens sold		6.00	0
Income from live stock		2,748.76	58
Cotton	586.00		13
Tobacco	1,039.25		22
Truck crops	49.80		1
Income from crops		1,675.05	36
Old machines and implements sold	22.65		
Rentals received for implements	31.25		
Received for work done for others	68.74		
Wood sold	157.15		
Miscellaneous income		279.79	6
Total farm cash income		4,703.60	100
Money borrowed		1,000.00	
Total money received		5,703.60	
EXPENDITURES.			
Dairy herd:			
Cows bought (8)	885.00		
Calf bought	25.00		
Dairy feeds	1,320.86		
Miscellaneous	23.65		
Total for dairy herd		2,254.51	44
Hogs bought (2)		43.35	1
Cockerels bought (2)		2.00	0
Total expenditures on live stock		2,299.86	45
Fertilizer	349.57		
Seed	88.09		
Twine, canvas, etc	29.68		
Thrashing, grading, picking	48.92		
Total expenditures on crops		516.26	10

TABLE I.—*An example of farm cash records summarized for a year's business on an eastern North Carolina diversified farm*—Continued.

Source of income or expense.	Amount.		Per cent of total.
EXPENDITURES—continued.			
Paid hired hands	$654.43		
Veterinary and shoeing mules	27.10		
Man and mule labor expenditures		$681.53	13
New buildings and improvements	326.54		
Repairs of buildings, fences, etc	176.96		
New machinery bought	423.51		
Maintenance of implements	58.47		
Equipment expenditures		985.48	19½
Interest on borrowed money	427.27		
Taxes	66.81		
Cutting wood	58.43		
Telephone, stationery, etc	64.75		
Miscellaneous expenditures		617.26	12½
Total farm expenditures		5,100.39	100
Household and personal expense		532.50	
Total money paid out		5,632.89	

When the year's record is made the cash accounts can be assembled under headings (see Table I) that will show exactly what branch of the farm activities produced the dollars and what each required in the way of cash expenditure to keep it going.[1] Some farmers are apt to judge of the importance of the various farm projects by the time it takes to put them through. To such, a complete cash record for a year, properly assembled, will be an eye-opener. Often seemingly unimportant things on the farm, such as the flock of poultry, produce nearly as much net cash as the obviously important. The year's cash summary helps the farmer to get a better perspective of these things.

In using such records as an aid to future plans, hasty conclusions should not be drawn, nor should snap judgments be taken. The fact that the hogs or the corn crop brought in the most net money last year is no reason for assuming that all the activities of the farm henceforth should be

[1] A complete method of assembling the year's data is fully described in Farmers' Bulletin No. 661, entitled, "A Method of Analyzing the Farm Business."

devoted to the sole purpose of hog or corn raising. It may be that the keeping of cows was partly responsible for making the hogs so productive of net cash, or that the growing of wheat, clover, or other crops in rotation with corn made the latter crop much more profitable than it would have been if grown alone. Similar conditions will be met with on all farms, and therefore no sudden changes should be made on the basis of what a few accounts may show.

On the other hand, a single year's figures will occasionally indicate that something is radically wrong; will show where the net expenses of one farm enterprise is a great drain on the net cash returns made by the others. All phases of such an enterprise should be carefully studied and unless the losses can be assigned to some reason, such as a bad season, temporarily adverse market conditions, epidemics, or similar unusual conditions, it may often be dropped with profit.

Comparison of the annual figures year by year is another source of profit from the use of accounts, since by such comparison a true perspective and insight into the make-up of the business is gained.

USES OF AN ANNUAL INVENTORY.

The term "inventory" is used to designate a list of property, and such a list, made annually, is a most important and useful record. In any system of accounting the inventory is absolutely essential, as upon it is based the division of one year's business from another.

A farm inventory is simply a statement showing what the land, buildings, equipment, live stock, supplies, and produce on hand are worth at the time the inventory is made, together with amount of cash on hand and money owing to and owed by the farmer. It is a list of farm property and farm debts. (See Table II.) It corresponds to the "stock taking" which every merchant does periodically.

TABLE II.—*A sample farm inventory, showing in a general way how the valuable record is prepared.*

Items of property.	April 1, 1916.			April 1, 1917.		
	Number.	Rate.	Valuation	Number.	Rate.	Valuation.
Real estate: Farm of 120 acres (105 tillable), including value of improvements			$9,600.00			$9,600.00
Live stock:						
Cows dry and in milk	17	$60.00	1,020.00	14	$95.00	1,330.00
Bull	1		80.00	1		65.00
Heifers	4	30.00	120.00	5	50.00	250.00
Calves	2	12.00	24.00			
Total for dairy herd			1,244.00			1,645.00
Hogs:						
Sows	1	35.00	35.00	3	45.00	135.00
Pigs	7	28.00	196.00	22	6.00	132.00
Horses	4	105.00	420.00	4	95.00	380.00
Colts	1	60.00	60.00	2		110.00
Total value of stock			1,955.00			2,402.00
Machinery and tools:						
Plows	2	8.00	16.00	2	7.00	14.00
Harrows	1		12.00	2	12.00	24.00
(List all items of farm machines, wagons, harness, and small tools).						
Total amount invested in machinery and tools (not all listed here)			536.00			545.65
Feeds, produce, and supplies:						
Corn ... bushels	225	.85	191.25	190	2.00	380.00
Corn stover ... tons	6	5.00	30.00	10	6.00	60.00
Hay, mixed ... do	12	12.00	144.00	9	15.00	135.00
Hairy vetch seed ... pounds	20	.22	4.40			
Potatoes ... bushels	106	.80	84.80	60	3.00	180.00
Corn silage ... tons	10	5.00	50.00	15	6.00	90.00
Cement ... sacks				4	.80	3.20
Old lumber			12.50			5.00
Total value of feeds, produce, and supplies			516.95			853.20
Cash on hand and in bank			225.50			25.75
Value of bills due the farm			17.65			92.70
Total value of farm property			12,851.10			13,519.30
Amount of bills, notes, and mortgage the farm owes to others			3,250.00			3,575.25
Net worth (increase $342.95 for year)			9,601.10			9,944.05

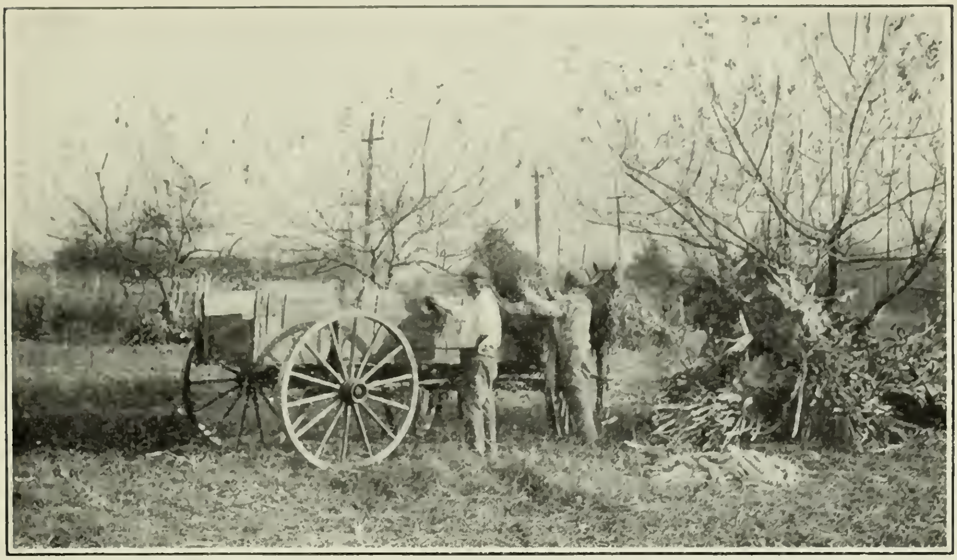


FIG. 1.—AN EXAMPLE OF THE PRIMITIVE FARM RECORD.

Measuring corn and keeping tally on the wagon box.

FIG. 2.—A FARMER WHO HAS KEPT COMPLETE COST ACCOUNTS FOR YEARS.

Such work takes much time and requires close attention to details.

The uses of the inventory are important and varied. As previously stated, it is the basis upon which is built the superstructure of accounting systems. Taken alone it will show a farmer exactly what he is worth and will be a guarantee of solvency and an aid in securing credits and loans from the bank in time of need. The inventories for two dates a year apart show whether progress or retrogression has occurred during the year, and definitely measure the degree of the change.

Taken in conjunction with a cash account for the year, the inventory shows how much has been made by farming and to what extent the personal and household expenses have offset profits. (See Table III.) It also gives a much better insight into the income produced by each farm department, as a decrease in inventory value of hogs, for instance, may offset to some extent what, from the cash account, looks like a very large income from that source, or vice versa.

Table III.—*Showing how the inventory totals and cash account may be utilized to show the profit made by the farm.*

Item.	Values. Apr. 1, 1916.	Values. Apr. 1. 1917.
Farm inventories:		
Real estate	$9,600.00	$9,600.00
Live stock	1,955.00	2,402.00
Machinery and tools	536.00	545.65
Feeds, produce, and supplies	516.95	853.20
Cash on hand and in bank	225.50	25.75
Bills due the farm	17.65	92.70
Total value of the farm property	12,851.10	13,519.30
Amount due by the farm to others	3,250.00	3,575.25
Net worth each year	9,601.10	9,944.05
Increase in net worth		342.95
From the cash account the amount of money paid out for other than farm expenses is found:		
Household expenses	338.38	
Personal expense	115.25	
Interest on the mortgage, $3,000 @ 5 %	150.00	
Purchase price of U. S. bond	50.00	
Total		653.63
Supplies and rent furnished by the farm:		
Rental value of the farm home	120.00	
Value of supplies (fuel, milk, eggs, etc.)	150.50	
Total		270.50
Total farm gain		1,267.08

COST RECORDS.

The foregoing discussion has embraced simple record keeping. The accounts described deal almost exclusively with facts about the farm as a whole, as a unit, and serve to compare this year's business with that of last year or the year before. In order to keep accounts with the separate enterprises, however, to show the factors of cost and the returns of each, and what each one gains or loses, cost accounts are necessary.[1]

Cost records, while of great use if correctly assembled and intelligently interpreted, can only be obtained by the outlay of considerable time and attention to detail. (See Pl. XVII, fig. 2.) A man who works hard at manual labor all day can very rarely find the time and seldom has the inclination to set down daily all the minutiæ necessary to complete cost accounts. In cost records there are added to the inventory and cash account, labor records, feed records, supply records, crop yield and animal production records, which, when the amount of time necessary to summarize and distribute the indirect costs is considered, require much more attention than can ordinarily be given. Only where the conditions seem to assure that the accounts will be pushed through the year to a successful conclusion should cost accounting be begun. Detailed accounts begun and abandoned are worse than time and labor thrown away. They are apt to give the idea that there is no use in keeping any records whatever.

However, cost data systematically recorded, summarized, and studied year by year are of the utmost value to any farmer whose circumstances permit him to obtain them. The labor records will show just how much labor and team work is required by each crop on the farm and the time of the season in which it is required. They show what proportion of the labor is devoted to work that produces income and the very considerable amount that is consumed by "odd jobs" on every farm. The proportion that labor cost is of the total in the production of all farm crops and stock is brought out, and the number of days of man and horse labor necessary to produce an acre of any crop or to care for any animal for a year.

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[1] Farmers' Bulletins No. 511, "Farm Bookkeeping," and No. 572, "A System of Farm Accounting," discuss the function of cost accounts, giving data useful to anyone interested.

A year's labor records show also just how much man power and horsepower is necessary to run the entire farm every week in the year and point out accurately just when the rush seasons occur and how much help is necessary to tide them over handily. With such records before him a farmer knows approximately how much labor and how many horses he will need to carry out his plan of operation for the coming year. He knows how much more or how much less labor he will need for every acre of increase or decrease in area of any crop and just when such labor will be required or may be spared. Increasing or decreasing the magnitude of the different farm enterprises and fitting them together until a complete year's work with an even load of labor for the entire season, with the rush points minimized, gives him personal control of unsettled labor conditions and puts him in an advantageous position to push through successfully the coming year's work.

Feed accounts, accurately recorded and summarized, will give valuable data on the amounts of grain and roughage required to put an animal on the market or to maintain the permanent herd. They give the quantities necessary to maintain the work stock, and thus enable the farmer to reserve sufficient for his needs and to sell his surplus feeds with safety. They enable the farmer to plan intelligently an increase or decrease in any of his herds and inform him just what these changes will entail in increased or decreased quantities of feeds required. They supplement the other records in that they indicate how to preserve the balance between crops and stock on the farm and thus become the basis upon which is determined the proportionate charge to stock and credit to crops for farm-produced feeds consumed.

Records of crop yields, animal products obtained, and of supplies used by the different farm enterprises are the additional factors necessary to make cost data complete. These are useful in that they show just what yields of crop and byproduct are obtained year by year, what and how much the animals produce, and by what farm departments miscellaneous supplies are used, thus permitting the making of adequate charges and credits.

USE OF COMPLETE COST ACCOUNTS.

When the cost records have been successfully carried through the year, all costs distributed, and the summarizing done, the cost of every crop and of each class of stock will be known, together with the income each has produced, and the resulting profit or loss for each, with the cost per acre, bushel, ton, or animal. (See Table IV.) These will prove of great interest and usefulness in numerous ways. The figures show the margin of profit and approximately what must be realized on each commodity produced in order to realize a profit or avoid a loss. Such figures for a series of years will be increasingly valuable.

TABLE IV.—*Showing how cost accounts on an eastern North Carolina farm were utilized to show whether each farm department made a profit or a loss and how much.*

Farm enterprise.	Income.	Cost.	Profit.	Loss.
Tobacco	$1,039.25	$388.83	$650.42	
Corn for grain	145.25	355.01		$209.76
Corn silage	337.50	362.44		24.94
Oats	65.00	90.54		25.54
Hay:				
Clover	90.00	43.03	46.97	
Cowpea	120.00	88.33	31.67	
Rye	30.00	47.40		17.40
Truck crops	170.02	122.12	47.90	
Dairy herd	2,185.24	2,604.17		418.93
Hogs	227.50	145.30	82.20	
Poultry	193.05	76.54	116.51	
Sand pit	74.50	33.26	41.24	
Wood lot	358.00	265.82	92.18	
Outside labor	68.74	65.38	3.36	
Total	5,104.05	4,688.17	1,112.45 696.57	696.57
Net farm profit			415.88	

Where losses are sustained, the study of the facts for past years when profits were made may show why the losses occurred, and influence the farmer to take heart for the future and strive to overcome, if possible, the conditions that caused the losses. (See Table V.)

TABLE V.—*Detail of the cost of growing potatoes on a western New York farm for a series of five years. A good illustration of the application of cost accounts in analyzing the cost of growing a crop.*

	1910	1911	1912	1913	1914	Five-year average.
Acres grown	20.5	17.2	20.7	19.3	16.7	18.88
Per acre costs:						
Labor in growing—						
Man	$7.61	$7.36	$7.82	$8.10	$5.78	$7.33
Horse	10.67	8.50	9.65	8.41	6.76	8.80
Labor in harvesting—						
Man	5.46	5.29	4.36	4.22	4.93	4.85
Horse	4.65	4.92	3.74	3.20	3.17	3.94
Total labor cost—						
In growing	18.28	15.86	17.47	16.51	12.54	16.13
In harvesting	10.11	10.21	8.10	7.42	8.10	8.79
Total	28.39	26.07	25.57	23.93	20.64	24.92
Materials used—						
Manure	2.76	9.13	9.00	1.23	8.59	6.14
Seed	3.20	7.18	17.78	8.18	10.57	9.38
Fertilizer	8.13	13.10	9.14	10.32	10.04	10.15
Lime for spraying	.48	.41	.44	.54	.15	.40
Arsenate of lead	1.70	1.40	1.17	1.34	1.26	1.38
Sulphate of copper	1.48	2.97	2.53	3.45	2.43	2.57
Total cost of materials	17.75	34.19	40.06	25.06	33.04	30.02
Indirect costs—						
Implement cost	4.39	7.10	8.37	6.50	8.13	6.90
Interest and taxes	2.96	3.75	3.57	5.43	5.40	4.22
Overhead expense	3.30	5.23	6.59	4.87	5.70	5.14
Total indirect cost	10.65	16.08	18.53	16.80	19.23	16.26
Total, all costs	56.79	76.34	84.16	65.79	72.91	71.20
Per bushel costs—						
Labor to grow	0.09	0.08	0.08	0.10	0.06	0.08
Labor to harvest	0.05	0.05	0.04	0.04	0.04	0.04
Total labor cost	0.14	0.13	0.12	0.14	0.10	0.12
Materials	0.09	0.16	0.19	0.15	0.15	0.15
Indirect cost	0.05	0.08	0.09	0.10	0.09	0.08
Total cost per bushel	$0.28	$0.37	$0.40	$0.39	$0.34	$0.35
Yield per acre ... bushels	201	208	208	168	217	200.6
Selling price per bushel	$0.40	$0.55	$0.49	$0.60	$0.28	$0.464
Seed per acre ... bushels	12.8	14.5	15.5	16.1	14.1	14.6
Seed cost per bushel	$0.25	$0.49	$1.15	$0.51	$0.75	$0.63
Fertilizer per acre ... pounds	643	872	700	767	713	739
Cost per ton	$25.32	$30.02	$26.10	$26.93	$28.20	$27.31

TABLE V.—*Detail of the cost of growing potatoes on a western New York farm for a series of five years. A good illustration of the application of cost accounts in analyzing the cost of growing a crop*—Continued.

	1910	1911	1912	1913	1914	Five-year average.
Acres grown	20.5	17.2	20.7	19.3	16.7	18.88
	Per acre.	*Per acre.*	*Per acre.*	*Per acre.*	*Per acre.*	*Per acre.*
Rates per hour:						
Man labor	$0.153	$0.141	$0.156	$0.171	$0.169	$0.158
Horse labor	0.177	0.143	0.148	0.120	0.130	0.144
Man hours per acre:						
To grow	49.74	52.22	50.08	47.37	34.22	46.73
To harvest	35.68	37.55	27.95	24.72	29.16	31.01
Total	85.42	89.77	78.03	72.09	63.38	77.74
Horse hours per acre:						
To grow	60.28	59.46	65.15	70.08	52.02	61.40
To harvest	26.29	34.40	25.27	26.63	24.37	27.36
Total	86.57	93.86	90.42	96.71	76.39	88.76

To obtain the greatest benefit from cost accounts, full data as to costs in quantities of labor, materials (as feed, seed, supplies, etc.), and the use of the farm equipment, should be recorded and carried along all through the process of summarizing. Hours of labor, pounds of grain, tons of fertilizer, etc., are equally as useful as the money figures, if not more so. Such data aid the farmer in getting a truer insight as to the facts and give him a firmer grip on his business affairs than can be obtained by money costs alone. Prices fluctuate, but the physical factors in the cost of production remain more or less constant; they constitute the best known source of information useful in the analysis of a farm business.

In making use of the results of a year's cost accounts for the purpose of perfecting the organization of the farm for the greatest profit, caution is doubly to be recommended. As previously stated, hasty conclusions should not be drawn. Sometimes a positive decrease in a year's profits may ensue if an enterprise be dropped because, taken alone, it has failed to pay. Cows, for instance, may not be showing a net profit, but if all the cows are sold, there may be no other profitable way of using up roughage which would thereby be wasted, resulting in a loss on the crop producing it. Labor devoted night and morning to milking and feeding cows, and charged to them, would be entirely wasted if the cows were sold and nothing else supplied to utilize it. Thus an added labor burden would have to be borne by the other enterprises. It is much better that these things be utilized than that they should be a dead loss, even though the cow account alone just breaks even, or worse. Any changes indicated, if made, should be brought about gradually and the effects noted in their relation to all other farm activities.

There is nothing like a set of records as a means of analyzing a farm business. To use such records, however, the fundamental principles must be understood and complied with; their limitations as well as their usefulness must be grasped. When this is done the accounts will become a strong staff and support.

HOUSEHOLD ACCOUNTS.

How many people know just what it costs them to live? Such information is extremely valuable, especially if the make-up of the cost is known, both as to money cost and the other factors. To the farmer such data should prove valuable indeed, especially in determining what part of his living comes from the farm.[1]

If the accounts have been completely kept, the household expenses are easily assembled from the cash record, inventory and record of supplies used. Nothing in the realm of figures is more likely to astonish the average farm family than a summary of the household costs. The farm furnishes the family a house to live in, milk, butter, cream, eggs, pork, fowls, fuel, vegetables, and fruit, and often a great many other things. Yet the farmer often does not think of all these unless they are set before him. If he breaks even on the year he is likely to think there is no profit in the business when, in fact, he may have been living much better than the average city business man of like education, attainments, and capital.

All these things may have to be seen to be believed, but a well kept set of records, by adequate handling, can be made to show them.

[1] Farmer's Bulletin No. 635, "What the Farm Contributes Directly to the Farmer's Living," should prove of much value and interest to all farmers who keep household accounts.

PRODUCTION OF DRUG-PLANT CROPS IN THE UNITED STATES.

By W. W. Stockberger,

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MEDICINAL plants have been cultivated in the United States for more than two centuries. Only a few decades have elapsed since healing herbs shared with small fruits and vegetables a place in every kitchen garden, and in certain localities their production and sale at one time formed the basis of small industries. In time, however, the numerous convenient preparations obtainable at every drug store rendered the domestic herb garden no longer necessary, and the great development of foreign commerce made it possible to obtain supplies of most crude drugs from sources where the cost of production was less than in this country. As a result, drug cultivation has never become an important branch of agriculture in the United States, and in recent years it has been confined chiefly to the production of relatively small crops of plants yielding volatile oils which are in demand for industrial purposes as well as for medicinal use.

DRUG CRISIS PRECIPITATED BY THE WAR.

The extent to which this country had become dependent upon foreign sources for its supply of crude drugs was not generally realized until 1914, when the war in Europe abruptly severed long-established trade connections and either greatly reduced or cut off entirely our supplies of many drugs. Prices rose to almost unheard-of figures, and the fear of a drug famine occasioned grave concern in business circles interested in maintaining the supply of medicinal products. The crude-drug situation soon became a popular subject for feature stories in numerous magazines and newspapers, and many people have been led to believe that the cultivation of medicinal plants offers unusual opportunities for large profits.

DRUG PLANTS CULTIVATED IN THE UNITED STATES.

Although the list of plants which yield useful drugs is large, the number at all suitable for cultivation in this country is relatively small. Many crude drugs are derived from plants which thrive only in the Tropics and therefore can not be successfully grown in the United States. Many other drugs are obtained from native trees and shrubs, and from wild herbs, some of which grow naturally on sandy or stony soil in the woodland shade, some in swamps and marshy places, while others occur as familiar weeds along roadsides, in meadows, and in open woods. When these wild plants are taken from their natural surroundings and placed under the conditions which exist in cultivated fields, they very frequently fail to make a satisfactory growth and often become the prey of insects or diseases from which they are practically free when in their native haunts. To domesticate these wild plants is by no means a simple task; it requires much time and patience, as well as unusual skill both in handling the plants and in supplying the conditions necessary for their favorable growth and development.

Many of the common medicinal plants are still grown in gardens in this country, either as decorative plants or for domestic use in cookery and as home remedies. For the most part, however, the consumption of salable products prepared from these plants is so small that their commercial cultivation would be impracticable, since their production in any considerable quantity would result in overstocking the market. A few medicinal plants, such as peppermint, spearmint, wormwood, wormseed, and tansy, are now grown commercially, chiefly as a source of volatile oils, but the relatively small acreage devoted to these crops is restricted to certain localities which have been found to be especially suitable for their production. Sage is a well-known market-garden product, but there is a small acreage of this crop grown exclusively for the production of the dry-leaf sage, much in demand by sausage makers and spice grinders. (See Pl. XVIII, fig. 2.)

The growing of ginseng and goldenseal is a small but well-established industry in several States, but it is well recognized that each of these crops requires a heavy initial outlay and that five or more years must elapse after the germination of the seeds before any returns can be expected.

CANNABIS AND PEPPERS IN THE SOUTH.

Cannabis is now grown commercially as a side line by a few farmers in South Carolina and by occasional individuals in some other States. Two large drug manufacturers also grow sufficient cannabis for their own needs. Considerable technical skill is required to produce cannabis of a quality that will meet the standard requirements for this drug. Cannabis grown in some localities is deficient in the active principles upon which its value depends, and preliminary tests to determine the quality of the product are therefore always advisable before planting this crop on a commercial scale.

The commercial production of peppers for the drug and spice markets receives some attention in South Carolina, Louisiana, and some of the States of the Southwest. A market has been found for the small species used by pharmacists and for the larger species employed in manufacturing the ground red pepper, such as paprika, which is extensively used as a condiment. In Florence County, S. C., a pepper growers' association has been formed among the farmers growing this crop. The chief objects of this organization are to maintain a pure seed supply and to facilitate the marketing of the product. Through the cooperation thus secured it has been possible to overcome many of the marketing difficulties which were encountered when the crop from this locality was first introduced to the trade.

EXPERIMENTS WITH CAMPHOR.

The experiments with the camphor tree begun in Florida about 12 years ago by the Bureau of Plant Industry have led to the recent planting of this tree on an extensive scale for the commercial production of camphor gum. This tree has long been grown as an ornamental in various parts of the South, and in several localities in Florida there are small plantings, now well grown, which were made with a view to the production of camphor gum in marketable quantities. The experience thus far gained indicates that the cost of producing camphor gum from small plantings is prohibitive, owing to the necessarily heavy overhead charges, and particularly the outlay required for the indispensable distilling plant. The smallest practicable commercial planting has been estimated at 500 acres, while it is believed that a plantation must cover several thousand acres in order to afford the best opportunity for reducing the cost of production to the minimum.

DIGITALIS.

Digitalis is one of the important drugs the normal supply of which has been seriously curtailed by the war in Europe. Attracted by the high market prices of these drugs, which include belladonna and henbane, many persons have recently attempted to cultivate them as a source of profit. The number of failures, however, has been relatively very large, either on account of inexperience or because of inability to provide the soil, climatic, and cultural conditions necessary for the successful growth of these plants.

Although very little digitalis is now cultivated as a drug crop, no serious market shortage need necessarily occur, since this plant, escaped from cultivation, grows wild over extensive areas in western Oregon and Washington, where, with proper encouragement, a supply sufficient to meet all domestic needs could be readily collected. For this reason it is doubtful whether present conditions warrant the growing of digitalis on land which might otherwise be devoted to the production of food crops.

BELLADONNA.

The continued high price of belladonna since the beginning of the present war has greatly stimulated interest in the production of this crop, but the acreage planted has been greatly restricted on account of inability to secure reliable seed at reasonable prices and because of the high cost of labor and the outlay required to provide the greenhouse facilities desirable for the successful propagation of thrifty plants. Information obtained from the best sources available indicates that approximately 100 acres of belladonna were harvested in this country in 1917. Although it is desirable that the acreage should be increased sufficiently to provide an adequate supply of this drug, it must be borne

FIG. 1.—FIELD OF BELLADONNA.

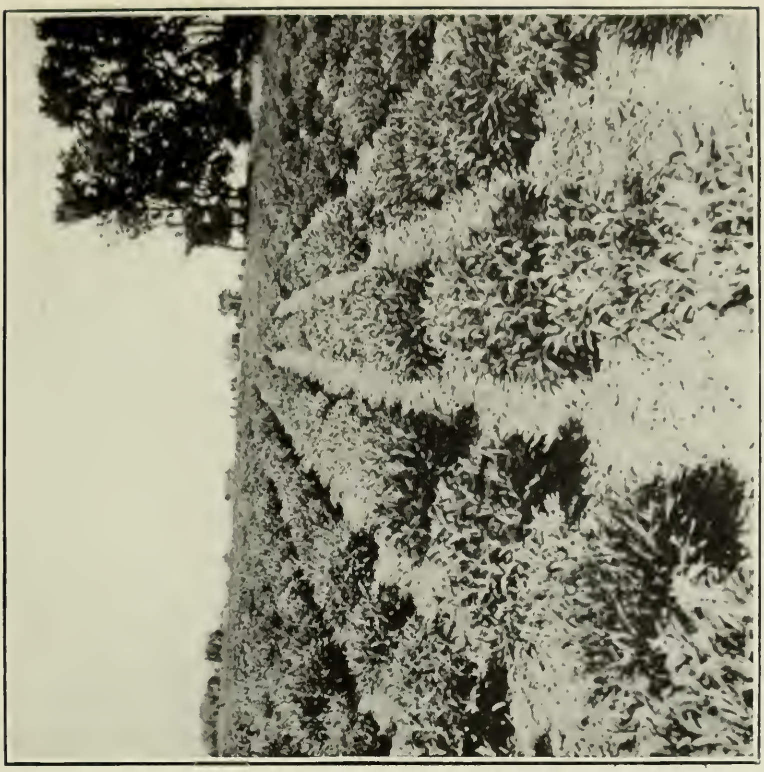


FIG. 2.—FIELD OF SAGE.

DRUG CROPS UNDER CULTIVATION ON A COMMERCIAL SCALE IN WISCONSIN.

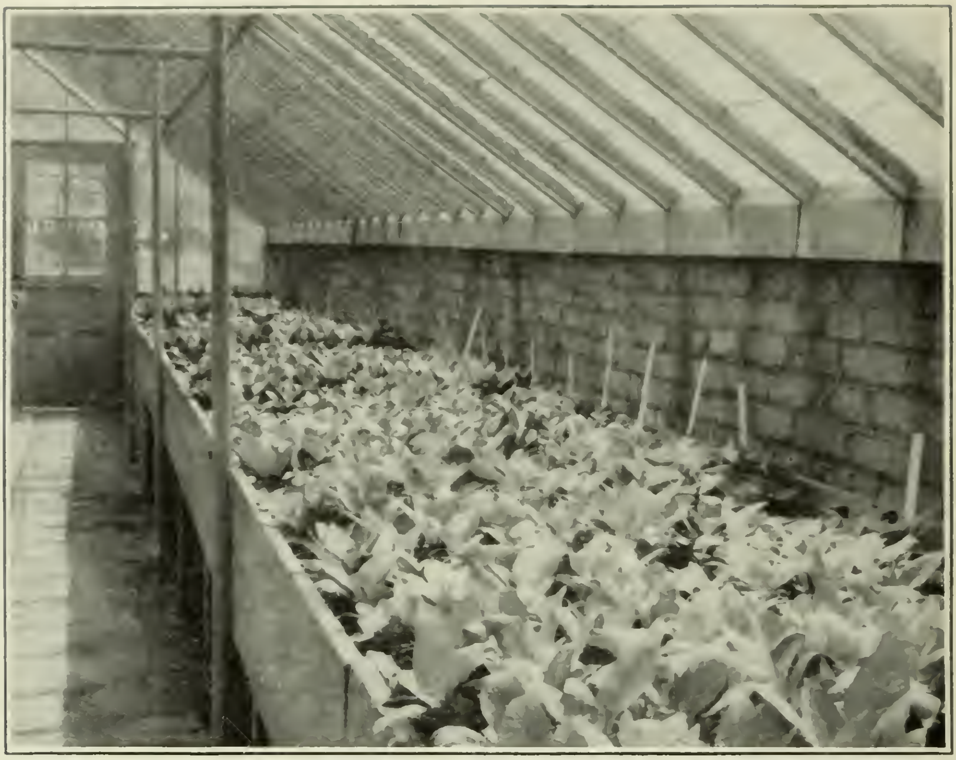


FIG. 1.—BELLADONNA SEEDLINGS IN A GREENHOUSE READY FOR TRANSPLANTING.

Belladonna is grown most readily from seeds sown in flats in the greenhouse in midwinter and transplanted to small pots in which they are handled like tomato plants, so that they may be ready for transplanting in the field as soon as danger of frost is over in the spring. Sowing belladonna seeds in the field or transplanting directly from the seed bed to the field has rarely given good results in this country.

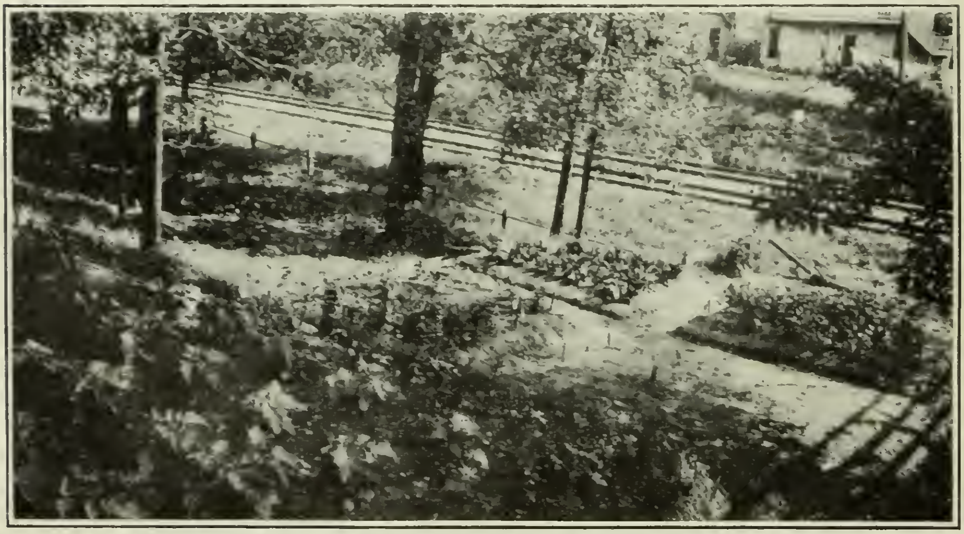
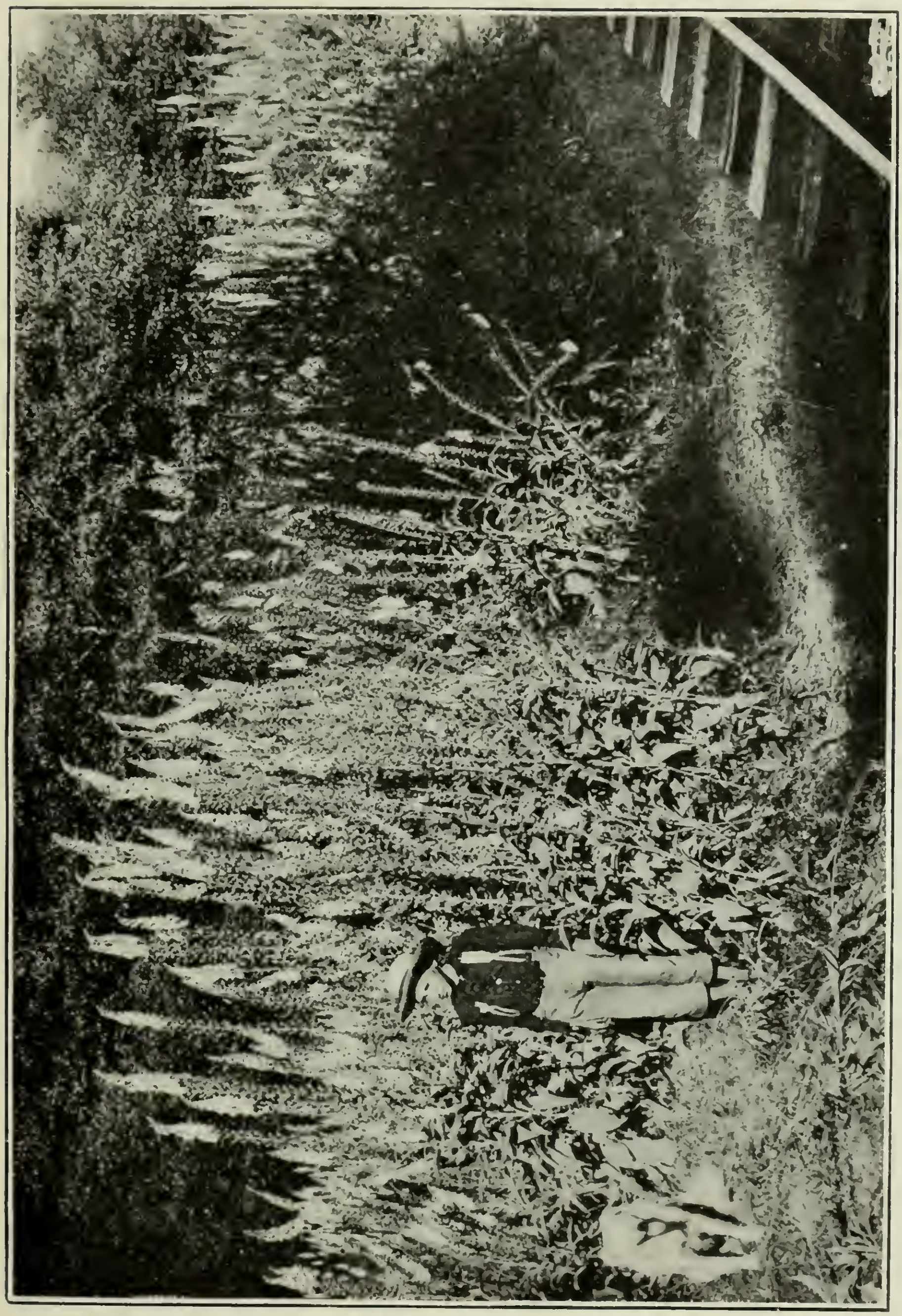


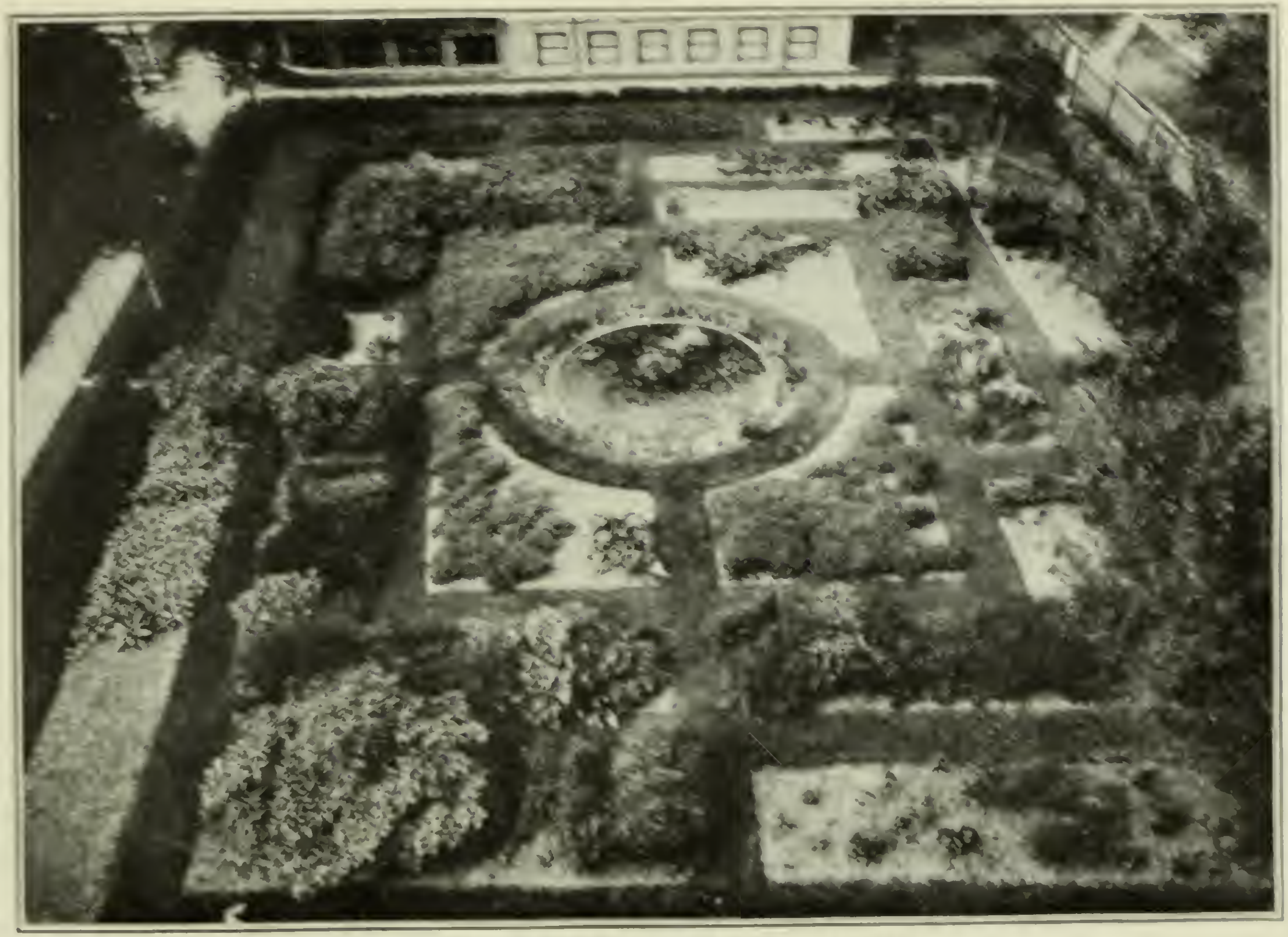
FIG. 2.—DRUG GARDEN OF NATIVE WOODLAND HERBS.

Portion of garden on the grounds of a university. Here the conditions under which woodland herbs grow naturally have been duplicated as closely as possible.



WILD GROWTH OF FOXGLOVE (DIGITALIS PURPUREA) ALONG A RAILWAY IN OREGON.

This plant is not grown extensively for drug production in the United States, but it has been widely introduced as an ornamental, and in many localities in Oregon and Washington, where it has escaped from cultivation, it is now found growing as a weed in such abundance that supplies sufficient to replace the shortage due to cessation of imports could readily be collected.



DRUG GARDEN FOR SCHOOL OF PHARMACY.

Drug gardens are now being maintained as a feature of the courses in pharmacy in a number of universities. This illustration shows a garden in which the cultures of medicinal plants furnish material of educational value for the pharmacy course and also serve as an ornamental addition to the grounds of the university.

in mind that all the belladonna needed can be grown on a very few acres. The quantity of belladonna annually consumed in the United States is not definitely known, but it has been estimated by men in the drug trade at approximately 300,000 pounds. Since the average yield per acre of dry belladonna leaves is about 600 pounds, it is evident that the area planted to this crop could not much exceed 500 acres without serious danger of overproduction. Indeed, any substantial increase in the present small acreage, by making more certain an available supply, will naturally tend to cause a material reduction in the market price.

HENBANE.

With very few exceptions, recent attempts to cultivate henbane as a drug crop in this country have resulted in failure. Although this plant is occasionally found growing wild in a number of the Northern States, it has not responded readily to cultivation on a field scale. When the seeds are sown in open ground germination is frequently uncertain, and often young plants grown under glass do not survive transplanting in the field. The leaves of henbane usually suffer severely from attacks of the potato beetle, and the crop is very likely to be destroyed if grown within the range of this insect. Since the difficulties connected with the cultivation of henbane are so great, this crop is not a desirable one for persons who can not well afford the loss which would be occasioned by a crop failure.

OTHER DRUG PLANTS.

A number of drug plants not mentioned here[1] are grown in a small way in various localities in this country, chiefly to supply a local demand. However, since the demand for them is very limited or a wild supply fairly available, their cultivation on a more extensive scale does not offer much prospect of profit. (See Pls. XVIII to XXI.)

HAPHAZARD PRODUCTION UNDESIRABLE.

As a safeguard to the public health, laws have been enacted which require manufacturers of drugs and medicines to

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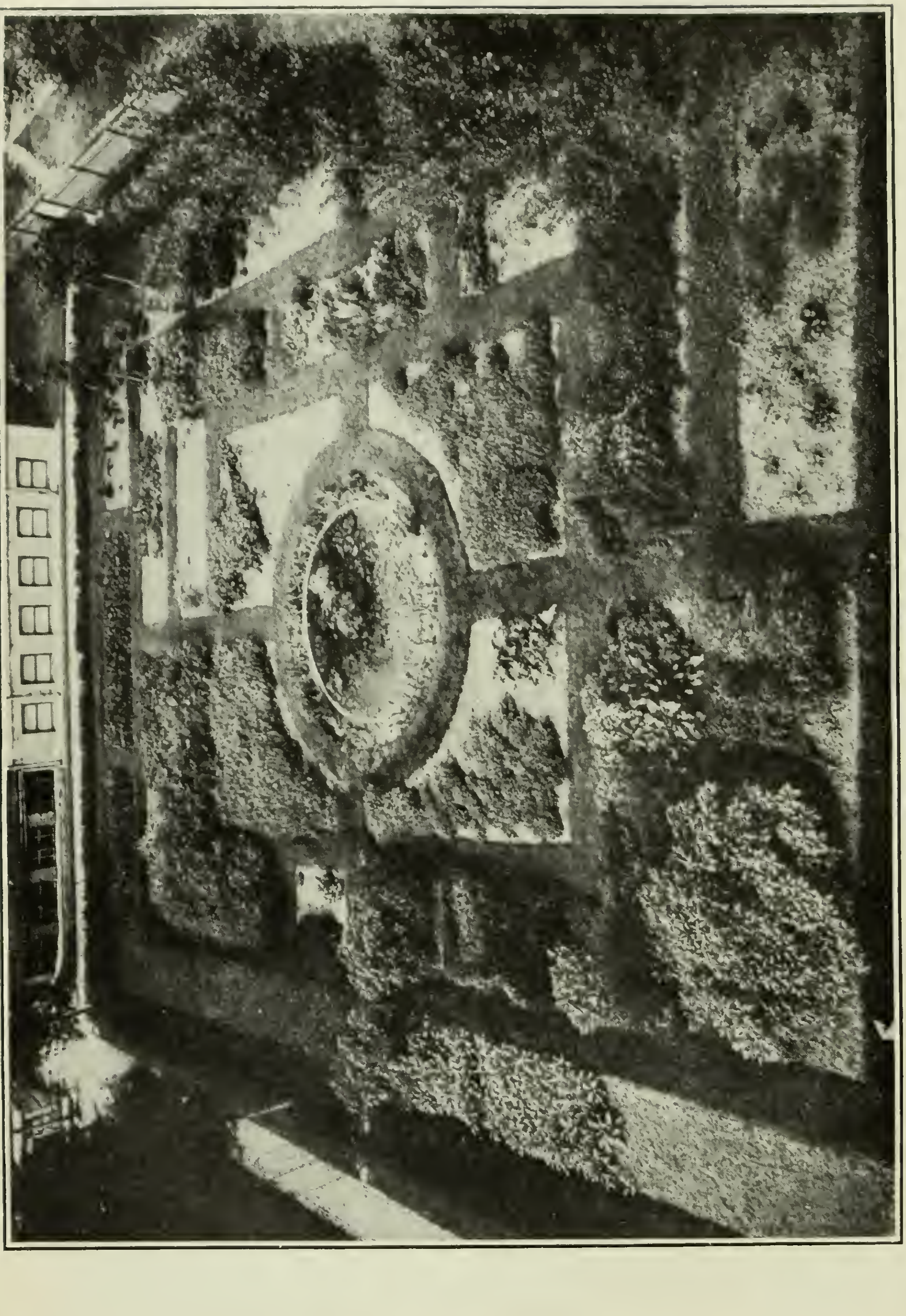

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maintain certain standards of purity and quality in their products. Official standards of quality have also been adopted for the more important crude drugs in common use. It is quite evident, therefore, that securing a high standard of quality should be a primary consideration in the production of drugs under cultivation. There are, however, good reasons for believing that this end will not be attained through the production of a small quantity of drugs by each of a large number of persons unskilled in drug growing, since the product would be very irregular in appearance and quality, owing to wide variation in the methods used in collecting, curing, preserving, and packing the drugs for market. For the production of a dependable supply of cultivated crude drugs of high quality, reliance must be placed upon well-equipped growers who make the growing of drug plants a special industry and who have the necessary experience in special methods of plant culture, acquaintance with trade requirements, and knowledge of the influence of time of collection and manner of preparation on the constituents of the drug upon which its value depends. If developed along these lines, commercial drug growing in this country promises to become established upon a sound basis for the future, when normal conditions return.

PRIME IMPORTANCE OF MARKET.

The person who seriously considers growing drug plants for profit can scarcely give too much attention to the problem of finding a market for his product. Unless the grower lives near a city in which dealers in crude drugs are located, the disposal of a small crop will present many difficulties. If the crop is shipped to a distant dealer the deductions which will probably be made on account of transportation charges and defective quality may so reduce the returns that the transaction will show little, if any, profit. The grower who produces a quantity of crude drugs sufficient to justify the expense of having their quality determined by a reliable analyst, and who is well informed in respect to the condition of the wholesale market, will be in a position to judge the fairness of the prices offered for his crop by the dealers and to protect his interests in effecting a sale.

Since this country has entered into war, many persons have seriously considered growing drug plants, not for profit but for patriotic reasons. This commendable spirit has been especially evident in many of the women's organizations throughout the country. However, it is not regarded as advisable to encourage this form of activity, since the need for women's services is so much greater in the work of food production and conservation and in preparing the various articles so much needed for the aid and comfort of the men at the front. Moreover, unless closely supervised by some central authority, any extensive movement to grow drugs might easily result in the production of far larger quantities than are needed. This would involve a useless expenditure of effort which might accomplish much good if exerted in other ways.

DRUG GARDENS FOR SCHOOLS OF PHARMACY.

An important feature of the development of drug-plant culture in the United States has been the establishment of medicinal-plant gardens as an adjunct of the schools of pharmacy of a number of colleges and universities. Unfortunately, the purpose for which these gardens were established is frequently misunderstood. They were designed primarily not as sources of information regarding the commercial cultivation of drug plants, but to facilitate and enrich the courses of instruction in the characteristics and properties of medicinal plants. During the last three or four years these educational gardens have rapidly increased in number and now form a part of the regular teaching equipment of 18 different institutions.

Although these gardens are not devoted to commercial drug growing, nevertheless they can be made to contribute in a very practical way to the public welfare. They afford unusual opportunities for students of pharmacy to acquire a thorough knowledge of many medicinal plants and to be thereby better enabled to recognize inferiority or adulteration in crude drugs. These gardens also supply material useful in the investigation of many problems arising in the necessary revision of the United States Pharmacopœia and the National Formulary, the official standards for drugs under the national food and drugs act. Since the improvement of the quality of drugs and the perfecting of the standards by which a high quality of drugs and medicines may be maintained are both questions of national concern, the service which the institutional drug garden can render in attaining these ends is worthy of wider recognition.

Much pioneer work remains to be done in establishing correct methods for the cultivation of drug plants and in determining the localities where the conditions are most favorable for the production of each particular drug. The progress of this work will be greatly furthered by the educational drug gardens, since they are located in widely separated localities and offer unusual opportunities for obtaining data on the behavior of drug plants under very diverse conditions of soil and climate. The obtaining of such data is the necessary preliminary step toward any rational experiments in commercial drug growing.

PHOSPHATE ROCK OUR GREATEST FERTILIZER ASSET.

By Wm. H. Waggaman,
Scientist in Fertilizer Investigations, Bureau of Soils.

THE development of the potential sources of fertilizer materials in the United States has been commanding special attention in recent years, and since the declaration of war against Germany this matter has assumed an importance greater than ever before.

A brief review of the progress made toward rendering this country independent of other nations for fertilizer supplies is interesting and, to say the least, very encouraging.

Only a few years ago it was generally believed, even by the best informed, that the Stassfurt deposits in Germany would be the world's most economic source of potash salts for an almost indefinite period. It now appears possible that when trade relations are restored between the warring nations this country may have firmly established a potash industry of its own.

The recovery of potash from partly desiccated lakes and from the giant kelps of the Pacific coast is now being profitably accomplished, and the saving of the potash volatilized in blast furnaces and in the burning of cement has been demonstrated as commercially feasible. The latter two sources if utilized to their fullest extent are alone amply sufficient to meet the annual demand of the fertilizer industry for potash salts.

Since combined nitrogen is not only one of the most important fertilizer ingredients but is essential also in the manufacture of military explosives, the war has done much toward stimulating effort in recovering and producing nitrogen compounds. The modern by-product coke oven is gradually replacing the old beehive type, and therefore ammonia is being recovered in ever increasing quantities from the coking of bituminous coal. Moreover, processes for the fixation of atmospheric nitrogen are being so perfected that it is only a question of time when an adequate supply of nitrogen compounds is assured our agricultural interests.

The third important fertilizer ingredient is phosphoric acid, which is the basis of nearly all mixed fertilizers, and is therefore applied to the soil in far greater quantities than either potash or nitrogen compounds.

It is very gratifying to know that this country possesses greater resources of phosphoric acid than any other nation. Not only have we supplied our own agricultural demands for this fertilizer ingredient, but for years we have been helping to maintain the crop-producing power of European countries by shipping them annually vast tonnages of phosphatic materials.

Though there are a number of commercial sources of phosphoric acid, such as basic slag, guano, bones, and other organic substances, by far the greater quantity used for fertilizer purposes is derived from phosphorite or amorphous phosphate of lime, of which there are enormous deposits in Florida, Tennessee, Utah, Idaho, Wyoming, and Montana and smaller deposits in South Carolina, Arkansas, Kentucky, and Virginia.

It is not possible to obtain strictly accurate figures on the available tonnage of phosphate rock in the United States, but the latest estimate of the United States Geological Survey places it at 5,712,082,000 tons. This estimate, however, is only for high-grade phosphate. Some years ago the writer, in cooperation with the phosphate operators, estimated that our reserve supply of all grades of phosphate rock, figured to the high-grade equivalent, was in the neighborhood of 10,500,000,000 tons, an amount which if properly conserved should meet our agricultural requirements for an almost indefinite period.

In 1913, before the European struggle began, the United States produced 3,068,604 tons of phosphate rock, which was nearly one-half of the entire world's output. During the past year (1916) the production was considerably curtailed, amounting to only 2,177,292 tons, but it is gratifying to know that a considerably greater tonnage (almost 100,000 tons) was utilized for domestic consumption than ever before in the history of the industry.

High-grade phosphorite, or phosphate rock, consists chiefly of tricalcium phosphate, commonly called bone phosphate of lime. The commercial grades range from 60 to 78 per cent of this compound and contain as impurities varying amounts of silica carbonates, fluorides, and oxides or phosphates of iron, and aluminum. The rock occurs at many different geologic horizons, ranging all the way from middle and late Tertiary in South Carolina and Florida to the Carboniferous age in the far Western States. Its mode of occurrence and physical properties also differ greatly in different localities. In Florida and South Carolina it is found in the form of bowlders, nodules, and pebbles imbedded in a matrix of sand and clay, the phosphate varying in color from white or cream color to an almost jet black, and in hardness from rock of flint-like character to soft, chalky material which can be readily crushed. In Arkansas, the Western States, and in certain parts of Tennessee phosphate occurs in definite strata interbedded with shales and phosphatic limestones. This bedded rock may be gray, blue, brown, or jet black. Some of it is dense and very hard and other types resemble fish roe in appearance, being made up of loosely cemented pebbles. This latter type is easily disintegrated. The Kentucky phosphate, as well as some of the highest grade brown rock in Tennessee, is found much disintegrated and mixed with impurities, which are ordinarily removed by a washing process.

Many theories have been offered to explain the manner in which phosphate deposits were formed and to what they owe their origin. Though these theories differ greatly in many respects, most of them agree, however, in two particulars, namely, that the deposits are of organic origin and have been laid down in, or concentrated through the agency of water.

METHODS OF MINING PHOSPHATE ROCK.

Because of the numerous modes of its occurrence, practically every known method is practiced in the mining of phosphate rock. In Florida and South Carolina phosphate occurs usually under an overburden of from a few inches to 30 feet or more of soil. This overburden is first removed either by steam shovels or by hydraulic methods, and the phosphate stratum thus exposed is taken out by hand or by mechanical or hydraulic means. The phosphate and matrix is then sent to the washer plant, where it is sprayed with water, and the clay, sand, and other impurities are disengaged by mechanical stirring devices and washed out through a flume. The rock is then screened, given a further rinsing, and is finally discharged into bins or piles, to be subsequently dried for shipment.

A good deal of phosphate was at one time dredged from the rivers both in Florida and South Carolina, but river mining has now practically ceased. Where the topography of the country is such that much phosphate occurs below tide level, however, dredges are frequently floated in the pits and mining operations profitably continued.

In the case of the bedded deposits of Arkansas, Tennessee, and the Western States, the rock is mined like coal, but much of this rock is so hard that blasting is often necessary. Where the strata lie close to the surface, mining may be done by open cut; but where the topography is rugged, tunneling is usually resorted to. This entails considerable expense in timbering, but the rock is obtained practically clean, needing no washing, and in dry climates requiring little or no artificial drying. Normally, the cost of mining phosphate rock and preparing it for the market varies all the way from $1.75 to $2.50 per ton, depending on the nature and richness of the deposit.

MATERIAL LOST OR WASTED IN MINING OPERATIONS.

Unfortunately all the methods of mining phosphate rock as conducted at present entail great losses of phosphoric acid. Where the phosphate rock occurs imbedded in a matrix the source of loss is in the finely divided material passing through the screens of the washer plant, no differentiation being made between the small particles of phosphate and the sand and clay. It is estimated that two-thirds of the phosphoric acid actually present in the mined portion of the Florida deposits has been thus lost or thrown upon the dump heaps. Considering that an average of more than 2,000,000 tons of phosphate rock has been marketed annually from this State for the past decade, the loss runs into rather appalling figures.

In the case of the western phosphate deposits the situation is as yet not serious, since these deposits have been exploited to no great extent. A number of phosphate strata occur in the western fields, but in mining operations only the highest grade phosphate is saved, the overlying and underlying strata, which contain considerable percentages of phosphoric acid, being left or thrown aside. In underground operations, after the removal of the high-grade material, many of the tunnels are allowed to cave, and the lower grade material is thus irretrievably lost.

Although our tonnage of phosphate exceeds that of any other nation, and there is sufficient high-grade rock in sight to meet any increased demand which is likely to occur for many years, the losses entailed in mining and preparing rock for the market must be regarded as serious, and a good deal of earnest effort has been spent in trying to work out methods of eliminating these losses.

METHODS OF MANUFACTURING SOLUBLE AND AVAILABLE PHOSPHATES.

The main reason why such immense quantities of low-grade phosphate material are thrown aside or wasted is that the manufacturing process universally employed in producing soluble and available phosphoric acid requires a very high-grade phosphate rock.

Of the 2,000,000 tons and more of phosphate rock produced in the United States in 1916, all but 70,000 were converted into acid phosphate, a product manufactured by mixing phosphate rock with an equal weight (approximately) of 60 per cent sulphuric acid. When properly made, acid phosphate is a dry, powdery substance containing from 14 to 18 per cent of soluble phosphoric acid, and is used as the basis of nearly all commercial fertilizers.

Since the presence of iron and aluminum renders superphosphate less soluble and causes the product to be sticky, the fertilizer manufacturers will accept only phosphate rock that contains low percentages of these elements. Many deposits, therefore, that are really high in phosphoric acid are unsuitable for the manufacture of acid phosphate because of the presence of these impurities in prohibitive amounts.

At least 200 patents have been issued in the United States on processes for producing soluble and available phosphates without the use of sulphuric acid. Many of these methods have interesting features, but none of them has yet proved commercially practicable for the manufacture of fertilizer.

There are two general processes, however, which give promise of becoming commercially important. The first of these is based on the production of phosphate compounds which undergo ready decomposition under soil conditions. In this class is the phosphate of basic slag, a substance which is now universally recognized as a highly desirable phosphatic fertilizer.

Among our many industrial wastes the slag of blast furnaces and smelters is one of the most striking. When these furnaces are tapped the slag is discharged in a molten condition at a temperature of from 1,600° to 1,800° C., and it seems most unfortunate that the tremendous number of heat units present in such a molten mass is not utilized.

The iron ores used in European countries are high in phosphorus, and therefore the slag produced from the smelting of such ores is highly phosphatic. In this country, however, all the iron ore, with the exception of some occurring in Alabama, contains almost no phosphorus, and the slag produced has had little or no value except for filling purposes and railroad ballast.

One company in Alabama using an iron ore high in phosphorus produces a basic phosphatic slag for which it finds a ready market. It would seem to be a rather simple matter for other concerns to mix finely divided phosphate rock or phosphatic limestone with the molten slag as it issues from the furnace, and thus produce a phosphatic fertilizer in which the phosphoric acid is readily available to crops.

The other method of producing phosphoric acid, which is attracting considerable attention at present, is based on the volatilization of this acid from its compounds and its subsequent collection. Though the procedures advocated by different investigators vary in detail, the general scheme consists in submitting an intimate mixture of phosphate rock and sand with or without coke to the action of a temperature sufficiently high to drive off the phosphoric acid and produce a slag consisting chiefly of silicate of lime.

This slag finally contains most of the impurities originally present in the phosphate rock. The nearly pure phosphoric acid volatilized by this method is either absorbed in water or treated in an electric precipitator. The acid can then be used either for treating a second batch of phosphate rock and producing thereby double acid phosphate, or it may be neutralized with ammonia, forming ammonium phosphate, one of the most concentrated fertilizers it is possible to produce.

It still appears doubtful, however, if the electric furnace will be widely employed to produce a commodity as cheap as phosphate fertilizer should be, but it is very probable that the substitution of some type of fuel-fed furnace will bring down the cost of producing phosphoric acid by volatilization very materially. The process, on the whole, appears particularly attractive from a conservation standpoint, since it renders possible the utilization of lower grades of phosphate unsuitable for treatment with sulphuric acid. Moreover, the product obtained is phosphoric acid in such a concentrated form that long railroad hauls would be commercially practicable, where they are economically impossible with superphosphate containing relatively low percentages of phosphoric acid.

In these stirring times efficiency is everywhere the watchword, but efficiency as applied to industrial processes should mean not only a maximum production at a minimum cost but the conservation of materials which will assure an adequate supply to future generations.

DANGER OF INTRODUCING FRUIT FLIES IN THE UNITED STATES.

By E. A. Back,

Entomologist in Charge of Stored Product Insect Investigations, Bureau of Entomology.

THE American farmer has had laid upon him a never-ending burden in the losses he sustains from the ravages of injurious insects. The sad part of it is that more than 50 per cent of all his insect troubles might have been avoided had public opinion and a knowledge of insects throughout the world been sufficiently advanced during the early days of the Republic to have made possible the splendid quarantine system that the United States Department of Agriculture, through its Federal Horticultural Board, has been perfecting since the passage of the Federal plant quarantine act of 1912.

It seems strange, in the light of present-day knowledge, that the department should have had any difficulty in securing the passage of a law to protect the American farmer. Twenty years ago, in an article published in the Yearbook for 1897, Dr. L. O. Howard, Chief of the Bureau of Entomology, began the campaign against the careless and unintentional introduction of pests from other countries through the ordinary trade channels. The need, then expressed, for National legislation establishing quarantines against foreign insects has been demonstrated only too well by the new and injurious pests that have since become established in America. Fortunately the campaign to protect the United States from insect-infested and diseased fruits and plants has led at last to the passage of such a law as the Federal plant quarantine act of 1912, to which reference has just been made. But it has taken much painful and expensive experience to educate public opinion to the point where such legislation was made possible. Apple growers have had to fight the codling moth and the San Jose scale: wheat growers, the Hessian fly. New Englanders have had to see their forests devastated by the gipsy moth and to suffer from the poisonous rash of the brown-tail moth. The western farmer has had to see his alfalfa fields devoured by the alfalfa leaf weevil; the orange and grapefruit growers of Florida have had to suffer from the devastating spread of the white flies through their groves; cotton growers have had to lose millions of bales of cotton to feed the cotton boll weevil; the Californian, years ago, had to see his citrus trees almost ruined by the cottony cushion scale; and more recently householders and others in large portions of the South have had to see their premises overrun by that diminutive scourge, the Argentine ant. What farmer of the South does not know of the tremendous losses caused by certain grain "weevils"? What railroad president or farmer of the eastern portion of the United States has not seen his chestnut forests dying within the past few years from the chestnut blight? Yet all these pests and many more have come to our shores from other countries through the usual channels of international trade. They can never be eradicated. They will tax forever the agriculture of our country.

However, "it is useless now," to quote from Mr. C. L. Marlatt, chairman of the Federal Horticultural Board, "to dwell on what could have been saved to the agriculture and natural-forest resources of this continent if our forefathers had been wise enough to have early established and intelligently enforced inspection and quarantine regulations against the Old World to exclude plant diseases and insect enemies. That would have been conservation in its most practical form. The past can not be remedied, but the future can be safeguarded, and that is the present opportunity." It is in this safeguarding of the future that the department is rendering, and will continue to render, a service to the country that can never be fully appreciated.

To fight insects and plant diseases by keeping them from gaining a foothold in our country is the aim of the Federal Horticultural Board. To do this an effective quarantine system is in operation at all ports of entry, and a careful survey is being made of pests in other lands likely to be introduced into our own, in order that the department may the better guard against them. This study has brought to light many pests that, as a result of the advance in agriculture in the more sparsely settled regions of the world, were not even known to exist when first was begun the campaign against foreign pests. Among the insects of other lands that have not yet become established in our own are the serious pests known popularly as fruit flies.

WHAT ARE FRUIT FLIES?

Fruit flies are insects that resemble ordinary house flies but are far more beautiful, inasmuch as their wings are prettily spotted and banded and their bodies are usually more brightly colored. They are like house flies, also, in that they lay small white eggs that hatch into whitish maggots. These maggots, or larvæ, when full grown, are from three-sixteenths to half an inch in length. They do not, however, develop in refuse or decaying matter as do those of the house fly, but feed upon the living tissues of fruits, nuts, and vegetables. The eggs, which the female fruit fly lays just beneath the skin of the host plant or fruit, hatch into the maggots just mentioned, and these burrow in all directions through the pulp of the host. As the maggots, or larvæ, tunnel their way about the pulp of their host, they cause decays to develop, and these rotting areas often produce greater injury than the maggots themselves.

The attention of the reader is directed to the illustrations (Pls. XXII to XXVII) for a more striking explanation than words can give of the injury fruit flies are capable of inflicting upon the food of man.

NATIVE SPECIES OF FRUIT FLIES.

At least five species of fruit flies are native to the United States. The best known is the "railroad worm," or "apple maggot,"[1] so common in sections of the Eastern States. This is the pest that forms the winding brown streaks and decays often found in such early apples as the Red Astrachan, Golden Sweet, and Early Harvest varieties. Then there are two species that cause wormy cherries[2] and two that attack gooseberries and currants.[3]

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[1] *Rhagoletis pomonella* Walsh.

[2] *R. cingulata* Loew and *R. fausta* Osten-Sacken.

[3] *R. ribicola* Doane and *Epochra canadensis* Loew.

FOREIGN SPECIES LIKELY TO BE INTRODUCED.

The native species of fruit flies just mentioned are confined to the northern half of our continent and are capable of withstanding our coldest winters. On the other hand, the fruit flies of foreign countries, which are most to be feared, are lovers of a warmer climate. Therefore, should they succeed in evading our quarantine officials and become established in our country, they will be most serious as pests of the Pacific slope, of our Southern States, and of our island possessions. Investigations now in progress indicate that there are at least 20 fruit flies that might seriously affect our food supply, in the form of fruits and vegetables, should they become established in our country. The more important of these are discussed below.

THE MEDITERRANEAN FRUIT FLY.

The Mediterranean fruit fly[1] is the most serious and widespread of all fruit-fly pests at the present time. During the past 100 years that it has been known to science it has been spreading to different countries until now it is causing havoc on all continents except that of North America. It first attracted attention in London as an injurious pest of oranges imported from the Azores. It was recorded as a pest in Spain in 1842, in Algeria in 1858, in Italy in 1863, in Sicily in 1878, in Tunis in 1885, and in South Africa in 1889. It spread to western Australia in 1897 and to eastern Australia in 1898. In 1899 it was found in Tasmania; in 1900 in peach orchards near Paris, France; in 1901 in New Zealand and Brazil. In 1904 it was found a pest in Egypt and in Asia Minor, and in 1905 in Argentina. Between 1909 and 1914 it was discovered in both the eastern and western portions of Africa. In 1910 it was first discovered in the Hawaiian Islands, and within two years it had spread to every important island of the group. During 1916 the orange, tangerine, peach, pear, and apple crops of the Patras consular district of Greece were badly damaged. Bermuda became infested in 1865. Can it be kept out of the United States?

The Mediterranean fruit fly is particularly injurious because it attacks many different kinds of fruits, nuts, and

[1] *Ceratitis capitata* Wiedemann.

vegetables. In the Hawaiian Islands, where it has been investigated thoroughly by the department, it attacks 72 kinds of fruits. A complete list of fruits and vegetables attacked will be furnished by the department to those who desire it. It may be said, however, that almost any fruit in the Hawaiian Islands may harbor larvæ of this fruit fly. A partial list of host fruits includes oranges, grapefruit, lemons, limes, kumquats, tangerines, peaches, apples, figs, apricots, bananas, mangoes, avocadoes, sapotas, loquats, persimmons, guavas, quinces, papayas or papaws, pears, plums, grapes, bell peppers, eggplant, tomatoes, and even cotton bolls and coffee cherries. Plates XXII to XXIV illustrate the work of this fruit fly.

OLIVE FRUIT FLY.

The olive fruit fly[1] is at present a pest in all the regions bordering upon the Mediterranean, throughout the northern, eastern, and southern parts of Africa, and in western Asia. It attacks only the fruit of the olive and closely related species. It frequently causes untold damage to the olive crops of Italy, Spain, and Africa. During October and November, 1916, the writer observed the destruction wrought by this pest in oil or manzanillo olives throughout the Barcelona-Tarragona and the Granada districts of Spain. Scarcely a ripening fruit could be found that was not badly infested. The beautiful eating olives, known in this country as "queen" olives, grown in the vicinity of Seville, Spain, are often infested. The illustrations of Plate XXV indicate the severe injury that the olive fly can inflict. The fruits illustrated were picked from the trees in Spain. The olive orchards of California are not yet infested with the olive fruit fly. Is it not worth while attempting to keep this pest out of the olive orchards of California?

MELON FLY.

The melon fly[2] is a pest *par excellence* of vegetables, particularly of cucumbers, squashes, pumpkins, tomatoes, string beans, cowpeas, watermelons, cantaloupes, chayote, and other vegetable marrows belonging to the cucumber family. The melon fly was not known to science until 1898, when it was discovered in the Hawaiian Islands, to which it had

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[1] *Dacus oleae* Rossi. [2] *Bactrocera cucurbitae* Coquillett.

spread from either China or Japan. At present it is known to exist not only in Hawaii, China, and Japan, but also in the Philippine Islands, Java, Tunis, northern Australia, Ceylon, and India. Its native home is, beyond doubt, the Indo-Malayan region.

During the period of somewhat over 20 years that it has been present in Hawaii it has spread to all the islands of the group and has put a stop to the free cultivation of the vegetables listed above. Watermelons and cantaloupes, particularly, can not be grown unless the fruits are protected by covering as soon as the blossoms open. Plate XXVI, figure 1, shows the method used in the Hawaiian Islands for protecting Chinese cucumbers from infestation, by inclosing each fruit in a long paper envelope. Often the vines are killed back by the maggots, and even the watermelon seedlings may be ruined by the maggots developing in the taproot. During the summer months in Hawaii it is impossible to grow tomatoes, pumpkins, or squashes. The vines may produce a rank, luxuriant growth and bloom profusely, but the melon fly lays its eggs in the undeveloped ovary of the bloom, or in the young fruit, and the maggots hatching prevent the fruit from maturing. Examples of the work of the melon fly are shown in Plate XXVI, figure 2, and in Plate XXVII. As many as 650 maggots have been reared from a pumpkin no more than 4 inches long. Can this pest be kept out of the cantaloupe and truck gardens of southern California, from the rich tomato plantations of Florida, and from other points of our Southland?

MEXICAN FRUIT FLY.

The Mexican fruit fly,[1] often referred to as the Mexican orange maggot, is known to occur only in Mexico. It attacks oranges, grapefruit, limes, peaches, guavas, and plums. It doubtless will be found attacking many other fruits when once it has been studied thoroughly. Although wormy oranges from Mexico have been condemned in our Middle Western States and at California points, this pest has not yet become established in the orange groves of California, Florida, or Louisiana, thanks largely to the quarantine measures adopted by the United States Department of Agricul-

[1] *Anastrepha ludens* Loew.

ture, California, Florida, and Arizona, and to cultural and climatic checks.

PAPAYA FRUIT FLY.

The papaya or papaw fruit fly[1] is a pest of the papaya, a fruit which, in tropical and semitropical countries, is either already or fast becoming a valuable breakfast fruit. The papaya fruit fly is a native of the West Indian region, and is known to be injurious in Porto Rico, the Bahama Islands, Santo Domingo, Haiti, Cuba, and Central American points. It has already spread to the southeastern part of Florida, about Miami. This pest should not be permitted to spread to the valuable papaya gardens of Hawaii and the Philippines.

WEST INDIAN FRUIT FLY.

The West Indian fruit fly[2] occurs throughout the West Indies, Mexico, Central America, and South America. It is a pest of prime importance, attacking many fruits. It has been reported infesting the peach, mango, orange, pear, plum, persimmon, guava, coffee cherries, and a number of other tropical and semitropical fruits. It and several other closely related species found in the same general region could easily become serious pests in Florida and the Gulf Coast States should they once become established there.

BANANA FRUIT FLY.

The banana fruit fly[3] was first described in 1909 as a pest of bananas in Fiji. It appears not yet to have become established in Australia, although it has been intercepted at Sydney in shipments of bananas from Suva. The banana fruit fly would become a serious menace to the banana export trade of the Hawaiian Islands and of Central America and South America should it spread to these food centers.

PINEAPPLE FRUIT FLY.

The pineapple fruit fly[4] was not known until 1903, when it was discovered in a shipment of pineapples imported from Rarotonga. At a later time pineapples from Suva were dis-

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[1] *Toxotrypana curvicauda* Gerstaecker.
[2] *Anastrepha fraterculus* Wiedemann.
[3] *Bactrocera curvipennis* Froggatt.
[4] *Bactrocera xanthodes* Broun.

covered infested. Besides pineapples, it has been found infesting oranges, granadillas, and mammee-apples (papaias) from Tonga and Rarotonga. Quarantine officials of the department are constantly guarding the fertile pineapple fields of Hawaii, which are exposed owing to the Australasian trade with Honolulu.

QUEENSLAND FRUIT FLY.

The Queensland fruit fly[1] is a serious pest of the banana, mango, peach, apricot, nectarine, orange, apple, quince, loquat, and a number of wild fruits. It is known to occur in Australia (Queensland and New South Wales), India, Ceylon, Java, and Amboina. This fruit fly threatens the Hawaiian Islands, where it would affect the pineapple and the banana, the only two fruits that are of commercial importance now that the Mediterranean fruit fly and the melon fly have been introduced and have attacked other Hawaiian fruits and vegetables with such disastrous results.

OTHER FRUIT FLIES MAY DEVELOP INTO PESTS.

In calling attention to the above-mentioned fruit flies as those most likely to be introduced, it should be borne in mind that at present very little is known regarding the capacity for injury possessed by a large number of other closely related species. The department has investigated those that are nearest and most likely to be introduced, but there exist throughout the semi-Tropics of both the Old and New Worlds other fruit flies that appear just now to be of little economic importance. This, however, may be merely because they are living at present in countries not yet developed agriculturally and are forced to subsist upon the scattered and small native fruits or are held in check by natural agencies.

Thus the Mediterranean fruit fly is so rare to-day in western Africa—its native home—where cultivated fruits are but little grown that no one would think of listing it as a dangerous pest. Yet, once it had spread to old settled countries, it proved to be a ruinous pest of practically all cultivated fruits. In South Africa the Natal fruit fly,[2] which was not

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[1] *Bactrocera tryoni* Froggatt. [2] *Ceratitis rubivora* Coquillett.

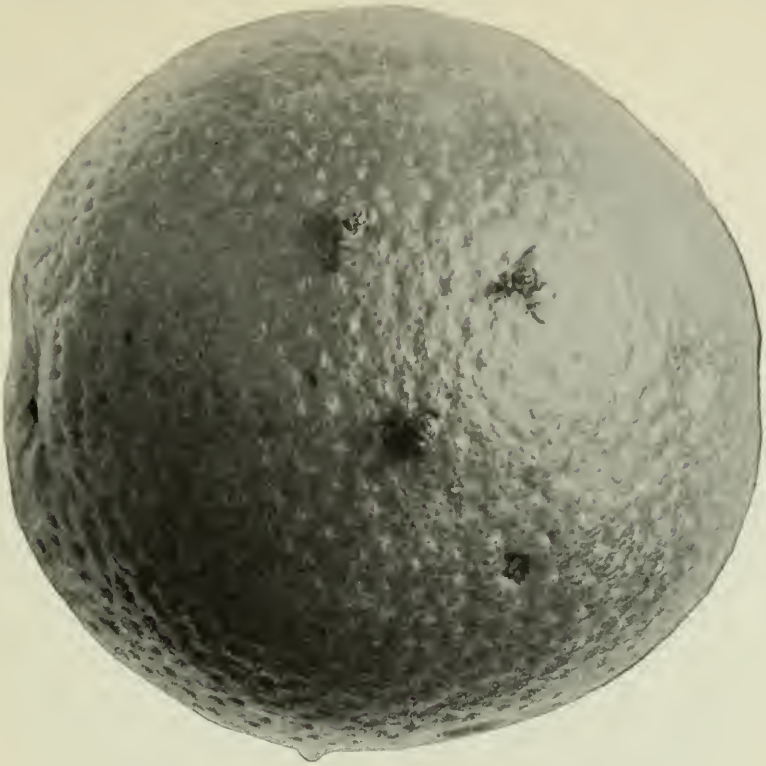

FIG. 1.—THREE ADULTS OF THE MEDITERRANEAN FRUIT FLY LAYING EGGS IN THE RIND OF AN ORANGE.

FIG. 2.—A GRAPEFRUIT SECTIONED TO SHOW THE HAVOC CAUSED BY MAGGOTS OF THE MEDITERRANEAN FRUIT FLY.

WORK OF THE MEDITERRANEAN FRUIT FLY.

FIG. 1.—APPLE PUNCTURED BY MEDITERRANEAN FRUIT FLY ADULTS.

Whenever growing apples are punctured by the fruit fly the skin about the puncture becomes discolored. The apple illustrated was found at Granada, Spain.

FIG. 2.—JAPANESE PLUMS SHOWING MANY PUNCTURES IN THE SKIN.

Females of the Mediterranean fruit fly have laid eggs. Note that about each puncture the flesh has withered, causing a distinct depression very characteristic of fruits such as the plum that are attacked as they reach maturity.

WORK OF THE MEDITERRANEAN FRUIT FLY.

FIG. 1.—THE QUINCE IS A FAVORITE HOST OF THE MEDITERRANEAN FRUIT FLY.

Every fruit offered for sale in Cadiz, Spain, in 1916, was affected. So firm is the flesh that badly infested fruits show no external discolorations. Often the only external evidences of infestation are such holes as are shown in this fruit, through which the maggots have escaped after tunneling to the surface.

FIG. 2.—MEDITERRANEAN FRUIT FLY MAGGOTS IN A JAPANESE PERSIMMON.

The persimmon, very much overripe, has been broken open to show the maggots. In such watery fruits the maggots feed nearer the skin. The persimmons in the markets of Barcelona, Valencia, and Cadiz, Spain, were infested during 1916.

WORK OF THE MEDITERRANEAN FRUIT FLY.

FIG. 1.—MANZANILLO OLIVES, NATURAL SIZE, INFESTED BY THE OLIVE FRUIT FLY.

Note depressions resulting from feeding of maggots in pulp and breaks in skin through which insect has left fruit. Practically every olive examined on trees in Barcelona, Tarragona, and Granada, Spain, was thus infested during October and November, 1916.

FIG. 2.—QUEEN OLIVES, SLIGHTLY ENLARGED, SHOWING HOLES IN SKIN MADE BY MAGGOT OR ADULT OF OLIVE FRUIT FLY.

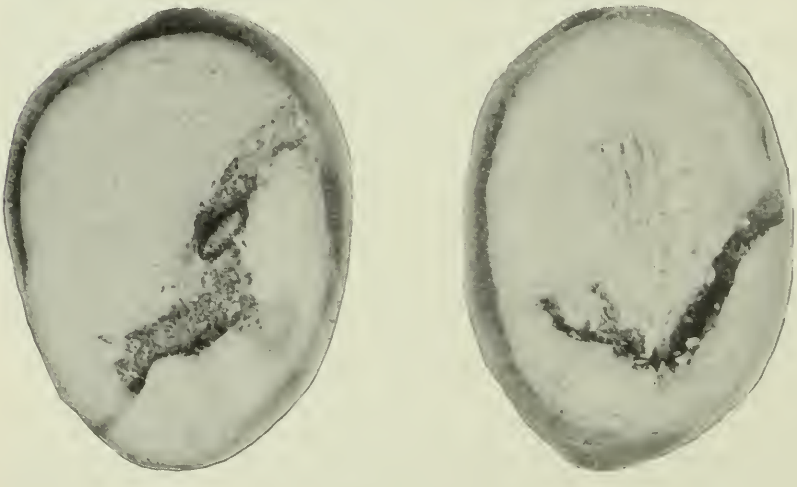

FIG. 3.—QUEEN OLIVES, SAME AS IN FIGURE 2, CUT OPEN.

The injury to the pulp caused by maggots of the olive fruit fly is very apparent. Such infested fruits are rejected from the best trade and are sold as inferior fruits, for salad purposes. Olives of figures 2 and 3 were grown near Seville, Spain.

WORK OF THE OLIVE FRUIT FLY.

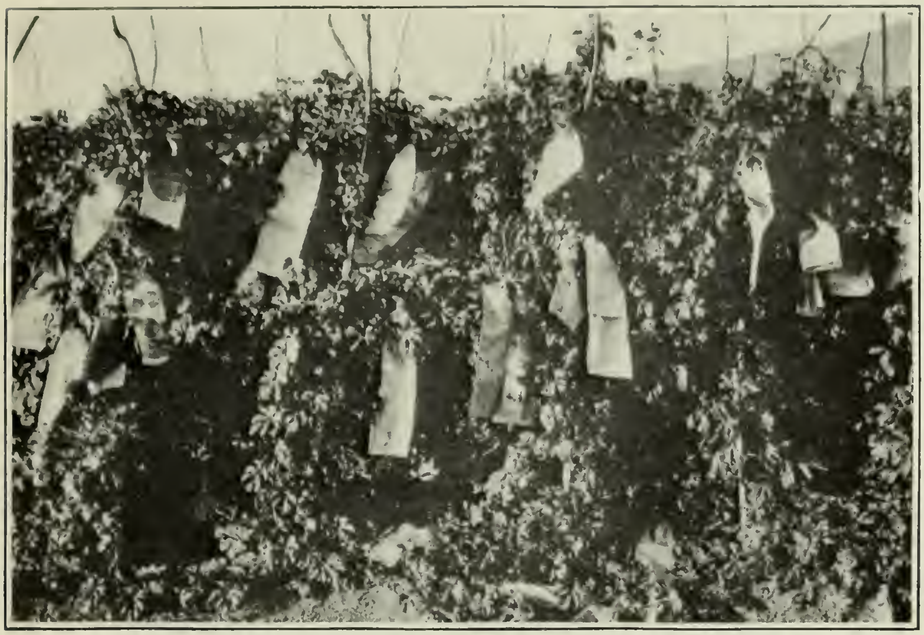

FIG. 1.—PROTECTING CHINESE CUCUMBERS FROM MELON FLY ATTACK.

The melon fly is so persistent in its attack upon cucumber and other fruits that the Chinese gardeners find it necessary in Hawaii to inclose all the growing fruits in envelopes made from newspapers. Otherwise the entire crop is ruined.

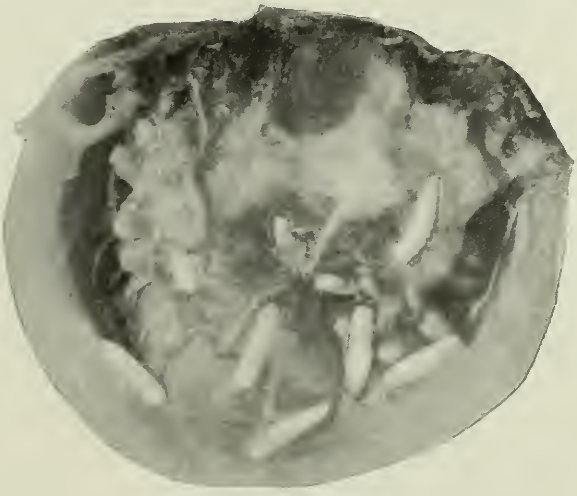

FIG. 2.—DESTRUCTIVE WORK OF MELON FLY LARVÆ IN TOMATO.

Living maggots quickly burrow out of sight. The maggots shown in the illustration have been killed that the reader may compare their size with that of a medium-size tomato.

THE MELON FLY.

FIG. 1.—A WATERMELON SHOWING DEFORMITIES CAUSED BY MELON FLY ATTACK.

When the fruits are punctured, the growth is arrested about the injured spot and various and curious deformities may result.

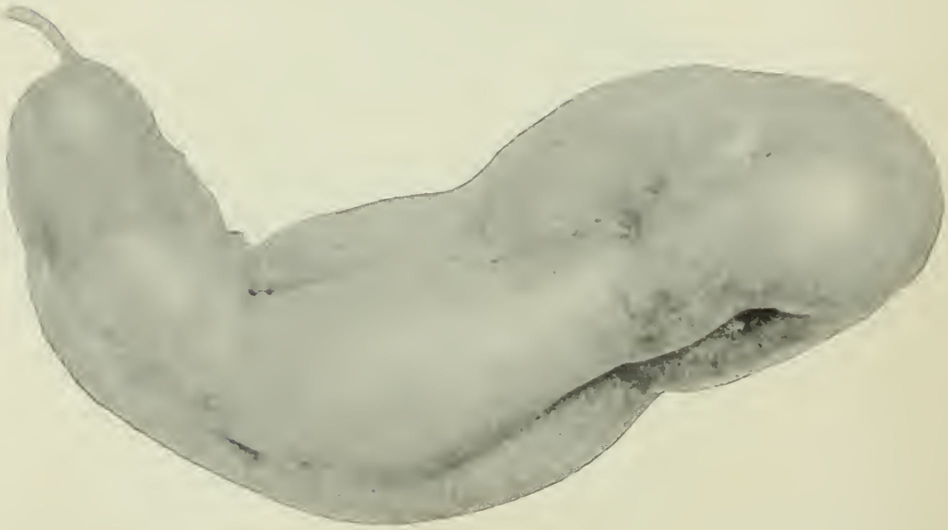

FIG. 2.—A CUCUMBER DECAYED AND OTHERWISE INJURED BY MELON FLY ATTACK.

It is almost impossible to grow cucumbers free from melon fly attack in Hawaii, although the cucumber is the most resistant to attack of all cucurbitaceous crops.

WORK OF THE MELON FLY.

FIG. 1.—HAND BAGGAGE OF TRAVELERS ARRIVING AT SAN FRANCISCO FROM HAWAII BEING INSPECTED FOR FRUITS AND VEGETABLES INFESTED BY FRUIT FLIES.

FIG. 2.—TRUNKS AND OTHER HEAVY BAGGAGE OF TRAVELERS ARRIVING AT PACIFIC PORTS FROM HAWAII BEING EXAMINED BY FRUIT-FLY INSPECTORS.

These inspectors intercept contraband fruits on an average about once a month.
(Photographs by Maskew.)

INSPECTION SERVICE.

FIG. 1.—CHINAMEN REMOVING ALL SPLIT, DECAYED, OR RIPE FRUITS FROM BUNCHES OF BANANAS IN A BANANA PACKING SHED NEAR HONOLULU.

Each bunch is cleaned with great care.

FIG. 2.—BANANAS AWAITING INSPECTION BEFORE SHIPMENT.

As overripe and damaged bananas may carry the fruit fly, each bunch, after it has been cleaned, is set aside to await inspection by the Federal inspector before it is wrapped in rice straw and shipped to California.

FIG. 3.—INSPECTOR EXAMINING BUNCHES OF BANANAS WRAPPED IN RICE STRAW ON SAN FRANCISCO DOCKS.

Each bunch bears a certificate stating that it was found free from infestation before being wrapped in Hawaii. (Photograph by Maskew.)

INSPECTION SERVICE.

described as new to science until 1901, was originally an insignificant insect attacking the fruits of native trees in Natal. But with the development of South Africa, which resulted in the cultivation on a commercial scale of an increasing number of our ordinary fruit crops, it has itself kept pace with fruit production, until now it is rated one of the most important pests infesting both native and cultivated fruits.

It is hazardous, therefore, to ignore even those fruit flies that are at present of little apparent importance as pests, inasmuch as any one of them, once introduced to a more favorable country, may develop into a pest of prime importance, just as the cotton boll weevil, at first an obscure pest of wild plants closely related to the cotton plant in Mexico, discovered its preference for the cultivated cotton and at once developed into one of the most disastrous pests of our Southland.

DANGER OF INTRODUCTION INCREASES EACH YEAR.

The danger is real that fruit flies of other lands may become established in our own unless active measures are taken to keep them out. Trade is extending to remote corners of the earth. The Tropics are becoming more important each year. Besides giving up their wealth, the Tropics will give up their pests, just as Europe and Asia in the free days of the past sent to our shores more than 50 per cent of our poverty-producing pests along with their enriching cargoes. Fast steamships and cold storage make it possible now for fresh fruits grown in such countries as Australia and South Africa to be placed on the markets of London, New York, San Francisco, and Buenos Aires, and these fresh fruits may carry the maggots of fruit flies. The warmer portions of our country are becoming more thickly settled, and with the increase in population come a larger number of vegetable gardens and fruit orchards, thus making host conditions more favorable for the establishment of fruit flies, as well as of other pests. There is no doubt that conditions are becoming more favorable in our country, as well as throughout the Tropics and semi-Tropics of the New World, for the increase of fruit-fly ravages.

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INSTANCES OF FRUIT-FLY SPREAD.

Numerous instances of fruit-fly spread can be shown. The Bermudas would not now be infested by the Mediterranean fruit fly, in all probability, had not a sailing vessel, bound for New York from the Mediterranean region during Civil War times, been blown from her course and forced to unload her cargo containing infested fruits at St. George. The Mediterranean fruit fly did not become established in Australia until steamships and cold storage made it possible for the infested Mediterranean countries to ship oranges to Perth and Sydney. With the pest established in eastern Australia, the ships plying between Australia and Hawaii carried the maggots to Honolulu, and to-day the agents of California and the department are intercepting infested fruits on ships arriving at San Francisco and San Pedro from Honolulu and Hilo.

A fruit-fly chrysalis, or pupa, was discovered in New Zealand in soil about the roots of a plant imported from Australia, and in Tasmania infested fruits from Sydney are frequently condemned. In 1909 a case of infested peaches with living larvæ of the Mediterranean fruit fly arrived at Auckland, New Zealand, after a four weeks' voyage in cold storage from South Africa. At San Francisco inspectors of the Federal Horticultural Board are almost monthly intercepting infested fruits in the ships' stores and even in the baggage and pockets of tourists returning from the Hawaiian Islands.

At Washington the Federal Horticultural Board has found a living papaya fruit fly in an express package from Mexico and living specimens of the olive fruit fly in a package of olive seed sent by mail from South Africa and destined for California, where the olive fly does not yet occur. The writer has seen cargoes of oranges, some fruits of which were infested, being loaded on ships at Spanish ports and consigned to London and South America. The writer and others have had the misfortune to purchase oranges containing maggots of the Mexican fruit fly on the trains between Mexico City and the Texas border. Fruit-fly attack is usually so obscure at first that the traveling public often purchase what appear to be sound fruits, only later to discover them maggoty within and to throw them away, sometimes long distances from the place of purchase. This method of spread has been common in Hawaii, Australia, and Africa.

WHAT THE DEPARTMENT IS DOING.

In the foregoing lines the reader will have learned something of what the department, through its Federal Horticultural Board, is doing toward intercepting and destroying fruit flies, as well as other pests, and preventing them from becoming established in this country. By means of quarantines and regulations the department is prohibiting the entry of all horticultural products likely to carry pests unless they have been rendered free from danger as pest carriers, either by Federal inspection or by treatment by approved methods under Federal supervision. The reports of the officers of the Federal Horticultural Board are replete with instances of injurious pests intercepted from all quarters of the globe. The latest, perhaps, is the confiscation at San Francisco of an infested grapefruit or granadilla from Java found in the baggage of a tourist.

While the inspectors are on the watch for the contraband material at ports of entry, the department carries its protection further. In the Hawaiian Islands, where the Mediterranean fruit fly and the melon fly are serious pests, it has been found that the banana and the fresh pineapple trade may be saved to the people provided certain precautions are taken. The department therefore has established in Hawaii a system of inspection that is heartily supported by the fruit growers and transporting companies concerned, whereby all plantations and packing houses from which fruit is shipped are kept from becoming sources of fruit-fly dissemination. The regulations of the department still further protect the mainland by rulings, as a result of which no shipments of fruit can be made from Hawaii to the Pacific coast or unloaded there unless they have first received the approval of the Federal Horticultural Board. Certain phases of the inspection service carried on to protect the mainland United States are illustrated by the figures of Plates XXVIII and XXIX. Aside, also, from the quarantine and inspection phases of the work of the department, the Federal Horticultural Board maintains a fruit-fly specialist whose duty it is to gather available information regarding fruit-fly pests, either by actual travel in foreign lands or by correspondence with specialists serving foreign Governments.

THE TRAVELING PUBLIC MUST AID.

After Federal and State officials have done all within their power to prevent fruit-fly pests from entering the United States through our ports of entry, much depends upon the intelligence and personal interest of the traveling public in supplementing their work. At present printed matter is distributed to all persons entering Pacific ports from the Hawaiian Islands. This calls attention to the serious consequences that may follow the careless and unintentional introduction of fruit flies from Hawaii. In addition each passenger must sign an affidavit stating that he has in his baggage no fruit subject to fruit-fly attack. This educational campaign, already in progress, has done much to reduce the number of instances of fruit stowed away in inaccessible places in personal baggage. Such fruits have no value except as curiosities to be shown friends at home. Travelers have been known to carry infested coffee cherries, kamani nuts, and other small inedible fruits in their pockets, where naturally such small fruits are easily overlooked by inspectors. If fruit flies are to be excluded permanently from our rich fruit and vegetable regions, inspectors must have the hearty and intelligent cooperation of each traveler.

CONCLUSION.

Persons who have traveled in countries where fruit flies are a scourge to the horticulturist and truck gardener realize fully the importance of the fight on the part of the United States Department of Agriculture to keep these pests from becoming established in our country. It is the putting into practice in the best possible manner of the old adage, "An ounce of prevention is worth a pound of cure."

THE GREAT PLAINS WATERFOWL BREEDING GROUNDS AND THEIR PROTECTION.

By Harry C. Oberholser,
Assistant Biologist, Bureau of Biological Survey.

FOR obvious reasons the breeding grounds of our waterfowl are of prime importance. The Biological Survey for several years has been investigating these areas in the various States, in order to ascertain the numbers and distribution of the birds, with a view to more effective cooperation in the conservation of the game supply.

Waterfowl shooting is one of the most fascinating of outdoor sports. The myriads of birds that 50 years ago thronged our lakes, streams, and coastal waters gave promise of the pleasures of the chase and of a food supply for unlimited future years. Various causes, however, have changed this rosy outlook, and the rapid decrease in the numbers of waterfowl in the United States during the last three decades has drawn the attention of sportsmen and others to the necessity of careful conservation if the supply is to continue.

THE GREAT PLAINS AS EXTENSIVE BREEDING GROUNDS FOR WATERFOWL.

Ducks and other waterfowl breed chiefly on or near the lakes, ponds, marshes, and streams of the interior, and about the waters and marshes of the coast. In the eastern United States their breeding grounds are not extensive and are confined principally to isolated swamps and lakes or to narrow coastal strips. In most of the Western States similar conditions exist, although at some of the larger lakes in the arid interior great numbers of water birds rear their young. Such important breeding places in the West are the Klamath Lakes in southwestern Oregon, Malheur and Harney Lakes in southeastern Oregon, Great Salt Lake in Utah, Ruby and Franklin Lakes in Nevada, and the Stinking Spring Lakes on the Jicarilla Indian Reservation in northern New Mexico. The Great Plains, however, contain the most extensive breeding grounds for waterfowl, particularly ducks. The portion of these grounds within the United States is but a southern extension of that in central southern Canada, which is the greatest breeding area for ducks on the North American Continent. The extreme southern end of the Great Plains, in Kansas, Oklahoma, Colorado, and northern Texas, has only widely scattered lakes and ponds, and thus harbors comparatively few waterfowl; but most of the remainder, lying chiefly in Nebraska, South Dakota, and North Dakota, is dotted with numberless lakes, ponds, and sloughs. (See Pls. XXX and XXXI.)

This important waterfowl breeding area is naturally divisible into two parts, one including the sand-hills of Nebraska, the other the lake region of North Dakota and South Dakota.

THE SAND-HILL REGION OF NEBRASKA AND ITS IDEAL BREEDING CONDITIONS.

The sand-hill region of Nebraska lies in the middle portion of the State and occupies, roughly, about one-third of the whole area, or approximately 25,000 square miles. It is a country of hills, few of them, however, over 300 feet in height, interspersed with valleys, many of these level floored and of considerable extent. The hills are heaps of sand, some with steep, others with gently sloping, sides, usually covered with a thick growth of grass or other low vegetation, but sometimes nearly bare or hollowed by the wind into the pits commonly called "blowouts." The lower valleys are all grass covered, and where not too wet are used as hay meadows. Scattered through them are numerous lakes, ponds, and sloughs, and a few streams, many of the lakes several miles in length. The water is in many cases somewhat alkaline, though seldom sufficiently so to prevent the growth of vegetation. Some have grassy shores with little or no other plant life, either in the water or about their margins; others have a fringe of marsh vegetation; and still others have their surface almost entirely covered with grass or water plants. The physical features here have thus combined to produce ideal conditions, of which the water birds have not failed to take advantage.

Among the game birds that breed here abundantly are the mallard, gadwall, blue-winged teal, shoveller, pintail, redhead, ruddy duck, and coot. Also, not a few canvas-back ducks pass the summer here, as well as a small number of baldpates, lesser scaup ducks, ring-necked ducks, green-winged teals, Virginia rails, long-billed curlews, and some others.

Among the water birds not commonly considered game, the most abundant in this region are the black tern, Forster tern, American eared grebe, killdeer, and Wilson phalarope.

THE LAKE REGION OF NORTH DAKOTA AND SOUTH DAKOTA TENANTED BY WATER BIRDS.

The lake region of South Dakota comprises the eastern third of the State, or about 25,000 square miles; that of North Dakota covers about 45,000 square miles, or two-thirds of the State, excluding only the southwestern corner beyond the Missouri River. This area in both States is mostly open, rolling country, with comparatively little timber, except along the streams, and is now largely under cultivation. The only hills of consequence are the bluffs along some of the rivers and the group of hills in northern North Dakota, known as the Turtle Mountains, which rise some 600 or 700 feet above the surrounding plains. Most of this lake region is sprinkled with innumerable sloughs, ponds, and lakes of all sizes up to that of Devils Lake, which is at present some 25 or 30 miles long. Some of these lakes and ponds have gravelly, sandy, or grassy shores, with no marsh vegetation, while many in places have excellent cover for birds, and others are entirely overspread with water plants. The lakes on the plains have little or no arboreal or shrubby vegetation about their margins, but those in the Turtle Mountains are almost surrounded by forest, which in many cases comes down to the very water's edge. Most of the lakes are shallow; some are so strongly alkaline that they offer no inducement to waterfowl; but nearly all are tenanted by water birds of some description.

Among the waterfowl breeding abundantly about the Dakota lakes are such well-known game birds as the mallard, gadwall, blue-winged teal, shoveller, pintail, redhead, ruddy duck, lesser scaup duck, canvas-back, coot, and sora rail; some of those tolerably common are the upland plover, willet, baldplate, and locally the white-winged scoter; and a number of others occur in smaller numbers. Among other very abundant water birds now not commonly classed as game might be mentioned the black tern, common tern, herring gull, ring-billed gull, Franklin gull, American eared grebe, Holboell grebe, killdeer, Wilson phalarope, and marbled godwit; while many others occur less frequently.

UNDISTURBED BREEDING GROUNDS ESSENTIAL TO THE GAME SUPPLY.

The essential requirements of good breeding grounds are satisfactory cover, suitable nesting places, plenty of the right kind of food, particularly for the young birds, and an absence of disturbance during the breeding period and for a reasonable time before its beginning. Most waterfowl are dependent upon the proximity of water for their food, and consequently for breeding places; and, unlike many land birds, can not under necessity accommodate themselves to a very different environment. As a natural consequence, the destruction of their breeding places means the elimination of the birds. Comparatively little of such loss is due to natural causes, though seasons of protracted drought are sometimes, at least temporarily, responsible. Disappearance of waterfowl is caused usually by (1) the draining of lakes and marshes to acquire hay meadows or land for other farm purposes; (2) the establishing of summer resorts or a too close approach of a great number of other human habitations; (3) extensive cultivation of the country; or (4) disturbance from spring shooting or from other causes during the breeding season. The maintenance of the breeding grounds of waterfowl is all-important both for the preservation of the various species and for the continuation of a supply of birds which shall furnish food and sport for the hunter. Furthermore, the breeding grounds of waterfowl, once destroyed over any considerable area by any of the agencies above mentioned, are with difficulty restored.

The Great Plains waterfowl breeding grounds, taken as a whole, are the most extensive now remaining in the United States, and the only ones east of the lakes of Utah and northern New Mexico. Though Canada has a large area where

B17182

FIG. 1.—CARPENTER LAKE IN THE TURTLE MOUNTAINS, NORTH DAKOTA.

This lake is the summer home of redheads, canvas-backs, lesser scaups, golden-eyes, and several other kinds of waterfowl.

B17177

FIG. 2.—SMITH LAKE IN THE TURTLE MOUNTAINS, NORTH DAKOTA.

The home of ducks and other waterfowl.

B16347

FIG. 1.—THE SAND-HILLS OF NEBRASKA.

Whitewater Lake, and Pelican Lake in the distance. Both these lakes are the summer home of many kinds of ducks and other waterfowl.

B16334

FIG. 2.—SOUTH CODY LAKE, NEBRASKA.

In these marshes and meadows adjoining, many ducks, including blue-winged teals and mallards, are to be found in summer.

great numbers of waterfowl still breed, we can not afford to rely on that for our supply of game, since the settling up of the middle Provinces is almost sure ultimately to have a very important effect on the Canadian supply of ducks and other waterfowl. It therefore becomes all the more important that this Great Plains area be maintained as a breeding ground, particularly for ducks, and that it be even improved, if the waterfowl game supply of the States east of the Rocky Mountains is to be preserved for future generations.

FURTHER RESTRICTIONS ON HUNTING NEEDED.

Granting the need of efforts to save and increase the waterfowl supply, particularly in North and South Dakota, the question becomes one of means to this end. Many and various restrictions have been placed on hunting in all parts of our country during the last 20 or 30 years. During this time it has come to be realized that first of all the birds must be allowed to rear their young in peace and safety. With this in view, the practice of hunting in spring while the birds are settling on their breeding grounds has been abolished during the last few years throughout the United States. This has done more for the preservation of wild fowl than any other single measure. Highly important as is the comparatively recent cessation of spring shooting, it is just as important, if not even a prime necessity, that this prohibition continue, as probably nothing can take its place as a means of increasing the game supply. There doubtless was a time when the simple expedient of refraining from disturbing the birds during the breeding season, coupled with a very reasonable restriction on the number of birds taken, would have sufficed to protect the game and to maintain a supply for all future generations, but that day has now undoubtedly passed, and it is necessary to impose further restrictions upon hunting in order to save our waterfowl from complete extermination. This has long been recognized and has been given force in scores of State laws.

These restrictions, which upon examination will be found entirely reasonable, and without which little can be accomplished in the matter of game protection, may well be briefly mentioned here. In addition to the absolute protection that should be accorded the birds on their breeding grounds, it is obviously desirable to insure them a measurable degree of safety during their migrations to and from the Southland *and also on their wintering grounds in the Southern and Eastern States.* Protection on the wintering grounds is more particularly necessary because almost the entire waterfowl population of southern Canada and the central and eastern United States is concentrated into a comparatively small area during the winter season, and unrestricted slaughter in this place would have results almost as disastrous as an invasion of the breeding grounds. It is now realized that protection at these seasons can not be obtained unless market hunting is either abolished or so restricted that it will be no longer possible to kill enormous quantities of game in a single locality within a limited time. Furthermore, the transportation of large quantities of game for sale should be prohibited, since this is merely a corollary of the no-sale provisions now in force in many States.

A further important provision, and one that should everywhere receive careful consideration, is a reasonable bag limit. The day has long since passed when it should be permissible for one man to kill in a single day, say, 500 ducks, many times more than he could possibly make use of in any legitimate way, unless the sale of the birds for market be so considered.

Open-water shooting is often very destructive to game, and should be prohibited on all inland lakes and streams, particularly on such bodies of water as are used by waterfowl for breeding purposes.

Guns of large caliber, such as have been used to kill at a discharge whole flocks of ducks at a great distance, have no place in the outfit of a true sportsman; they are intended solely as a means of destruction for the benefit of market hunters, and their use should not be allowed at any time.

The use of motor boats in the pursuit of game is likewise undesirable, since it gives a hunter undue advantage, not only over the birds but over his fellow sportsmen, and should not be permitted in hunting waterfowl.

The hunting of birds by night or during the time between sunset and dark and that between daybreak and a half hour before sunrise is also a vicious practice. The reason is readily apparent, for birds must have some part of the day in which to rest and feed; therefore to keep them disturbed during the hours of dusk or darkness, as well as during the daylight, is too continuous a pursuit. It is even desirable, as some States already have recognized, to allow shooting only on certain days of the week, in order that the birds may have time to recuperate from the onslaught of hunters.

If present restrictions do not result in an increase of the game supply, resort must be had to a further shortening of the hunting season, so that the number of birds killed may be appreciably diminished. It may be necessary even to declare a closed season for a period of years on a number of game birds which it is now permissible to shoot during an open season of considerable length. This expedient has already been tried with marked success in the case of game birds, both waterfowl and others, and under some circumstances is, at least locally, about the only remedy for the threatened extinction of certain birds.

PUBLIC AND PRIVATE RESERVATIONS FOR PROTECTING WATERFOWL.

As an additional measure of protection it is extremely desirable that there be established in the Great Plains region a number of refuges for waterfowl and other game, in order that the birds may have certain places for breeding in spring and summer and for rest during their migration journeys. There are already on the Great Plains eight Federal reserves, three of which, however, are of little or no value for waterfowl, and it is hoped that it may be possible to establish others in the near future. It is within the power of the various States to set aside State game refuges, as has been done with admirable results in Minnesota and North Dakota. Individuals as well as States can aid in this matter by preventing all hunting on their lands. This is particularly desirable in cases where one person controls all the land about a lake suitable for breeding waterfowl. The important results that can come from such preserves are exemplified on an estate in Rolette County, N. Dak., where the owner has for many years protected the birds on Island Lake, a body of water some 2 square miles in extent; and it is very much to be hoped that his success may inspire many others in this and other States to follow his example.

With adequate Federal, State, and private game reservations in the States within the waterfowl breeding area of the Great Plains, and with proper restrictions on hunting, the preservation and even the increase of the game supply may confidently be expected, to the great benefit of present and future generations.

THE WEED PROBLEM IN AMERICAN AGRICULTURE.

By H. R. Cates,

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THE control of weeds is one of the oldest and still one of the most important problems connected with agriculture. Because we have always had weeds with us, there is a tendency to accept the situation as inevitable and one of the necessary evils connected with farming; consequently no sufficient, general, and concerted effort is being made to overcome the great loss which they cause. Yet the weed fight is one of the standard routine operations on the farm, and it represents a large proportion of the labor necessary to produce crops. No other single feature of farming requires such universal and unceasing attention as do the weeds.

WAYS IN WHICH WEEDS CAUSE INCREASINGLY LARGE LOSSES ANNUALLY.

The annual loss to the farmers caused by weeds is enormous. A discouraging feature regarding this loss is the fact that it grows greater each year.

Weeds are costly and injurious in many ways. They injure crops both in quantity and in quality and greatly increase the labor involved in farming. Other conditions being equal, the yield of most crops is inversely proportional to the growth of weeds. An intertilled crop in which weeds are allowed to grow unmolested is usually an entire failure. Considering the principal crops in the United States, it is estimated that weeds reduce the yield of corn by 10 per cent; tame hay, 3 to 16 per cent; potatoes, 6 to 10 per cent; spring grain, 12 to 15 per cent; winter grain, 5 to 9 per cent; tobacco, fruit, and truck crops, 0 to 5 per cent; pasture, 5 to 50 per cent.

In damage to quality of product due to weeds, the principal sufferers are the small grains, pastures, hay, grass, and seed crops. The annual loss to the spring-grain growers of the Northwest due to dockage of the marketed grain because of weed seeds present amounts to from 3 to 10 per cent of the crop. Winter grain suffers less from weeds than the spring-grain crop.

The extra labor required to keep weeds under control is probably the greatest economic loss which they cause. The labor cost of weeds falls most heavily on the intertilled crops. Numerous experiments have shown that in growing most intertilled crops cultivation is of minor importance except to eliminate weeds.[1] (See Pl. XXXII, fig. 1.) Even in the semiarid regions, where summer fallow is practiced, presumably to conserve moisture and control weeds, experiments have shown that if weeds be eliminated from the summer fallow, cultivating the land during the summer has little or no effect on the succeeding crop yields. Tillage is by far the most expensive feature of growing intertilled crops (Pl. XXXII, fig. 2). Numerous cost-account records collected by the Office of Farm Management, United States Department of Agriculture, show that on the average diversified American farm the cost of tillage operations comprises from 30 to 40 per cent of the total cost of farm operations. Probably half the total amount of cultivation required is necessary only for controlling weeds, and in many instances practically all intertillage could be eliminated without affecting crop yields if by other means weeds were prevented from growing. Most of the hand labor involved in cultivating intertilled crops other than cotton and truck is necessary only to remove weeds that have been missed by the cultivators.

Such weeds as wild onion,[2] bitterweed,[3] and the ragweeds[4] cause great annoyance to dairymen and milk dealers. These weeds, when eaten by milch cows, give a very disagreeable odor and flavor to the milk, and consequently to all other dairy products. When cows eat such weeds in large quantities the milk is not marketable. The control of pasture weeds is a big problem for dairymen in certain areas. (See Pl. XXXIII, fig. 1.)

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[1] Bureau of Plant Industry Bulletin 257, "The Weed Factor in the Cultivation of Corn," by J. S. Cates and H. R. Cox.

[2] *Allium* spp. [3] *Helenium tenuifolium.* [4] *Ambrosia* spp.

Very often the price of land in a community is largely regulated by the number and character of the weeds present. In many areas of the South Atlantic and Gulf Coast States, where nut-grass[1] abounds, some farms are so badly infested with this weed that their value is reduced almost half, and cases can be cited in which farms have actually been abandoned because of the presence of nut-grass. In some of the areas of the Northern States farms have been abandoned because of quack-grass.

Weeds result not only in big financial loss but also in great annoyance. Diseases such as hay fever could be eliminated almost entirely by adopting efficient methods for controlling the incidental weeds found along roadsides, in vacant fields, and in waste places.

The loss of cattle and sheep due to poisonous weeds is very great. On the United States National Forest ranges alone the loss in 1916 amounted to 6,648 cattle and 16,273 sheep, besides a number of horses, goats, and other animals.

As host plants for many of our worst plant diseases and insect pests, weeds are responsible for an enormous loss. The recent rapid spread of white-pine blister rust, which is threatening several hundred million dollars' worth of the most valuable pine forests, is due entirely to the presence of forest weeds belonging to the genus Ribes, which includes wild gooseberries and raspberries. If all the members of the genus Ribes were cleared out of the white-pine forests, the disease would disappear automatically. Such insects as the cotton boll weevil and wheat-field chinch bugs usually spend the winters protected by weeds allowed to grow around the borders of the fields.

Many lakes and navigable streams become choked with water weeds; navigation is interfered with and it becomes necessary to cut out the weeds, a difficult task.[2] Water weeds give trouble in irrigation ditches and canals also. They often make a growth almost sufficient to stop the flow of water. (See Pl. XXXIII, fig. 2.) A conspicuous example is the water hyacinth,[3] which presents a serious problem in many of the canals in the Southern States, particularly in

[1] *Cyperus rotundus.*

[2] The water weed *Elodea canadensis* is likely to prove troublesome in this respect.

[3] *Eichhornia crassipes.*

Florida and Louisiana. In maintaining waterways, the cost of keeping weeds under control must be considered.

The esthetic aspect of the weed problem also must be considered. Those farms upon which the "incidental" weeds are kept cut along the fence rows, in vacant fields, and in waste places are much more attractive and salable than farms upon which the weeds are allowed to grow undisturbed. A good lawn free from weeds is a pleasure and a satisfaction worth far more than the effort and expense necessary to maintain it. (See Pl. XXXIV.)

Weeds are injurious and detrimental in so many ways that it is extremely difficult to calculate the damage which they cause. This damage, however, is much greater than is apparent. One big fact regarding weeds is that they increase in numbers each year until their presence is accepted as the normal condition and their detrimental effect overlooked. Insect pests and plant diseases that appear only occasionally command much more attention in proportion to the damage they cause than do weeds, because they are more or less a novelty and farmers are not accustomed to them.

HOW WEEDS REDUCE CROP YIELDS.

Just why weeds reduce crop yields is not exactly clear, but even where plant food, moisture, and light are sufficient for both weeds and the crop, the crop yields generally will be lower than where, under similar conditions, weeds are not present. Experiments have shown that in most cases the total amount of plant food removed by the weeds and a crop grown together is far less than the amount removed by a crop grown alone. For example, if weeds are allowed to grow unmolested in a cornfield, the total amount of plant food removed by the weeds and the corn growing together is far less than the amount removed by a similar field of corn in which the weeds are kept out. Several theories and explanations have been advanced regarding this fact. Root interference is thought by many to be the principal factor involved, and it undoubtedly plays an important part.

HABITS OF WEEDS OFTEN SIMILAR TO THOSE OF THE CROPS THEY INFEST.

Another advantage the weeds have is that of adaptation to crops. Specific weeds are troublesome in fields and crops in which conditions are most favorable for their development. In other words, the troublesome weeds in a specific crop, such as spring wheat, are those plants whose life history and habit of growth are such that they normally thrive best under the conditions favorable for the production of the crop in question. Two of the most prevalent annual weeds in spring-wheat fields are the wild mustard and the wild oat. These weeds are enabled to exist because they mature seeds which shatter and reinfest the land before the wheat is ready to harvest. A combination of many factors enables weeds to compete successfully with cultivated crops and greatly to reduce the crop yields.

In harmful effect weeds vary extremely. Just as two cultivated crops grown together are not always injurious one to the other, so weeds may not injure the desired crop. Investigations at the Minnesota Agricultural Experiment Station have shown that by growing certain combinations of crops, such as wheat and flax, two-thirds of a normal yield of flax can be produced without reducing the yield of wheat. The presence of other crops, however, as oats in a wheat field, even in small quantities, will reduce the yield of wheat materially. The same variation appears in the effect of weeds in grain fields. Many farmers contend that the presence of wild mustard in a field of rank-growing wheat is beneficial rather than harmful, because it does not reduce the yield of wheat and the stiff mustard stalks act as a support for the wheat, preventing it from falling down and lodging. Other weeds, however, as wild oats and sow thistle, often greatly reduce the yields of wheat. This, again, strongly indicates that the reductions in crop yields due to weeds are not entirely a question of plant food, moisture, and light.

WEEDS BENEFICIAL IN SOME CASES.

Contrary to the usual opinion, weeds are not always harmful; in fact, in some cases they are a great blessing, especially on those farms where proper crop rotations are not practiced and where shiftless methods are employed. (See Pl. XXXV, fig. 1.) Investigations have shown that crop yields in most cases are related directly to the amount of organic matter in the soil. Until efficient cropping systems have been established which include crops that add organic matter to the soil, this material must be furnished by weeds, farm manures, and crop residues.

On many idle fields the weed growth is sufficient to act as a soil binder and prevent erosion which otherwise would occur, especially in many parts of the South. Probably this is the greatest benefit which weeds confer. Weeds, however, are an advantage only on those farms on which efficient cropping systems and the most effective general farm practices are not followed. As general farm practices and conditions improve, the disadvantages of weeds become greater and more apparent.

CROP ROTATION A FOE TO WEEDS.

The high cost of weeds in many areas is largely the result of single-crop farming. Crop rotation and diversification are the greatest foes of weeds, and usually where a single-crop system of farming is practiced weeds are exceedingly troublesome. In many instances lands have become so foul with weeds that certain crops can no longer be grown profitably upon them. This is true in many of the fields in Louisiana which have been continuously cropped to rice for a number of years, until those weeds which thrive under conditions favorable to the production of rice have become so prevalent that it is no longer profitable to grow the crop.

In California, where wheat has been growing continuously for a number of years, the land has become very foul with weeds. The prevalence of weeds is forcing the introduction of crop rotations and is decreasing the acreage of wheat in that area.

The hard spring-wheat area, composed largely of North Dakota, western and southern Minnesota, and eastern South Dakota, is now going through the same evolution. In this area the grain fields, which have been continuously cropped to wheat for years, have become so badly contaminated with such weeds as wild oats, wild mustard, French weed, and sow thistle that in many instances wheat can no longer be grown profitably. These conditions are being remedied, and the loss due to weeds is being greatly reduced by the adoption of efficient cropping systems and general farm practices, giving due consideration to those methods and practices which are most effective in controlling weeds.

HOW TO CONTROL WEEDS.

To control or eradicate a weed it is first necessary to determine the kind, the character and habits of growth and reproduction, and sufficient about its life history to fix the time when it is most susceptible to treatment.

With regard to methods of control and eradication, weeds may be divided into two classes:

The first class is composed of those weeds which, because of their habits of growth, require special methods or treatments. This class includes such weeds as Canada thistle, quack-grass, hawkweeds, nut-grass, Johnson grass, perennial sow thistle, and many others. These weeds are extremely difficult to kill, and specific methods must be determined for each one, based on a study of the life history and habit of growth.

The second class is composed of annuals, biennials, and such perennials as require no special treatment to kill them. These are often termed incidental weeds. In this case the problem is not one of killing but of controlling.

Comparatively few specific weeds require special methods for their control, and for many of these effective methods have already been determined. After effective methods shall have been evolved for controlling the remaining individual weed problems, such as are presented by nut-grass, sow thistle, hawkweeds, and others, the next step will be to incorporate these special methods into such cropping systems and farm organizations that weeds will be controlled incidentally. Our farm organization should be such that the systems of farming employed and the general farm practices involved will keep weeds under control automatically or incidentally in connection with the regular farm operations. This is true farm economy, because any labor involved in controlling weeds is performed not to create a profit in itself but to avoid a loss.

In addition to finding effective and practicable methods for controlling many of the most pernicious and troublesome weeds, such as quack-grass, Johnson grass, Canada thistle, and others, weed studies have supplied much general information regarding these pests, methods that are effective and practicable in one area may not be applicable in another area where natural conditions are dissimilar and entirely different systems of farming are practiced. Therefore it is necessary to determine for each area just what methods are most advisable under the existing conditions. Yet some general precautionary measures and practices will be found beneficial and applicable under all conditions. These measures, though well known to most farmers, are not practiced. For instance, most of our small-grain and hay-field weeds have been introduced by sowing impure seeds. Many other weeds are to-day being widely disseminated in the same manner. With the improved cleaning machinery available (see Pl. XXXV, fig. 2) it is usually not difficult to clean seed, yet a large proportion of the seed sown is foul with weed seeds.

In small-grain and hay farming no feature of weed control is more important than the use of clean seed. The cost of cleaning seed is small and the results very marked, yet this fact has not been sufficiently emphasized to impress the farmers with its true importance.

Many weeds are propagated only by seeds. Weed seeds are produced in large numbers along roadsides, fence rows, and ditch banks, in vacant fields, and in waste places, and the seeds are scattered by wind, water, birds, and other agents. By cutting the weeds before the seeds are sufficiently mature to germinate, an enormous amount of trouble and labor and loss could be avoided; but only the most progressive farmers do this. (See Pl. XXXVI, fig. 1.)

A systematic rotation of crops is one of the most feasible and effective means of controlling weeds. Universal crop rotations will not come, however, especially in the small-grain areas, until forced by economic and agronomic conditions, in which weeds will be an important factor. As the lands became foul with weeds, necessitating a rotation of crops, the one-crop system of small-grain farming has gradually been forced farther west. In the westward advance of agriculture, the custom has persisted of growing small grain on the newly developed lands until they become so foul with weeds that crop rotations are necessary. Thus crop rotation is now being introduced in the hard spring-wheat area.

FIG. 1.—CORN FROM CULTIVATED AND NONCULTIVATED PLATS.

Which shock is corn that has had no intertillage? One is from an experimental plat at Arlington Farm, Va., which received the usual cultivation, the other from an adjacent plat that was merely scraped with a hoe to keep down the weeds. There was practically no difference in yield.

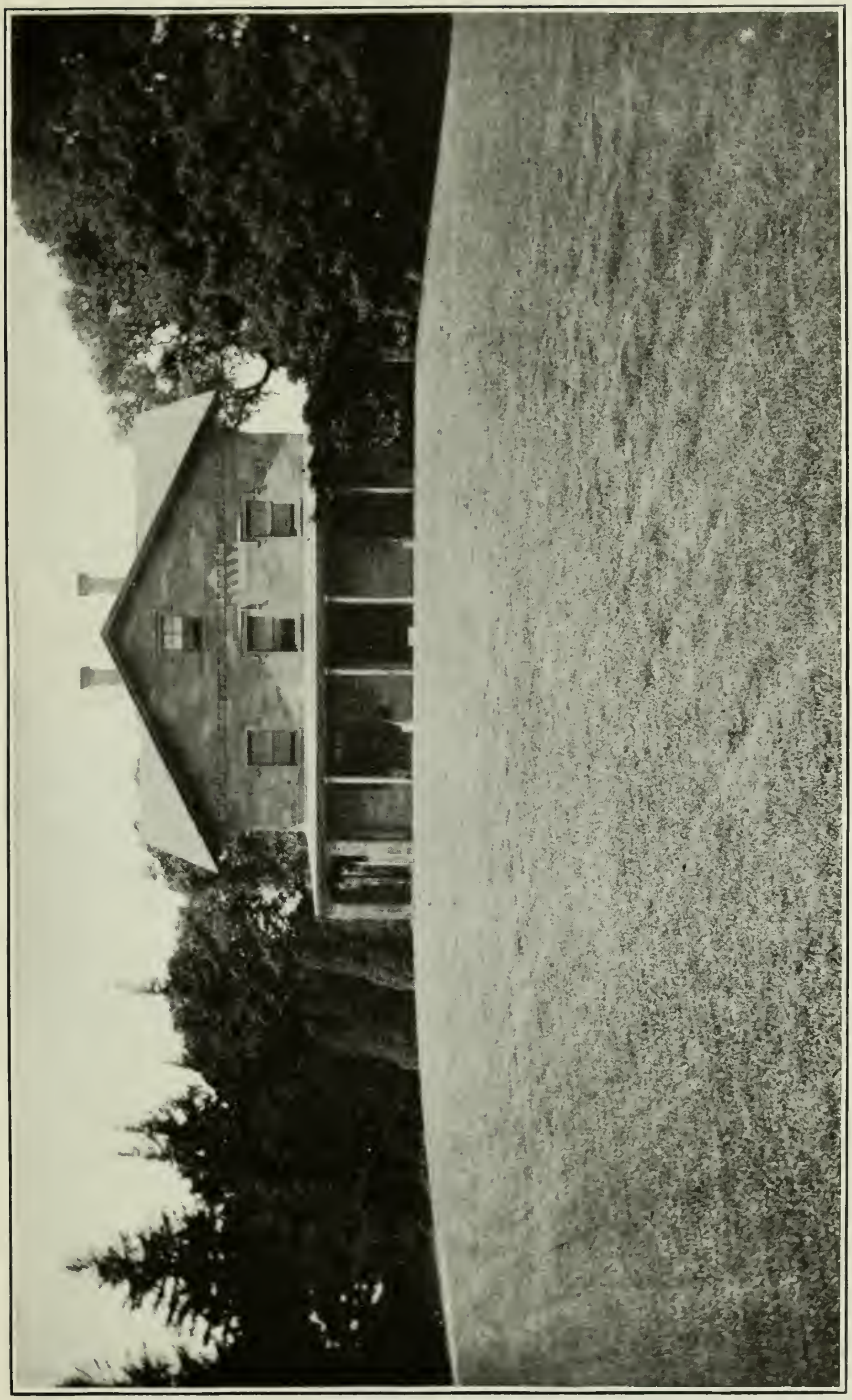
FIG 2.—THE PRIMARY OBJECT OF THE INTERTILLAGE OF CORN IS TO CONTROL WEEDS.

FIG. 1.—A WEEDY PASTURE.

Many pasture weeds can be controlled by mowing before the weed seeds are mature.

FIG. 2.—AN IRRIGATION DITCH WITH WEEDY BANKS.

Weeds are often troublesome in irrigation ditches, and the water is an excellent carrier of weed seeds, transporting them from one farm to another.



A GOOD LAWN, FREE FROM WEEDS; AN ESSENTIAL FOR AN ATTRACTIVE COUNTRY HOME.

FIG. 1.—A WEEDY VACANT FIELD.

Weeds in vacant fields are often beneficial in adding organic matter to the soil.

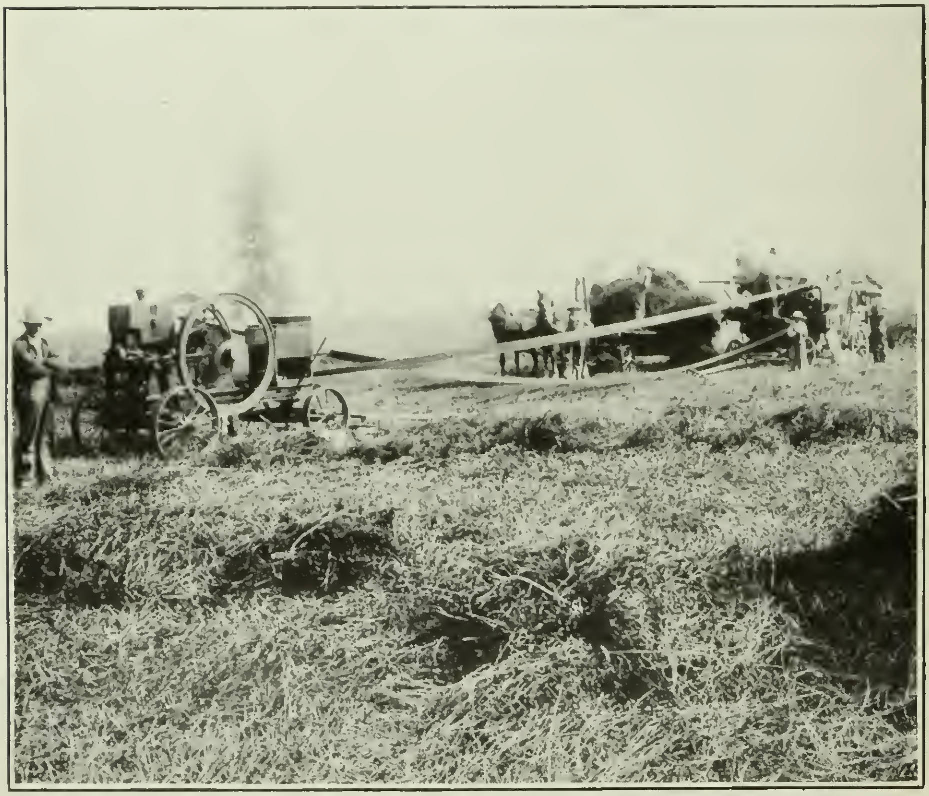


FIG. 2.—THRASHING CLOVER SEED.

Many weeds are introduced by sowing uncleaned seed, because proper cleaning precautions are not taken.

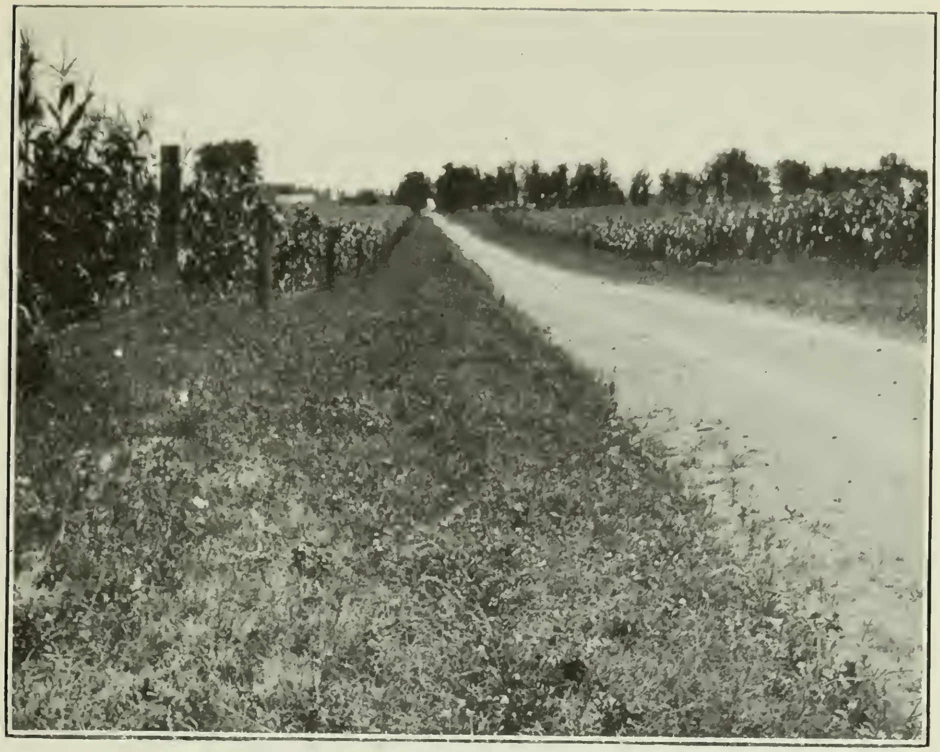


FIG. 1.—A WELL-KEPT ROADSIDE.

Mowing before seed maturity will control many kinds of weeds in fence rows and at roadsides.

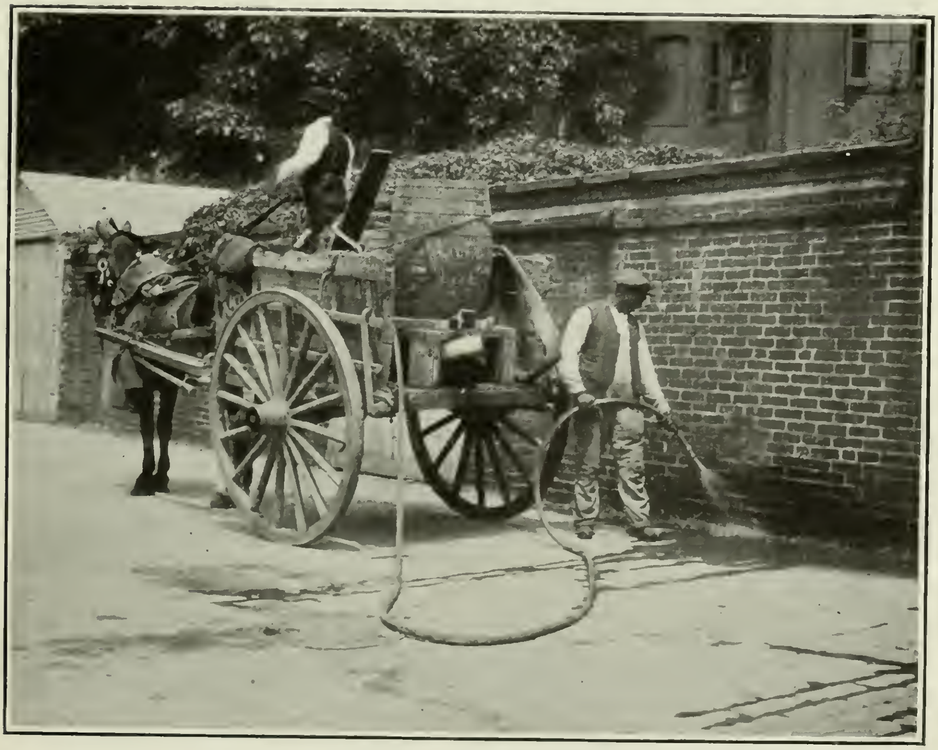


FIG. 2.—KILLING WEEDS WITH CHEMICAL PLANT POISONS IN THE ALLEYS OF WASHINGTON, D. C.

The use of chemicals, such as salt, arsenite of soda, nitrate of soda, iron sulphate, copper sulphate, cyanamid, and others, for controlling weeds is not generally advisable. Where it is desired to kill all vegetation, as on tennis courts, walks, and driveways, chemicals can be used to good advantage. (See Pl. XXXVI, fig. 2.) Many of the railroads are now using chemicals for keeping down the vegetation along their rights of way. For general weed control, however, the use of chemicals is a complex process, expensive, and uncertain. In addition, it overlooks a fundamental principle of weed control, namely, that the work should be incidental and in connection with other farm operations in so far as possible.

An important requirement in weed control is to keep on the alert for new weeds which may be introduced and for native weeds which are developing pestiferous tendencies. When any new weed appears it should immediately be called to the attention of some one who can identify it. Many of the worst weeds have been introduced from abroad and have become disseminated through careless and neglectful methods. In fact, comparatively few native plants are troublesome weeds. By immediately reporting the appearance of any new weed which may prove troublesome, measures may be adopted for keeping it under control before it has gained sufficient headway to do serious damage. If the first appearance in this country of weeds such as Russian thistle,[1] field hawkweed,[2] and Canada thistle[3] had been reported to National or State agricultural officers, much of the loss and trouble which they are causing might have been avoided. It is important to report the appearance of new weeds and to take precautions to prevent their dissemination.

Before the most efficient farm organization and cropping system for controlling weeds can be perfected, more definite information regarding weeds and weed-control methods must be obtained. First, it is necessary to determine the weed problem and the individual weeds which are causing trouble in a given region and make a detailed study of these to find when and how the weeds may be destroyed. These investigations should include studies of the biological habits of weeds in somewhat the same manner that the entomologist

[1] *Salsola pestifer.* [2] *Hieracium pratense.* [3] *Cirsium arvense.*

and plant pathologist study the life histories and habits of insects and fungi. The object of such studies will be to find the weak point in each weed's career and, having found it, adopt a cropping system and farm practice that will utilize the known weakness. Probably the first important feature of weed control is to know when the individual weeds are most susceptible to injury.

Every locality has individual weed problems peculiar to itself. These problems must be studied in connection with the general tillage systems and other farm operations and practices of the locality. It is just as important to know the general farm practices and customs as it is to know the weeds. One should also know what practices are most injurious to the weeds. In other words, a study of the weed problem not only involves the individual weeds, but includes a study of farm organizations and other general farm practices and conditions.

Not only is it necessary to obtain more definite, clear-cut information about weeds and methods of weed control, but it is just as important to impress farmers with the seriousness of the situation and arouse public sentiment to the support of measures which will lessen the damage caused by weeds.

Practically every State has passed a weed law of some sort, which, if enforced, would do much to relieve the situation. Some of these laws are adequate and practicable; others are absurdly impracticable. In few of the States, however, are these laws enforced. This is because the importance of the weed problem and the loss due to weeds has neither been sufficiently impressed upon the public nor brought to attention in such a manner as to create a public sentiment that will justify enforcing the weed laws. Without the consent and support of the people it is difficult to enforce such laws. Some very effective weed laws are now being enforced in the Canadian Provinces, especially Saskatchewan and Alberta, where a single-crop system of grain farming is practiced. Eventually some weed legislation will probably be enforced throughout the spring-grain areas. Before any adequate weed law can be satisfactorily or advisedly enforced, however, it will be necessary to create a favorable sentiment among the farmers by giving them more definite information regarding effective and practicable control methods. A national weed law prohibiting the interstate shipment of seed, feed, and other materials that contain viable weed seeds if the contained weed seeds are in violation of the statutes of the State into which they are being shipped would be of great advantage in checking the further distribution of weeds.

Cooperation is one of the first essentials of success in any big commercial enterprise. Cooperation among the farmers is just as essential for controlling weeds. Weed control is a community problem rather than one for the individual farmer to solve, and without community action the efforts of the individual farmer are usually discouraging. This is true because where weeds are allowed to grow undisturbed they produce sufficient seeds each year to infest the adjacent lands. Agricultural clubs and other farm organizations could perhaps undertake no more important cooperative work than that of controlling weeds. The advantages of community action for the control of weeds can not be too strongly emphasized.

REST ROOMS FOR WOMEN IN MARKETING CENTERS.

By Anne M. Evans,

Investigator in Women's Rural Organizations, Bureau of Markets.

MANY REST ROOMS ESTABLISHED WITH THE HELP OF WOMEN'S ORGANIZATIONS.

REST rooms have been established in more than 200 counties in the United States to meet the needs of the country woman in town on business. They provide a place where the farm woman has a right, without asking any favors, to the use of facilities for rest and refreshment. They have been established by women's rural organizations in cooperation with other local organizations, with individuals, and with village, town, or county authorities; by business corporations operating private city markets; and by individual merchants. Where farm women's organizations have been interested in establishing rest rooms, local farm women's clubs have been able to arouse the necessary community interest in the need for rest rooms to insure their financial support. This has been done through cooperating with other local farm women's clubs, with organizations of women in town, with civic leagues, with chambers of commerce, and with county agents.

In cooperating with other clubs in establishing a rest room, any local farm women's club may take the initiative. Opportunity is given at club meetings for discussing the need for a rest room, and other local clubs may be asked to arrange similar discussions. Such cooperation is facilitated in rural communities where local clubs meet together for joint sessions three or four times a year. A rest room was thus established in Guthrie, Okla., through the cooperation of four women's rural clubs. At one of these meetings the need for a rest room was presented for consideration. After much discussion a committee of three was appointed at a joint meeting to make inquiry with regard to rooms which might be secured and to report the cost of maintaining such rooms. This committee interviewed the business men of the city, but met with little encouragement. They were told that rest rooms had been tried and were a failure; that some of the stores had rest rooms already, but that they were not used by the country people. After three weeks of effort a member of the committee learned of a vacant room in the courthouse that might be used for a rest room if permission could be secured from the county commissioners. Members of the committee and their friends called upon each of the commissioners to request the use of the room and ask his advice as to how to proceed. As a result the matter was brought formally before the commissioners at their next meeting, and the room was placed at the disposal of the members of these organizations. This success was reported at a joint meeting of the clubs, and another committee was appointed to attend to furnishing the room and to consider methods of raising the necessary funds for its maintenance. At Grand Junction, Colo., where a similar method was pursued, a room was not available in a public building, but funds were appropriated to pay the rent of a room in a convenient location.

Through their organizations town and country women have cooperated in providing rest rooms near railroad stations where the waiting-room facilities at the stations were inadequate. They have cooperated in establishing libraries which provide convenient and adequate rest rooms for town and country women. In Traer, Iowa, all the women's organizations held a joint meeting to discuss the need for a library. By continued discussion before the clubs and by special work in small groups sufficient community interest was aroused to warrant the authorization of a library tax. Women's organizations raised funds in various ways. A number of public-spirited individuals donated the funds for purchasing the ground and constructing a $10,000 library. In the plans for the building, provision was made for suitable rest rooms. Aroused community interest frequently results in securing a vacant room in the town hall, county courthouse, public market, or other public building.

Frequently the county agent, as the representative of the rural interests of a county, will take the initiative and secure the cooperation of the chamber of commerce or the county commissioners. One rest room at Chickasha, Okla., was a portion curtained off from a large room used for the offices of the county agent and the secretary of the chamber of commerce. At Salisbury, N. C., the rest rooms adjoined the offices of the county agent and were located in a building used as a community center. The civic league of Knoxville, Tenn., assisted the women's organizations in securing a rest room on the second floor of the public market building. Frequently rest rooms are provided in connection with women's exchanges. A county federation of home economics clubs held their regular meetings in one of these rooms.

As examples of rest rooms established by private corporations or business houses, many instances may be cited. At Washington, D. C., a rest room was established in a private market because the superintendent of the market had felt the desirability of it. Frequently rest rooms are provided in dry-goods stores and in grocery stores. A rest room at Kalamazoo, Mich., has been in use since 1882, and has become the common meeting place for country people living in different directions from the city. The number of country women dealing with these business houses warranted the establishment of rest rooms by the proprietors to meet the needs of their customers.

Two main principles underlie the successful establishment and maintenance of rest rooms. Either there must be a demand arising from business interests or there must be a community interest which recognizes the need for a rest room for women. Such community interest may be aroused and stimulated by the work of women's clubs.

EQUIPMENT SIMPLE AND DURABLE.

The furnishings of a well-equipped rest room should be simple, comfortable, and durable. As an example of rest rooms furnished by a group of country women's clubs whose members personally donate pieces of furniture or secure them as gifts from various interested merchants, one may be cited which is provided with rocking-chairs, straight chairs, a table with reading material, oilcloth-covered lunch tables, a couch, a crib, and a screen. Free telephone service and electric lights are furnished. Clean, washable couch covers and clean sheets and pillowcases may be secured from the matron in charge. A gas burner is provided for heating water or milk. The room is heated by a coal stove.

A well-equipped, steam-heated rest room was provided for in the courthouse in Norwalk, Ohio, when the building was planned. Plate XXXVII, figure 1, shows the interior of this rest room and the matron in charge. Simplicity may be noted in the arrangement of the room and in its furnishings. The screen has been set aside to show the couch. The women's organizations were allowed $100 from county appropriations to purchase the furnishings of this room. A first-aid equipment for use in emergencies has been found helpful to the matron in charge. Pure drinking water and sanitary toilet facilities are necessary adjuncts to every rest room. Plate XXXVII, figure 2, shows the rest room established in connection with a market at Washington, D. C. The room was provided by tearing out two stalls and building a balcony over this space in the main market room. A matron is employed eight hours a day. Free telephone service to all departments of the market is furnished. A pay telephone for city and long-distance calls is provided, together with comfortable chairs, desk, and writing material, screened couch, and adequate toilet conveniences. This room was furnished at the expense of the market and is in constant use.

FINANCING THE REST ROOM DEPENDS UPON WOMEN AT FIRST.

In financing a rest room two items of expense are to be considered—the initial cost of furnishing and the annual cost of maintenance. The latter item includes the cost of rent, heat, service, and incidental expenses. A rest room may be financed wholly or partly by the women's organizations until arrangements are made to meet the expenses through public appropriations. It may be financed through town or county appropriations, or by private individuals, or by any of these in combination. Usually the permanently established rest room is located in the town hall or county courthouse, since appropriation can be made annually for the maintenance of such rooms from public funds. When financed by private individuals, the money is either a bequest or gift, or the money spent for the rest room is considered

FIG. 1.—REST ROOM IN COURTHOUSE AT NORWALK, OHIO.

A woman's organization was allowed $100 from county appropriations to buy the furniture for this room.

FIG. 2.—REST ROOM PROVIDED BY A CITY MARKET IN WASHINGTON, D. C.

A large sign which may be seen through the window calls attention to its location in a balcony above the main floor.

by the merchants as bringing returns in increased trade. In such cases there is no expense to the women making use of the room, and the value of the cooperation of women's organizations lies in their making known the location of the room and thus insuring a more general use of it. Where women's organizations have undertaken to raise funds they have done it through private solicitation or contributions of food, furnishings, and money; by forming a rest-room society; by appropriations from the local clubs; and by other means.

At Grand Junction, Colo., money was obtained by private solicitation and county appropriation to finance a rest room. The furnishings for the room and the matron's salary were provided by an organization composed of a number of rural women's clubs. One hundred and fifty dollars was appropriated from county funds and a like sum from town funds to pay the cost of the rent and heat of a convenient room, as no room was available in any of the public buildings. For furnishing the room, contributions were solicited from members of the organization and from the merchants in town. To pay the matron's salary of $25 a month, pledge cards were issued, each calling for the payment of 5 cents a month. In two years the demands for other activities in connection with the rest room developed, and the monthly expenditure increased from $60 to $160 a month. This additional amount was provided by profits from a restaurant established in connection with the rest room and by subletting space for a woman's exchange. The total receipts from all sources average $160 a month, which amount is expended in carrying on the various activities undertaken.

At Bellaire, Mich., a rest-room society was formed. A room was secured free of charge in the basement of the courthouse. The aid societies of the various churches and other women's organizations contributed a hundred dollars toward furnishing it. The rest-room society, with annual dues of 50 cents a member, managed the finances and supervised the room. No matron was employed, the cleaning being done by the janitor of the town hall as a part of his regular duties.

In Norwalk, Ohio, a temporary financial arrangement was made. Funds were raised by the women's organizations by various means to pay part of the rent of a room over the post office. This plan was continued for a year, until definite arrangements could be made for a rest room in the courthouse. The other expenses were paid from the profit on dinners served by the matron, from the sale of contributions of food, and from money given by interested women. The interest manifested and the use made of this room demonstrated to the county commissioners the need of providing a suitable room. A rest room was therefore included in the plans for the new courthouse, and $100 was allowed from county appropriation for the furnishings and equipment, which were selected by the women's organizations. The women's societies also paid the matron's salary until it was provided for from appropriations made for the general maintenance of the building.

Subscriptions ranging from $1 to $10 were made by 7 home-economics clubs and 25 school and civic leagues of Prince William County, Va., to raise funds to pay the cost of maintaining a rest room at Manassas, the county seat. The total cost of maintenance is about $25 a month; $12 a month is paid for rent, $8 for the caretaker, and about $5 for lighting, water, and incidentals. The country people bring in an occasional load of wood for heating. The women's home-economics clubs furnished the room by means of donations solicited from local merchants.

In financing rest rooms it may be seen, therefore, that women's organizations do not raise funds to maintain the room permanently, but they often create sufficient public sentiment to secure a heated room in a convenient public building or sufficient county appropriations to pay for rent and heat. Janitor service is frequently furnished, but in many instances the value of a matron's service is sufficiently appreciated to warrant the raising of funds by the women's organizations to pay her salary. The women's organizations frequently furnish the equipment, or where the county appropriates the funds for the furnishings the women assist in making the selections. They also provide small amounts of money needed for incidentals, such as laundering linen, replenishing first-aid equipment, and furnishing magazines or ornamental plants. A permanent rest-room committee may be appointed to confer with the matron, supervise the rooms, and report the needs as they arise.

EMPLOYMENT OF A MATRON MAKES THE REST ROOM MORE USEFUL.

In rest rooms employing matrons many activities can be carried on which otherwise would not be possible. The matron not only sees that the rest room is kept in a clean, sanitary condition at all times, but she may care for a sleeping child or assist in providing hot lunches at noon for women and children. She may care for packages which otherwise would have to be carried from place to place. In some rest rooms the matron takes charge of the woman's exchange, which usually is supervised by a committee from the women's clubs.

The matron may supervise the general cleaning and attend personally to keeping the room in proper condition during the day, or she may do all the cleaning herself. Many women needing relaxation will not make use of the couch in a public rest room unless the headrest is provided with a washable cover. The crib must be provided with clean sheets. The matron not only keeps sheets and covers, to be used when necessary, but takes charge of the towels, soap, and other supplies to be furnished upon request.

The country children attending the schools in Grand Junction, Colo., are able to get hot lunches at the rest room established by their mothers. The matron assists and supervises the children. The use of the rest room at noon for this purpose is very common where a matron is employed. Where only a janitor is employed it has been necessary in some instances to prohibit young people from using the room, owing to the resultant disorder.

A WELL-MANAGED REST ROOM HELPS MANY WOMEN.

The rest room may become the center for various community activities. From the establishment of the rest room at Grand Junction, Colo., has developed a rural civic library of 150 books, a woman's exchange, a labor and commodity exchange conducted by means of a bulletin board, and a restaurant where light lunches are served from 10 a. m. to 6 p. m. Thirty-five people may be accommodated at one time.

The properly established rest room meets the daily needs of a large number of country women. At Manassas, Va., the average number of farm women using the rest rooms established through the activity of the farm women's organizations is from 15 to 20 daily. Other rest rooms are much more extensively used. Guest books in which to record the names and addresses of all coming to the room are sometimes provided. Some of these books show a registration of more than 1,000 women in one month. On Saturdays, or holidays, and on special occasions, the rooms are generally occupied to their full capacity.

The usefulness of a rest room to farm women depends upon its location, its management, and their feeling of right or interest in its facilities. When the rest room is established through the efforts of the women's organizations, its location and management are likely to meet the needs of a larger number of country women than when it is established in connection with a private business. Further, a rest room established by the concerted action of an organized group or by a community is usually more widely known and better appreciated by country women, not only because of the sense of interest or ownership which they feel, but because the members of the organizations are in a position to determine the location and management best suited to the largest number of women, and to give the widest publicity to its usefulness.

The rest room located in a public building is likely to be more useful than one located in a private building. When located on the first floor or in the basement, rest rooms are more convenient for women with children and women carrying packages than if placed on upper floors. Rest rooms located on the main floor of the market are more useful than those in a wing of the building. Rest rooms convenient to places for hitching teams or parking automobiles, or near interurban stations, and also convenient to market, to the grocer, and to the department store, where the country people trade, are more useful than those located at some distance.

COOPERATIVE CAMPAIGNS FOR THE CONTROL OF GROUND SQUIRRELS, PRAIRIE-DOGS, AND JACK RABBITS.

By W. B. Bell,

Assistant Biologist, Bureau of Biological Survey.

NATIVE RODENTS cause losses of crops in the United States amounting to many millions of dollars each year. Everywhere present, when a region is first settled they persist and frequently adapt themselves in a surprisingly short time to feed upon cultivated crops. Because of their great abundance and remarkable fecundity they have resisted successfully the sporadic individual efforts of the tillers of the soil to eradicate them. Their long-continued inroads into the profits of the farmer, when not disregarded altogether, are too frequently looked upon as inevitable. Often the margin destroyed by them makes the difference between a comfortable profit and a wretched failure. Even experienced agriculturists too commonly fail to realize the enormity of their cumulative exactions upon the financial resources of the country and the possibility of applying more intelligently the means of combating them.

Farming operations tend to provide ideal conditions for the abnormal multiplication of those rodents which readily turn from supplies of native vegetation to feed upon growing crops or stored agricultural products. Indiscriminate destruction of their natural enemies, the hawks, owls, and predatory mammals, disturbs still further the balance in nature by removing these checks upon them. Hence, the numbers of these animals have increased, as have also the losses inflicted by them, in spite of individual attempts to control them. Under these conditions lands cleared of the pests by progressive farmers soon become reinfested by invasion from adjacent areas where less thrifty practices permit these rodents to remain and multiply.

THE BOUNTY SYSTEM INADEQUATE.

The payment of bounties for the destruction of native rodents has cost States, counties, and townships excessive sums annually. In 1916 counties in Iowa paid $77,279 in bounties upon pocket gophers alone. Of this sum a single county paid $11,138. One county in California paid out in bounties upon ground squirrels $18,570 during 1916. Such typical bounty expenditures have usually served to reduce the numbers by less than the annual reproductive increase, thus leaving each year a larger breeding stock of mature animals to propagate and with their progeny to continue their devastating ravages upon the crops.

GREAT DAMAGE DONE BY RODENTS.

In States west of the Mississippi River prairie-dogs, ground squirrels, pocket gophers, rabbits, cotton rats, and field mice have taken a continually increasing toll from the crops of wheat, oats, corn, barley, and other cereals; from alfalfa, potatoes, beans, fruit, melons, and almonds; and from pasture ranges. States east of this boundary have suffered heavily from the depredations of rabbits, woodchucks, and meadow, pine, and white-footed mice in gardens, field and truck crops, orchards, and vineyards. The value of crops destroyed annually from these sources in the United States has recently been estimated to be in excess of $150,000,000. This amount is based upon information regarding conditions reported by field representatives of the Biological Survey, county agricultural agents, other competent officials, and farmers; it does not include losses inflicted by house mice and rats.

Some idea of the losses suffered by individual States from native rodents may be obtained from the following estimates recently submitted by directors of agricultural extension: Montana, $15,000,000 to $20,000,000; North Dakota, $6,000,000 to $9,000,000; Kansas, $12,000,000; Colorado, $2,000,000; California, $20,000,000; Wyoming, 15 per cent of all crops; Nevada, 10 to 15 per cent of all crops, or $1,000,000; New Mexico, $1,200,000 loss to crops and double this amount to range. In a single county of Virginia losses of orchard trees from depredations of pine mice during the last two or three years are estimated at not less than $200,000. Similarly heavy losses are being disclosed in other States as attention is being directed to these causes of decreased production, causes which have too frequently been overlooked, unrecognized, or considered unavoidable. That such losses constitute an entirely unnecessary drain upon the productive capacity of the farms, and that they may be permanently eliminated at a cost which is but a small fraction of the damage occasioned during a single year, has been abundantly proved by the extensive work already accomplished in campaigns conducted by the Biological Survey in cooperation with State and county organizations.

COMMUNITY COOPERATION ESSENTIAL.

The fact has been recognized for many years that community cooperation is essential to the effective control of rodents which feed upon agricultural crops and migrate or wander from place to place in search of food and shelter. During the last four years plans have been conceived and put into operation which have effected the required cooperation of many thousands of farmers and have resulted in practical elimination of rodent pests over millions of acres of valuable agricultural land, attended by an enormous direct saving and followed by increase in crops produced. The eagerness with which farmers have availed themselves of the opportunity to join in concerted movements to obtain relief from these pests, where the effectiveness of modern poisoning methods has been demonstrated, is most significant and gratifying, while the returns in increased crop yields upon the amount of labor and money invested in the community campaigns have exceeded all expectation. A successful fight against rodent pests requires that all local, State, and National agencies concerned be brought into harmonious and effective cooperation and that methods of proved efficiency be used.

COOPERATIVE CAMPAIGNS EXTERMINATING GROUND SQUIRRELS IN NORTH DAKOTA.

In the great grain-producing areas of North Dakota there has been developed the most extensive and thoroughly organized campaign, with a comprehensive plan of State-wide eradication of rodent pests, that has yet been witnessed.

This campaign was organized under a cooperative project agreement between the Bureau of Biological Survey and the

States Relations Service of the United States Department of Agriculture and the North Dakota Agricultural Experiment Station and Extension Service, including the county-agent organization. With commendable foresight the State legislature provided a revolving fund, available for use in procuring and maintaining the required stock of poison supplies. State enactments also authorized county commissioners upon petition of resident landowners to provide funds and to enforce the destruction of prairie-dogs, ground squirrels, pocket gophers, and certain other rodents which were declared a nuisance.

The initial campaign was launched against the Richardson ground squirrel, commonly known locally as "gopher." This animal each year caused enormous losses of grain, despite large sums which were being expended in unavailing efforts to combat it. Farmers were so familiar with these losses that little effort was required to convince them of the importance of eradicating this pest. So many kinds of poison preparation had been tried by them at great expense and with unsatisfactory results, however, that they were skeptical about the practicability of all such means applied to field conditions.

The Biological Survey and the North Dakota Agricultural Experiment Station had planned and conducted an extended series of experiments with many kinds of poisons and baits to determine a method which would be effective and economical under the usual farm practice. Such a poison was devised and tested thoroughly at many points within the range of this ground squirrel and was recommended for use. Wide publicity was given the work by publications, farmers' meetings, and field demonstrations throughout the infested portions of the State. The demonstrations, affording, as they did, ocular evidence in the form of scores of dead ground squirrels, were so convincing that skepticism gave way to the greatest enthusiasm and willingness to join in a concerted organized movement.

Further evidence that the method offered a practical solution of the problem of eradicating these rodents was afforded by a field party of the Biological Survey operating with poison on the Fort Totten Indian Reservation near Devils Lake, where the ground squirrels were being practically

PHOTO FROM N. DAK. AGR. COLLEGE.

FIG. 1.—DEMONSTRATING THE PREPARATION OF POISONED GRAIN.

Strychnin paste is mixed with oats or other grain in a box or on a smooth floor by means of a shovel.

PHOTO FROM N. DAK. AGR. COLLEGE.

FIG. 2.—DISTRIBUTING PREPARED GRAIN TO FARMERS.

The poisoned grain is placed in sacks plainly labeled to show the character and the purpose of the contents before being distributed to cooperating farmers.

PHOTO FROM N. DAK. AGR. COLLEGE.

FIG. 1.—A "POISON SQUAD" AT WORK.

The men engaged in distributing poison to exterminate ground squirrels form in line and zigzag back and forth to meet one another as they move across a field in search of burrows.

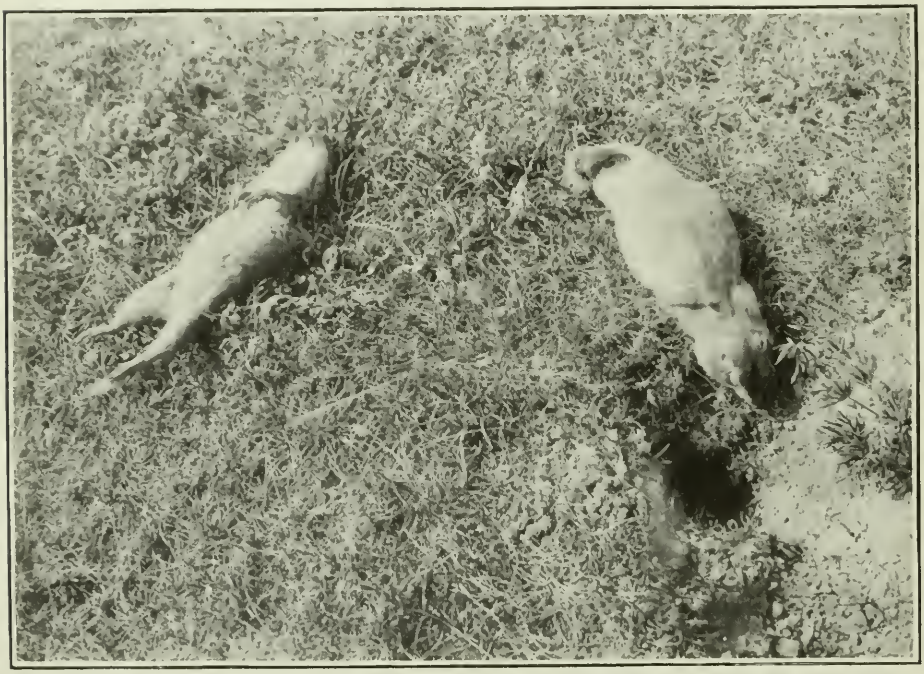


PHOTO FROM N. DAK. AGR. COLLEGE.

FIG. 2.—RICHARDSON GROUND SQUIRRELS KILLED NEAR BURROW BY POISONED OATS.

The squirrels die in a few minutes after taking the poisoned grain into their cheek pouches.

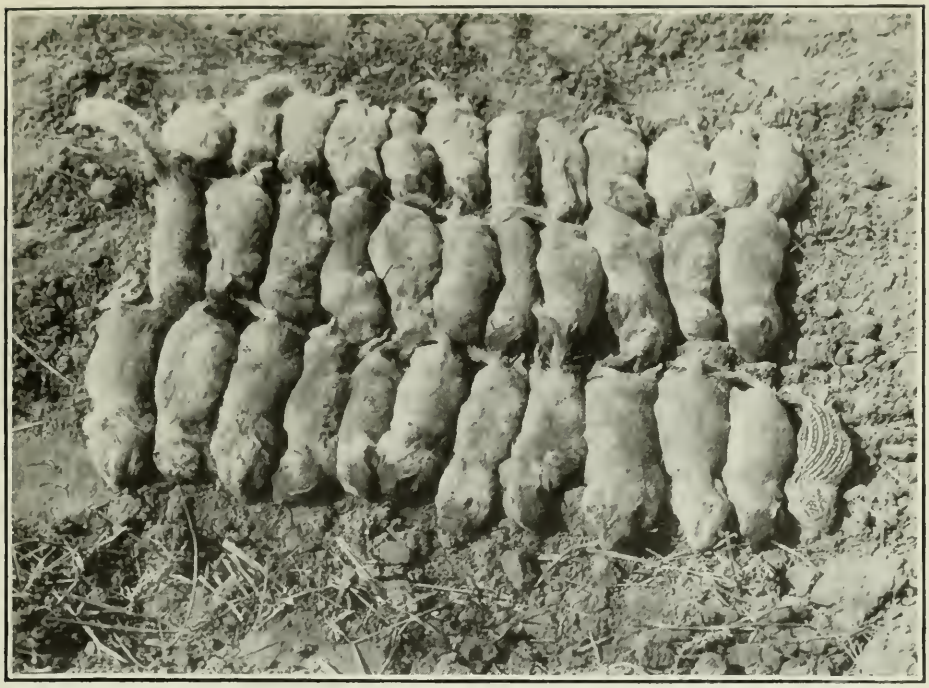


PHOTO FROM N. DAK. AGR. COLLEGE.

FIG. 1.—A FEW OF THE MILLIONS OF GROUND SQUIRRELS KILLED IN THE NORTH DAKOTA CAMPAIGNS.

Three species are shown, the striped or thirteen-lined, the short-tailed Richardson, and the bushy-tailed Franklin ground squirrels.

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FIG. 2.—ONE DAY'S KILL OF PRAIRIE-DOGS IN ARIZONA.

Sixteen hundred and forty-one dead prairie-dogs were collected from 320 acres which had been treated the day before by one man. Eighty quarts of poisoned rolled barley were used, the total cost, including labor, being $9.79. Only a part of the prairie-dogs poisoned are shown, as a large proportion of them die in the burrows.

exterminated upon thousands of acres. Over 98 per cent of the animals have now been killed by the first application of the poison.

The support of county commissioners and township supervisors was enlisted in several counties where it was desirable to undertake the control of native rodents, and funds were provided by them to purchase poison supplies in large quantity, thus obtaining much more favorable price quotations. Experts in rodent control detailed by the Biological Survey, aided by county agricultural agents, interested and organized the farming communities. Entire counties were organized in this systematic voluntary warfare upon the rodents, using the township as a convenient working unit. Poisoned grain was prepared in quantity, placed in plainly marked containers, and distributed to farmers, who then applied it according to directions about the ground-squirrel burrows upon their farms. More than 5,000,000 acres were treated with poison in 1916.

During the spring of 1917 more than 16,000 farmers in North Dakota joined in this movement. The ground squirrels were poisoned on 4,500,000 acres, resulting in a practical elimination of the pest in the areas treated and a saving in the year's crop of more than $1,000,000. Including hire of labor to distribute the poison, the cost averages less than 5 cents per acre under North Dakota conditions, and where landowners perform the labor the actual cash outlay per acre is materially reduced. As a small amount of follow-up work serves to exterminate the animals entirely and thus to free the land permanently from their depredations, the increased production becomes an annually recurring one, effected at a total cost much less than the loss formerly experienced during the single year.

The continuance of this campaign, which is planned progressively to cover the entire infested portion of the State, will at the present rate of progress practically exterminate this destructive pest from North Dakota in about five years. The achievement in this systematic campaign marks a distinct advance in procedure for the control of rodent pests in agricultural regions. It has conclusively demonstrated the possibility, when local, State, and Federal agencies cooperate heartily in meeting a real agricultural need, of

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GROUND-SQUIRREL CAMPAIGNS PROMISING RELIEF IN OTHER STATES.

More recently, in response to bitter complaints and urgent requests for assistance from farmers, campaigns have been undertaken against ground squirrels in Montana, Idaho, and Oregon under plans of cooperation essentially the same as those employed in North Dakota. In these States the organization has centered in farm bureaus and pest clubs, which, under the stimulus and guidance of experts from the Biological Survey and county agricultural agents, have distributed many tons of poisoned grain. This was prepared in accordance with methods which have been proved by extensive investigations and field operations of the Biological Survey most effective and economical for the various species and seasons. In some instances county commissioners provided the funds necessary to obtain the supply of poison, and this was distributed free to farmers who participated in the campaign. In other cases funds were advanced to purchase in quantity the essential poison ingredients. These were then prepared and sold to the cooperating farmers at cost, effecting a considerable saving in price, in addition to furnishing a supply of poison of standard strength and known efficacy against the particular species of rodent involved.

Where it has been impracticable for county commissioners to advance funds for the purpose, farm bureaus and pest clubs have pooled their orders so as to avail themselves of the advantage of the reduced price. The increase in crop production resulting from the extermination of these pests is so direct and obvious that the vigorous and enlarged prosecution of these campaigns is assured.

The initial steps have also been taken in Nevada and California to place the work of ground-squirrel control upon an organized cooperative basis.

COOPERATION EFFECTIVE AGAINST PRAIRIE-DOGS.

Prairie-dogs also, which greatly reduce the carrying capacity of the pasture ranges of the West and lay waste the grain and vegetable crops of the farmers, are giving way before the systematic poisoning campaigns organized to eradicate them. The extermination of these animals upon large areas of national forest and other public land in Arizona, New Mexico, Colorado, Wyoming, South Dakota, and Oklahoma by field parties of the Biological Survey showed conclusively that these foes of the agriculturist can be effectually and economically exterminated by properly directed effort. Their ravages have been so severe as not only to cause a marked reduction in the products that could have been harvested from the acreage planted, but also to discourage settlement and in many cases actually to drive out settlers who were not able to maintain themselves in the face of such depredations.

Observing the results obtained by "poisoning parties" of the department upon public land, ranchmen and farmers have petitioned urgently for assistance. The pressing need for increasing food-crop and live-stock production emphasized the importance of eliminating this direct and preventable source of loss. Poisoning parties upon Government land were stationed where the work would be of the greatest possible value, by increasing the live-stock carrying capacity of the Government ranges, and would protect the forage and crops of ranchmen and farmers from destruction by prairie-dogs coming from the Government lands. At the same time an active campaign of demonstrations was undertaken in cooperation with the State extension services in Arizona and New Mexico to promote extermination of these pests on privately owned agricultural and grazing lands. This resulted in the planting to crops of considerable areas which would have been left uncultivated but for the successful extermination of the prairie-dogs and in the saving of important yields of wheat, oats, corn, potatoes, beans, and alfalfa from destruction by them.

JACK RABBITS DESTROYED BY THOUSANDS.

Satisfactory progress was made also in the campaigns undertaken against jack rabbits in California, Oregon, Nevada, Idaho, and Utah. These animals at certain seasons congregate in large numbers upon wheat, oats, rye, barley, and alfalfa fields, often completely devastating them, besides destroying great quantities of alfalfa hay in the stack. A farmer in Oregon writes, "Jack rabbits are so bad they destroy all our grain. If we can not obtain some help to get rid of these pests, we will have to do as other settlers are compelled to do, leave." This statement is characteristic of expressions from farmers throughout the regions where these animals occur in destructive abundance. The farmers' clubs organized for systematic poisoning of these pests in Crook County, Oreg., succeeded in destroying 59,000 during the winter of 1916–17, making a total of at least 134,000 jack rabbits killed in this county alone since the campaigns there were first undertaken. Many thousands of these animals have been destroyed in campaigns at a cost of less than one-tenth of a cent each. To the effectiveness of this work the saving of succeeding crops is largely attributed.

AN INSTANCE OF SUCCESS AGAINST GROUND SQUIRRELS.

The following statement is typical of the great number of expressions of approval received from farmers and orchardists who have used the Government poisoning methods in organized campaigns:

A hill near my house has been infested by these "ground diggers" since the year one, I should judge, and for the last three years they have carried off most of the fruit from my orchard adjoining, in spite of all the poisoning and smoking I could do. To-day I don't believe there is a live squirrel in the hill, and this with only two applications of the poisoned grain recommended by the Department of Agriculture. A large percentage of them must have died in the holes, as I found comparatively few on the surface. By thorough cooperation and perseverance I believe this pest can be practically exterminated and at small cost. Let this good work go on. If there is anything else in the making that is only half as good, let the farmer have the benefit of it at the earliest possible moment; he needs it, and our country needs it.

THOROUGH COOPERATION AND WISE DIRECTION ESSENTIAL TO SUCCESS.

Losses due to the depredations of rodent pests have too long been considered inevitable and uncontrollable. With modern improved methods of poisoning and systematic organization and prosecution of cooperative campaigns this heavy drain upon production need no longer be tolerated by progressive communities. The details of organization must vary somewhat according to the requirements for the particular animal pest involved and the conditions prevailing in the community where the work is undertaken.

As suggested by the campaigns which already have been conducted effectively, the more important features essential to ultimate success are: (1) Cooperation of all agencies involved, including farmers, local organizations, county, State, and Federal officials; (2) leadership trained and experienced in methods of rodent control and in organization; (3) a unit plan to systematize activities and cover a sufficiently large territory to prevent reinfestation; (4) financial support to procure supplies in large quantities; and (5) legal provision for the extermination of pests upon neglected areas.

Plans for the campaigns against the animals should be laid sufficiently in advance of the season favorable for beginning field operations to effect preliminary arrangements and procure necessary supplies. The need should be foreseen and the work of extermination undertaken at a time when the animals will take poison most readily and previous to the time they usually make their attacks upon growing crops. When an abundance of succulent food is available poisoning is more difficult, and when damage to a crop becomes apparent it is usually too late to develop the organization required for obtaining the most effective and lasting results. With due foresight, proper organization, and a direction of campaigns by men trained and experienced in approved methods, success in the eradication of noxious rodents is practically assured.

THE HOUSE RAT: THE MOST DESTRUCTIVE ANIMAL IN THE WORLD.

By David E. Lantz,
Assistant Biologist, Bureau of Biological Survey.

THE RAT A WORLD-WIDE MENACE.

A SINGLE RAT does far less harm in a year than one of the larger mammals, such as a lion, tiger, or wolf; but the large mammals of prey are comparatively few in number, while rats are exceedingly abundant. North America or any other continent has probably as many rats as people—possibly two or three times as many. The destruction wrought by this vast horde of rodents is far greater than that wrought by lions, tigers, wolves, and all other noxious mammals together.

Injurious insects are enormously destructive to crops. Probably their combined ravages inflict greater economic losses than do those of rats; but no one kind of insect destroys as much. The harm done by any species of insect is usually confined to certain geographic limits, rarely extending over large parts of a continent; that done by the rat extends over the whole world. Oceans fail to limit its activities.

The rat's destructiveness is not confined to crops and property; it menaces human life as well. This rodent is responsible for more deaths among human beings than all the wars of history. Not all the fatal epidemics of the past were bubonic plague, but enough of them have been so identified to show that almost every century of the Christian era has had at least one great pandemic of this scourge which destroyed millions of the world's population. The great plague of London, which killed more than half the inhabitants that did not flee from the city, was by no means the worst outbreak recorded. The plague called "black death" devastated Europe for 50 years of the fourteenth century, destroying two-thirds to three-fourths of the population of large territories and one-fourth of all the people, or about 25,000,000 persons. Since 1896 plague has carried away nearly 9,000,000 of the population of India alone. The disease is still intrenched in Asia, Africa, Australia, and South America, and cases of it have occurred in Europe and North America.

Through the fleas that infest them, rats are almost wholly responsible for the perpetuation and transmission of bubonic plague, and it has been proved also that rats are active, although not exclusive, agents in spreading pneumonic plague. Only the prompt measures taken by the United States Public Health Service against these animals prevented disastrous epidemics of plague in San Francisco, Seattle, and Hawaii in 1909, in Porto Rico in 1912, and in New Orleans in 1914.

The entire rôle of the rat in transmitting diseases to man is not fully understood. Septic pneumonia and epidemic jaundice in man have been traced to the rodent, and it is known to perpetuate trichinæ in the pig. It is suspected of being a carrier of infantile paralysis, and it undoubtedly carries many kinds of infectious germs from its haunts of filth, leaving them upon human food.

The economic loss due to rats is astounding. No extensive or exact statistics on the subject are available,[1] but surveys of conditions existing in a few of the older cities of the United States show that losses due to rats are almost in exact ratio to the populations. In rural districts the losses are much greater in proportion to inhabitants than in cities. Assuming that there are in the United States only as many rats as people, and that each rat in a year destroys property valued at $2, the total yearly damage is about $200,000,000. To this must be added the expense of fighting rats, including the large sums paid for traps and poisons, the keep of dogs and cats, and the labor involved. In addition, the loss of human efficiency due to diseases disseminated by the rat should be considered. It is hardly thinkable that a civilized people should rest supinely under such conditions and let this evil continue, particularly when it is known that numberless human lives are in jeopardy. Think of the waste involved in a loss of $200,000,000 a year! The constant

[1] Estimates of annual rat damage in foreign countries made previous to the present war were: United Kingdom, $73,000,000; France, $38,500,000; Germany, $47,640,000; Denmark, $3,000,000.

labor of an army of more than 200,000 men is required to produce the materials eaten and destroyed by rats. If half this loss were represented by grain destroyed, it would take about 5,000,000 acres to produce it.

Man has been fighting the rat for centuries and has made little progress. The rodents are intrenched in fortresses of man's own building. If they are driven out or overcome for a time, others soon swarm from neighboring premises, and the battle has to begin anew. Defeats have been due not so much to lack of proper methods as to neglect of precautions and an absence of concerted action. The work has been made abortive by providing continued subsistence for the rodents and by failing to destroy their intrenchments. When once they are deprived of these advantages and the campaign against them is organized on lines of intelligent cooperation a large measure of success will be achieved.

Civilization and science have by no means spoken their last word about the means of combating this greatest plague of the human race. A building can be made rat-proof; why not a farmstead, a street, a village, a city, or a seaport? If rats can not be exterminated, they at least can be repressed in this country, and at the same time effective barriers can be erected against the landing of fresh hordes. Up to the present time, however, few efforts have been made to find out the way or even to apply properly the means already at command. It is high time to begin.

THREE KINDS OF HOUSE RATS.

Three kinds of house rats occur in the United States, none native, but all migrants from the Old World. Most formidable and most widely distributed is the brown rat,[1] known also as gray, barn, wharf, sewer, or Norway rat. This rat is the worst of our rodent pests. It made its appearance in America shortly before the Revolution. It may be recognized by its large size, robust form, blunt head, short ears, and the fact that its tail does not exceed the combined length of its body and head. It is a burrowing species, commonly nesting in the ground, and is found throughout the country, except possibly in Wyoming and Montana.

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[1] *Rattus norvegicus.*

The brown rat owes its dominance to its ferocity, its great fecundity, and its ability to adapt itself to nearly all conditions. With abundant food it breeds from six to ten times a year and produces (in the middle part of the United States) an average of about 10 young to the litter. Young females breed when three or four months old. The possibilities of such reproduction are a menace to the human race. At the maximum rate of increase and without check, in a few years the rats in the world would consume all vegetable and animal products, and the earth would become a lifeless waste.

The black rat[1] arrived from Europe soon after the settlement of the Atlantic coast. It has disappeared from most parts of the country, but it persists in a few remote localities in the North, is more common southward, and a few occasionally land at most of our seaports. This rat seldom burrows in the ground, but lives in walls of houses and between floors and ceilings. It is slender and not able to cope with the more robust and fiercer brown rat. It may be recognized by its smaller size, its pointed muzzle, its sooty color, and the fact that its tail is longer than the head and body.

A third form is the roof rat, or Alexandrian rat,[2] probably a southern race of the black rat. It resembles the black rat in every particular except in its color, which is nearly like that of the brown rat, but more yellowish on the underparts. It is common throughout the Southern States and has been able to maintain itself against the brown rat, probably because of its habit of living and nesting in trees. Records of the occurrence of the brown, black, and roof rats in the same locality in the South are not infrequent.

The black rat and the roof rat are less prolific than the brown rat. While they probably breed as often, they produce smaller litters. The period of gestation—about 21 days—is the same for the three forms.

BARRING RATS FROM SHELTER AND FOOD ON THE FARM.

Of all people the farmer has most reason for detesting the rat. The majority of farms present ideal conditions for this rodent and consequently are badly infested. First comes the item of shelter. Many farm dwellings are old

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[1] *Rattus rattus rattus.* [2] *Rattus rattus alexandrinus.*

buildings with shallow foundations laid in lime mortar; if there is a cellar, it probably has an earthen floor or a wooden one resting on sills in contact with the ground. The barns were built solely to shelter live stock, implements, and crops from inclement weather, and with no thought of excluding rodents. Decayed and almost abandoned sheds and outbuildings are allowed to remain long after their usefulness has passed. Wood and lumber piles often literally encumber the ground. Stone fences or walls of open construction inclose many fields, orchards, or wood lots. All such surroundings are favorable for rat concealment.

Besides shelter, the farm offers a great variety and abundance of rat food. Here are grains always accessible in field, shock, stack, mow, crib, granary, and bin. Here grow luscious fruits and succulent vegetables. Here are rich eggs and toothsome young poultry, all tempting to the rat. Here, too, are scattered abundant waste offerings from feed troughs of horses, cattle, swine, and poultry. Food and shelter everywhere! Is it surprising that rats love the farm and stay on it?

The migrations of rats from one locality to another are of special interest. After a series of years in which the pests are comparatively scarce in a rural neighborhood they suddenly become abundant and exceedingly destructive over large areas. Such invasions are frequently reported and hard to understand. Probably food is the chief factor involved. Rats migrate from places where food is scarce to places where it is plentiful; and abundant food in the new locality causes abnormal reproduction, the effect of which in a short time is that of a sudden invasion of a vast horde of rats.

Another movement of rats is local and seasonal in its occurrence. An exodus of the animals from cities and villages to river banks and farmsteads in the surrounding country takes place every spring and is followed by a return migration each autumn. This phenomenon has been observed almost everywhere. It explains why rats are more abundant in towns during the cold season, while in the country they occur in largest numbers during the summer months.

What measures may the farmer adopt to free his premises of rats and insure himself against loss from their depredations? The question is important and the suggested task is doubly difficult when he undertakes to accomplish it by his own efforts. He may clean up his premises and destroy all the rats found there, but as long as his neighbors neglect to take similar precautions his home will be constantly subject to fresh invasions and his work must be repeated. All rodent destruction is properly the business of the community and must be so recognized before substantial progress can be made. As long, however, as community action is delayed, the farmer must continue his individual efforts or suffer serious losses of property.

The measures needed for eliminating rats from the farm include destroying their hiding and nesting places, keeping food from them, killing them, and organizing the entire community for concerted action against them.

RAT HARBORS DESTROYED BY RAT-PROOFING FARM BUILDINGS.

Rat harbors should be demolished everywhere. On the farm first attention is needed to things that are of no further use, as dilapidated buildings, lumber and trash piles, open stone walls, and the like. These should all be removed and the premises cleaned up. Buildings that are still useful may then be made rat-proof, often at slight expense. Small structures should be raised on posts at least 18 inches above the ground, with the space beneath left entirely open. If such buildings are used for storing grain or provisions they may be further protected by thin sheet metal or wire netting tacked to surfaces that might be gnawed from the top of a post or other point where the animals could get a foothold. A horizontal belt of tin, 12 inches wide, nailed on the outside of a crib 3 feet above the ground, is an effectual barrier against a climbing rat.

Rat-proofing by elevation has the advantages of cheapness and the fact that it may be applied to a great variety of structures. In the South, dwelling houses are often so treated; but in a colder climate, foundation walls are needed, either of concrete or of stone laid in concrete.

Many cellars may be made rat-proof by a floor of concrete. Holes in the wall around water or sewer pipes should be filled with concrete to the full width of the wall. Cellar windows should be screened with heavy wire netting of

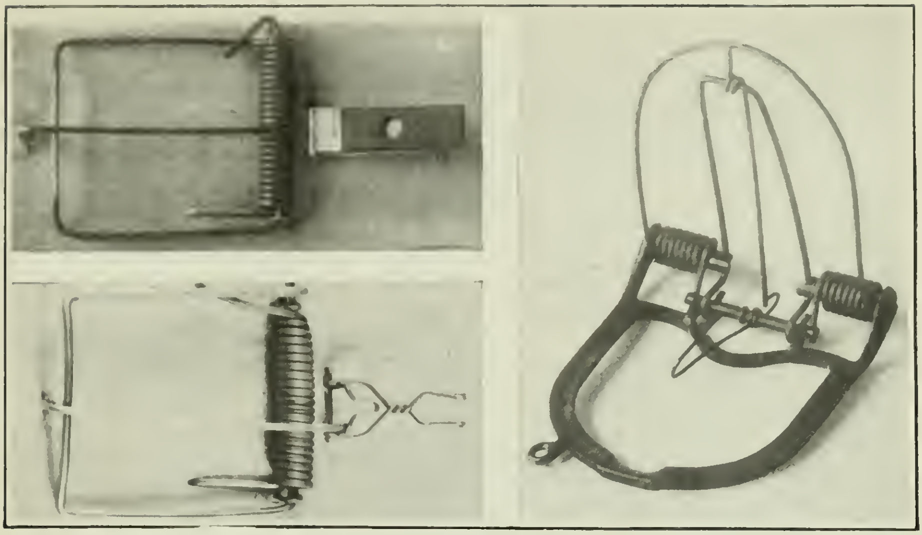

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FIG. 1.—TYPES OF GOOD GUILLOTINE TRAPS. FOR USE IN CATCHING RATS.

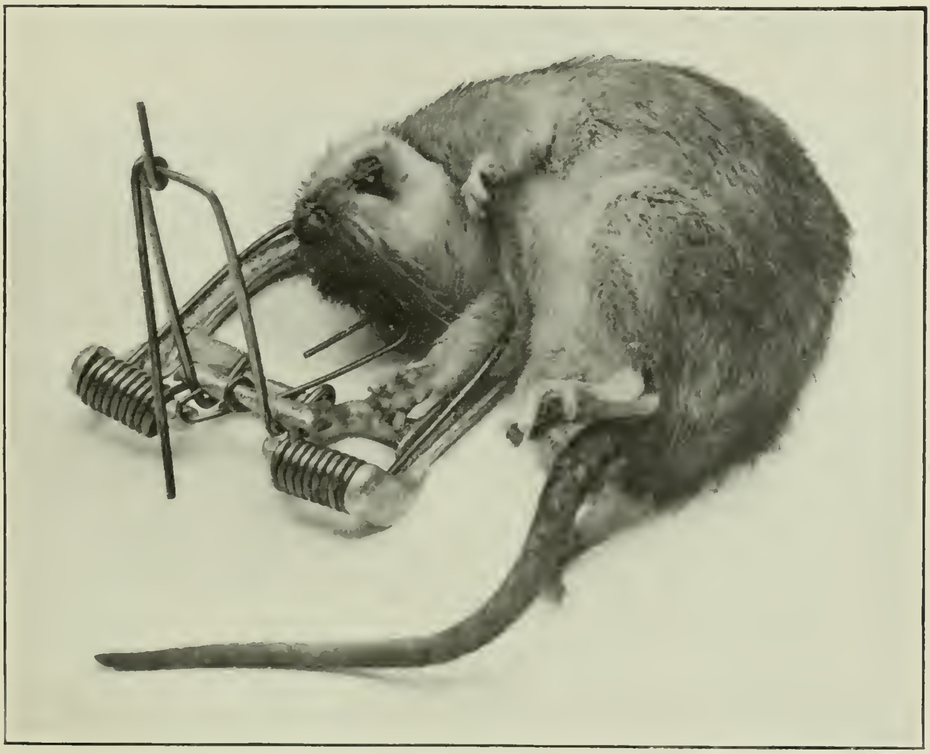

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FIG. 2.—RAT CAUGHT IN GUILLOTINE TRAP.

Good traps well placed and set will kill many rats.

B811M—PHOTO FROM U. S. PUBLIC HEALTH SERVICE.

FIG. 1.—RAT NESTS UNDER PLANKED-OVER BACK YARD.

Rats flourish in such harbors.

B675M—PHOTO FROM U. S. PUBLIC HEALTH SERVICE.

FIG. 2.—RAT-PROOFING BY CONCRETE SIDE WALL.

Under the supervision of officers of the U. S. Public Health Service many places in New Orleans were thus made rat-proof in 1914.

B812M—PHOTO FROM U. S. PUBLIC HEALTH SERVICE.

FIG. 1.—ERADICATING PLAGUE RATS.

Twenty-one plague rats were found under and about this Chinese restaurant in New Orleans, demolished in 1914.

PHOTO FROM U. S. PUBLIC HEALTH SERVICE.

FIG. 2.—BUILDING OUT THE PLAGUE RATS.

Sanitary rat-proof building erected on site of the demolished Chinese restaurant shown in figure 1.

B814M

FIG. 1.—RAT DAMAGE TO STANDING CORN.

In this field of over 100 acres, raised by boy scouts, rats climbed 6 feet to reach the corn and destroyed approximately 10 per cent of the large crop.

B815M

FIG. 2.—THREE CORNSTALKS FROM SAME FIELD.

Rats ate the tender grains, leaving bare cobs for the youthful farmers.

one-fourth-inch mesh (mice can go through one-half-inch square holes).

Meat houses must have careful attention or they will be invaded by rats, with serious destruction of smoked meats. In cases where it is impracticable to rat-proof walls and foundation, the meat may be protected in wire cages or the room may be lined with wire netting of one-fourth-inch mesh.

FOOD KEPT FROM RATS BY VARIOUS DEVICES.

Keeping food from rats is an important measure, because well-fed rats breed often and have many young at a time; also, because the presence of abundant food makes the work of trapping or poisoning the animals extremely difficult. While rat-proof construction of buildings is the best means of protecting food, a variety of other devices may prove helpful. Provisions, flour, seed grain, and the like may be kept in wire-covered cages or boxes, safe from both rats and mice. By simply plastering a stone or brick wall in a cellar or compartment it may be made too smooth for rats to climb. Rats may be kept from traversing the top of a cellar wall by a tin barrier closing the space between two joists that rest on the wall. Provisions may be kept on shelves suspended from the cellar ceiling. Not only grains and stored provisions, but waste food also, should be protected from the rodents. All garbage from the kitchen should be placed in well-covered metal containers and promptly fed to swine or burned. The fly and rat nuisances are as dangerous in the country as in cities.

TRAPS, DOGS, CATS, AND POISONS TO DESTROY RATS.

No opportunity to kill rats should be neglected on the farm. Traps, dogs, cats, and poisons may be useful. The first need is traps and a knowledge of how to use them. The most reliable traps for general use are the inexpensive snap, or guillotine, traps. Many efficient kinds are on the market, but the cheaper ones are rarely to be recommended for durability. Those that have sheet-metal bases are not desirable, as rats fear and avoid them. Snap traps should be set so that they will spring at a slight touch. They may be placed in rat runs, at rat burrows, behind boards leaned against the wall, and in a great variety of other favorable places. Dry oatmeal (rolled oats) is recommended as a bait for both rats and mice. Place a few grains on the trigger pan or under the trigger wire, with a few grains near the trap.

Trapping rats is an art which may be learned by practice. A common mistake is to set one or two traps where a dozen are needed. On a badly infested farmstead 40 or 50 snap traps can be used to advantage. The kind of bait should be suited to the circumstances. Great success should not be expected with the oatmeal where other grains are present. Meat, fish, smoked sausage, toasted cheese, fried bacon, butter, peanuts, and pumpkin, melon, or sunflower seeds are good to use as a change from oatmeal.

The wire-cage trap, if substantially made, is useful on the farm. Coarse bait is required, and may be hung from the top of the trap by a light wire. Set the trap on a floor or on a board, lay a short board on top, and cover the whole with an old cloth or gunny sack, leaving only the trap entrance uncovered. The trap may be baited and left open for a night or two until rats learn to feed inside, after which a good catch may be expected. An excellent plan for using the cage trap is to bore a hole two or three inches in diameter at proper height in the door of granary or feed room. The hole may be covered with a metal slide when the trap is not in use. Set the trap inside the granary with its entrance fitted to the hole and cover and bait in the usual manner; any rat entering the granary is caught. The same plan is applicable to rat holes in other situations, and it has been used effectively between connecting rooms of cold storage warehouses.

The small breeds of dogs, especially terriers, are valuable as rat killers on the farm. They are easily trained and are always available when needed. Wherever rats are routed from nests or harbors these dogs are eager for the fray. When shocked or stacked grain is moved or threshed they kill many rats. Sometimes a barrier, or fence, of light boards is placed about a stack, and dogs inside get all the rodents dislodged. In this way 500 or 600 rats have been destroyed from a single stack.

Cats are useful about farm buildings mainly because they kill mice. Sometimes they hunt and destroy rats, but a cat that will kill an adult rat is rare. The chief objection to cats on a farm is their persistent destruction of song birds. A good cat is valuable when her killing propensities can be confined to rodent pests, but the majority of felines are worthless or actually injurious on the farm.

Great caution should always be observed in the use of poisons, but there are situations on the farm in which poisons may be used safely and effectively. In the open fields poisoned grain may be scattered near rat burrows. In the poultry yard poisons may be exposed for rats inside darkened boxes. A small, rather shallow box containing the baits is set on the ground with a larger box inverted over it. A hole in the larger box will admit the rat to the food, while chickens will be safe. Strychnin is the safest poison to use where poultry run, because hens are immune to small quantities of this poison. The same is true of quails, grouse, pheasants, and turkeys.

The early threshing of grain, which prevents shocks and stacks from remaining long as harbors and breeding places for rats, is a measure that will avoid much loss of grain now experienced in America.

RURAL RAT CLUBS ACCOUNT FOR MANY RATS.

In any rural community badly infested with rats, it is a good plan for farmers to form rat clubs and offer prizes for destroying the rodents. The younger members of the community as well as adults should be allowed to compete and the prizes should be awarded periodically, as once a month. A first, second, and third prize are suggested for those who bring in the greatest number of rat tails. Specific rules governing the contests should be made at the start, and instruction as to proper methods of trapping or otherwise killing rats should be a part of the program for each meeting of the club. Prizes may be provided by private donation or even by assessment of members. The plan gives better satisfaction than a system of straight rewards, because it arouses more enthusiasm and costs less. A rat and sparrow club in England in three seasons secured the destruction of 16,000 rats and 28,000 sparrows by an expenditure of less than $30 in prize money. Had ordinary bounties been paid, the same work would have cost $1,000 or $1,200.

COOPERATION NEEDED TO DESTROY RATS IN VILLAGES.

In the matter of rat infestation, small towns are intermediate between farm and city. They show a marked increase of rodents in winter and a decrease when spring opens. Yet the outlying parts of a village are peculiarly subject to losses of poultry during the summer. Pigeon lofts, also, in small towns are subject to raids by rats, and the toll of eggs and young squabs is often heavy. Rats can climb fine-meshed netting and gain entrance to the pigeon yard at the top where the birds themselves enter.

The measures recommended for repressing rats on farms will apply to villages, but cooperation of citizens to destroy the rodents will usually be more readily obtained. Often the small town has a civic club which could take up rat work whenever its importance is presented. It requires only an intelligent and persistent leader to set the machinery for rat repression in motion. The leader should provide for the instruction of the community as to best methods of trapping, sanitation, rat-proofing buildings, and other measures needed to discourage the rodent. An appeal to civic pride will often bring excellent results in cleaning up premises and in replacing wooden walks or porches, dilapidated buildings, or other harbors for rats.

BUILDING REGULATIONS NEEDED IN CITIES.

The city is the great stronghold of the rat, its permanent refuge, and its last line of defense. The rodent might be destroyed in all rural districts and villages, but if not routed in the cities the whole country would soon be repopulated with rats from these centers of infestation. Distance does not limit the rat's wanderings. This fact is aptly illustrated by the manner in which the brown rat spread in the United States. It appeared first in the larger seaports, whence it gradually reached the inland towns along the larger streams. But when railroads were built they facilitated its distribution to distant cities and later to intervening towns along these highways of commerce. While rats seem to prefer water transportation, they are not averse to traveling by rail. A few years ago crates of chinaware were unpacked in Baltimore and in the straw packing were found mature black rats that evidently had been brought all the way from Canton, China—first by ship to San Francisco and thence by rail to their destination.

The institutions peculiar to large cities favor the rat and account for its abundance. The old wooden wharves, the bricked sewers, the extensive lumber yards, the ancient factories, the grain elevators, the markets, and many other features attract and harbor the rodents. As a rule, the older the city the more rats are to be found in it; but even in parts rebuilt after large fires and from which one would think modern construction would have excluded the animals they are still to be found, though less abundant. Many large buildings, rat-proof as to walls and foundations, have become infested with rodents through carelessness or oversight of owners or occupants, and the animals are intrenched behind fixtures or merchandise. Fortunately it is possible to dislodge and rout them from these hiding places.

Losses from rats in cities are enormous. In 1908 the Biological Survey made a careful study of rat infestations in two cities, Washington and Baltimore, with the result that actual losses of produce and other property amounting annually to $400,000 and $700,000, respectively, were revealed. These sums are nearly in ratio to the populations. The Women's Municipal League of Boston recently announced that losses from rats in that city amounted to $1,350,000 each year. Losses in Pittsburgh, Pa., have been estimated at over $1,000,000 a year. No doubt present values of produce would greatly increase these estimates.

The repression of rats in cities is often hindered by objections to proposed building reforms. Almost an entire block of city dwellings was tenantless for nearly a year because of rat infestation and the refusal of the owners to make necessary repairs to exclude the rodents. In one instance the loss of rents on a single block must have been nearly $10,000. Commission merchants, renting property in a good location, have been known to endure with seeming patience the loss of nearly a hundred dollars each month from rat depredations, while the property owners not only refused to make repairs but advanced the rents 25 per cent.

The routing of rats from cities has become both an economic and a sanitary necessity. Facing the possibility of an epidemic of bubonic or pneumonic plague and the enormous expenditures necessitated by such an outbreak, it is the part of wisdom for any city to protect itself from the calamity. It is not for the individual householder or citizen to decide whether he will interest himself in the subject. It is a matter for municipal legislation, and it is the duty of the citizen to support the ordinances and to cooperate with the authorities to the best of his ability in order that the city may be a clean and safe place in which to live.

The measures that should be adopted to rid cities of rats include:

> First, the requirement that all buildings to be erected shall be made rat-proof under a rigid system of inspection. This requirement probably would add an average of less than 2 per cent to the cost of construction, but the advantages would be out of all proportion to the added cost.
>
> Second, the requirement that all existing buildings with rat-proof walls and foundations be made really rat-proof by closing or screening every opening through which rats might enter. This is a large program, and its enforcement will require skill as well as intelligent supervision. Often it is a puzzle to know how rats gain entrance to a building. A large department store occupying a supposedly rat-proof structure became infested with rats, and only after weeks of investigation was it learned that, to obtain ventilation on summer nights, a watchman had been in the habit of opening a side door without putting up a barrier against rats. A sheet-metal barrier 2 or 3 feet high with ends fitted to the casings at the sides of the doorway would have kept the rats out.
>
> Third, voluntary application of rat-proofing repairs to all buildings that need them. Often only a slight modification of some feature is necessary, as the addition of gratings or screens to basement windows, the closing with concrete of a hole in a wall, or the concret-

ing of a cellar floor. Frequently, however, buildings will need elevation and concrete foundations to make them impervious to rats. By the addition of a concrete side extension, an ordinary wall may be made rat-proof.

Besides the above requirements as to buildings, the measures recommended for eradicating rat harbors on the farm, and for destroying rats there, apply in the main to the city. Dogs of the better breeds, or cats, may be used to advantage to destroy rats in warehouses, factories, or stables, but cleanliness and sanitary reasons forbid their use in stores where provisions are kept for sale.

Fewer suitable situations for the use of poison exist in the city than in the country, and traps become the main reliance for killing rats. Rat viruses are not recommended, since they are much more expensive and more uncertain as to results than poisons. The kinds of traps adapted to city use and the methods of using them are the same as for the country.

Various civic organizations, including commercial clubs, women's municipal leagues, and boards of health, should be deeply interested in rat repression for the cities. One of the most important factors is publicity. All citizens need to be educated concerning the rat's menace to health and material prosperity, and much of the success of campaigns for eradicating the pest will depend upon close cooperation between press and people. The advantages of display posters in public places have been amply proved in rat campaigns in a number of the larger cities.

SPECIAL PRECAUTIONS REQUIRED IN SEAPORTS.

Foreign commerce makes seaports peculiarly liable to the introduction of infectious diseases, especially bubonic plague. The sanitary officers of ports therefore are responsible to some extent not only for the local health, but for the health of the entire Nation. Within the last few years bubonic plague has been introduced at San Francisco, Seattle, and New Orleans, as well as at seaports of Hawaii and Porto Rico. The subsequent costly campaigns against rats under direction of the United States Public Health Service are matters of history.

Bubonic plague is communicated to man by the bite of fleas that infest rats and a few other mammals, such as marmots and ground squirrels. As only the rat travels from country to country it is the only animal that imports plague. Pneumonic plague is carried in the same way, but this disease is infectious and may also be communicated directly from man to man.

Adequate preventive measures at all seaports probably would render unnecessary the heavy expenditures involved in fighting plague after its introduction. Rats take plague only from fleas of rats that have come from places where plague exists—that is, the carrying rats generally arrive on shipboard. If, therefore, they can be prevented from landing, there will be little danger of introduction of plague.

But rats carry diseases other than plague, and seaports have the same economic losses from rats that worry other cities. The port has the added duty of protecting itself from foreign rats. Besides the usual measures against rats in cities, provision should be made for the fumigation of all vessels arriving from foreign ports and the frequent fumigation of ships engaged in trade along the coast or on inland waters. Vessels at docks should be required to place rat guards on all hawsers, and should be "breasted off" the dock by spars furnished with rat guards. This matter is so important to public health as to warrant Federal legislation prescribing port regulations on the subject.

NATURAL ENEMIES OF RATS TO BE ENCOURAGED.

The natural enemies of rats and mice include, besides such domestic animals as the dog, cat, and ferret, nearly all the predatory mammals and birds of prey, as well as snakes, storks, herons, and some other water birds. The continuous warfare kept up by these wild forces combined is, under natural conditions, a far more effective check on rodents than the work hitherto accomplished by man. In recent years, however, the animals that prey upon rodents have become very scarce, while rodents themselves have increased to such numbers that they damage crops severely. Hawks, owls, skunks, weasels, and snakes are among the beneficial animals that have been nearly exterminated through prejudice and ignorance.

All the hawks, owls, and weasels in the country combined do not destroy one-sixth as much poultry or game as the common brown rat, and many of them are efficient enemies of both rats and mice. It should be sufficient to permit the farmer or game keeper to destroy any individual animal or bird found preying on poultry or game; to give him license to kill the beneficial and the harmful alike and at any time or place is unreasonable. Nevertheless, laws in many parts of the United States not only give such license but authorize payment of rewards for the killing. The present hawk law of Ohio is an instance. As drawn and passed in 1915, it reasonably provides that townships shall pay a bounty of $1 each on a few species of hawks that are actually injurious because the main part of their food is birds. In 1916, under this law, bounty was paid on over 20,000 hawks, probably five times as many as there could have been found in the whole State of the kinds upon which rewards were to be paid. Probably no attempts were made to identify the hawks presented for bounty. Already the unfavorable effects of this law are shown in the large number of complaints of serious damage done by rats and mice in Ohio and adjoining States.

Because they hunt at night, owls are especially efficient in destroying rats. The great horned, short-eared, long-eared, barred, and barn owls are all good ratters, and even the little screech owl occasionally gets a rat. The barn owl is the most useful of all because of its habit of living about farm buildings. It is so harmless to poultry that it has been known to take up its residence in a pigeon house and rear its young there.

POISONS USEFUL AGAINST RATS.

In most States the owner or lessee of land may legally put out poison for rodents on his own premises. Extreme caution, however, should always be taken to prevent accident. Except in grain, poisons should never be placed in open or unsheltered locations. All packages and containers of poison should be plainly marked with cautionary labels and kept out of the reach of children. Poisons are unsuited for general use in occupied dwellings, because the decaying bodies of rats are objectionable. No poison exists that when eaten will dry up carcasses and prevent putrefaction or that may be relied upon to drive the animals from the premises to die. The brown rat when poisoned seeks its burrow, wherever located. A slow poison will usually allow it to reach this retreat, and thus is less liable than a quick poison to give unpleasant results in a dwelling. This statement does not apply to the black rat or the roof rat nor to the common mouse, which are not burrowing species, but which usually live in the walls of houses.

For poisoning rats or mice in open fields, at garbage dumps, on river banks, in warehouses, and in similar situations the following formulas are recommended:

Strychnin (sulphate) formula.—Dissolve 1 ounce of strychnin (sulphate) in a pint of boiling water. Dissolve a heaping tablespoonful of dry laundry starch in a little cold water, add it to the strychnin solution, and continue to boil for a few minutes until the starch is clear. Add a scant teaspoonful of saccharin or a cup of thick sirup to sweeten the paste and stir thoroughly. Pour this mixture while hot over 12 quarts of clean oats in a metal tub and mix until all the grain is coated. Before using let the grain stand until the coating dries. Occasional stirring will hasten the drying. Scatter the grain near rat burrows or runs.

Strychnin (alkaloid) formula.—Mix thoroughly 1 ounce of powdered strychnin (alkaloid), 1 ounce of common baking soda (bicarbonate), and one-eighth ounce of powdered saccharin. Put the mixture in a tin pepperbox and sift it gradually over 30 pounds of crushed oats in a metal tub, mixing the grain constantly so that the poison will be evenly distributed. Put out the poisoned grain about rat burrows or runs, but not in piles of more than a teaspoonful.

Barium carbonate formula.—Barium carbonate for rats or mice may be fed in a dough composed of 4 parts of meal or flour to 1 part of the mineral. A more convenient bait is ordinary oatmeal (rolled oats) with about one-eighth of its bulk of barium carbonate, mixed with water enough to make a stiff dough. This may be exposed in bulk in a pan, or put out, about a teaspoonful at a place, in rat runs. Eaten in sufficient quantities, this mineral is dangerous to all animals, and caution is needed in its use.

While most salts of barium are dangerous, barium sulphate, which is sometimes sold as a substitute for the carbonate, is not poisonous to rats or other animals.

Squills formula.—The sea leek,[1] or squill, is a favorite rat poison in Europe. It is rapid in its action and a very small quantity will kill a rat. The following three methods of preparing the poison are in use:

First method: Mix thoroughly 1 ounce of powdered squills with 4 ounces of strong-smelling cheese.

Second method: Cut a sea leek into slices and chop 2 parts of the leek with 3 parts of bacon into fine pieces. Mix with meal or flour enough to make all cohere. Then bake into cakes.

Third method: Chop the leek fine and mix with flour and water to make a dough; roll out flat, and dry in an oven. Pound into a fine powder. This may be used on any kind of rat bait.

RAT DAMAGE MIGHT BE REDUCED NINE-TENTHS.

To combat the rat successfully is largely a building problem. Buildings should be so constructed as to exclude the animals from shelter and food. When this is done, individual and community efforts to destroy rats will give satisfactory and lasting results. The program may be regarded by many as too expensive. Will it be too costly? What do rats cost now? If half the money now spent in feeding and fighting rats could be expended in wisely planned and well-executed cooperative efforts for rat repression, it would be possible within a few years nearly to rid the country of its worst animal pest, to reduce losses from its depredations by at least 90 per cent, and to free the land completely from the fear of bubonic plague.

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[1] *Scilla maritima.*

FERTILIZERS FROM INDUSTRIAL WASTES.

By Wm. H. Ross, *Scientist,*
Division of Investigations of Fertilizer Resources, Bureau of Soils.

THE principal industries of the country are agriculture, mining, lumbering, fishing, and manufacturing. Products are allowed to go to waste in these industries when they have no commercial value, when they can not be recovered economically, when there is no known process of recovering them, or when it is not known that a loss is actually taking place. The last decade or two have witnessed a wonderful development in the utilization of many of these products. In some cases the discovery of new uses for certain of them has so increased their value that what was once a principal product becomes secondary in value to what was formerly a waste product. Improved operations and the utilization of certain waste materials have also made possible the profitable recovery of other products which formerly could not be prepared economically.

A use to which a larger number of waste materials is put than for any other purpose is the manufacture of fertilizers. In most industries the raw materials used must be carefully selected both with respect to composition and purity of material. The fertilizer industry, however, forms an exception to this rule, for there is a wide latitude allowed in the choice of the materials that may be employed. Some forms of combination of the fertilizing elements are preferred to others, but almost all are used. There are also no definite regulations with respect to purity beyond the requirements that the fertilizing elements must be present in available form and that excessive amounts of poisonous substances should not be present. The variations in composition of materials used in fertilizers is therefore very great, and it is this fact which enables so many by-products of the industries to find ultimate disposal in the manufacture of fertilizers.

POTASH FROM THE HARDWOOD INDUSTRY.

A striking illustration of the change in value which a product may undergo with the development of an industry is furnished by the utilization of certain woods, as the oak and the hemlock. In the early development of the country the bark of these trees served as the only source of tannin used in the manufacture of leather. In many places the collection of bark developed into an industry of considerable importance, and occasionally the profits realized on the sale of the bark greatly exceeded that which could be obtained from the remainder of the tree. Where conditions were favorable, timber was also prepared for market; but it often happened that on stripping the bark the remaining portion of the tree was either allowed to decay or purposely destroyed in clearing the land. The practice of such wasteful methods of forestry naturally soon resulted in a marked limitation in the extent of virgin forests. This fact, taken with that of a rapid increase in population, soon greatly increased the demand for wood products. Under these conditions it was no longer profitable to leave good timber to decay. Hardwood material in particular came into great demand, and even the lowest-grade material could then be profitably utilized as a fuel for the generation of power, leaving an ash which found important application as a fertilizer or for the preparation of potash salts.

At present the demand for wood products is much greater than the supply. In thickly settled districts, discarding waste material in lumbering is no longer practiced. All tops of trees, slabs, edgings, and the sawdust in particular are carefully collected and used for different purposes, as when destructively distilled for the preparation of many chemical products, as alcohol, sugar, and oxalic acid. The residue in this case, as well as when the wood is used for fuel, becomes directly available for use as a potash fertilizer. No reliable figures are available for the amount of potash that is now being recovered from this source; but it has been estimated, on the basis of the lumber cut of 1915, that the total amount that is theoretically recoverable from the hardwood wastes of the country amounts to about 19,000 tons annually.

The development as thus outlined in the use of certain woods is only one of many instances that might be cited in illustration of the way in which materials formerly treated as wastes may become so extensively utilized that what was once a principal product simply becomes one of several by-products.

FERTILIZERS FROM THE PACKING-HOUSE INDUSTRY.

An industry that is now said to thrive more than any other on the utilization of waste is the preparation of meat products. The pork, beef, and mutton retailed in our stores represent only from 40 to 85 per cent of the animal on the hoof. Time was when a large part of the remaining 15 to 60 per cent was simply thrown away. At present, however, the field of usefulness of waste material has been so largely extended that practically all the profits of this industry are now derived from their successful exploitation. In no other industry has conservation been more carefully worked out, and in the up-to-date slaughterhouses of our large cities it may truthfully be said that a slaughtered animal is utilized from the tip of his nose to the last hair on the end of his tail.

The by-products obtained in the packing-house industry may be divided into two classes—the edible and the inedible. The inedible portions constitute the external covering (hair, horns, hoofs, and hides), some of the offal, and the bones. From these materials is prepared a great variety of substances, some of which have developed into enormous industries in themselves, such as the making of leather, soap, glue, and fertilizer. The last mentioned is of special interest as it represents the ultimate utilization of the waste in the packing-house industry. This is illustrated, for example, in the manufacture of such articles as buttons, combs, knife handles, and spatulas from the horns and hoofs of cattle and sheep and the hoofs of hogs. The waste resulting from the preparation of these materials and from hoofs and horns of too low grade to be used for this purpose was at one time thrown away, but it has been found that by treating such material with sulphuric acid the nitrogen which it contains becomes available as a fertilizer. Under the trade name of processed fertilizer this waste from a waste is thus profitably disposed of. The trimmings and waste obtained in the manufacture of hair and leather goods are likewise consumed as fertilizer in the same way.

Of more importance from the point of view of fertilizer manufacture is the utilization of the bones, blood, entrails, etc. Incongruous as it may seem, each of these materials is now used in the preparation of a great many different products. Thus the bones alone furnish at least 30 different articles, but portions of each of the materials named ultimately find their way into fertilizer manufacture. In utilizing the bones in this way they may be either steamed, ground, and placed on the market under the name of bone meal, or they may be treated with sulphuric acid to make them more readily available for plant food. In the latter form they are known as acidulated bones.

The blood, entrails, and other miscellaneous material which have been rejected for other use all find ultimate disposal in what is known as tankage in the fertilizer trade. Blood tankage is simply made by cooking, pressing, and then drying. All other materials are graded and then subjected to a prolonged cooking in large tanks under steam pressure. When this is completed the fat is drawn off from the top to make tallow and grease. The solid residue in the tanks, together with that obtained after concentrating the tank water, is pressed in hydraulic presses to remove excess water and as much fatty matter as possible. On drying the different grades are then placed on the market and form the various tankages which are so valuable for their nitrogen and phosphoric-acid content in the manufacture of fertilizers.

FERTILIZERS FROM THE FISH INDUSTRY.

The oldest industry to make use of waste for fertilizing purposes is the fish industry. The custom of fertilizing crops by means of fish existed among the Indians of New England even before the arrival of white settlers in this country. It is said that for fertilizing corn one or two fish were placed in each hill. This procedure was adopted by the colonists, and at the time of a large catch the surplus fish were simply spread broadcast over the fields. In places where fish were plentiful this disposal of an oversupply of fish has been practiced until very recent times.

It was soon observed, however, that the response first noted on liberally fertilizing with fish decreased with each successive application, and the initial good effects could be obtained again only after the soil had been allowed to stand for a time without further applications of the fish. After many suggestions had been advanced in explanation of this result, it was finally shown to be due to the deleterious action on plants of the oil in the fish. When the oil was removed by cooking and pressing the residue obtained no longer exhibited the effects previously noted and its value as a fertilizer was consequently greatly improved. A further advantage in removing the oil was furnished by the value which the oil possesses in itself for use in the industries. At present the price of crude fish oil is normally quoted at about 25 cents per gallon, which is more than sufficient to cover the cost of the extraction. It thus happens that in the utilization of fish waste the recovery of the extracted residue, or fish scrap, as it is known in the trade, often becomes subordinate to the recovery of the oil.

The principal sources of fish oil and scrap at present are nonedible fish, as the menhaden, and the refuse collected in canning factories from the heads, tails, bones, shells, intestines, etc., of edible fish. Nonedible fish furnish the largest supply of both oil and scrap. The average annual catch of menhaden for the last eight years was about 500,000,000 fish, which, with the refuse collected in canneries, produced about 60,000 tons of scrap and 85,000 barrels of oil. The largest recorded catch was in 1903, when about 1,000,000,000 fish were caught.

The composition of fish scrap varies with the nature of the material from which it is prepared. Generally speaking, it may be said to contain on an average about 8 per cent each of nitrogen and phosphoric acid. The presence in fish scrap of a comparatively high percentage of two of the essential plant foods makes it one of the most valuable of the organic fertilizers. The catch of menhaden during the last two or three years has been much below the average. The total production of fish scrap in 1916 consequently amounted to only 27,000 tons.

FERTILIZERS FROM THE IRON AND STEEL INDUSTRY.

Our largest manufacturing industry is the making of iron and steel. The pig iron recovered in the smelting of iron ore amounts on an average to about 25 per.cent of the raw materials required. The equivalent of about 14 per cent of the raw material is driven off by volatilization in the coking of the coal; in the process of smelting, a further 40 per cent escapes from the furnaces in the form of gas, fume, and dust; and the remaining 21 per cent represents the slag discharged at the time of tapping the furnace.

In the early history of the industry little was done to utilize any of these waste materials. In fact, until the last decade the most that was done in this direction was to utilize to some extent the heat that escapes from the furnace. Within the last few years, however, a great deal of attention has been given in this industry to the utilization of waste, and it may be said that more advance has been made recently in the efficient operation of the blast furnace than has, perhaps, been accomplished in any other important industry. This development may be noted particularly in the coking of coal for blast-furnace use. In 1909, 84 per cent of the coke produced in the country was prepared in what are known as beehive ovens and the remaining 16 per cent in the more modern by-product ovens. In 1916 the output of by-product coke increased to 38.6 per cent of the total, with every prospect of a still further increase for the present year. In the beehive process the nitrogen present in the coal and all other volatile constituents are driven off by the treatment, and apart from the heat generated by the combustible constituents of the gas all represent a total loss in the process. In the by-product oven, on the other hand, there is recovered not only the nitrogen occurring in the coal but also a great number of other by-products, which find very extensive application in the manufacture of dyes, explosives, drugs, and other products. In this process the nitrogen passes off and is recovered as ammonia. By combining this with sulphuric acid there is formed a product known as ammonium sulphate, which at present is one of the most important sources of nitrogenous fertilizers in the country. The output in 1915 amounted to 249,000 tons, and in 1916, to 325,000, valued at about $25,000,000.

The economic uses of blast-furnace slag have also been greatly developed within the last few years. Formerly this slag was looked upon as an incumbrance of the works, and unless the furnaces were near to some ravine or body of water where the slag could be conveniently dumped its disposal was often a matter of considerable expense. A great deal of slag is still allowed to go to waste, but the uses to which it is applied are now rapidly increasing from year to year. Large quantities are now being used as raw material in the manufacture of glass, bricks, paving blocks, and particularly as a source of raw material used in about one-tenth of the Portland cement produced in this country.

The slag obtained from the blast furnace is low in all the recognized fertilizing elements, and therefore has never found any application in the manufacture of fertilizers, although its use for such a purpose has been suggested. Of much more value in this connection is the slag obtained in the preparation of steel from high phosphorus pig iron. To remove the excess of phosphorus the iron is melted in converters lined with limestone, and quantities of quicklime are added to the molten metal. At a certain stage air is driven through the molten material, which leads to an accumulation in the slag of the phosphorus originally present in the metal. This slag, which floats on the molten metal, is drawn off and cooled, and when finely ground is placed on the market under the trade name of basic slag. The phosphoric acid in the slag prepared in this way varies from 11 to 23 per cent. For a long time the fertilizing value of the slag was not recognized, but it has now become one of the most popular of commercial fertilizers. In fact, on account of its freedom from acidity many prefer it to any other phosphatic material. Owing to the low phosphorus content of most American ores the basic slag produced in this country is small in amount. In other countries the slag produced for the fertilizer trade amounts to about 2,000,000 tons annually.

The third main avenue for escape of waste products in the blast furnace is through volatilization from the furnace. These losses in the form of gas, dust, and fume are receiving special attention at present. In the operation of the modern blast furnace a portion of the waste gases is utilized directly in gas engines for making a blast or for generating electric power, while the remainder is used in burning under boilers and in heating stoves for preheating the blast. Before being used for any of these purposes the gas is passed through dust collectors and a water-spraying system for the removal of the suspended dust and fume. Complete removal of this suspended material has been found, however, to be a matter of considerable difficulty. With the present installations for purifying the portion of the gases used for burning, a portion of the dust always escapes absorption and is either deposited in the stoves and boilers or is carried up the flues. The dust collected in the stoves and boilers has long been known to have some fertilizing value, but little attention was given to it until recently, when it was found that the dust collected in some plants contains sometimes upwards of 20 per cent of soluble potash. Dust of this kind is now being disposed of for use in fertilizers.

In an investigation recently made at one of the steel plants of this country it has been found that the potash in the dust collected in the stoves and boilers amounts to only about 5 per cent of the total escaping from the furnace. The greater part is lost in the washers or escapes from the flues. A little over a year ago tests also were made at the same plant with an electrostatic or hot dry process for purifying the gas. The results showed that the extent to which the gases could be purified in this way compared very favorably with that obtained in the most complete installations of the present cold wet process. In addition there was secured by the hot dry method a high percentage recovery not only of potash but also of other materials, as iron and zinc compounds, which may be carried over in the dust. The possibilities of potash recovery in the steel industry are promising, but owing to the abnormal conditions now prevailing in this industry new developments are likely to be postponed for the present.

POTASH FROM THE CEMENT INDUSTRY.

A good illustration of a case in which a valuable product is lost in an industry without it being known for a long time that a waste is actually taking place is furnished by the escape of potash from cement plants. In the manufacture of Portland cement an intimate mixture of a material like clay and limestone is ignited at a high temperature to the point of fusion. For many years it was thought that in the manufacture of cement this product was the only one produced, and that therefore no loss of any other material took place. It is now known, however, that in the burning of cement a greater or less proportion of the potash occurring in the raw materials is driven off and escapes from the kilns with the flue dust. Even after it was noticed that some loss of potash took place in this way, little importance was attached to the observation until analyses were made four or five years ago of some dust collected at the plant of the Riverside Portland Cement Co. The original object of collecting the dust at this plant was to comply with injunction proceedings instituted by the surrounding orange growers against the escape of dust from the plant. To the surprise of everyone the dust when collected was found to contain such a percentage of potash as to make its recovery a profitable procedure entirely apart from any other consideration. Since then a number of additional plants have also installed equipment for collecting the potash that escapes from the kilns, and at several other plants installations for the same purpose are now in building.

The recovery of potash at the Riverside plant now amounts to about 3 pounds per barrel of cement, or to about 60 per cent of the total potash that enters the kilns. This is now separated by leaching from the rest of the dust with which it is collected, and is placed on the market in the form of a concentrated salt containing about 80 per cent of potassium sulphate. At other plants, as the Security Cement & Lime Co., the potash is not separated from the dust, but the mixture of both is disposed of directly as collected for use in the manufacture of fertilizers.

In an investigation recently completed in the Bureau of Soils, it was shown that the potash that escapes from the different cement plants of the country varies from 0.35 to 5.34 pounds per barrel of cement, with an average of about 1.9 pounds. Taking 90,000,000 barrels as the average annual production of cement in this country, then it may be estimated that the total potash escaping from all the cement plants of the country as at present operated amounts to about 86,000 tons annually. Assuming in the light of results already obtained that it would be possible to recover in available form, say, 80 per cent of the total escaping, then the available potash that would be possible of recovery in the cement industry of this country amounts to about 70,000 tons annually.

It has been shown, moreover, that the amount of potash that escapes from cement plants may be increased by increasing the percentage occurring in the raw material or by increasing by chemical or other means the percentage of potash volatilized. If the same relative increase in the potash volatilized could be effected in all plants as has already been secured in some plants where potash is now being recovered, then the available recoverable potash in the cement plants of the country would be increased from 70,000 tons to about 100,000 tons annually. Still greater possibilities are to be expected by the use of feldspar and other potash minerals in the raw materials, and it is for reasons such as these outlined that the cement industry is looked upon as one of the principal potential sources of potash supply in this country.

FERTILIZERS FROM PLANT WASTES.

Since fertilizers are used as food for plants it will follow that plants, and particularly certain parts of plants, may serve as fertilizers for a new crop. This fact has long been recognized, and the wastes obtained in the utilization of all plant products may therefore be disposed of for fertilizer use. At one time a plant waste known as cottonseed meal, obtained in the manufacture of cottonseed oil, constituted the largest single source of nitrogenous material used in fertilizers, and the quantity still used for this purpose is in excess of 300,000 tons annually. Plant wastes of this kind, together with certain animal wastes, as dried blood, are now being used, however, more and more as feed for animals; but even in the utilization of organic wastes fertilizers will no doubt still always consume the greater number of products, for all may be used for fertilizer manufacture, but all are not suited as food for animals. A case of this kind is seen in the recovery of potash as a by-product in the manufacture of nicotine from tobacco waste. In this there is also furnished another illustration of the use as a fertilizer of a waste product recovered in the utilization of a waste.

Summing up, it may be stated that industrial wastes furnished about 40 per cent of the potash, 8 per cent of the phosphoric acid, and 85 per cent of the nitrogen used in this country in 1916.

The potash was obtained from such wastes as tobacco stems, cottonseed hulls, hardwood ashes, wool washings, blast-furnace flue dust, cement flue dust, and sugar residues; the phosphoric acid was furnished by such materials as bones, shells, fish scrap, and basic slag; and the nitrogen was obtained from wastes in the manufacture of castor, linseed, and fish oils; from animal wastes, as blood, hair, horns, hoofs, and hides; from leather and wool wastes; from coke; and from other substances too numerous to mention.

THE DESIGN OF PUBLIC ROADS.

By Charles H. Moorefield,

Senior Highway Engineer, Office of Public Roads and Rural Engineering.

MANY factors are to be considered in planning the improvement of almost any public road, let alone a system of roads for an entire community. Almost daily the Office of Public Roads and Rural Engineering is in receipt of the query "What kind of roads are cheapest and best for my community to build?" Replies necessarily must be more or less disappointing because the information in the letters of inquiry seldom is sufficient to warrant the Office in offering any very definite advice.

Road design is, in general, a local problem, the proper solution of which involves: (1) The safety, convenience, and comfort of those for whose use the road is intended; (2) the amount of funds available for the improvement; (3) the relative availability and cost of various road-building materials that might prove suitable for constructing a road of the general character desired.

In other words, the aim in planning public road improvements should be (1) to furnish the taxpayers the kind of public road accommodations they need and are able to pay for, and (2) to attain this purpose at the least possible ultimate cost to the public treasury.

In order to accomplish this the person who designs a road must be thoroughly familiar with local conditions, and must possess the judgment necessary to weigh the importance of the various factors that should be considered.

From what has been said it is evident that the most to be hoped from a general discussion of road design is a presentation of facts and suggestions that may serve in a measure to guide the judgment in adapting the design of a particular road to local conditions. Therefore, no attempt will be made to state definite and exact rules for designing roads to suit

Design and cost data for typical Federal-aid projects, proposed for the Secretary of

State and project.	Location.	Traffic importance.[1]		Design data.			
				Road materials locally available.	Width.		
		Horse.	Motor.		Right of way.	Roadway.	Surface.
					Feet.	*Feet.*	*Feet.*
Cal. 1...	Beresford to Redwood City	H.	V.H.	Stone...........	60–66	36	20
Cal. 3...	Alameda County; boundary to Richmond.	V.H.	V.H.	Eliot stone......	100–120	60–80	20
Col. 1...	Denver to Littleton........	V.H.	V.H.	Basalt gravel, sand.	60	24	16
Maine 1.	Brunswick to Gardner.....	L.	M.	....	66	21–23	16
Maine 2.	Waterville to Bangor.......	L.	M.	Gravel..........	66	21–23	16
Md. 1...	Buckeystown Turnpike...	V.H.	V.H.	Stone...........	40	24	15
Md. 2...	Bladensburg to Lanham..	V.H.	V.H.	....	40	24	16
Mass. 1..	Fairhaven to Long Plain..	V.H.	V.H.	Ledge rock and sand.	50	24	18
Mass. 3..	Newburyport Turnpike...	V.H.	V.H.	Stone and gravel	50	....	18
Mich. 2..	Saugatuck, Holland.......	V.H.	V.H.	None.............	66	24	16
Mich. 8..	South Haven, Saugatuck..	M.	M.	None.............	66	....	16
Minn. 2.	Chisago County, Twin Cities—Duluth.	L.	M.	Clay and gravel.	66	24	16
Minn. 8.	Winona County, river road	L.	L.	None.............	66	24	......
Minn 12.	St. Paul—Stillwater........	M.	V.H.	Gravel..........	66	24	16
N.H.1..	Rockingham County, La Fayette road.	H.	V.H.	Gravel..........	50–80	24	18
N.C.2..	Henderson County, Hickory Nut Gap.	L.	M.	Gravel..........	40	18	0
N.C.3..	McDowell County, Swannanoa Gap.	L.	L.	Sand and gravel.	40	18	0
N.C.5..	Catawba County, Central Highway.	L.	L.	Sand and clay...	40	....	16
Pa. 1....	Waterford, Susquehanna..	M.	L.	None............	40	26	16
Pa. 2....	Washington and Allegheny Counties, Washington Pike.	L.	M.	None............	36	26	16
Pa. 3....	Johnstown, Mundys Corner.	V.H.	V.H.	Sand............	33	26	16

[1] Daily traffic: Light (L.), 1 to 100 vehicles; moderate (M.), 101 to 200 vehicles; heavy (H.), 201 to 300 vehicles; very heavy (V. H.), over 300 vehicles.

[2] Revised estimate.

[3] Reconnaissance estimate.

[4] Bids received, low bid, $34,308.12.

improvement by various State highway departments and approved by Agriculture.

Design data—Continued.				Cost data (estimated).				
Maximum grade.		Kind of surfacing.	Length of project.	Cost per mile.				Total cost of project.
Per cent.	Length			Grading.	Bridges and culverts.	Surfacing.	Total per mile.	
	Mi.		*Miles.*					
4.6	0.02	Bituminous concrete (Topeka specifications).	4.235	$3,390.13	$1,894.68	$13,629.90	$18,914.71	[2] $80,103.79
1.70	.10	.....do................	2.55	2,325.09	2,534.74	17,420.24	22,280.07	[2] 56,814.21
3.10	.09	Concrete...............	3.95	906.25	1,992.27	12,528.07	15,426.59	[3] 60,935.04
11.0	.02	Bituminous macadam.	15.57	4,150.93	1,149.83	12,853.83	18,154.59	[2] 282,666.91
7.9	.06	Gravel................	6.98	1,937.45	1,296.25	4,381.77	7,615.47	[3] 53,156.03
2.8	.02	Concrete...............	2.01	1,262.81	257.49	15,548.42	17,068.72	[4] 34,308.12
6.0	.13	.....do................	3.32	2,724.40	1,764.53	16,927.77	21,416.70	[5] 71,103.45
4.8	.01	.....do................	2.182	3,964.17	952.84	16,843.99	21,761.00	[3] 47,483.42
.....	....	Bituminous macadam.	1.162	4,868.67	2,007.17	17,454.16	24,330.00	[6] 28,223.50
4.1	.06	.....do................	5.983	1,176.66	545.68	11,610.86	13,333.20	[2] 19,772.55
.....	....	.....do................	7.0	1,512.62	632.66	11,854.72	14,000.00	[3] 93,000.00
5.5	.04	Gravel................	32.16	933.77	386.50	2,100.13	3,420.40	[2] 110,000.00
.....	....	None at present.......	6.25	2,984.64	855.36	....	3,840.00	[7] 24,000.00
.....	....	Gravel................	5.30	1,338.68	311.32	2,595.30	4,245.30	[8] 22,506.00
5.8	.01	Modified asphalt gravel foundation.	1.2	632.50	696.67	12,288.45	13,617.62	[2] 16,341.14
6.0	.03	None..................	7.75	1,740.04	1,665.47	....	3,405.51	[3] 26,392.83
.....	....	.....do................	3.0	7,671.94	990.00	....	8,661.94	[8] 25,985.83
.....	....	Sand-clay or top soil...	8.00	892.37	286.72	440.00	1,619.09	[8] 12,952.76
8.9	.0[illegible]	Vitrified brick, concrete foundation.	2.675	2,989.10	1,518.05	21,981.69	26,488.84	[2] 70,857.65
9.2	.15	Reinforced concrete....	6.48	4,037.67	2,381.56	18,338.87	24,758.10	[2] 160,433.53
8.5	.22	Vitrified brick, concrete foundation.	6.234	2,667.53	1,941.99	29,244.04	33,853.56	[2] 211,043.28

[5] Bids received, low bid, $72,843.82.

[6] To be revised.

[7] Reconnaissance estimate. To be surfaced with gravel after heavy fills have had time to settle.

Design and cost data for typical Federal-aid projects, proposed for the Secretary of

State and project.	Location.	Traffic importance.		Design data.			
				Road materials locally available.	Width.		
		Horse.	Motor.		Right of way.	Roadway.	Surface.
					Feet.	*Feet.*	*Feet.*
R. I. 1..	Washington County, So. Kingston Post Road.	L.	V. H.	Gravel and sand.	Variable	24–28	18
Vt. 1....	Chittenden County, French Hill.	L.	M.	Gravel and stone	....	....	21
Vt. 2....	Winooski, River Road.....	M.	M.	Gravel and stone	50	....	21
Va. 1....	Russell County, Moccasin Gap.	L.	L.	Limestone and chert.	30	18	12
Va. 2....	Prince William County, Marumsco-Neapsco.	M.	H.	Gravel..........	30	22	16
Va. 3....	Hampton, Newport News.	V. H.	V. H.	None...........	30–40	....	16
Va. 4....	Danville-Martinsville.....	L.	L.	Soil............	30	....	20
Wash. 1.	Thurston County, Pacific Highway.	M.	V. H.	None...........	60	26–30	20
Wash. 2.	Navy Yard, Clifton Port..	M.	L.	Gravel..........	60	20–30	12
Wash. 3.	Stevens County, Meyers Falls–Kettle Falls.	L.	M.	Gravel..........	60–120	20–24	12
Wash. 4.	Clarke County, Pacific Highway.	L.	M.	None...........	60	28–30	14
Wash. 6.	Kamilche Section, Olympic Highway.	L.	H.	Gravel..........	60	24	14

[1] Reconnaissance estimate.

conditions. The most important features of the problem will be taken up separately and discussed with a view to showing the variations in current practice and the influence of some special conditions, with regard to each feature.

The table on pages 266 to 269 presents data relating to the design of a number of roads proposed by various States and approved by the Secretary of Agriculture for improvement as Federal-aid projects under the recent act of Congress providing for Federal cooperation in the improvement of post roads. These proposed improvements were planned by the State highway departments and approved by the Office of Public Roads and Rural Engineering. The designs were based on a thorough knowledge of local conditions, on the *improvement by various State highway departments and approved by Agriculture*—Continued.

Design data—Continued.			Length of project.	Cost data (estimated).				
Maximum grade.		Kind of surfacing.		Cost per mile.				Total cost of project.
Per cent.	Length			Grading.	Bridges and culverts.	Surfacing.	Total per mile.	
	Mi.		*Miles.*					
5.4	0.02	Bituminous concrete..	3.66	$4,601.07	$523.55	$17,624.79	$22,749.41	[1] $83,262.85
.....	....	Gravel with crushed-stone base.	.9	3,262.50	2,517.77	5,321.88	11,102.00	[1] 9,991.52
.....	....	.....do................	.66	1,705.00	500.00	7,569.00	9,774.00	[1] 6,450.9
7.0	.05	Chert gravel, water-bound macadam.	4.38	1,507.60	1,014.68	3,971.15	6,493.43	[2] 28,441.23
6.0	.16	Gravel................	3.56	4,400.00	1,647.59	4,574.58	10,622.17	[2] 37,814.92
.....	....	Concrete..............	3.45	956.52	85.92	13,450.56	14,493.00	[1] 50,000.00
.....	....	Top soil..............	8.03	964.38	371.56	1,316.52	2,652.46	[1] 21,300.00
5.0	.13	Concrete..............	3.50	1,923.63	170.30	15,543.34	17,637.27	[2] 61,730.45
.....	....	Gravel................	9.92	4,863.73	1,824.09	1,582.13	8,269.95	[1] 82,037.89
.....	....	.....do................	5.98	3,552.77	1,184.89	1,951.30	6,688.96	[1] 40,000.00
.....	....	Gravel or macadam....	3.62	11,798.56	3,040.45	5,117.40	19,956.41	[1] 72,242.28
.....	....	Gravel................	3.41	6,098.38	4,775.52	2,845.13	13,719.03	[1] 46,781.90

[2] Revised estimate.

part of the State highway departments, and while in many cases the limited amount of funds available for a particular project has made it inexpedient to plan the improvement for that project with the sole view of securing greatest ultimate economy, it is believed that the improvements as planned will in all cases prove at least fairly satisfactory, and will undoubtedly justify expenditures equal to the estimated costs.

Figures 4, 5, and 6 are typical cross sections, illustrating the design of the various types of roads for which data are given in the table, though none of the cross sections is an exact reproduction of that used on any project. The cross sections are intended to cover a wider range of practice than that covered by the table, and the following remarks regarding various features of the design are intended to aid in applying the information furnished by both the table and the cross sections.

DRAINAGE.

Every person living in a humid climate is familiar with the action of water in converting clay into mud and in causing all kinds of soils, except sand, to give way when a load is applied. But in spite of this widespread knowledge inadequate drainage probably is responsible for more road failures than any other cause.

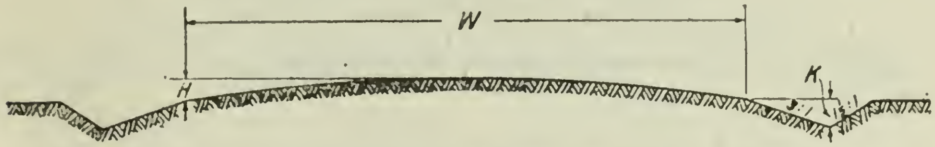
The subject of road drainage is too broad to be discussed adequately in an article of this kind, but the Office of Public Roads and Rural Engineering has issued several bulletins dealing with this subject. Copies of these may be secured by purchase from the superintendent of documents, Government Printing Office, Washington, D. C., or in cases where the department's supply has not been exhausted copies may be secured free by addressing the Division of Publications of the department.

SELECTION OF SURFACE TYPE.

There are some seven or eight well-recognized types of road surface, each of which is well adapted to certain sets of conditions. Most of these types are illustrated roughly by means of the cross sections shown in figures 4, 5, and 6. Before discussing the question of how to select the proper type of surface for a particular road it seems desirable to point out at least some of the limitations to which the different types are subject. For complete discussions of the various types the reader is referred to other publications of the department that have been prepared from time to time by the Office of Public Roads and Rural Engineering.

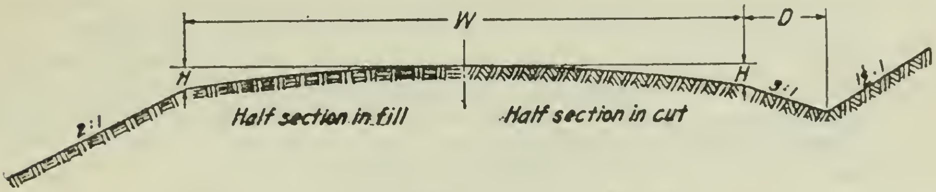
The cross sections indicate, in a general way, the range of dimensions in good design practice, with each type of surface. There are many special circumstances, however, that may make it desirable to modify the cross sections entirely outside of the limits shown. In the peninsular section of Florida, for example, many brick roads are being constructed with no other foundation than the natural sandy soil of the roadbed, and, under such favorable climatic conditions, they may prove satisfactory for many years. The so-called monolithic type of brick pavement is another modification which is being used satisfactorily in some localities. In constructing this latter type the sand bedding is omitted entirely and the bricks are laid directly upon the green-concrete foundation.

The typical design for concrete roads is sometimes modified by the introduction of steel reinforcement, which is



CROSS SECTION OF EARTH ROAD COMPLETED WITH GRADING MACHINE.

W should be not less than 20 feet. *K* usually varies from 12 inches to 18 inches and depends on wid h of road and amount of water to be carried; *H*, crown, varies from one-half inch to the foot for level grades to 1 inch to the foot for grades of 5 per cent or over.



TYPICAL CROSS SECTION OF EARTH ROAD.

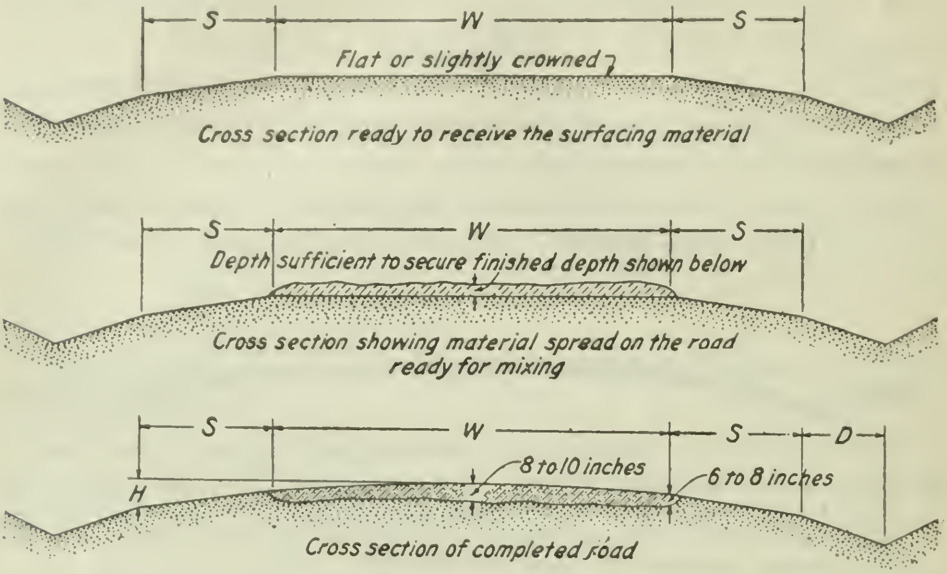
W should be not less than 20 feet. *D* varies from 2 feet to 6 feet, depending on rainfall and grade; *H*, crown, varies from one-half inch to the foot for level grades to 1 inch to the foot for grades of 5 per cent and over.

FIG. 4.

intended to prevent objectionable cracks from forming in the pavement. Also, where first-class concrete materials are scarce the pavement may be constructed in two courses, so that an inferior grade of aggregate may be used in the lower part of the concrete.

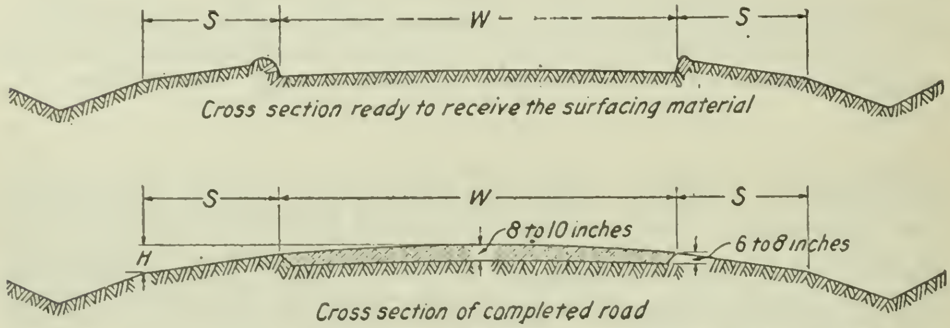
Bituminous roads may be constructed either by the mixing or penetration method. When the mixing method is followed the surface is called bituminous concrete, and when the penetration method is followed the surface is called bituminous macadam. A variety of bituminous materials are used in connection with either method. For these reasons neither the method nor the bituminous material is indicated on the typical cross-section drawing.

The method of constructing water-bound macadam roads does not vary over a very wide range in good practice, but the quality of the stone used may affect the efficiency of such



A. Typical Cross Sections Showing Method of Constructing a Sand-Clay Road by Mixing Sand or Clay with the Roadbed Material.

W should be at least 12 feet for single-track road and *S* generally not less than 5 feet. For double track *W* should be not less than 14 feet and *S* not less than 3 feet; *H*, crown, varies from 1 inch to the foot for level grade to 1 inch to the foot for a grade 5 per cent or over; *D* varies from 2 feet to 6 feet, depending on rainfall and grade.



B. Typical Cross Sections Showing Method of Constructing a Sand-Clay Road, Using Topsoil or Other Natural Mixture.

W should be at least 10 feet for single-track road and *S* generally not less than 5 feet. For double track *W* should be not less than 14 feet and *S* not less than 3 feet; *H*, crown, varies from one-half inch to the foot for level grade to 1 inch to the foot for a grade of 5 per cent or over.

Fig. 5.

roads to a considerable extent. Water-bound macadam, after being opened to traffic, frequently receives a surface treatment of bituminous material and stone chips or pea gravel.

Surface treatments of this kind generally are classed as maintenance work, because their purpose is to allay dust and

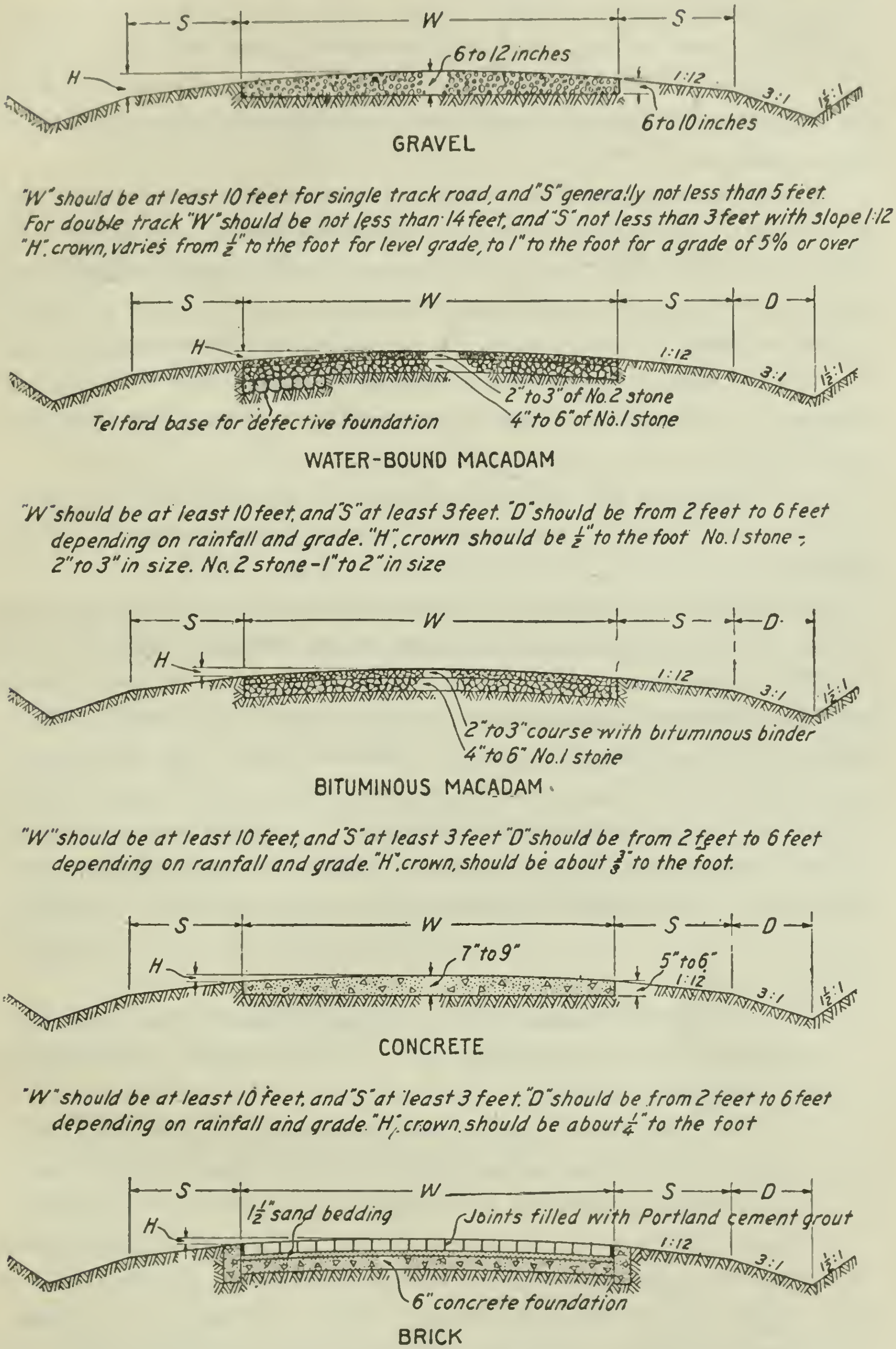


Fig. 6.—Typical cross sections.

at the same time permit the substitution of continuous maintenance for periodic renewals. But surface treatments really change the nature of the surface and adapt it to a class of traffic different from that for which plain water-bound macadam is adapted.

Gravel, sand-clay, and earth roads must all frequently be modified from the typical designs shown, so as to adapt the construction to the materials available or the conditions encountered.

In order to select the type of surface best adapted to the needs of a particular road it is necessary to consider (1) the class of traffic to which the road will be subjected, and (2) to compare the estimated ultimate costs of the different surface types which would be capable of withstanding that particular class of traffic in a manner satisfactory to the community. A practical way to proceed in making the selection would be:

(1) Estimate the traffic importance of the road in question, as indicated in connection with table of design and cost data.

(2) Eliminate from consideration all surface types, except those which experience has shown to be well adapted for the traffic in question. To do this requires, of course, a study of the efficiency records of existing improved roads which fall in the same traffic class. Unfortunately, the number of roads for which accurate traffic and efficiency records have been kept is not sufficient to warrant very definite conclusions to be drawn, covering all classes of traffic and types of construction. The following summary supplies about as definite information on this point as can be drawn from available records:

> (*a*) Earth roads, when properly maintained, are satisfactory in dry weather for a light volume of all kinds of highway traffic.
>
> (*b*) Sand-clay roads are the same as earth roads, except that the surfacing material has been selected carefully with a view to increasing the stability of the surface in both wet and dry weather. They are satisfactory for a moderate traffic of horse-drawn vehicles and a light traffic of automobiles. They seldom are satisfactory for even a light traffic of heavy trucks unless the roadbed material is very stable.

(*c*) Gravel roads, when well built, are satisfactory for a heavy traffic of horse-drawn vehicles, a light traffic of automobiles, and a light traffic of heavy trucks.

(*d*) Water-bound macadam roads are adapted to the same general character of traffic as gravel roads.

(*e*) Surface-treated macadam roads are adapted especially for a heavy traffic of automobiles. They also are satisfactory for a light traffic of horse-drawn vehicles and heavy trucks. In all cases they require constant maintenance.

(*f*) Bituminous roads are suitable for a heavy traffic of both automobiles and horse-drawn vehicles and a moderate traffic of heavy trucks.

(*g*) Concrete roads are adapted to the same general class of traffic as bituminous roads, and generally are capable of withstanding the traffic of somewhat heavier vehicles without injury.

(*h*) Brick roads are adapted to the same general class of traffic as concrete roads. Either brick or concrete roads, however, may be economical for only moderate traffic where other road-building materials are scarce.

(3) The final step in selecting the surface type is to pick out, from the two or three types adapted to the kind of traffic involved, the particular type which, in the long run, will prove cheapest. This problem usually must be solved separately for each read, because the factors which enter into its solution are nearly always different for different roads.

The principal factors to be considered in estimating the ultimate cost of a road are cost of construction and cost of continuous maintenance. The incidental cost to the users of a road on account of deflecting traffic for periodic repairs also may be a factor in determining the relative efficiency of a particular type of road surface, but since it is practically impossible to estimate this cost, it can be considered only in a very general way.

The cost of construction depends principally on the availability of materials and the cost and efficiency of labor. The cost of continuous maintenance depends on the same considerations with the additional elements of traffic, climate, and soil conditions to be considered. The human element which determines the kind of organization under which work is done may also have an important bearing on the cost of both construction and maintenance.

The table on this page illustrates how the efficiency of different types of surfaces may be compared after the construction, reconstruction, and maintenance costs have been estimated for a period covering the life of the most durable type considered. In the hypothetical case for which this table was prepared, it was assumed that any one of three surface types (I, II, and III) would satisfy the traffic, and the whole problem was to choose the most economical of the three types.

Method of making economic comparison of road surfaces.

Item.	Type of surface.		
	I	II	III
Estimated life of surface with proper maintenance (years)	8	10	15
Original construction cost per mile	$6,000	$10,000	$16,000
Cost of necessary reconstruction during a period of 15 years	3,000	5,000	....
Estimated cost of maintaining surface per mile:			
Average annual	400	200	50
Total at end of 15 years	6,000	3,000	750
Five per cent interest on all estimated expenditures for construction, reconstruction, and maintenance to end of 15-year period, per mile:			
Original construction	4,500	7,500	12,000
Reconstruction	1,050	1,250	....
Maintenance	2,400	1,200	300
Total	7,950	9,950	12,300
Total cost per mile at end of 15-year period	22,950	27,950	29,050
Value of road surface per mile at end of 15-year period	3,400	7,500	....
Net outlay per mile of road	19,500	20,450	29,050

For the hypothetical case illustrated, the choice of surface evidently lies between Types I and II. The net outlay at the end of the 15-year period is slightly in favor of type I, but the difference is so slight that the question of which estimate contains the fewer uncertainties probably should prove the deciding factor. In this case, Type III, notwithstanding its relatively long life and low maintenance cost, could not be economically considered.

On account of the uncertainties that always enter into estimates of construction and maintenance costs, it might be argued that any attempt at scientific comparisons of this kind is worthless. But the same uncertainties still would be present if the decision were made a matter of "lump-sum" judgment, and there always is a greater chance for accuracy, even in a rough guess, where each of the factors which should influence the judgment is guessed at separately. If it were desired to compare the areas of two fields, for example, the first step would be to measure or estimate the linear dimensions of each. If the difference in area were small, and the dimensions were guessed at, there is a possibility, of course, that the smaller field might be mistaken for the larger, but the probability of such erroneous judgment would be much less than if the areas were guessed at without reference to the dimensions.

The matter of how to estimate the cost of constructing and maintaining the various types of road surfaces does not fall properly within the scope of this paper, and, accordingly, will not be discussed. The estimating of costs is treated to some extent in bulletins of the Office of Public Roads and Rural Engineering and to a much greater extent in textbooks and the engineering press. However, the design controls the cost, and each feature of the design therefore should be given very careful consideration in the preparation of comparative estimates of cost.

WIDTHS.

The widths of the roads for which design data are shown in the table of design and cost data vary over a wide range and appear to be practically independent of the traffic importance of the roads. This lack of relation between width and traffic importance is general, and results in large part from the necessity for designing improvements to fit cases where both the cost and length of road to be improved are definitely limited at the start.

Highway engineers are fairly well agreed that for ultimate economy the surfaced portion of a road should be at least sufficiently wide to allow traffic to distribute itself over the entire surface and thus prevent the concentration of wear in two narrow tracks. The minimum width that will enable a fair distribution of traffic over the surface is about 12 feet, but a width of 12 feet falls just short of providing space for two vehicles to pass each other safely, and seldom is employed. A surface width of 14 feet is sufficient for horse-drawn vehicles to pass each other conveniently, and 16 feet is sufficient for automobiles, though 18 feet is greatly preferable, especially where the traffic is mixed. The 18-foot surface is being used to a considerable extent in many of the wealthier communities, and for moderately heavy traffic is proving economical as well as convenient.

Figure 7 is a cross section of the road between Washington D. C., and Baltimore, Md., and illustrates a design which, in some cases, has proved very economical. Here, a very durable surface has been constructed along the central por-

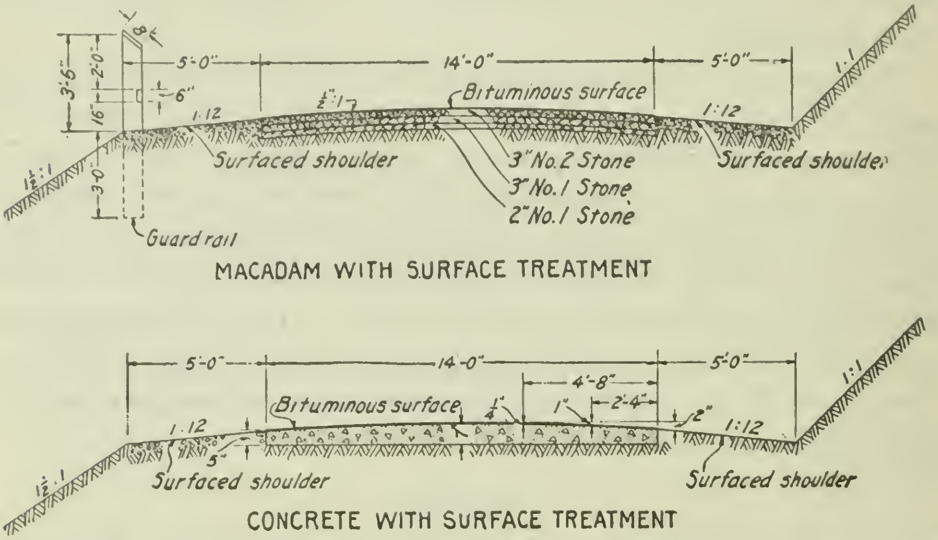


FIG. 7—Typical cross sections, Washington-Baltimore road.

tion of the road to a width of 14 feet, and a less durable surface of gravel or crushed stone has been constructed along each side as shoulders, adjoining the central surface. The central width of 14 feet carries most of the traffic over this road, but the shoulders are maintained in good condition, and the whole surface, taken together, forms a much more commodious roadway than would a 16 or 18 foot central surface with unsurfaced shoulders. On less heavily traveled roads a similar design sometimes is employed, using a 9 or 10 foot width of central surface with shoulders of firm earth, gravel, or stone. For a design of this kind to prove satisfactory, however, continuous and efficient maintenance of the shoulders is absolutely essential. If the shoulders are not maintained true to cross section, and firm, the danger of accidents to automobile traffic is very great. In fact, the danger may be greater than with a single-track road surface, 9 or 10 feet wide, having shoulders of sand or other unstable material, because in the latter case drivers soon learn to take necessary precautions when leaving the surfaced portion of the road in order to pass another vehicle. They also learn to exercise care in selecting the point at which a passing is made.

No matter what the surfaced width of a road may be, the total width of roadway always should be sufficient to provide a reasonable margin of safety when vehicles are passing each other, with some allowance for unexpected maneuvers on the part of frightened animals or inexperienced drivers. A total width of about 20 feet is the minimum that will provide reasonable security and is the minimum that should be employed under any circumstances. Another consideration that frequently serves to fix the total width is that moderately wide shoulders can be maintained much more readily than narrow ones. On embankments it is customary to make the shoulders at least 4 feet wide and in cuts at least 3 feet. This means that where the surfaced width of a road is to be 16 feet, its total width should be not less than 24 feet on embankments and 22 feet in cuts.

The width of right of way necessary for a road varies with the topography as well as with the width of roadway. Where the topography is flat, or gently rolling, a 50-foot right of way is sufficient for a 20-foot road, while for very rolling or hilly country a 60-foot right of way may be required for a 20-foot road. For roadways wider than 20 feet the width of right of way should, in general, be increased by an amount equal to the additional width of roadway. In other words, the right of way should generally be from 30 to 40 feet wider than the roadway.

GRADES.

The question of maximum allowable grades is a very important consideration in designing a road. In deciding this question there are several important factors to consider:

(1) The main roads should, in general, have easier grades than the feeder roads, so that any load that may be hauled

on to a main road can be hauled over it without increasing the motive power.

(2) The better a road surface, the easier should be the grades, otherwise the full benefit of the improved surface will not be secured on comparatively level stretches of the road. For example, on a level grade a horse can pull about twice as much over a gravel-road surface as over a surface of ordinary earth, but on a 5 per cent grade the increased motive power required for the same loads would be only about 100 per cent for earth as against more than 150 per cent for gravel. In the case of motor vehicles this increase in motive power can be effected within limits by shifting the gears and where motor vehicles will constitute most of the traffic the matter of grades is not so important.

(3) According to the best current practice, the maximum grade for roads that are of sufficient importance to warrant a highly improved surface is determined in great measure by the topography of the region traversed. The following tabulation shows the usual range for various conditions of topography:

	Per cent.
Coastal plain and prairie regions	2 to 3
Average rolling country	4 to 6
Hilly or mountainous regions	6 to 8

The question of minimum grade is of importance only as regards the side ditches. These always should have sufficient fall to drain off the water they collect without allowing the roadbed to become saturated. Ordinarily, it is desirable to give the side ditches a fall of not less than about 1 foot per 100 feet of length, but for comparatively short distances, and for deep ditches, a somewhat less fall may prove adequate.

SLOPES.

The proper slope for the sides of cuts and embankments is an important detail in the design of a road, and is influenced by both the character of the soil and the climate. In cuts a good quality of nonslaking clay will stand on a slope of about 45 degrees or, as slopes are expressed, 1 horizontal to 1 vertical, where fairly deep freezing occurs; and in some of the Southern States such material has been known to stand for many years on a slope of less than ½ to 1. On the other hand, clay that slakes very easily may require a slope of as much as 3 or 4 to 1 in order to prevent erosion, even where climatic conditions are favorable. The usual slope for clay is, in warm climates, 1 to 1 for cuts and 1½ to 1 for embankments, and in cold climates, 1½ to 1 for cuts and 2 to 1 for embankments.

Sand of average quality requires a slope of about 2 to 1 in cuts and 3 to 1 in embankments, regardless of the climate. Moderately coarse sand mixed with gravel will stand on a steeper slope than fine sand, because the former is not moved so readily by storm water.

Rock cuts, as a rule, are not dressed down to even an approximately smooth surface. In excavating solid rock only such material is moved as is necessary to secure the desired width of roadway, the faces being cleared, of course, of all material which is loose, or which might become loosened by frost and slide down upon the road. Stone embankments will stand on a slope of about 1 to 1.

In order to prevent defacement of earth slopes by erosion, after the road is complete, it is well to include in the design some provision for grass or vine protection. In cold climates a growth of honeysuckle makes a good protection, and may be secured by planting honeysuckle slips either late in the fall or early in the spring. The slips are obtained from existing vines and are planted about 18 inches apart in each direction. In warm climates Bermuda grass makes an excellent sod for the protection of slopes and is cultivated easily. Tufts of the grass are planted about 12 inches apart in each direction.

On concluding this discussion of road design it is desired to emphasize the all-important fact that well-balanced and experienced judgment is a much more valuable asset in planning public road improvements than any amount of theoretical knowledge. No knowledge gained from books alone can give a complete grasp of the relations existing between a public road and the community it serves. Theory is simply the sign post that points the way, while judgment is the vehicle on which the journey is dependent.

CONSERVATION OF FERTILIZER MATERIALS FROM MINOR SOURCES.

By C. C. Fletcher,
Scientist, Investigation of Fertilizer Resources, Bureau of Soils.

IN view of the present scarcity of fertilizers, it becomes advisable to use as soil amendments many substances that might not ordinarily be employed. The large general farmer has to rely principally upon stable manure, commercial fertilizers, and green manure crops, but the small farmer or suburbanite often can use to advantage a great variety of waste substances valuable as fertilizers, but obtainable in such small quantities as to make it unprofitable to handle them on a commercial scale. In butchering hogs on the farm the blood, entrails, etc., are usually wasted. These are all valuable fertilizers. Practically all kitchen waste should be fed to animals if possible; but if no chickens or pigs are kept it should be used in composts as fertilizer. Dry leaves, weeds, sweepings from the house and barn, coffee grounds, banana peelings, soot, wood ashes, etc., all have fertilizer value. These and many other materials should be saved and either applied direct to the soil or composted with manure before using.

MAKING COMPOSTS.

It is possible to make composts in various ways, but the most common way is to alternate layers of stable manure with waste and absorbent materials, such as dried leaves, peat, muck, sods, etc. The pile is kept moist and turned several times thoroughly to mix the compost. The outside of the pile may be kept covered with soil. Where possible, at least half of the material used should be manure, but if this much can not be obtained a small amount should be used, in any event, to inoculate the heap with the bacteria of decomposition.

Another method of composting, practicable where hogs are available, is to keep the animals in a tight pen, the floor of which is covered with a layer of muck, straw, or leaves. Absorbent material is added as needed, and the residues of foods, together with the manure, are thoroughly mixed and tramped by the pigs. If care is used, this practice will yield a large amount of valuable compost. Especially good results may be obtained by feeding thus during the summer, as then weeds and cull vegetables from the garden may be used as feed during the entire garden season. A single pig, bought in the spring, may prove a profitable investment as a source of manure for the home garden. The author has obtained from a compost of this sort results practically equal to well-rotted manure.

COAL ASHES AND SPOILED FEEDS.

Coal ashes have little value as a fertilizer, but when mixed with heavy clay soils they make the latter more productive by the loosening of the soil and the consequent improvement of moisture and tillage conditions. Often wood is used in starting coal fires, and as wood ashes contain from 5 to 10 per cent of potash this admixture tends to add to the value of the coal ashes. Soot is especially valuable for its content of nitrogen, averaging 3 per cent. It should be carefully saved.

Almost all commercial feeding stuffs are good fertilizers. They are usually worth more as feeds than as fertilizers, but often they become moldy or otherwise unfit for food, and, in such event, instead of being destroyed, they should be saved and applied to the soil. The feeds rich in nitrogen are especially valuable, such as cottonseed meal, bran, and beef scrap.

ANALYSES OF VARIOUS MATERIALS.

The majority of materials of which analyses are given below are not of sufficient value to justify purchase for use as fertilizers, but they are of sufficient value to warrant composting or similar treatment on individual farms where they may happen to be available at little or no cost.

The following table, compiled mainly from standard textbooks, experiment station reports, and analyses made in the laboratory of the Bureau of Soils, giving percentages of nitrogen, phosphoric acid, and potash, will show the relative values of many substances that may sometimes be used to advantage as fertilizer materials. For comparison, there are shown at the head of the list some of the more common fertilizer materials.

Fertilizer value of various materials expressed in percentages of nitrogen, phosphoric acid, and potash content.[1]

COMMON MATERIALS.

Fertilizer.	Nitrogen.	Phosphoric acid.	Potash.
	Per cent.	*Per cent.*	*Per cent.*
Calcium cyanamid	19.0 to 22.0		
Ammonium sulphate	19.0 to 20.5		
Nitrate of soda	15.5 to 16.0		
Ground bone (raw)	2.5 to 4.5	20.0 to 25.0	
Dried blood	10.0 to 14.0	1.0 to 5.0	
Tankage	11.0 to 12.5	1.0 to 2.0	
Acid phosphate		12.0 to 16.0	
Basic slag		17.0 to 18.0	
Raw ground phosphate rock		26.0 to 35.0	
Potassium sulphate			48.0 to 52.0
Potassium muriate			48.0 to 52.0
Kainit			12.0 to 12.5
Dried sheep manure	1.51 to 3.09	.95 to 2.50	.33 to 2.24

OTHER MATERIALS.

Fertilizer.	Nitrogen.	Phosphoric acid.	Potash.
Alfalfa hay	2.45	0.50	2.10
Apple skins (ash)		3.08	11.74
Ash from Cana tree			15.65
Banana skins (ash)		3.25	41.76
Banana stalk (ash)		2.34	49.40
Barley, grain	1.75	.75	.50
Bat guano	1 to 12	2.5 to 16	
Beet roots	.25	.10	.50
Brewer's grains, wet	.90	.50	.05
Brigham tea (ash)			5.94
Ground bone, burned		34.70	
By-product from silk mills	8.37	1.14	.12
Cantaloupe rinds (ash)		9.77	12.21
Castor-bean pomace	5 to 6	2 to 2.5	1 to 1.25
Cattail reed and stems of water lily	2.02	.81	3.43
Cattail seed	.98	.39	1.71
Coal ash, anthracite		.1 to .15	.1 to .15
Coal ash, bituminous		.4 to .5	.4 to .5
Cocoa-shell dust	1.04	1.49	2.71
Coffee grounds	2.08	.32	.28
Coffee grounds, dried	1.99	.36	.67

[1] Where different analyses of the same substances are given, they are slightly different products or are taken from different sources.

Fertilizer value of various materials expressed in percentages of nitrogen, phosphoric acid, and potash content—Continued.

OTHER MATERIALS—Continued.

Fertilizer.	Nitrogen.	Phosphoric acid.	Potash.
	Per cent.	*Per cent.*	*Per cent.*
Corncobs, ground, charred			2.01
Corncob ash			50.00
Common crab	1.95	3.60	.20
Corn, grain	1.65	.65	.40
Corn, green forage	.30	.13	.33
Cottonseed	3.15	1.25	1.15
Cottonseed-hull ashes		7 to 10	15 to 30
Cottonseed-hull ash		8.70	23.93
Cotton waste from factory	1.32	.45	.36
Cowpeas, green forage	.45	.12	.45
Cowpeas, seed	3.10	1.00	1.20
Cucumber skins (ash)		11.28	27.20
Dried mussel mud	.72	.35	
Eggs	2.25	.40	.15
Eggshells, burned		.43	.29
Feathers	15.30		
Field bean, seed	4.00	1.20	1.30
Field bean, shells	1.70	.30	.35
Firepit ashes from smokehouses			4.96
Fish scrap, red snapper and grouper	7.76	13.00	.38
Fish scrap, fresh	2 to 7.5	1.5 to 6	
Fresh-water mud	1.37	.26	.22
Garbage rubbish (New York City)	3.4 to 3.7	.1 to 1.47	2.25 to 4.25
Garbage tankage	1 to 2	.5 to 1	.5 to 1
Greasewood ashes			12.61
Garden beans, beans and pods	.25	.08	.30
Gluten feed	4 to 5		
Greensand		1 to 2	5.00
Grape refuse from wine factory	.75	.20	.40
Grapes, fruit	.15	.07	.30
Grapefruit skins (ash)		3.58	30.60
Hair	11.96		
Do	14 to 16		
Harbor mud	.99	.77	.05
Hoof meal and horn dust	10 to 15	1.5 to 2	
Kentucky bluegrass, hay	1.20	.40	1.55
King crab (dried and ground)	10.00	.26	.06
King crab (fresh)	2 to 2.5		
Lamb's quarters	.97	.24	
Leather, acidulated	7 to 8		
Leather, ground	10 to 12		
Leather, scrap	6.88		
Leather, scrap (ash)		2.16	.35
Lemon culls, California	.15	.06	.26
Lemon skins (ash)		6.30	31.00
Limekiln ash		.75	2.00
Do		.5 to 1	.1 to 1.50

Fertilizer value of various materials expressed in percentages of nitrogen, phosphoric acid, and potash content—Continued.

OTHER MATERIALS—Continued.

Fertilizer.	Nitrogen.	Phosphoric acid.	Potash.
	Per cent.	*Per cent.*	*Per cent.*
Lobster refuse	4.50	3.50	
Lobster shells	4.60	3.52	
Milk	.50	.30	0.18
Mussels	.90	.12	.13
Molasses residue in manufacturing of alcohol	.70		5.32
Oak leaves	.80	.35	.15
Oats, grain	2.00	.80	.60
Olive pomace	1.15	.78	1.26
Olive refuse	1.22	.18	.32
Orange culls	.20	.13	.21
Orange skins (ash)		2.90	27.00
Pea pods (ash)		1.79	9.00
Peanuts, seeds, or kernels	3.60	.70	.45
Peanut shells	.80	.15	.50
Peanut-shell ash		1.23	6.45
Picker dirt from cotton mill	1.37	.68	1.56
Pigweed, rough	.60	.16	
Potatoes, tubers	.35	.15	.50
Potatoes, leaves and stalks	.60	.15	.45
Potato skins, boiled sweet (ash)		3.29	13.89
Potato skins, raw white (ash)		5.18	27.50
Poudrette	1.46	3.68	.48
Powder-works waste	2 to 3		16 to 18
Prune refuse	.18	.07	.31
Pumpkins, flesh	.16	.07	.26
Pumpkin seeds	.87	.50	.45
Rabbit-brush ashes			13.04
Ragweed, great	.76	.26	
Red clover, hay	2.10	.50	2.00
Red-top, hay	1.20	.35	1.00
Residuum from raw sugar	1.14	8.33	
Rockweed	1.90	.25	3.68
Roses, flowers	.30	.10	.40
Rhubarb, stems	.10	.04	.35
Rock and mussel deposit from sea	.22	.09	1.78
Sagebrush (ashes)			4.10
Do			5.42
Salt-marsh hay	1.10	.25	.75
Salt mud	.40		
Saltpeter waste	.52 to 3.3		5.6 to 13.7
Sardine scrap	7.97	7.11	
Seaweed (Atlantic City, N. J.)	1.68	.75	4.93
Shoddy and felt	4 to 12		
Shoddy dirt from woolen mill	4.40	.20	.68
Shrimp heads (dried)	7.82	4.20	
Shrimp waste	2.87	9.95	
Siftings from oyster-shell mound	.36	10.38	.09

Fertilizer value of various materials expressed in percentages of nitrogen, phosphoric acid, and potash content—Continued.

OTHER MATERIALS—Continued.

Fertilizer.	Nitrogen.	Phosphoric acid.	Potash.
	Per cent.	*Per cent.*	*Per cent.*
Silkworm cocoons	9.42	1.82	1.08
Soot from chimney flues		1.05	.35
Spanish moss	.60	.10	.55
Spent wash of distilleries (beet sugar, molasses, and sucrate liquors)	1.40		
Starfish	1.80	.20	.25
String-bean strings and stems (ash)		4.99	18.03
Sunflower seed	2.25	1.25	.79
Sweet potatoes	.25	.10	.50
Tan-bark ash		.24	.38
Tan-bark ash, spent		1.5 to 2	1.5 to 2.5
Tea grounds	4.15	.62	.40
Tea-leaf ash		1.60	.44
Timothy hay	1.25	.55	1.00
Tobacco leaves	4.00	.50	6.00
Tobacco stalks	3.70	.65	4.50
Tobacco stems	2.50	.90	7.00
Tomatoes, fruit	.20	.07	.35
Tomatoes, leaves	.35	.10	.40
Tomatoes, stalks	.35	.10	.50
Wastes from hares and rabbits	7.00	1.7 to 3.1	.60
Waste from felt-hat factory	13.80		.98
Waste product from paint manufacture	.028	39.50	
Waste gunpowder (sweepings from powder mill)	10.28		34.50
Waste silk	8 to 11		
Wheat, bran	2.65	2.90	1.60
Wheat, grain	2.00	.85	.50
Wheat, straw	.50	.15	.60
White sage (ashes)			13.77
Wood ashes, leached		1 to 1.5	1 to 3
Wood ashes, unleached		1 to 2	4 to 10
Wool waste	5.0 to 6.0	2 to 4	1 to 3

THE PEANUT, A GREAT AMERICAN FOOD.

By H. S. BAILEY, *Chemist in Charge, Oil, Fat, and Wax Laboratory*, and J. A. LE CLERC, *Chemist in Charge, Plant Chemical Laboratory, Bureau of Chemistry.*

AT THIS time, when conservation of all our foodstuffs is necessary, special attention should be given to the peanut, one of America's best and cheapest foods. Not only can it be used in the place of wheat, thus saving a large amount of this cereal for the allies, but, being rich in protein and in fat, it may also serve as a meat substitute. The peanut is one of the most nutritious foods known to man, and possesses a very wide range of food possibilities. In one form or another it is almost universally eaten and enjoyed in this country, and it promises eventually to occupy an important place in the average well-balanced ration, as it now does in the dietary of a great many persons. Indeed the demand for this legume for human food purposes is increasing by leaps and bounds.

A pound of whole peanuts, as used in confections, peanut butter, etc., contains nearly one-half pound of fat and one-fourth pound of protein, both the oil, or fat, and the protein being of a very high grade and readily digestible. One pound of peanuts furnishes about 2,700 calories, while 1 pound of beefsteak yields less than one-third as much, and 1 pound of eggs less than one-fifth that amount. If the peanuts are pressed and the flour and oil utilized separately, a delicious wheat substitute is obtained, in one case, and a sweet, wholesome table and cooking oil, in the other. Peanut meal rivals almond meal in popular favor. Both the peanut itself and the meal or flour are cheap sources of energy and protein, and lend themselves well to all sorts of culinary purposes. It should be understood that the peanut is a food, not a condiment, and therefore can be used to replace flour, meat, or fat. The oil extracted from the peanut is already one of the most important of the world's food oils.

THE PEANUT CROP.

Like the pea and bean, the peanut is a legume, but differs from other legumes in that its fruit or seed matures beneath the surface of the soil, whence its name *Arachis hypogea*, which means growing below ground. Other names commonly applied to the peanut are ground nut, earthnut, ground pea, pindar, goober, goober pea. Probably a native of tropical America, it was introduced into the United States during the early colonial days. Only within the last half century, however, has the peanut assumed any commercial importance. Great strides have been made in its culture and consumption within the last decade, and in 1916 the South, which raises about 99 per cent of all the peanuts grown in this country, devoted over 1,000,000 acres to the culture of this plant, the yield being 34,600,000 bushels. So popular is this nut becoming that the number of acres planted to peanuts in the United States alone, in 1917, was estimated at over 2,000,000. The peanut is grown commercially not only in this country, but also in Central and South America, Algiers, Mozambique, India, West Africa, and China. In Marseille, the center of the European oil industry, in 1912, over 120,000 tons of peanuts in the shell and about 240,000 tons of shelled peanuts were crushed, yielding over 15,500,000 gallons of edible oil. It is estimated that 26,000,000 pounds of oil were produced in 1916 in the United States.

The average yield per acre in the United States is about 34 bushels of peanuts in the shell. A good yield is 60 bushels, with 1 to 1½ tons of hay. Yields of 160 bushels, with 2 tons of hay, per acre are on record. The estimated crop for 1917, in the United States, is approximately 60,000,000 bushels of peanuts in the shell, which would yield 20,000,000 bushels of shelled nuts. In practice, a mill can produce 1 gallon of oil from 1 bushel of peanuts in the shell. One acre of land that will produce 20 bushels of wheat, 40 bushels of oats, or 40 bushels of peanuts will yield 154 pounds of digestible protein in the form of wheat, 149 pounds in the form of oats, or 186 in the form of peanuts. It will yield 24 pounds of fat in the wheat, 61 in the oats, or 300 in the peanut. As fat and protein are the most valuable and expensive foods, it is apparent that the peanut should form one of the country's most important food crops.

TYPES OF PEANUTS GROWN.

Two different types of the peanut are grown in the United States—the Virginia, or Jumbo, type, which includes such well-known varieties as Virginia Bunch, Virginia Runner, North Carolina or Wilmington (African), and the Spanish type, which includes the true Spanish, the Georgia Red, Valencia, and Tennessee Red. The Spanish type is peculiarly adapted to the production of oil, while the best grades of the Spanish and the cheaper grades of the Virginia are commonly employed for the manufacture of peanut butter. The Spanish type contains from 55 to 80 per cent of kernel, with an average of about 70, while the Virginia type contains somewhat less, from 50 to 75, with an average of 65 per cent. To a large extent this variation is due to the difference in the soil and climate prevailing in the various localities where peanuts are grown. The results of many analyses of the two types of peanuts give the following as the average composition of the kernel:

Average composition of the peanut kernel.

Type.	Water.	Ash.	Fat.	Protein (N×6.25).	Fiber.	Carbohydrates.	Calories per pound.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	
Spanish	4.2	2.6	50.0	26.0	2.1	15.1	2,870
Virginia	4.2	2.7	43.7	29.0	2.8	17.6	2,709
Shell [1]	5.0–5.8	3.3–6.8	0.10–0.5	5.1–8.2	66.7–78.3		
Skin [1]	9.6	7.7	14.2	15.5	23.4		

[1] The shell and red skin have a certain food value, as shown by these analyses. The oil content of the shell may, however, fall as low as 0.1 per cent.

USES OF THE PEANUT.

The roasted peanut, the most popular of the different peanut foods, may be obtained at stores and of street vendors everywhere. It is easily eaten and forms a most important article of diet, being especially well adapted as a sort of emergency ration.

There is no definite rule as to the time of roasting. The usual practice in the case of peanuts in the shell is to maintain a temperature of from 400° to 450° F. for about 30 to 35 minutes, depending somewhat on the condition of the peanuts. Most peanut roasters merely gauge this by sampling them from time to time. When the shelled peanut is being roasted the temperature should not exceed 320° F.

The salted peanut is another form which is growing very rapidly in popular esteem. The peanuts are first roasted, then shelled and salted.

The blanched peanut, used in making brittle candy, cakes, and cookies, is prepared as follows: The blanching, which consists of removing the red skin and the germ, can be accomplished by rubbing the roasted and shelled peanuts by hand over a wire-bottomed screen or sieve. This rubbing removes the skin and separates the kernels into halves, at the same time removing the germ, which falls through the screen if it is of proper size. The skins can be separated from the meats by pouring the nuts from one vessel to another in front of a fan, which blows out the light seed coats.

During recent years great quantities of shelled peanuts have been converted into peanut butter, which has become very popular for use in soups, gravies, in connection with macaroni, and for sandwiches. The Spanish nuts, which give smoothness to the product, and Virginia nuts, which give flavor, are used for this purpose. In the process of manufacture the shelled and blanched roasted kernel is ground to a pulp by means of a special grinder similar to that used for chopping meat, about 1 to 3 per cent of salt being added during the grinding. (Pl. XLV, fig. 1.)

The Office of Home Economics, which is studying the digestibility and food value of peanuts along with methods of cooking them, has supplied the following recipes.

Some of the dishes suggested are suitable for luncheon or supper, others are substantial enough to serve as a dinner dish in place of meat. The muffins, salad, and sweets show how they may also have more extended use in the family diet.

Peanut Butter.

Peanut butter can be made at home by grinding the roasted peanuts through the food chopper several times, using the nut knife. Add salt to taste. This makes a paste which may be thinned with a little cream or milk, if desired.

Another *sandwich filling* may be made by the following recipe:

1 cup milk or water.
1 tablespoon flour.
½ tablespoon water.
1 egg.
1 teaspoon salt.
1 tablespoon sugar.
1 tablespoon butter or other fat.
¼ cup vinegar.
Red pepper.
2 cups roasted peanuts ground fine.

Heat the milk and while it is heating mix the flour with the water and add eggs, salt, and sugar. To this mixture add the heated milk. Cook five minutes, stirring constantly. Then add butter, vinegar, and ground peanuts.

Creamed Peanuts on Toast.

2 cups milk.
1 cup finely ground roasted peanuts.
1 teaspoon salt.
1 teaspoon cornstarch.
1 teaspoon onion juice.
¼ cup chopped stuffed olives.

Canned pimentos, chopped green peppers cooked until tender, or cooked celery are equally as good as stuffed olives.

Scald milk in the double boiler, reserving a tablespoon of cold milk to mix with the cornstarch. Add with onion juice and other seasonings to the hot milk. Let come to a boil and finish cooking over the double boiler. Add the peanuts the last thing before serving. Serve on toast.

Good for a luncheon dish.

Creamed Peanuts and Rice.

1 cup rice (uncooked).
2 cups chopped peanuts.
½ teaspoon paprika.
2 teaspoons salt.
White sauce:
 3 tablespoons flour.
 3 tablespoons fat.
 3 cups milk (whole or skim).

Boil the rice and make a white sauce by mixing the flour in the melted fat and mixing with the milk. Stir over fire until it thickens. Mix rice, peanuts, and seasoning with the sauce, place in greased baking dish and bake for 20 minutes.

Peanut Fondu.

1 cup finely ground peanuts.
1 cup dried Liberty-bread crumbs.
1 egg.
1⅝ cups milk.
1½ teaspoons salt.
Dash of paprika.

Grind the peanuts fine. Mix all the ingredients except the white of egg. Beat egg white very stiff and fold in. Bake in a buttered baking dish for 30 to 40 minutes in a moderate oven.

Peanut Loaf.

1 cup chopped peanuts.
2 cups Liberty-bread crumbs.
2 tablespoons melted fat.
1 egg.
½ teaspoon salt.
¼ teaspoon pepper.
½ to ¾ cup milk.

Mix, using enough milk to make a moist loaf. Put in buttered pan and bake an hour in a moderate oven, keeping covered the first half hour. Baste once or twice with melted fat. Turn into a hot platter and sprinkle with chopped peanuts.

Peanut-Potato Sausages.

1 cup mashed potatoes.
1 cup ground roasted peanuts.
1 egg, well beaten.
1½ teaspoons salt.
⅛ teaspoon pepper.
Salt pork, bacon, or other fat.

Mix the mashed potatoes and seasonings with the ground nuts. Add beaten egg. Form into little cakes or sausages, roll in flour, meal, or Liberty-bread crumbs, and place in greased pan with a small piece of fat or salt pork on each sausage. Bake in a fairly hot oven until brown.

Parched Corn-meal Biscuits (Without Wheat).

½ cup yellow corn meal.
1 teaspoon salt.
1 cup peanut butter.
1½ cups water.

Put the meal into a shallow pan, heat in the oven until it is a delicate brown, stirring frequently. Mix the peanut butter, water, and salt, and heat. While this mixture is hot, stir in the meal, which also should be hot. Beat thoroughly. The dough should be of such consistency that it can be dropped from a spoon. Bake in small cakes in an ungreased pan. This makes 16 biscuits.

Peanut Muffins.

¾ cup corn meal.
1¼ cups rye flour.
1 cup finely ground peanuts.
1 egg.
1 teaspoon salt.
1¼ cups milk.
4 teaspoons baking powder.

Add liquid to dry ingredients and mix well. Bake in well-greased muffin pans.

Peanut Brownies.

(These use no sugar, no white flour, and no shortening.)

½ cup corn sirup.
2 tablespoons strained honey.
1 square chocolate.
¾ cup buckwheat flour.
½ teaspoon baking powder.
1 cup chopped peanuts.
¼ teaspoon salt.
1 teaspoon vanilla.

Melt the chocolate and mix with the corn sirup and honey. To this add 1 teaspoon vanilla and the dry ingredients—flour, baking powder, salt, and nuts. Mix well and drop by the spoonful on well-greased pan. Bake in a moderate oven.

Peanut Salad with Bananas.

Slice bananas through the center, spread out on lettuce leaves and sprinkle liberally with chopped peanuts; serve with mayonnaise or plain salad dressing.

Peanut candies are always popular. Such sweets can be made at home with no sugar.

Peanut Brittle.

1 cup white corn sirup.
1 tablespoon vinegar.
¼ teaspoon salt.
1 teaspoon vanilla.
1 cup freshly roasted peanuts halved.

Cook the corn sirup, vinegar, and salt in a saucepan until a little dropped in cold water forms a soft ball. Put the peanuts and this sirup into an iron skillet and stir until the sirup becomes a golden brown. Remove from the fire and stir in vanilla. Have ready a shallow buttered pan, pour candy in and spread out in a thin sheet. Allow to cool, then remove from pan and crack into pieces.

Peanut-Pop Corn Balls.

2 quarts freshly popped corn.
2 cups freshly roasted peanuts.
1 cup corn sirup.
1 tablespoon vinegar.
½ teaspoon salt.
1 teaspoon vanilla.

Boil the sirup, vinegar, and salt until the sirup hardens when dropped in cold water. Add vanilla. Pour, while hot, over the pop corn and peanuts, and mix well. When cool enough to handle, grease the hands and form into balls.

PEANUT FLOUR.

The flour or meal, obtained either directly from the peanut roasted or raw, or from the peanut-oil cake, is now on the market in some places, and may be expected to be available in increasing quantities during the coming year. This product is especially well adapted to serve as a part substitute for wheat flour in the making of bread, biscuits, cakes, gems, griddle cakes, and waffles, and in this regard the peanut may be said to have a direct bearing on the war problem of saving wheat. Flour obtained by grinding the roasted or unroasted peanut has the same composition as the peanut kernel. When, however, it has been prepared from the pressed cake, after most of the oil has been removed from the peanut, the flour contains a very high percentage of protein. (See accompanying table.)

Composition of peanut flour and wheat flour.

Flour from—	Water.	Ash.	Fat.	Protein (N × 6.25).	Fiber.	Carbohydrates.	Calories per pound.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	
Peanut cake	8	4.8	8	48	4.7	26.5	1,722
Shelled nuts	4	2.7	47	28	2.5	13.8	2,877
Wheat	12	.5	1	11	.2	75.3	1,647

It will be seen that peanut flour from the peanut pressed cake, which is the usual source of this flour, contains over four times as much protein, eight times as much fat, and nine times as much mineral ingredients as white flour. The amount of flour available depends upon the nature of the peanuts pressed. When shelled nuts are used, the pressed cake is practically all available for flour purposes. When the nuts in the shell are pressed, the oil cake, containing the hulls and red skins, must be purified before the flour can be used for human food. (Pl. XLVI.)

Peanut Bread (Three Loaves).

2¼ quarts sifted flour.
¾ pound roasted and hulled peanuts.
2 cakes compressed yeast, or
1 cake dry yeast, or
2 cups liquid yeast.
3 tablespoons sugar.
1½ tablespoons salt.
3¼ cups lukewarm liquid (water, milk, or equal parts of water and milk).

Break peanuts into small pieces and mix thoroughly with the flour that has been weighed out. When liquid yeast is used its volume must be included in the total liquid required. Measure out liquid yeast, dissolve sugar and salt in the rest of the liquid and add to yeast and set aside for an hour in a warm place. Or, if compressed yeast is used, soften the cake in a little lukewarm liquid and add to the remainder of the liquid in which the sugar and salt are dissolved, and set aside for an hour in a warm place. At the end of the hour add this ferment to the measured flour in the mixing bowl and mix thoroughly. Knead about 15 minutes, until s nooth and elastic. Cover the bowl and let rise 1¾ hours—usually it has trebled its bulk in this time. If desired, knead down and let rise a second time until very light. Then knead lightly, mold, place in a greased pan, cover, and let rise until two or three time the original bulk. Bake 50 to 60 minutes in a moderately hot oven.

If dry yeast is used, soak one yeast cake in water as usual for 1 hour. Use this in making a sponge with 1½ quarts of sifted flour and the required amount of sugar. In the morning, or when this sponge is light, stir it until smooth, add the salt, and finally the well-blended mixture of three-fourths quart of flour and three-fourths pound of crushed roasted peanut meats. Knead until smooth and elastic, adding flour or water, if required to make a dough of the proper consistency. Cover and allow to rise again until quite light. Divide and mold into loaves, allow to rise until two and a half times the original volume, and bake as directed above.

When bread is made from 1 part of ground peanuts (from shelled nuts) and 3 parts of wheat flour, the product is very rich in protein, fat, and mineral constituents, as may be seen from the following table:

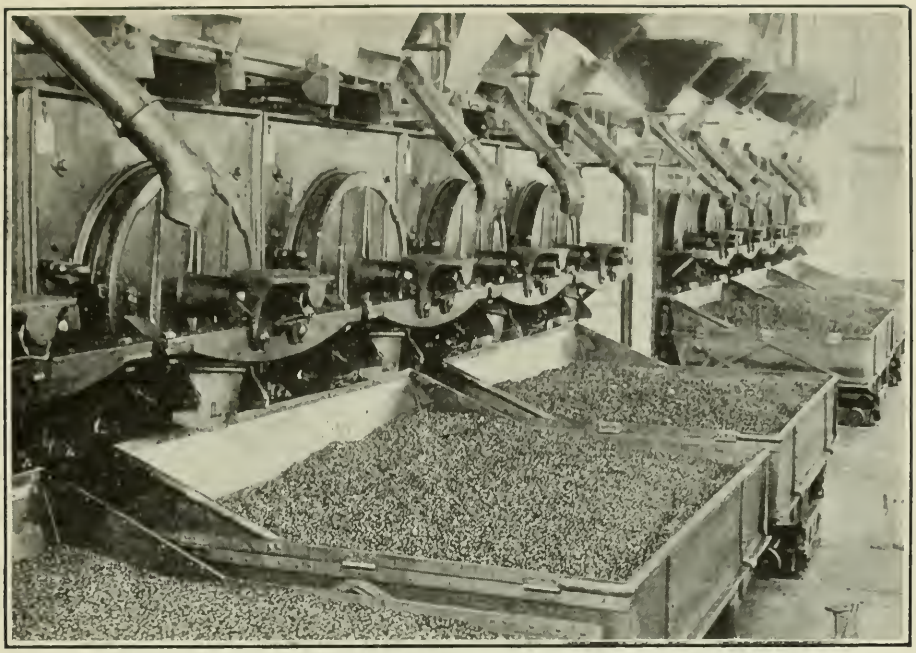


FIG. 1.—PEANUTS FOR MAKING PEANUT BUTTER ARE ROASTED IN REVOLVING DRUMS, THEN DUMPED INTO LARGE TRAYS AND COOLED BY A BLAST OF COLD AIR.

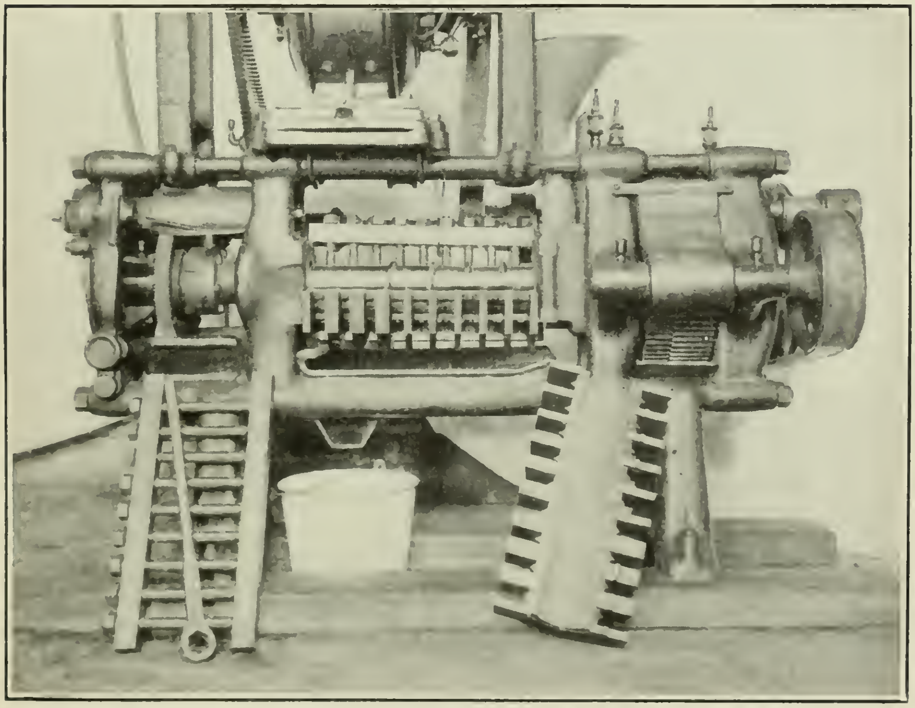


FIG. 2.—EXPELLER USED IN PRESSING PEANUTS AND OTHER OIL-BEARING PRODUCTS.

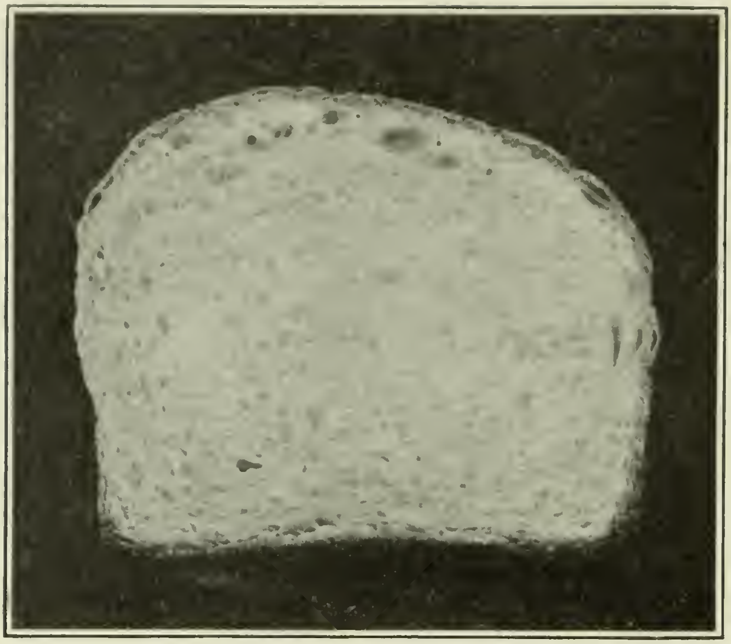


FIG. 1.—BREAD MADE FROM WHEAT FLOUR.

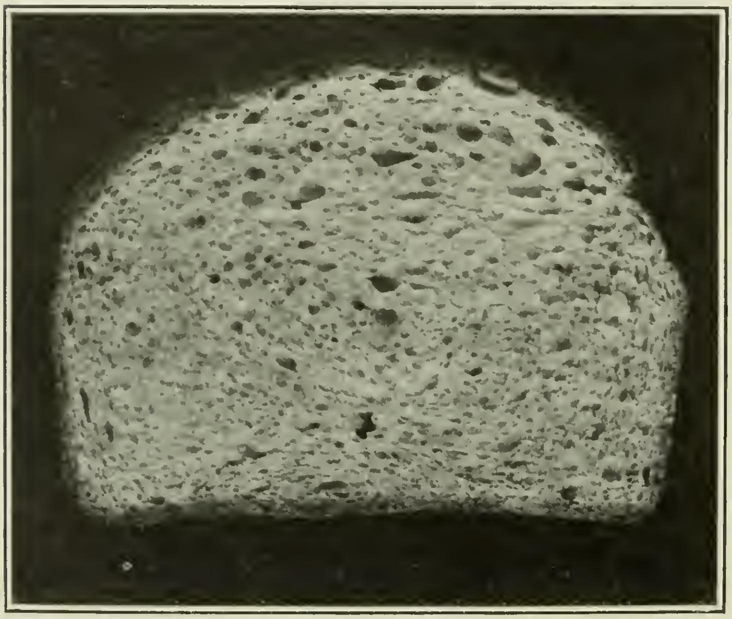


FIG. 2.—BREAD MADE FROM FLOUR CONTAINING 25 PER CENT OF PEANUT MEAL.

Comparison of composition of 25 per cent peanut bread and spring-wheat flour bread.

Composition.	Spring-wheat flour bread.	25 per cent peanut bread.
Total ash........per cent..	1.28	1.61
Salt-free ash........do....	.31	.62
Fat........do....	2.08	9.45
Fiber........do....	.13	.42
Protein (N×6.25)........do....	8.74	12.25
Carbohydrates........do....	52.77	41.25
Calories........	1,223	1.394
Nutritive ratio........	6.6	5.3
Water........per cent..	35	35

Such bread is far more nutritious than white flour bread. A study of the protein of the peanuts has shown that it is especially rich in basic amino acids, and therefore resembles the proteins of meat to a large extent. The peanut might therefore prove highly effective in supplementing flour made from wheat whose proteins are deficient in these valuable basic amino acids.

Cakes, especially small cakes, can be made in the usual way, by using almost any combination of wheat flour and peanut flour. Biscuits, of the baking-powder variety, can be made with one-half peanut flour and one-half wheat flour. An even larger proportion of peanut flour and a correspondingly smaller amount of wheat flour can also be used with excellent results.

PEANUT OIL.

Not all the peanuts which this country is now producing are marketed for the purposes already mentioned. There is a limit to the small boy's appetite for roasted peanuts, and his big sister can not eat all the salted peanuts which might be made. Neither are there enough picnics, school lunches, and vegetarian homes to consume the thousands of pounds of peanut butter which could be made from the harvest of our southern fields. Even before the Great War there was an increasing demand for vegetable fats and oils. Furthermore, new uses for vegetable oils were being discovered, and the rising price of butter, coupled with a better understanding of the food value of margarines, had brought about an increase in the consumption of peanut and other vegetable oils. These and other causes, such as the inroads of the boll weevil in portions of the cotton belt, have led to a very surprising increase in the quantity of peanuts produced in America and in the proportion of our annual crop which is pressed for oil.

The production of peanut oil is an old-fashioned industry in Europe, and for years large quantities of African and East Indian nuts have been pressed in France and Holland. In making those grades of oil which are used for food purposes, the French have always used the cold process, and made what is called a virgin oil. Just as in the production of the highest class of olive oil, the better grades of fruit are cold pressed at relatively low pressure, so with peanut oil, the higher qualities of oil are made by cold pressing sound nuts. But the yield of the oil from the cold pressing is, of course, lower than when the nuts are first cooked in order to start the oil, and then subjected to great pressure.

There are, then, two distinct processes for making not only peanut but other vegetable oils: First, the cold process, giving a comparatively low yield of oil, which, however, requires no further treatment to render it satisfactory for table use; and the hot process, which yields more gallons of oil per ton of the peanuts pressed, but an oil with such a strong taste that it must be refined and often also deodorized. (Pl. XLV, fig. 2.)

The refining of crude peanut oil consists simply in treating it with the proper amount of caustic-soda solution to remove what fatty acids may be present, and then separating the soaps thus formed from the unaffected oils. The most common method for deodorizing vegetable oils is to pass a current of superheated steam through them, and carry off by vacuum the vapors arising from the oil.

Oils which have been subjected to these processes lose nearly all of their characteristic flavor, and become so bland that the ordinary individual finds it difficult to distinguish between highly refined olive, cottonseed, peanut, and corn oil. To those who like for their salads, and even for cooking, an oil which carries a taste of the fruit from which it was produced, the virgin oils will be more acceptable. Many people, however, do not like the taste of olive oil, or virgin peanut oil, but prefer for shortening and table uses a bland, nearly tasteless product, and to such the refined peanut oil will appeal more than the virgin grade.

There seems to be some prejudice against peanut oil, based upon the idea that it will not keep well, that it becomes rancid more quickly than other oils. This may be due to the fact that until the last few years practically all of the peanut oil on the domestic market was imported from Europe, such oil being seldom of the first grade, since both France and Holland had a local demand more than equal to the supply of first-pressing oil. Experiments in the laboratory, and the experience of a number of housewives who have used properly made peanut oil, have shown conclusively that, if reasonable care be taken to keep the oil in a cool, dark place, it will not spoil within a year's time.

For the making of salad dressings, either of the ordinary French type or those in which the oil is mixed with other ingredients to form a homogenous emulsion, as in mayonnaise and cooked dressings, peanut oil will be found thoroughly satisfactory. Some grades of peanut oil apparently form a permanent mayonnaise dressing more readily than other salad oils. The difficulty sometimes experienced in making mayonnaise that will stay smooth and uniform is seldom encountered when peanut oil is used, even though the oil is added to the other ingredients without the precaution often necessary with olive oil.

For cooking purposes, such as deep frying, and as a shortening, in cakes and other baked goods where a butter substitute is desired, peanut oil will be found very satisfactory. To Saratoga chips and French-fried potatoes it imparts a slightly nutty flavor which many people think exceptionally fine, and sweet potatoes, cut in cubes, or strips, and cooked to a rich brown in this oil, will be found delicious.

Lard substitutes.—Among those who prefer a solid fat to a liquid oil for cooking purposes the so-called lard substitutes or compounds are becoming increasingly popular. Until very recently, most of the compounds on the American market have been mixtures of cottonseed oil and the harder portion of beef tallow known commercially as oleostearine.

The discovery of a process by which a liquid, such as cottonseed or peanut oil, can be made into a solid fat by treating the oil with hydrogen in the presence of a catalytic agent, usually nickel, has made it possible for manufacturers to produce, at a price which permits them to compete with the older style of compounds, products which contain no animal fat. To this class belong many lard substitutes sold under trade names. While many of these are made from vegetable oils other than peanut, this particular oil is becoming more and more popular with the manufacturers of hydrogenated compounds.

Margarines.—Another class of products which has only recently been manufactured and used in the United States includes the vegetable margarines. These are butter substitutes, manufactured usually from a mixture of coconut and peanut oil which has been ripened in skimmed or partly skimmed milk and then churned in a manner very similar to that used in the production of butter. The true oleomargarines, which have been used in this country for many years, are made in a manner similar to that employed in the manufacture of vegetable or nut margarines, as they are sometimes called, except that instead of coconut oil, neutral lard or oleo oil is used. It has been said that a large proportion of the peanut oil which this country imported before it began producing peanut oil itself was used by the packing houses and other manufacturers of oleomargarine.

Many inquiries as to the relative food value of different animal and vegetable fats are received by the Department of Agriculture. So far as the chemical analysis is concerned they all have practically the same fuel value. Experiments made by the department [1] indicate that all the fats commonly used for edible purposes are digested with practically the same degree of completeness. Very recently it has been discovered that butter contains a growth-determining substance which appears to be absent from the vegetable oils and from the ordinary commercial animal fats. However, the fact that this substance, the exact nature of which has not yet been determined, does not occur in peanut oil need not deter anyone from the use of this valuable oil either for cooking purposes or in butter substitutes, as the ordinary

[1] Office of Home Economics, States Relations Service.

diet of the average American household contains a sufficient quantity of other foods in which this growth-determining material occurs.

SUMMARY.

To sum up, the use of the peanut and peanut products as food may be highly recommended for the following reasons:

(1) The oil is most valuable as a table oil, equal to other oils in digestibility and food value.

(2) The shelled nuts are a splendid food, cheap and nutritious.

(3) The salted nuts are equally nutritious.

(4) Peanut butter is highly useful in many ways besides being rich in fat and protein. It is a butter substitute and likewise a substitute for meat.

(5) The whole shelled nuts as well as parts of nuts are well adapted for use in candies, cakes, cookies, wafers, etc.

(6) The flour from the peanut itself or from the oil cake is a good part substitute for wheat flour for bread making or for making baking-powder biscuits, cakes, gems, waffles, griddle cakes, etc. Its high content of protein makes it a meat substitute as well.

(7) The use of such flour in bread making will save an equivalent quantity of wheat for the allies.

HOW THE DAIRY COW BROUGHT PROSPERITY IN THE WAKE OF THE BOLL WEEVIL.

By L. A. Higgins,
Dairy Division, Bureau of Animal Industry.

FOR MANY YEARS the country surrounding a certain southern Mississippi town was devoted to the raising of cotton. The cultivated land was mostly in small farms owned by white farmers, and most of the labor connected with the production of cotton was done by negro tenants. Each year the farmers as a rule borrowed to the limit on their future cotton crops in proportion to the acreage to be grown, and to meet their obligations they were forced to sell the cotton early in the fall, regardless of price. Forced sales to meet overdue payments, coupled with high rates of interest, kept many of them constantly in debt.

On most farms no live stock was produced. Even the horses and mules used in handling the cotton crop were brought in from Tennessee, Kentucky, and Missouri, and farm and home supplies of all kinds were imported by local dealers and sold to the farmers. From these dealers the farmers purchased wheat flour, corn, meat, lard, canned goods, and vegetables. In the county seat, a town of 5,000 or 6,000 people, from 16 to 20 carloads of bacon were sold in a single year, and much of it went to near-by farms. Only the farmers who obtained a part of their living from their own farms were out of debt and in good financial circumstances.

ARRIVAL OF THE BOLL WEEVIL.

The boll weevil reached the district in 1908 and did serious damage in 1909. The local compress receipts from the cotton crop of 1908 were 31,812 bales, but receipts fell off to 18,178 bales in 1909, to 8,282 bales in 1910, and to 3,168 bales in 1911. Evidently the income from cotton was rapidly approaching the vanishing point. Though very much discouraged, the farmers continued to try to grow cotton, expecting the boll weevil to leave their section and go elsewhere. The scourge did indeed spread to other sections, but the number of weevils remaining never grew less.

No money could now be borrowed on prospective cotton crops, and the farmers mortgaged their land to the limit. Land values fell to 50 per cent below normal, and credit soon entirely disappeared. The continuous growing of cotton had depleted soil fertility, and there was neither money nor credit with which to purchase commercial fertilizers. The virgin forests of long-leaf yellow pine that had once covered the entire section were now nearly exhausted, and the local lumber mill, with a payroll of $50,000 a month, closed its doors in 1909. In a near-by village the cotton and woolen mill, that had formerly paid more than $22,000 a month in wages, ceased to operate in 1910. Everywhere business was at a decline, and the whole region faced financial ruin. Many negro tenants, who knew nothing about the growing of any crop but cotton, left the neighborhood, owing their landlords for two or three years' supplies, and went to sections where the weevil had not yet arrived.

EFFORTS TO ESTABLISH NEW CROPS.

The business men of the community were thoroughly aroused to the situation and began advocating the production of other crops in place of cotton. They appointed trade days, or rally days, to arouse enthusiasm and to encourage the production of various crops. They succeeded in getting the farmers to plant peanuts, but the yield was disappointing and there was no available market for them. Ribbon cane was planted very largely, but each farmer made a different quality of sirup and there was no market, the product being neither standardized nor advertised. Large crops of melons were raised, but the local demand was small and shipments to distant markets sometimes failed to pay freight charges. Sweet potatoes were tried, but with disappointing results. The farmers had not learned how to grade any of these products, neither had they learned what kind of package the market demanded. They knew that cotton must be baled, but thought it unnecessary to pack or grade other products. The merchants knew as little as the farmers about marketing any of these crops, so the production of such cash crops proved to be a failure.

There were a few razorback hogs in the country, but little corn on which to fatten them. The local market could not handle them, and the farmers did not know how to cooperate in carload shipments to distant markets. The need for cooperation had not been felt under the cotton system of farming.

THE FIRST CREAMERY.

There were a few scrub cows, commonly know as "piney-woods" cows, scattered throughout the country. (Plate XLVII, fig. 1.) These cows had been grown on the range and were undoubtedly built for speed rather than the production of milk. While fresh they were milked once a day, but as there was no market for the milk or its products the calves were allowed to do most of the milking.

In 1910 some enterprising citizens began a movement for a local creamery, and eventually one was built at a cost of $7,000. It was a poorly arranged brick building, and the enterprise failed within a year, leaving a considerable debt. Through the efforts of a few business men the creamery was opened again in 1911, but soon failed a second time.

At this juncture the United States Department of Agriculture and the State agricultural college became interested in the problem. On March 5, 1912, the Dairy Division of the United States Department of Agriculture sent a specialist, who made a thorough study of the local problems. He found everything in a deplorable condition owing to the ravages of the boll weevil. The cotton business was gone, other crops had not been successful, the soil was in poor physical condition, the creamery was a failure, the cattle were a cross between the long-horned mongrel scrub and a poor quality of Jersey, and the people were very badly discouraged. The field man knew other sections where the one-crop system had failed and left the farmers stranded, and he also knew that the dairy cow had generally managed in some way to pull them through, but here was a case more difficult than any he had known before. The creamery had failed, the cows on hand were well nigh worthless, good cows could not be purchased elsewhere and brought in because of the cattle tick, and the soils were badly worn.

In spite of the discouraging outlook the field man decided that there was a fighting chance that the dairy cow might yet save the situation. He realized that to win she must be fed, and well fed. Accordingly he encouraged the production of such crops as would build up the soil, keep it clean of weeds, and put it into first-class physical condition. Legumes and corn were the crops best adapted to do these things. Fortunately, they were also the crops best adapted to support the dairy cow.

THE WORK OPPOSED.

The field man met considerable opposition at first. In connection with corn production the field man advocated the construction of silos, though at that time silos were almost unknown in that part of Mississippi. Most of the farmers were skeptical about the feeding of silage. Many of them thought it would be impossible in such a climate to keep green feed put up in that way. They claimed that even if it did not spoil, the cows would not eat it, and that if they did eat it the sour silage would spoil the milk or cause them to give buttermilk. It was also claimed that the silage would ruin the teeth of the cows and that the fermentated juices would make the cows drunk. A few farmers, however, were willing to follow the directions of the field man and the new work was started.

IMPROVEMENT BEGINS.

Although it was April, 1912, before any systematic constructive work was begun, 15 silos were built before the end of the summer and a comparatively large quantity of lespedeza hay was stored for winter feeding. The creamery was remodeled and reopened for business. (Plate XLVIII, fig. 1.) Pastures were gradually improved, and the farmers began to take better care of their cows and calves. An 8-page circular, entitled "Raising the Dairy Calf," was prepared and distributed, and many demonstrations were made to teach better methods of feeding and caring for both cows and calves. A few good bulls were selected, and arrangements were made to get maximum service from them. This greatly improved the next crop of calves. Farmers were encouraged to weigh and test the milk of each cow once a month, many unprofitable cows were sent to the butcher, and the herds were built up rapidly. (Plate XLVII, fig. 2.)

EDUCATIONAL CAMPAIGN.

A series of strictly dairy meetings was held to help create an interest in the cow and the proper handling of her products. At these meetings models of dairy barns, cow stalls, silos, and milk houses were used in order to make the instruction more definite and concrete. The record work was illustrated by a monthly record sheet, milk scales, and Babcock tester, and all who cared to learn to use them were given an opportunity. Considerable attention was given also to proper feeding according to production, and to the thorough sterilizing of milk utensils.

Some schools took up the work with enthusiasm, and milk testing was done by the pupils. From the milk and butterfat records many problems were obtained and used as supplementary work in arithmetic. Feeding problems also contributed many valuable lessons that made the school work more interesting. The schools assisted greatly in distributing information concerning dairying and helped materially in making the new work a success.

EXAMPLES OF PROGRESS.

A cotton farmer who lived near the county seat was doing well until the boll weevil appeared and worked havoc with his cotton crop. Like most other farmers of the district he continued to try to grow cotton, sinking deeper in debt each year for subsistence for his family, the negro tenants, and the teams. He was a typical cotton farmer and could see no advantage in the new movement toward dairying. He said that cotton had failed, that other crops had not been a success, and that he did not intend to lose more money by milking cows. He said further that so far he had always made his living in easier ways and that he did not propose "to be tied to the hind legs of a cow."

However, other members of his family were not so much opposed to dairying, and finally, about July 1, 1912, they were persuaded to milk the few cows already on the place. The gross returns for July were $12.36; for August, $37.67; for September, $70.35; and for October, $128.78. By that time 4 or 5 new cows had been bought, and some of the original herd had been sold on account of low production. The next year the farmer milked 20 cows, and the milk alone brought in a total income of $1,200 after paying for all the feed consumed. Some additional income was obtained from the sale of the calves, and the manure was used to improve the soil. In March, 1913, a good registered Jersey bull and 4 registered cows were bought. One of the cows has since qualified for the register of merit. A silo was built, the farm produces an abundance of legumes, and the cows are fed according to directions. This cotton planter is now one of the loudest boosters for the dairy cow in southern Mississippi and gives her all the credit for having saved his farm.

Another farmer began milking cows in 1913. He, too, had been a cotton farmer, but soon after the weevil came he began to raise beef cattle. Finding that some of his cows were fair milkers, he selected a few of the best and began to ship milk to New Orleans. He gladly accepted the help of the Government field man and followed directions. A silo, dairy barn, and milk house were erected. A daily record was kept of the quantity of feed consumed and the quantity of milk produced, and once a month the field man tested the milk for butterfat. In 1914 the records showed that 5 of the cows were unprofitable, and they were disposed of. During the following year 9 more were considered unworthy and were discarded. In 1915 the average monthly receipts from the sale of milk from 35 cows were $260, in 1916 the monthly returns from 33 cows were $350, and during the first half of 1917 the monthly returns from about the same number of cows were $425. A second silo was built recently, and the dairy herd is now headed by a very fine registered Jersey bull.

Three years ago another farmer of the neighborhood was heavily in debt on account of losses due to the failure of the cotton crop. He was urged to go into dairying, which he did. The first year after he began milking cows he was able

FIG. 1.—THE NATIVE "PINEY WOODS" TYPE. "BUILT FOR SPEED RATHER THAN THE PRODUCTION OF MILK."

FIG. 2.—A HIGH-PRODUCING HERD ON A FARM THAT WAS ALL BUT RUINED BY THE BOLL WEEVIL.

FIG. 1.—THE CREAMERY AS REMODELED.

FIG. 2.—THE VELVET BEAN GROWS LUXURIANTLY IN SOUTHERN MISSISSIPPI.

to meet his interest and to make a small payment on the principal, the second year he made another and larger payment, and he expects that the income from the dairy business this year will enable him to make the last payment and free his farm from debt.

Another farmer who had been an ox driver all his life, sold his 8 oxen and built a home for himself and family in the midst of the cut-over district. He began milking cows the latter part of August, 1916. He is now milking 9 cows, from which he sells $100 worth of milk each month, and he says, "No more oxen for me." These are only a few of the many examples of successful dairying throughout the district.

DAIRYING FOSTERED BY BANKERS.

The local bankers, though skeptical at first, are now supporting the movement. In many cases they are providing the funds for the purchase of better dairy cattle. Several carloads of grade dairy cows have recently been brought in by the creamery, the transaction being financed by the local banks. One of the leading business men of the community recently said that he would rather have the trade of one good dairy farmer than that of 10 average cotton farmers, not that the dairy farmer bought more goods than the cotton farmer, but because the dairy farmer was able to pay cash for what he got, while the cotton farmer had to do business on a long-time credit basis.

THE WORK SPREADS.

Many other creameries have been established in the southern part of the State. Seven of the plants now in operation furnish a stable market for 1,500 patrons. From a small beginning the dairy cow has gradually won her way to prominence in a section where "King Cotton" had swayed his autocratic scepter for years. The banker, the business man, and the farmer now have confidence in one another and they all have confidence in the cow. The dairy cow is doing her part in the building up of worn-out soils, and she is making it possible to cultivate profitably the vast areas of land recently laid waste by the boll weevil. The enriched soil produces large crops of corn and legumes, which support the ever-increasing herds of dairy cattle. Lespedeza is native to the soil, and the velvet bean has now become a staple crop. (Plate XLVIII, fig. 2.) With the luxuriant growth of legumes and other forage crops, the long, mild seasons, the cheap production of heifer calves, the cattle tick now practically eradicated, and with excellent transportation facilities, southern Mississippi is rapidly becoming a great dairy center.

SHEEP AND INTENSIVE FARMING.

By F. R. MARSHALL,

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THE SHEEP industry of the United States is in a stage of transition. In most of the western range States the number and size of flocks continue to decline. In the farm States there is a distinct trend toward the more general production of wool and mutton. The net result for the country as a whole in 1917 is reported to have been an increase of 2 per cent over that of 1916.

This movement, though accentuated by war conditions and prices, did not originate with the war. It had its beginning much earlier and may be expected to continue after peace is restored. The full significance of this movement is not generally appreciated. It has been either actively discouraged or misunderstood by certain agricultural authorities who seem to believe that the passing of the sheep industry of the Eastern States in early times finally disposed of the question of the economic place of sheep in intensive farming. It is believed that the analysis of the situation which follows will show that this view is erroneous and unfortunate in respect to the development of opinion as to the best practices for the most effective and economical use of the land in the immediate future and in the period following the war.

TREND OF SHEEP RAISING IN UNITED STATES.

It may seem strange that after more than a century of sheep raising in the United States the relationships of that branch of agriculture are still the subject of discussion, while beef cattle, dairy cattle, and swine have mainly found their permanent locations and profitable extent of development in relation to other lines of agriculture. The divergence of opinion arises mainly from a failure to distinguish between sheep kept chiefly for wool production in newer parts of the world and in the Eastern States prior to 1880, and the other type of sheep husbandry that regards mutton and lamb production coequally with wool, exemplified on the farms of Great Britain.

The frequently repeated statement that the decline of farm sheep raising, that occurred decades ago, is proof that the industry can not have a place in modern intensive farming has mainly gone unchallenged. The fact is that there is very little resemblance between the former business of growing wool and the present rapidly developing business of keeping sheep for the economical production of meat as well as wool. The type of sheep raising now engaging the interest of farmers is essentially new. It has never been tested in a large way in the United States and has never been abandoned anywhere when once established.

Federal statistics show a decline of 8 per cent in the number of sheep kept in the United States between 1910 and 1917. To a considerable extent this decline is due to the abandonment of keeping wethers. When wool was the most important product, large numbers of wethers were kept, sometimes until 4 or 5 years old. With higher market values for lambs, wethers have been largely discarded and ewes put in their places. The ewes produce practically the same quantity of wool as the wethers and a crop of lambs each year, equal to about 80 per cent of their number. The decrease in meat production therefore has not been so great as might be supposed. The number of sheep (including lambs) slaughtered in 1915 was 14 per cent less than in 1914, and in 1916 the number was 8 per cent less than in 1915. This was due to the fact that the settlement of the range had made it necessary for many western sheep owners to dispose of their flocks, which swelled market receipts for a time, but diminished the number of ewes to produce lambs later on.

In the former period of the farm rearing of sheep mainly for their wool, mutton was very lightly esteemed as an article of diet. Lamb, as we now know it, was not offered for sale. Other meats were abundant, cheaply produced and retailed at low price. The general and continuing upward trend of beef and pork values diverted attention to the then cheaper mutton and lamb. When once understood, these meats, particularly lamb, came into favor and, though now selling higher than other meats, are in strong demand because of their taste and flavor and also because of the special economy of their use by small families and by city residents in general, who compose the majority of the patrons of our butcher shops and markets. This condition, in conjunction with the peculiar economy in the production of lamb, gives to the sheep as a meat-producing animal an assured position in the more nearly stable plan of operations rapidly being adopted on American farms. In this, as in the cattle industry, the farmer's security is due to the removal of danger of unequal competition of cheaper lands in Western States. The lessened difference in acreage value of range and farm lands and the much greater feed-producing capacity of the latter, puts the business of live-stock production on a basis where the margin of profits depends mainly upon the skill and business ability of the producer.

FARM PRODUCTION OF WOOL.

Students of world wool-trade conditions are convinced that future wool supplies must come quite largely from farm flocks. At present the bulk of the world's wool supply comes from sheep kept on the agricultural frontiers. The flocks of Australia and South Africa are maintained primarily for wool production. The fine-wool type of sheep has been the forerunner of agriculture in the drier and in the new areas of all countries. The mutton sheep comes in at the other end of the gamut as a necessary instrument in highly intensive and self-supporting agriculture. In our own range States, in New Zealand, and in South America the better parts of the pastoral areas are now devoted to the production of both wool and mutton from what is broadly called the "crossbred" type of sheep.

The range areas of the United States, Australia, and South America have steadily been encroached upon by closer settlement and use of the lands for grain growing. While these same lands, or such of them as are found continuously profitable for farming purposes, will eventually evolve into a system of raising live stock, there will be a long interval of lessened production of meat and wool. This might be compensated for by the production of still newer areas, but the primitive conditions still existing in the unproductive parts of Asia and the equatorial regions at best give no promise of the addition of new wool-yielding areas for a very long time. Since the supplies can not be maintained from new sources, the only opportunity remains in increasing the output of present sources of supply. A smaller and diminishing margin between supply and consumption of wool seems inevitable. It is not possible to see how this tendency can fail to cause a new level of values for wool unless civilian consumption is very greatly curtailed. Since very little of the actual requirements for wool can be satisfied with substitutes the only alternative lies in the maintenance of a level of values to justify an increase in wool production in present range or farm sections.

As was suggested, the range product has been declining in all countries except South Africa and New Zealand. A portion of this decline in range production in the United States may be offset by improved methods and the revision of State or National attitudes on public land policies, but it is probable that much more of the wholly unimproved lands now used for grazing will be settled before a condition is reached under which each type of land is employed in the most economical way. The strong probability of an early increase of supplies of wool from the present principal sources indicates the continuing importance of wool as a source of income from flocks previously kept for meat production. The British breeds of sheep amply demonstrate the possibility of obtaining large yields of wool and meat from the same animals, and with both commodities in strong demand the commercial flocks of the future will develop still further upon a wool and mutton basis.

The United States is still a large importer of wool. Her meat consumption, in normal times, equals production. Her farms contain much unproductive land and the earlier rush westward left many large areas undeveloped. It seems certain that the new order of affairs will result in the increased production of live stock, particularly sheep, on the larger areas of idle lands in the Appalachian, Great Lakes, and South Atlantic regions. The still more intensive use of land in farms, and effort to secure the most economical use of every acre, every facility, and all available labor, will necessitate the general inclusion of sheep in our system of mixed farming and live-stock production.

ECONOMIC PHASES OF SHEEP RAISING.

In addition to the great need of increased production of meat and wool and the development resulting from the operation of higher values, the raising of sheep has a new appeal to older farming areas as a result of alterations in feed values and the scarcity of farm labor. The major factor in determining the cost of other animal products is the value of grain or mill feeds. Pasturage and roughage are important, but both beef and pork require a very considerable use of concentrated feeds for the finished animal that is most profitable when sold for slaughter. The most valuable carcasses of lamb and mutton require a very much smaller proportion of fat and therefore a smaller use of grains than is required in other meat animals. In the case of lamb, which is much more popular than mutton, a majority of the animals are marketed at the time of weaning and without having had any feed other than milk of their dams and a slight amount of grazing. The lambs raised in areas incapable of producing a good milk flow in the ewes, and which therefore go to fattening yards, consume considerable grain, but their finish is largely produced from hay and other roughages of comparatively lower value.

With breeding ewes, as with mature females of other classes of live stock, the free use of grain is not needed when good roughages are furnished. Fleeces of good weight and quality can be produced without the use of concentrated feeds.

The other prominent economic advantage of sheep raising is in the comparatively small demand it makes upon farm labor. The labor cost per dollar's worth of wool or lambs is lower than in any other farm-animal product. This factor had a noticeable effect in 1917 upon farmers' attitude toward sheep raising and may be expected to be more appreciated in the future. In the past injury has been done by advocating sheep raising on the ground that no labor or attention is needed and farms are cleared of weeds. So far as their appetite for weeds is concerned, the sheep may be regarded to some extent as scavengers. They will eat most weeds, and on any farm will greatly reduce the amount of hand labor needed to hold in check the areas of pasture and grain fields. Many rougher, permanent grass pastures that require mowing can be kept clean by the use of sheep, while at the same time the cattle-carrying capacity of the pasture is increased. It is a mistake, however, to encourage or advocate the raising of sheep by people whose main interest is in weed control. While the labor required by sheep raising is continuous, it is not heavy, and, if properly supervised and made interesting by financial return, can well be performed by boys incapable of other kinds of farm labor. Constant attention and careful observation are necessary to maintain thrift in flocks of practical commercial size.

One competent, experienced man can care for from 300 to 500 ewes during winter. Extra help will be needed at lambing and shearing time, but unless the forage rotation plan is followed, the full time of the shepherd will not be needed for the flock in summer.

OBSTACLES TO EXPANSION.

The first and greatest obstacle to an adequate increase in the size and number of farm flocks has been removed in the restoration of equal competition with other areas and in the improved prospect of continued higher values for wool and lambs. Owners of farms can now safely develop flocks to the size suggested by the character of their land, existing marketing facilities, and available labor without hindrance to logical development such as formerly existed in disproportionate prices for different classes of animals and other farm products.

A second obstacle to a quick increase lies in the fact that comparatively few farmers are as well qualified to care for sheep as for other classes of stock. The management of mutton sheep does not differ altogether from that of the former wool flocks, but the majority of farmers have had no experience in caring for sheep. The systems of management for quickest returns, continued health, and maximum profits under different types of farm conditions are not well understood, nor have they been determined by experiment stations in any such way as has been done for other classes of stock.

This obstacle is a temporary one. The needs and habits of sheep differ widely from those of horses, cattle, and swine, but present no problems that will not be met by interested

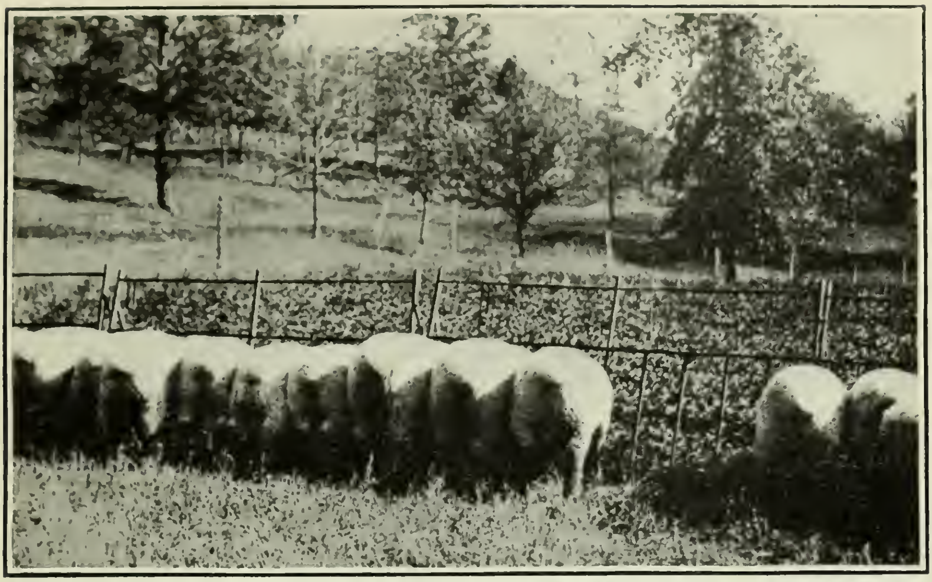


FIG. 1.—A BRITISH METHOD OF UTILIZING FORAGE WITHOUT WASTE AND FURNISHING CHEAP FEED WITHOUT THE USE OF LABOR FOR HARVESTING.

The fence is moved along as the sheep consume the forage.

FIG. 2.—FARM-RAISED LAMBS GRAZING ON SOY BEANS IN JUNE.

The use of forages obviates danger of infection with parasites common on permanent pasture and produces a good market finish.

TYPES OF PASTURE LANDS WELL ADAPTED TO SHEEP RAISING, OF WHICH SEVERAL MILLION ACRES IN THE UNITED STATES ARE NOW IDLE.

study and observation supported by satisfactory returns. The boys' sheep clubs now being formed are valuable largely for the opportunity furnished to interest prospective farmers and give them experience with sheep which, though on a small scale, will teach the essential points of sheep management and contribute materially in overcoming the present lack of qualified shepherds.

The dog question is still a serious hindrance to sheep raising in most farming localities. The probability of sheep being killed by dogs is sufficiently great to keep many people out of the business. Public sentiment as to the necessity of more adequate control of dogs for many reasons is rapidly changing. The prospective sheep raisers, however, are not assured of protection until such sentiment results in the enactment and the enforcement of suitable laws. Five States enacted improved legislation in 1917 and a number of other States are likely to take similar action. The experience of the States having had most experience in this matter emphasizes the need of plain and ample provisions for full enforcement of the laws enacted. Readily available officers are necessary to appraise and secure early compensation for damage done. Such compensation can not be adequate or timely where payments can be made only from local collections for dog licenses. It was not the fault of the losing farmer that lack of vigorous enforcement of the law resulted in too low a condition of the funds to do the work intended. Compensation arrangements are a secondary though essential feature of this kind of legislation. The first need, and one calling for a clear assignment of duties to available and efficient officers, is for public education through the collection of license fees or taxes and the prevention of dogs from running at large and unattended where sheep are kept.

POSSIBILITIES OF SHEEP RAISING IN INTENSIVE FARMING.

An indication of the probable development of sheep raising may be obtained from a study of the data concerning British agriculture and live stock. In many respects the agricultural conditions of the fourteen Northeastern States of this country are comparable with those of Great Britain. Both areas contain a large amount of nonarable land and have large populations and manufacturing industries. The fact that the British agriculture is much older and has developed under conditions of competition with other countries insures that each of its branches has a sound economic basis.

It seems clear that the much denser sheep population of Great Britain is not obtained at the expense of other live stock, though swine are relatively less important than in the area shown for the United States. The advantage is due to more complete utilization of nonarable land and particularly to more intensive use of live stock on the cultivated lands. On British farms of from 50 to 300 acres there are 574 sheep per 1,000 acres and 820 per 1,000 acres of land on farms that are above 300 acres. Similar data are not obtainable for United States farms. These larger British farms are not due to inclusion of poorer or rougher land, as the large farms have the smaller proportion of nonarable land.

Great Britain has 384 sheep for each 100 cattle, while the United States has 73 and the fourteen States referred to have 59 sheep to 100 cattle.

AIDS TO EARLY INCREASE IN FARM SHEEP RAISING.

The continued prevalence of high wool and meat values will place the farm sheep business in a new light. The demand for ewes for farm flocks was not met fully in 1917 and a much larger proportion of ewe lambs was retained by owners for breeding purposes than has ever been known. This has been true in the East; and in the West, particularly in Utah and Idaho, large numbers of ewes have been sold from range flocks to be placed upon farms.

Improved legislation in respect to dogs will also greatly aid the expansion of the business. Amount and character of available hired farm help has already caused many farmers to substitute sheep raising for some of their lines of production for which more and harder labor was needed.

The necessity of utilizing the many million acres of land not now in farms will cause a great increase in the number of sheep kept. There are large bodies of such land in all the States traversed by the Appalachian Mountains. Much of the cut-over timber lands of Michigan, Wisconsin, and Minnesota are suitable for sheep, though development of the business can not take place at a more rapid rate than the clearing of the land for the production of winter feed. In some parts land now cleared will be more serviceable for the raising of winter stock feed than under its present use for raising crops to be shipped out.

The southern cut-over lands seem more likely to be used for some time, so far as sheep are concerned, in large areas under a semiranching system of management.

There is still need of publicity and educational work regarding the safety of engaging in sheep raising. The long-continued circulation of misleading ideas as to the meaning of the history of the business in this country and as to the true economic place of sheep can not be quickly overcome. Education and demonstration respecting methods of feeding and caring for sheep are widely called for. To a small extent this is being supplied by agricultural extension agencies. In 1917 ten specialists in sheep husbandry commenced work in twelve States under cooperative arrangements between the Department of Agriculture and the States in which the work is done.

Two active, nonprofit-making organizations, supported by private funds, commenced work in 1917 and give large promise of extending and rendering more effective some phases of the work not so readily served by State and Federal agencies.

There is particular need of more general demonstration and experimental work in sheep husbandry by the State agricultural experiment stations. With but one or two exceptions no data are obtainable from that source in regard to economical methods of growing lambs for market or in regard to wool production, although considerable valuable work has been done in studying economical rations for winter ewes and for fattening lambs. In the main the business of finishing purchased lambs probably will continue to decline. The prospects of a new and large sheep husbandry are chiefly along the line of producing lambs and wool—the lambs to be sold before reaching their sixth month. The greatest need of practical experimental work is not likely to be during the period of war prices but during the time of readjustment of farming to new conditions which will follow the close of the war.

A larger development of the farm sheep industry than that reported for 1917 is to be expected. The continued development of this phase of animal husbandry will contribute materially to the food and clothing supplies. It will also add stability to our systems of farming and play an important part in the more complete utilization of our agricultural resources.

TEAMWORK BETWEEN THE FARMER AND HIS AGENT.

By C. E. Bassett,
Specialist in Cooperative Organization, Bureau of Markets.

IT IS doubtful whether any class of men offering service to the farmers has been as generally and as severely condemned as has the commission merchant—the middleman—who accepts the surplus products of the farm on consignment and sells for a commission charge. While many striking cases have proved that, too often, there have been betrayals of trust on the part of city dealers to whom farm products have been consigned, it is doubtful if it can be demonstrated that all the shortcomings of the commission business as now conducted are the fault of the commission merchant.

In commission transactions the farmer who makes the shipment is the principal and the commission merchant is his agent in an implied contract based upon the ordinary charges and practices of the commission business. In all contracts each party has certain rights and certain duties, and unless one of the parties performs all of his duties he has no right to blame the other party for a failure to secure the best results. The failure on the part of both parties to post themselves as to their respective duties leads to most of the trouble in this regard.

CHOOSE FOR SHIPMENT PRODUCTS THAT WILL SHIP.

In his early farming experience the writer made frequent use of commission merchants as a medium for marketing farm products which could not be disposed of to local buyers. Many of these consignment deals were very disappointing, and it was easy to drop into the ranks of those who condemn before they investigate.

Among the varieties of berries produced on our farm were a few that were of such attractive appearance and appetizing flavor that it was natural to believe that shipment of such fruit to the city market ought to be profitable. Imagine our surprise and indignation when our first shipments of these home-tested and approved varieties brought us small returns. Moreover, we were told on the account of sales that such berries were "undesirable," and "soft and leaking."

The feeling that the transaction was not a fair one led to an investigation. Another fine shipment was made and the consignor arranged to be present, though unknown, when the sale was made. He was able to identify his shipment in the city market by the stencil number on each crate, but was astonished to learn that, however fine these berries might be when eaten fresh from the field, they were so soft and tender, that they could not reach the market in attractive condition under the rough handling of quick transportation. The lesson was to grow varieties that not only were good, but that would carry. The fault in this case was our own, rather than that of the salesman; and what he saw on the city market opened the eyes of the writer to the other side of this method of marketing.

HOME MARKET VS. CITY MARKET.

Farmers generally believe that it is best to sell at home when a fair price can be obtained, and they draw that conclusion because they compare home sales with returns received for shipments made on consignment. However sound the policy may be to sell at home when a fair price can be secured, no two plans of marketing are fairly compared unless they are practiced upon exactly the same grade of products, with other conditions fairly equal.

When the farmer comes on his home market with a load of produce and meets a large number of eager bidders, he is inclined to sell. One of the reasons why there are so many bidders may be the attractive appearance and high quality of the product, but the interest of the buyers is usually a sure indication that the market is strong; that is, that the bidders have reasonable assurances that if they buy they can sell again at a profit. Under such a condition the farmer is induced to sell. The next time the farmer appears on the market with a load of produce, the local buyers may show no interest and refuse to make any offer. This may be because the produce is not of good quality, but as a rule it is a very good indication that the city markets are "off" and that the local dealers know that they would face a loss if they were to pay any price that the farmer would consider. With no local market, the farmer may be forced to consign his produce to a city commission house. His possibly unattractive goods placed on an already overstocked and weak market may bring unsatisfactory returns, no matter how faithfully the commission merchant may work to secure top prices and render an accurate and honest return for the consignment. It is often upon such experiences as these that the grower-shipper bases the conclusion that there are no honest dealers in cities, or that, if there be such, they are hard to find.

"LAST RESORT" SHIPMENTS.

Too often the commission consignment business is used as a last resort, and products, undesirable either because of their low grade or because of the weak market, are dumped on the commission merchant. At such times his inability to get the same price for low-grade products that others may secure for products of high grade may be taken as an evidence of his lack of business ability or his general dishonesty, or both. A fair test of the relative merits of the two ways of marketing can be obtained only by giving to both the home dealer and the commission merchant equal amounts of products of the same grade at the same time.

Most of the farm produce sent to market on consignment is shipped without any previous notice to the commission merchant and he has no opportunity to prepare for its reception and sale. Nor are shipments made regularly, so as to enable the agent to build up a profitable demand for the products of the shipper. Business like this, which is spasmodic, careless, or otherwise not dependable, is not profitable.

AVOID COMPETING WITH YOURSELF.

One grower who took a great deal of care with his pack had created a sharp demand for his products and his brand was sought by discriminating buyers. Since he feared that one commission merchant would not be able to dispose of his entire shipment to advantage, he divided his daily shipment among four commission men in the same town. Not being satisfied with the returns, he visited the city and discovered that the four dealers to whom he was shipping were located not only on the same street, but in the same block, and two of them in the same storeroom. The shipper's fancy-packed products were on sale at four places, and buyers were forcing the four dealers to compete, with a resultant cut in prices. The farmer changed his method, shipped all of this product to one agent who could fix a fancy price for this fancy pack, and there was no competition to destroy his market.

SUGGESTIONS FOR SHIPPERS.

For those who contemplate the use of commission men as marketing agents, the following suggestions are offered:

1. Know your agent. Select one who has a reputation backed by experience, an advantageous location, and competent help. A personal visit will help the farmer in deciding these points. Have a clear understanding as to charges to be made for services—selling, cartage, storage, repacking, etc. Avoid unknown firms that make unreasonable promises as to what they will do with shipments. Among so many dealers it is not surprising that some get into the business who secure trade through fraudulent representations and who drop out of sight as soon as a "clean-up" has been effected.

2. Know your market. From your carefully selected agent learn the needs of the market, the most desirable varieties to raise, proper containers in which to pack and ship, style of pack most desired, the use of labels or brands, proper amounts and time of shipment, and local preferences, such as that for white eggs in Chicago and for brown eggs in Boston. Try to cater to existing market demands, rather than to force your own ideas as to what the trade ought to consume.

3. Make regular shipments. Instead of making the city commission district the dumping ground for what your local dealers will not buy, keep your city agent regularly supplied with what his trade will take, thereby helping him stabilize the business in which you are both concerned.

4. Keep each other informed. Early in the shipping season the farmer should give his agent a careful estimate of what may be expected, and no material changes in the

quantity of the regular shipment should be made unless a prompt notice is given the agent, in order that he may secure purchasers in case of increase or arrange to care for his regular customers if shipments will not meet requirements. Successful shippers make frequent use of the telegraph or long-distance telephone to keep agents posted as to changes in shipments. The agent should also be expected to keep the shipper informed as to any changes in the requirements of the market.

5. Avoid frequent changes in agents. Some shippers prefer to divide their shipments each day among numerous commission merchants in the same market. While it may be wise under certain conditions to check one agent by the sales of another, the most successful consignor seems to be the one who selects an agent with great care and then sticks to him, cooperating with him in every possible way and carefully scrutinizing all settlements. The honest agent is glad to do his part in such "teamwork" and welcomes the most exacting examination of his methods.

TEAMWORK ESSENTIAL TO SUCCESS.

As already indicated, marketing farm products through the commission house is a partnership affair, and no partnership can be a complete success unless each partner does his best and is willing to make it possible for the other to work to the best advantage. Teamwork always counts, and never more than in the relation of principal and agent, as it exists between the farmer and his commission man.

GROWTH OF THE BEEF-CATTLE INDUSTRY IN THE SOUTH.

By F. W. Farley,

Animal Husbandry Division, Bureau of Animal Industry.

GROWING good beef cattle is a new industry in the South, but one that has grown so rapidly in the last few years that it is now among the leading phases of southern agriculture. Ten years ago, when cotton was the principal crop, very little attention was given to the improvement of beef-cattle herds, although the actual number of these cattle was greater than at present. The interest in the beef-cattle business in the South that took root so suddenly was due to two principal factors, the first and most important of which was the invasion of the cotton boll weevil, and the second the changed conditions in the corn belt and on the western ranges.

Statistics show that there was a gradual decrease in all beef animals in the cotton belt from 1900 to 1914, after which there was a gradual increase to 1917. However, these figures do not indicate the actual development that has come about, since the greatest improvement has been made in quality rather than in numbers. When cotton reigned supreme, farmers kept their steers until they were 5, 6, and even 8 years old before marketing them. This practice gradually changed as interest in beef-cattle raising became more intense, farmers selling their cattle at an earlier age from year to year until now very few are kept beyond three years. At the same time more attention has been given to marketing, and as a result a minimum number of cattle are kept other than the breeding stock.

The number of cattle from the State of Mississippi sold on the St. Louis stockyards in 1908 was 8,000, while in 1916 it had risen to 162,000. Even though these figures represent only one State in which the increase was probably greater there than in some of the others, they indicate that the South is producing more beef animals now than it has ever produced before. Also, since the larger part of these sales were of steers, the estimates of the number of cattle in the South in the last few years has included more cows and fewer 4-, 5-, and 6-year-old steers in proportion than in previous years, thereby showing but a small increase in numbers, though the breeding capacity and actual production have become much greater. These figures have another significance which is gratifying, in that the cattle shipped out were largely scrubs, whereas pure-bred bulls and good breeding cows were being shipped in at the same time to take their place on the farms.

Estimated number of beef cattle in eleven cotton-belt States from 1900 to 1917.

[From census and Department of Agriculture reports.]

Year.	Number.	Year.	Number.
1900 [1]	16,155,656	1913	10,727,000
1906	14,533,386	1914	10,666,000
1910 [1]	12,203,561	1915	10,668,000
1911	11,701,000	1916	11,259,000
1912	11,175,000	1917	11,456,000

[1] Census.

In order to get a clear idea of the growth of the beef-cattle industry in the South, several factors must be taken into consideration, the most important of which are the progress of tick eradication, the number of pure-bred bulls and cows brought in, the number of silos and barns built, the increased number of improved pastures and farms, and the application of better methods of feeding and marketing.

The year 1909 really marked the beginning of the beef-cattle business on a practicable basis in the South.

FORMER CONDITIONS.

Before the Civil War southern slaveholders took a great deal of pride in having a few well-bred cattle of the Devon and Shorthorn breeds on their plantations, and the blood of these cattle is still found in the native southern herds in a few rich-red, big-framed cows.

Texas has been a cattle-breeding ground for three-quarters of a century or more, corn-belt feeders having gone there for steers as early as the forties; however, the only cattle produced there then were the Texas "longhorns." About thirty years ago the ranchmen began to bring in pure-bred bulls, mostly Shorthorns and Herefords, with which to grade up their herds. To-day the Texas "longhorn" is almost extinct, and while most of the large ranches have been cut up into smaller ranches and farms, they are stocked with high-grade and pure-bred Hereford herds on a Shorthorn foundation, and there is a large annual shipment of these cattle to other States for breeding purposes and to supply feed lots. A few range herds of Angus cattle are found, and on the ranches along the Gulf coast Brahman cattle are quite numerous.

In the States of Louisiana, Arkansas, Mississippi, Alabama, Florida, Georgia, and South Carolina, especially where cotton was the principal crop, little thought was given to intelligent selection and breeding of beef cattle. The use of scrub bulls was so general and inbreeding so intense that the native mongrel cattle with very few exceptions were very inferior and no improvement was made until the appearance of the cotton boll weevil, which forced the farmers into the cattle business. These States have always offered the same advantages for beef-cattle production that they offer at the present time, but so long as the landlords of the cotton plantations could produce cotton on a large scale with cheap farm labor and very little personal supervision, it furnished a very tempting and easy means of making money. Although the ravages of the boll weevil took the vitals out of the single-crop system thousands of farmers still continued to plant cotton, and until they actually faced bankruptcy refused to abandon a system that had given them so many years of comparative ease.

THE BOLL-WEEVIL INVASION.

The boll weevil, which invaded Texas in 1892, made its appearance in Louisiana in 1903 and gradually spread across the State, reaching Mississippi in 1907. Within three years it had invaded two-thirds of that State and had made its way into southwestern Alabama. In 1914 the weevil-infested territory included the eastern half of Texas, the southeastern part of Oklahoma, the southern half of Arkansas, the whole of Louisiana and Mississippi, and the southwestern half of Alabama. By 1917 the infested territory had increased so as to include also the whole of Alabama, two-thirds of Georgia, and northern Florida.

It was during the period of 1909–1914 that the great depression came, Louisiana and Mississippi being hit harder than any of the other infested States. Cotton had always been readily accepted as collateral, and banks made the practice of lending thousands of dollars annually on that crop. These loans were safe so long as the cotton crop was a certainty, but at this time farmers had suffered several years of crop failure, due to the destructive work of the weevil. It was necessary for them to continue to borrow money, however, in order to operate, and the bankers continued to advance them loans from year to year thinking that the next would be a good crop year and that they could then collect past-due loans. The situation grew worse, however, and as a result hundreds of banks failed. In the State of Mississippi the boll weevil drove one-fourth of the banks into bankruptcy. Cotton farmers were simply forced out of business, cotton gins became idle, and plantation after plantation was left uncultivated. Land values dropped so suddenly that in 1909 plantations in Louisiana which had been valued at $40 and $50 an acre only a year or so before could be bought for $5 to $10 an acre. This same condition existed in Mississippi in 1913 and 1914. Of necessity farmers began to look for some new industry that would fit into their farm operations and take up the lost motion. They first took up trucking, but that enterprise did not prove to be profitable as a substitute for cotton because only a few sections were suitable for conducting operations on a large scale.

It was then that the South's mild climate, wonderful carrying capacity of pasture for eight or nine months a year, heavy yields of the different legumes, large yield of by-products from cotton seed, and large yields of grain most forcefully suggested cattle raising. There were a few farmers who had foreseen the critical situation at the outset and had got in on the ground floor of the cattle business by stocking their farms with breeding cows and good bulls. These men suffered least from the boll-weevil invasion because they were prepared and ready to meet the new conditions when they came. Their work along constructive lines had much to do with the establishment of the beef-cattle industry of the South.

CHANGE OF CONDITIONS IN CORN BELT AND ON WESTERN RANGES.

The slump in prices of cattle during the early nineties, together with a rapid advance in land values in the Middle West, induced farmers throughout this section to cut down the size of their herds and convert their pastures into corn and wheat fields, thereby forcing cattle feeders to go to the western ranges for steers to fill their feed lots. With the elapse of only a few years, however, the seriousness of this situation became evident. The breeding herds of beef cattle on the western ranges had gradually diminished owing to settlement, thus further reducing the supply of steers for the corn-belt feed lots. This in turn made it necessary for the cattle feeders to look for other sources from which to obtain cattle if they were to maintain their status in the feeding business. They directed their attention toward the South as a possible breeding ground, and although they were skeptical as to the ability of the South to supply them with cattle, their interest having been turned in that direction, it no doubt had a marked influence on the rapid development of the industry that has come about.

BEEF-CATTLE EXPERIMENTAL WORK.

In 1904 the Bureau of Animal Industry, in cooperation with the Alabama Experiment Station, inaugurated a series of extensive beef-cattle experiments in Alabama for the purpose of working out the most profitable methods of feeding and handling beef cattle in that section of the South. This work was carried on until 1913, after which it was transferred to Mississippi, where it was continued in cooperation with the experiment station of that State, one experiment being carried on at Canton in the brown-loam section and another at Abbott in the black-prairie section. The work is still in progress, and during the present year the work at Abbott was transferred to Collins, in the cut-over pine section.

In 1913 beef-cattle experimental work similar to that conducted in Alabama and Mississippi was inaugurated in the mountainous section of North Carolina by the Bureau of Animal Industry in cooperation with the North Carolina Experiment Station. In this case the object is to determine the most profitable lines to follow in handling beef cattle in the mountains of that and adjoining States. This work also is still in progress.

The results of all the above work that has been completed have been published in United States Department of Agriculture and State bulletins and distributed to farmers and cattlemen throughout the South. In addition beef-cattle specialists of the Southern States are using the results in their work and are having success in introducing them into beef-cattle operations.

WORK OF EXTENSION FORCES.

As soon as the boll weevil had thoroughly demonstrated that cotton would perhaps never again be safe as an exclusive crop, the farmers were in a frame of mind not only to receive but to seek advice and information on the cattle business and to put this advice into execution. The extension forces of the United States Department of Agriculture and the State colleges had been active in continually agitating this very sensible and safe phase of diversification and soil building; persistently urging and demonstrating the production of feed crops and pastures and the introduction of better breeding stock, thus revealing the possibilities of the beef-cattle industry, and teaching the people by practical demonstrations the proper methods of feeding and handling beef cattle. This work elicited a hearty response. The demand for information became so great that the regular extension forces could not comply with all the requests.

In 1914 a special appropriation was made with which the Animal Husbandry Division of the Bureau of Animal Industry placed beef-cattle specialists in the Southern States to work in tick-free areas in cooperation with the extension forces and the county agents. The services and advice of these specialists were given to farmers on the improvement of pastures for beef cattle, the selection and bringing in of pure-bred bulls, the construction of beef-cattle sheds and barns, the most economical methods of feeding cattle for market, the proper selection and culling of breeding herds, the forming of live-stock associations, and any other work pertaining to the promotion of the beef-cattle industry.

The following summary shows the total results of work done by the specialists and county agents along beef-cattle lines throughout the period July 1, 1914 to July 1, 1917.

Results of work done by beef-cattle specialists and county agents in beef-cattle extension in the South (fiscal years 1915, 1916, and 1917).

Nature of work.	1915	1916	1917
Pure-bred bulls brought in	2,647	2,552	6,482
Pure-bred cows brought in	3,972	3,829	9,750
Grade breeding and feeding cattle brought in	7,372	10,237	22,588
Live-stock associations organized	35	21	25
Silos constructed	76	217	113
Forage crop demonstrations for beef cattle conducted	172	112	42
Cattle-feeding demonstrations conducted	80	181	208
Number of cattle fed in demonstrations	9,068	11,284	5,517
Cooperative sales of fat cattle belonging to small feeders	....	7	15
Farmers' meetings addressed on beef-cattle subjects	250	584	539
Number of farmers addressed at meetings	19,000	62,454	58,786
Number of farmers given specific advice on beef-cattle operations	2,514	3,552	5,300
Demonstrations given of roping, castration, dehorning, and vaccinating cattle	....	118	207

This summary includes only the personal services rendered and does not include results secured in an indirect way. For instance, in many cases where a farmer was induced to buy a pure-bred bull and castrate his scrub, to build a barn or silo, to plant a permanent pasture, to build a dehorning chute and dehorn his cattle, or to conduct a cattle-feeding demonstration, it often resulted in several farmers in the neighborhood doing the same things.

CATTLE-FEEDING DEMONSTRATIONS.

One of the more important things that the southern cattlemen yet had to learn after they had started in the beef-cattle business was to feed and finish their cattle for market instead of selling them in a thin condition. The cattle-feeding demonstrations conducted by the beef-cattle specialists have proved to be one of the most effective and practical agencies in bringing about a change in this practice. As a result of these demonstrations many farmers who otherwise hesitated to venture into a locally untried industry have become convinced that it is more profitable to finish their cattle on feeds that can be grown on their own farms, thereby returning these feeds back to their farms in the form of manure, than to sell them thin. They have learned that even the native cattle can be fattened on cottonseed meal or velvet beans, together with a roughage, and that they will bring a much better price on the market than they had been accustomed to getting. In these cattle-feeding demonstrations weights and records were kept by the specialist or county agent and at the conclusion of the demonstration farmers' meetings were held on the farm whereby farmers had the opportunity of seeing the cattle and studying the results obtained.

The following table gives the data obtained from four demonstrations conducted in Georgia, Alabama, and Mississippi in 1916, which are illustrations of numerous other demonstrations of like kind.

Record of feeding demonstrations in Georgia, Alabama, and Mississippi (1916).

Detail of work.	Steer feeding, Hart County, Ga.	Calf feeding, Sumter County, Ala.		Steer feeding, Hinds County, Miss.
		Lot 1.	Lot 2.	
Number of cattle	39	42	30	84
Days fed	91	150	120	126
Average initial weight ... pounds	647	372	540	646
Average final weight ... do	956	585	711	897
Average total gain ... do	309	213	171	251
Average daily gain ... do	3.4	1.42	1.42	1.99
Average daily ration (full feed):				
Cottonseed meal ... do	6.25	2.75	3.12	3.76
Shelled corn ... do	...	2.00	1.00	...
Cracked corn ... do	...	...	...	2.44
Corn silage ... do	33.25	17.00	22.00	41.00
Corn stover ... do	2.50	...	...	...
Mixed hay ... do	(a)	2.00	5.00	4.05
Peavine hay ... do	...	1.50	2.00	...
Cost of feed per hundredweight of gain	$4.35	$7.87	$8.77	$8.48
Initial cost per hundredweight	$5.34	$5.60	$5.60	$4.50
Selling price per hundredweight	$7.86	$7.00	$7.25	$7.82
Average profit per head	$27.21	$3.36	$6.19	$7.70

a Velvet-bean pasture for 16½ days charged at $16.

The results of beef-cattle extension work are brought out more forcefully through the fact that at least 75 per cent of the beef cattlemen of the South are now using pure-bred bulls, 50 per cent have silos and improved pastures on their farms, and 30 per cent finish cattle for market.

BABY-BEEF CLUBS.

Another important phase of beef-cattle extension work is the organization of baby-beef clubs of boys from 10 to 18 years old. This work is really divided into two phases—"baby beeves" and "pure-bred calves." The work with pure-bred calves is having a wonderful effect in stimulating an interest for better breeding cattle, while the baby beeves give practical demonstration in putting the proper finish on steers for market.

The first baby-beef club organized in the South was started in Covington County, Miss., in the fall of 1914. The calves were fed throughout the winter and spring and sold the following May at the baby-beef club show, bringing 2½ cents a pound more than any other cattle sold in the county at that time. The State club was organized in 1915 as a part of the beef-cattle demonstration work and a State show was held at the State fair in October. In 1916, 21 banks in the State advanced $10,000 to finance the boys in buying calves and giving premiums. In addition to this the Illinois Central Railroad gave as prizes to the winners in each of nine counties five pure-bred bulls. The prize-winning calves, together with the bulls given as prizes, were exhibited at the State fair in October. During the fall of 1915 a State club was also organized in Texas, where the State show and contest was held at Fort Worth the following spring. Additional State clubs were organized in Oklahoma, Alabama, Georgia, South Carolina, and Florida in 1916 with a total membership of 2,722 in the seven States.

THE PURE-BRED CATTLE BUSINESS.

The establishment of pure-bred herds of beef cattle in the South has progressed as rapidly as conditions would permit. At the present time there are a large number of small breeders of pure-bred cattle, and a few herds that take rank with the leading herds of the United States, both as to size and excellence of animals produced. These pure-bred cattle are making money for their owners and are a source of inspiration to others. The produce are readily sold; in fact, during the past two years the breeders have not been able to supply the local demand.

The first public sale of pure-bred cattle in the South of which there is any record was held at Oklahoma City, Okla., in February, 1903, and consisted of 56 head of Shorthorns. The second sale was at Auburn, Ala., in February, 1904. This offering consisted of 53 head of Herefords and was distributed among farmers of Alabama and Georgia. Most of these cattle later died of tick fever.

A few subsequent sales were held each year, but very little was accomplished in this respect until about 1914. At this time pure-bred breeders in the North, breed associations, and cattle dealers saw opportunities for the sale of large numbers of pure-bred cattle following the eradication of the tick, and began to hold public sales at more frequent intervals.

In the accompanying table, showing the number of public sales of pure-bred beef cattle held in the Southern States by years, as reported in the leading breed and agricultural journals, it will be noted that the 11 sales held from 1903 to 1913, inclusive, have been totaled as a whole rather than by years because of the fact that there were so few sales during this period and also because the beginning of 1914 marks the time when the most rapid advance in the number of sales began. In the 73 sales held during 1914, 1915, 1916, and the first 10 months of 1917, as shown by the table, 1,250 bulls sold for an average price of $274.25 and 1,899 females sold for an average price of $305.49, or a total of 3,149 pure-bred beef animals sold for an average of $293.08 per head.

FIG. 1.—TEXAS BABY-BEEF CLUB EXHIBIT AT FORT WORTH IN 1916.

FIG. 2.—FIVE YEARS AGO THIS WAS A COTTON PLANTATION. NOW THE NEGRO CABINS ARE EMPTY AND THE COTTON FIELDS ARE SODDED TO LESPEDEZA AND BERMUDA GRASS, ON WHICH GOOD ANGUS AND HEREFORD CATTLE GRAZE.

FIG. 1.—FARMERS AT A CATTLE-FEEDING DEMONSTRATION.

FIG. 2.—PURE-BRED SHORTHORN CALVES ON A SOUTHERN PLANTATION GRAZING ON A PERMANENT PASTURE OF HOP CLOVER, WHITE CLOVER, LESPEDEZA, AND BERMUDA GRASS.

NATIVE SOUTHERN GRASS-FED CATTLE READY TO BE LOADED ON CARS. THE DEHORNED ONES (UPPER PICTURE) SOLD FOR 60 CENTS A HUNDRED POUNDS MORE THAN THOSE WITH HORNS.

FIG. 1.—BARN, SILOS, AND CATTLE OF ONE OF THE FIRST PURE-BRED HERDS ESTABLISHED IN THE SOUTH.

FIG. 2.—A COMMUNITY STOCKYARD AND SHIPPING PENS IN THE MOUNTAINS OF NORTH CAROLINA, FROM WHICH THOUSANDS OF GRASS-FED STEERS ARE SHIPPED ANNUALLY.

Public sales of beef cattle held in Southern States (1903 to 1917).

Date.	Place of sale.	Breed.	Number of animals sold.		Average price.		Number remaining in South.	
			Bulls.	Cows.	Bulls.	Cows.	Bulls.	Cows.
Feb. 12, 1903	Oklahoma City, Okla.	Shorthorn..	17	39	$155.00	$117.50	17	39
Feb. 17, 1904	Auburn, Ala........	Hereford...	27	26	197.60	228.85	27	26
Nov. 22, 1905	San Antonio, Tex...	Shorthorn..	7	6	115.71	263.33	7	6
Mar. 22, 1906	Fort Worth, Tex....	.....do......	12	10	173.00	137.50	12	10
Mar. 23, 1906	.....do...............	Hereford...	32	14	141.40	126.07	32	14
Mar. 20, 1907	.....do...............	Shorthorn..	11	28	78.95	97.45	11	25
Mar. 21, 1907	.....do...............	Hereford...	10	22	137.64	176.98	10	22
Apr. 9, 1907	Nashville, Tenn.....	.....do......	13	30	129.88	166.75	13	30
Mar. 10, 1911	Jackson, Miss.......	.....do......	16	28	241.00	170.00	15	27
Mar. 14, 1912	.....do...............	.....do......	12	30	215.00	142.85	12	30
Mar. 14, 1913	.....do...............	.....do......	21	18	273.80	225.25	20	18
	Totals and averages, 1903-13.	....	178	251	176.96	159.27	176	247
Jan. 10, 1914	Memphis, Tenn.....	Hereford...	18	32	210.55	154.70	18	32
Mar. 11, 1914	Fort Worth, Tex....	.....do......	19	22	168.98	189.02	18	21
Mar. 17, 1914	Jackson, Miss.......	.....do......	14	27	458.90	399.25	14	24
Apr. 7, 1914	Memphis, Tenn.....	Angus......	34	26	161.60	145.95	34	26
Apr. 10, 1914	Livingston, Ala.....	Shorthorn..	14	26	221.07	199.42	14	26
June 6, 1914	McMinnville, Tenn..	Hereford...	23	27	198.24	221.76	22	27
June 8, 1914	Fayetteville, Tenn..	.....do......	23	27	179.36	200.64	22	27
Aug. 12, 1914	Meridian, Miss......	Angus......	12	24	122.08	139.45	12	24
Do......	.....do	Shorthorn..	8	20	126.25	167.45	8	20
Aug. 13, 1914	.....do...............	Hereford...	13	25	190.80	185.20	13	25
	Totals and averages, 1914.	....	178	256	202.55	201.56	175	252
Jan. 1, 1915	Albany, Ga..........	Shorthorn..	16	39	162.25	172.07	16	39
Feb. 25, 1915	Oklahoma, Okla....	Hereford...	13	2	220.00	125.00	13	2
Mar. 17, 1915	Jackson, Miss.......	.....do......	19	26	535.55	345.25	19	25
Mar. 18, 1915	Meridian, Miss......	.....do......	4	11	140.00	161.10	4	11
Mar. 19, 1915	Siloam, Ga...........	.....do......	15	33	174.00	137.00	15	33
Apr. 17, 1915	San Angelo, Tex....	.....do......	12	30	187.00	177.00	12	30
July 24, 1915	Huntsville, Ala.....	.....do......	14	19	232.63	256.38	14	19
Sept. 23, 1915	Knoxville, Tenn....	.....do......	16	37	222.80	234.30	16	37
Do......	Midland, Tex........	.....do......	34	14	258.00	267.00	34	14
Oct. 10, 1915	Quitman, Ga........	.....do......	18	22	167.09	186.91	17	21
Nov. 3, 1915	Macon, Ga...........	.....do......	19	24	182.00	164.00	19	24
Nov. 4, 1915	Shreveport, La......	.....do......	27	11	165.00	162.00	27	11
Nov. 19, 1915	Atlanta, Ga..........	.....do......	29	17	310.93	439.41	27	17
Nov. 20, 1915	Siloam, Ga...........	.....do......	9	29	109.60	151.10	9	29
Dec. 20, 1915	Jackson, Tenn.......	.....do......	13	9	155.00	130.00	13	9
	Totals and averages, 1915.	....	258	323	252.75	209.50	255	321

Public sales of beef cattle held in the Southern States (1903 to 1917)—Contd.

Date.	Place of sale.	Breed.	Number of animals sold.		Average price.		Number remaining in South.	
			Bulls.	Cows.	Bulls.	Cows.	Bulls.	Cows.
Jan. 26, 1916.	Salisbury, N. C.....	Angus.....	12	22	105.05	150.95	12	48
Feb. 2, 1916.	Montgomery, Ala...	.....do.....	17	30	96.02	129.98	16	12
Feb. 23, 1916.	Memphis, Tenn.....	Shorthorn..	18	42	314.00	276.30	17	37
Mar. 3, 1916.	Childress, Tex.......	Hereford...	16	27	123.00	150.00	16	27
Mar. 7, 1916.	Oklahoma, Okla....	.....do.....	46	11	143.00	216.00	44	11
Mar. 8, 1916.	Knoxville, Tenn....	Angus.....	18	25	193.55	285.00	17	18
Mar. 14, 1916.	Fort Worth, Tex....	Shorthorn..	12	16	173.75	277.50	12	4
Mar. 23, 1916.	Watonga, Okla......	.....do.....	5	30	878.00	476.19	4	23
Mar. 27, 1916.	Jackson, Miss.......	Hereford...	21	19	189.52	246.58	20	18
Mar. 28, 1916.	.....do..............	.....do.....	17	28	538.23	494.68	11	17
Mar. 29, 1916.	Orrville, Ala........	.....do.....	22	23	199.80	198.70	22	23
May 3, 1916.	Atlanta, Ga.........	....do.....	7	38	270.67	323.50	7	37
May 4, 1916.	.....do..............	.....do.....	7	38	328.57	321.00	7	37
May 9, 1916.	Tulsa, Okla.........	Shorthorn..	7	35	233.57	285.71	6	30
May 10, 1916.	Lawhon, La........	.....do.....	6	15	132.03	162.96	6	14
Aug. 10, 1916.	Shreveport, La......	.....do......	8	18	237.22	292.78	8	16
Aug. 12, 1916.	McMinnville, Tenn .	Hereford...	17	20	178.00	265.00	17	20
Sept. 14, 1916.	Amarillo, Tex.......	.....do.....	45	7	393.50	415.00	44	6
Sept. 29, 1916.	Midland, Tex.......	.....do.....	38	16	370.54	292.00	34	16
Oct. 20, 1916.	Atlanta, Ga.........	.....do.....	10	10	279.30	331.00	9	10
Oct. 21, 1916	Meridian, Miss......	.....do.....	24	18	186.60	171.00	24	18
Oct. 24, 1916.	Nashville, Tenn.....	Angus.....	6	26	295.83	342.11	5	22
Oct. 28, 1916.	Tulsa, Okla.........	Shorthorn..	3	23	250.00	274.78	3	22
Nov. 15, 1916.	Chickasha, Okla....	.....do.....	38	92	136.28	165.72	37	82
Nov. 23, 1916.	Watonga, Okla......	.....do.....	7	31	440.00	643.87	6	25
Nov. 24, 1916.	Nashville, Tenn.....	Hereford...	16	37	243.48	234.30	13	37
1916..........	.....do..............	Angus.....	14	33	209.00	263.00	13	27
	Totals and averages, 1916.	....	457	730	246.81	278.53	430	639
Jan. 1917.....	Salem, N. C.........	Shorthorn..	16	4	179.03	220.96	16	4
Jan. 13, 1917.	Baton Rouge, La....	.....do.....	20	12	190.00	144.33	20	12
Feb. 15, 1917.	Fort Worth, Tex....	Hereford...	43	5	351.00	390.00	43	5
Feb. 19, 1917.	Memphis, Tenn.....	.....do.....	19	41	205.00	239.40	18	41
Feb. 21, 1917.	Amarillo, Tex.......	.....do.....	41	6	292.00	242.50	37	6
Feb. 26, 1917.	Memphis, Tenn.....	Shorthorn..	12	37	543.32	392.03	11	29
Feb. 27, 1917.	Jackson, Tenn......	.....do.....	1	17	775.00	405.59	1	15
Mar. 14, 1917.	Fort Worth, Tex....	.....do......	14	33	294.83	367.91	13	29
Mar. 21, 1917.	Watonga, Okla......	.....do.....	10	26	404.50	536.16	9	26
Mar. 22, 1917.	Knoxville, Tenn....	.....do.....	21	29	164.04	179.13	21	29
Mar. 22, 1917.	.....do..............	.....do.....	5	10	228.00	288.00	5	10
Apr. 5, 1917.	Atlanta, Ga.........	.....do.....	10	24	274.25	338.08	10	21
Apr. 7, 1917.	Jackson, Miss.......	Hereford...	25	21	246.00	210.00	25	21
May 12, 1917.	Morristown, Tenn..	.....do.....	8	31	192.00	176.40	8	31
May 15, 1917.	Watonga, Okla......	Shorthorn..	5	34	1,092.00	803.52	5	29
May 16, 1917.	Tulsa, Okla.........	.....do.....	7	36	509.28	527.08	7	32

Public sales of beef cattle held in the Southern States (1903 to 1917)—Contd.

Date.	Place of sale.	Breed.	Number of animals sold.		Average price.		Number remaining in South.	
			Bulls.	Cows.	Bulls.	Cows.	Bulls.	Cows.
May 20, 1917.	Demopolis, Ala......	Hereford...	10	20	254.00	289.00	10	20
May 23, 1917.	Berryville, Ark......	Shorthorn..	14	33	178.00	167.00	14	33
Oct. 13, 1917.	Amarillo, Tex........	Hereford...	34	40	398.89	446.21	32	38
Oct. 23, 1917.	Nashville, Tenn......	Angus......	14	39	271.50	308.00	10	24
Dec. 2, 1917.	Jackson, Miss........	Hereford...	28	92	1,044.14	877.12	13	74
	Totals and averages, 10 mos. of 1917.	....	357	590	360.68	436.48	328	529
	Grand totals and averages, 1903–1917.	....	1,428	2,150	262.12	288.42	1,364	1,985

The table above represents approximately one-third of all the pure-bred beef animals sold in the South at public auction during the period covered, the other two-thirds being sold through State, county, and community associations, of which there are no official records.

EFFECTS OF TICK ERADICATION.

The improvement of the beef herds in the South by bringing in good breeding cows and pure-bred bulls with which to stock the abandoned cotton fields and to grade up the native cows, is so closely allied with the eradication of the cattle tick that the one can not be discusssed clearly and effectively without discussing the other. In fact, this improvement would not have been possible had tick eradication not preceded it. The eradication of the tick has removed one of the greatest burdens that all cattlemen had to deal with. Since it has been made evident that the cattle tick can be eradicated and is doomed to be expelled from the South, and with a more recent assurance of this fact by State-wide tick-eradication laws, thousands of farmers have gone into the cattle business who would not do so before. The work has not only removed the tremendous danger but has demonstrated that cattle can be produced now much more cheaply pound for pound than when both cattle and ticks had to be fed.

With the exception of a few sections of the South the eradication work has progressed rapidly enough to make for the best welfare of the beef-cattle industry, in view of the fact that the farmers at the outset of the transformation were cotton raisers and not cattlemen, and that therefore it was necessary for them to learn the business as they gradually grew into it instead of plunging into the business and learning it afterward.

Progress in tick eradication in 11 cotton-belt States

(July 1, 1906, to Dec. 1, 1917.)

State.	Counties infected July 1, 1906.	Counties infected Dec. 1, 1917.		Counties released.		Area infected July 1, 1906.	Area infected Dec. 1, 1917.	Area released.	
		Whole.	Part.	Whole.	Part.				
	No.	*No.*	*No.*	*No.*	*No.*	*Square miles.*	*Square miles.*	*Square miles.*	*P. ct.*
Texas	198	154	3	41	3	191, 885	142, 918	48, 967	26
Oklahoma[1]	[1]61	22	10	25	14	47, 890	22, 377	25, 513	53
Louisiana	63	49	2	12	2	45, 409	37, 824	7, 585	17
Arkansas	75	27	6	42	6	52, 525	20, 952	31, 573	60
Mississippi	81			81		46, 362		46, 362	100
Alabama	67	27	3	37	3	51, 279	19, 918	31, 361	61
Tennessee	42			42		16, 987		16, 987	100
Florida	50	46	1	3	1	54, 861	49, 961	4, 900	9
Georgia	149	79		70		57, 438	35, 324	22, 114	39
South Carolina	44	10		34		30, 495	8, 619	21, 876	72
North Carolina	75	21	2	52	2	37, 365	9, 674	27, 691	74
Total	905	435	27	439	31	632, 496	347, 567	284, 929	45

[1] Only portions of 5 of the 61 counties were quarantined.

Cattlemen of the South now recognize the fact that inasmuch as the ultimate aim of the cattle industry is to put cattle on the market for slaughter, it is important that they adopt the most effective means of making them bring the best possible results and at the same time enrich their land, and that success may be expected just in proportion as they handle the proposition with intelligence and discrimination, doing away with all haphazard methods and having a definite and concrete purpose in view. They are divorcing themselves from all speculative ideas and devoting their operations to a systematic production of beef cattle for practical market purposes which is commanding for them the growing respect of the cattle markets.

BREEDING HORSES FOR THE UNITED STATES ARMY.

By H. H. Reese,
Animal Husbandry Division, Bureau of Animal Industry.

FOR SEVERAL years the United States Government has been confronted with the difficult task of obtaining a sufficient number of horses of the right types for cavalry and light artillery use. Such types of horses have been scarce and are gradually becoming scarcer because motor-propelled vehicles have curtailed the demand for driving and delivery-wagon horses to such an extent that farmers have practically discontinued the breeding of light horses and instead have turned their attention to the production of draft horses. While our draft-horse stock has been improving in quality in recent years, our light-horse stock has been deteriorating.

In an effort to remedy this condition, which was of direct importance to the military strength of our Nation, because the War Department had depended upon the light horses produced by private breeders for its supply of Army horses, Congress provided in a limited way to encourage the production of such horses. The results of this undertaking, which are discussed herewith in detail, have been satisfactory. In order to furnish an adequate supply of light horses for our Army on a peace footing as well as to create a reserve which will be needed in recouping an Army actively engaged in war, when the demands are infinitely greater, this plan of encouragement should be considerably increased in scope.

GOVERNMENT ENCOURAGEMENT.

This plan of encouraging farmers in certain localities in producing more and better light horses, especially of military types, was put into operation beginning with the breeding season of 1913. The work was assigned to the Department of Agriculture, this department cooperating with the War Department in the furtherance of this plan. The plan adopted by the Government consists primarily in placing sound stallions of proper type and belonging to the Thoroughbred, American Saddle, Standardbred, and Morgan breeds in suitable localities. The work was inaugurated in the States of Vermont, New Hampshire, Virginia, West Virginia, Kentucky, and Tennessee.

STALLIONS USED.

The Government purchased only stallions of merit. The first requisites were that they should be good, sound individuals and registered in the proper studbooks. Good breeding was sought, and in many cases stake and show-ring winners were obtained, but they were selected more largely on account of conforming to the saddle or artillery type than because of any previous records or solely on account of pedigree. The following stallions were purchased:

Stallions purchased by the Government.

Name.	Year foaled.	Color.	Height.	Weight.	Breeding.
THOROUGHBREDS.			*Hands.*	*Pounds.*	
Charcot	1903	Brown	16	1,240	By Common; dam, Spanish Match, by Royal Hampton.
Gold Heels	1899	Bay	15.1¾	1,170	By The Bard; dam, Heel and Toe, by Glenelg.
Kind Sir	1909	...do	15.3	1,100	By Flambeau; dam, Floradora, by Meddler.
Myles O'Connell	1907	Brown	15.3½	1,100	By Milos; dam, Meteora, by Magnet.
Jack Parker	1906	Chestnut	16.0½	1,190	By Golden Garter; dam, Flora Mac, by Falsetto.
Ganadore	1909	Bay	16.0½	1,100	By The Commoner; dam, Mountain Mist, by Magnetizer.
Lynchburg	1909	Brown	15.2½	1,050	By The Scribe; dam, Rose Washington, by Faustus.
Single File	1908	Bay	16.1	1,140	By Sir Dixon; dam, Single Shot, by Star Shoot.
Demodus	1910	...do	15.3½	1,070	By Nasturtium; dam, Iveragh, by Springfield.
SADDLE HORSES.					
Richmond Choice 4578	1910	Black	15.3	1,175	By Rex Peavine 1796; dam, Dianah Mason 5816, by King Richard 2879.
Victor Peavine 5264	1911	Chestnut	15.2	1,100	By Rex Peavine 1796; dam, Pattie Stone 5773, by King Richard 2879.

Stallions purchased by the Government—Continued.

Name.	Year foaled.	Color.	Height.	Weight.	Breeding.
SADDLE HORSES—con.			*Hands.*	*Pounds.*	
Fairacre King 4059......	1909	Chestnut	15.2½	1,090	By Bourbon King 1788; dam, Aletha Chief, by Bourbon Chief 976.
Young Bill 5910.........	1908	...do ...	15.2½	1,100	By Golden King 2359; dam, Mary Wells 2784, by Bourbon Chief 976.
Beechwold Chester 6226.	1906	Brown..	16.	1,150	By Happy Dare 1870; dam, Mollie Nichols 4788, by Denmark Chief J. B. 682.
Captain Peary 4161.....	1909	Bay.....	15.2½	1,050	By Highland Flower 1662; dam, Nancy Lee 476, by Monte Cristo 59.
Hamilton's Chief 5801...	1908	Chestnut	15.3	1,060	By Bourbon Chief 976; dam, Belle McDonald 1499, by Rex McDonald 833.
Highland Cloud 3490...	1908	Bay.....	16	1,250	By Cloud King 2198; dam, Valeda 2613, by Highland Denmark 730.
Jesse Dare 6100..........	1907	Chestnut	16.2	1,265	By Highland Dare 1534; dam, Lizzie Squirrel 9091, by Black Squirrel 58.
Judge Collins 2553......	1904	Bay.....	16.1	1,120	By Highland Denmark 730; dam, Nora N 2071, by Black Squirrel 58.
High Vine 2733.........	1904	Chestnut	15.1½	1,160	By Highland Gaines 1667; dam, Bessie Sable 2882, by Shropshire Kentucky Squirrel 1365.
STANDARDBREDS.					
MacNunne 45328........	1906	Bay.....	16.2½	1,300	By McDougall 33606; dam, The Nunne, by Young Jim 2009.
Sigler 51525..............	1909	...do ...	15.2½	1,180	By Red Medium 30516; dam, Maud Sigler, by Wilton 5982.
Lord Rion 52777........	1906	...do ...	16	1,160	By Arion 18000; dam, Madge Fullerton, by Young Fullerton 3528.
Twilight M. 41993.......	1905	Chestnut	15.2¾	1,160	By Delmont J. 39474; dam, May Fry, by Charleston 9589.
Be Guo 52852...........	1905	Bay.....	15.3	1,075	By Wiggins 33907; dam, Lady Crescent, by Cyclone 1956.
King Spier 46820........	1907	Brown..	15.2	1,160	By Directum Spier 35012; dam, Lady Thisbe, by Milroi 20585.
Richford Jay 52050......	1909	Bay.....	16	1,300	By Jay McGregor 37692; dam, Ecka, by Richford Baron 44951.
Glacier B. 32181.........	1899	Black...	15.2	1,100	By Bob Mc 20539; dam, L. E. W., by Clark Chief, jr. 2110.
The Tribesman 54716...	1907	Brown..	15.2½	1,050	By The Clansman 40942; dam, Black Eagle Belle, by Bow Bells 13073.

Stallions purchased by the Government—Continued.

Name.	Year foaled.	Color.	Height.	Weight.	Breeding.
STANDARDBREDS—con.			*Hands.*	*Pounds.*	
Hamlin McKinney 53966	1907	Bay.....	15.1	1,000	By McKinney 8818; dam, Lucinda Hamlin, by Mambrino King 1279.
MORGANS.					
Daniel Webster Lambert 6529.	1907	Chestnut	$14.2\frac{1}{2}$	925	By Lambert B. 5238; dam, Aggie, by Cobden 1515.
Madison Lambert 6530..	1907	Bay.....	15.1	1,030	By Lambert B. 5238; dam, Jessie T., by Harlus.
Donlyn 5849............	1909	...do....	14.3	1,000	By Donald 5224; dam, by Billy Roberts, 4550.

In addition to the above-mentioned stallions the following thoroughbreds have been donated to the Government and have been used in the remount-breeding work of the Agricultural Department, and the Morgans named below, from the United States Morgan Horse Farm, Middlebury, Vt., have also been used in this work.

Stallions donated to the Government.

Name.	Year. foaled.	Color.	Height.	Weight.	Breeding.
THOROUGHBREDS.			*Hands.*	*Pounds.*	
Henry of Navarre [a]	1891	Chestnut	$15.1\frac{3}{4}$	1,100	By Knight of Ellerslie; dam, Moss Rose, by Ill-Used.
Octagon [b]	1894	...do ...	$16.1\frac{1}{2}$	1,200	By Rayon d'Or; dam, Ortegal, by Bend Or.
Belfry II..............	1908	Bay.....	16.1	1,200	By Rock Sand; dam, Beldame, by Octagon.
Footprint.......	1908	Chestnut	16.1	1,200	By Rock Sand; dam, Fetish, by Rayon d'Or.
Dandy Rock...	1910	Brown..	15.3	1,150	By Rock Sand; dam, Donna Mia, by Ill-Used.
Boola Boola............	1907	...do....	16	1,200	By Ben Brush; dam, The Mecca, by Midlothian.
Black Dick............	1898	Black...	$16.0\frac{3}{4}$	1,150	By Sir Dixon; dam, Merdin, by Hindoo.
Merry Task............	1907	Bay.....	16	1,150	By Octagon; dam, Merry Token, by Merry Hampton.
Saint Rock............	1913	Chestnut	16	1,100	By Rock Sand; dam, St. Pricilla, by Rayon d'Or.

[a] Octagon, Henry of Navarre, Belfry II, Footprint, and Dandy Rock were donated by Mr. August Belmont, of New York, N. Y., prior to 1913. Boola Boola was donated by Mr. Johnson N. Camden, of Versailles, Ky., in January, 1913. Black Dick was donated by Mr. Thomas Nelson Page, of Virginia, in November, 1915. Merry Task and Saint Rock were donated by Mr. August Belmont in July, 1917.

[b] Octagon died July 3, 1917.

Stallions donated to the Government—Continued.

Name.	Year foaled.	Color.	Height.	Weight.	Breeding.
MORGANS.			*Hands.*	*Pounds.*	
Bennington 5693	1908	Bay	15.1	1,060	By General Gates 666; dam, Mrs. Culvers (3711) (s).
Castor 5833	1909	...do	14.3	1,000	By General Gates 666; Babe, by Bob Morgan 4549.
Red Oak 5249	1906	...do	15	1,040	By General Gates 666; dam, Marguerite, by White River Morgan 482.
Snoqualmie 5783	1909	...do	15	1,000	By Troubadour 5125; dam, Sarah, by Gov. Fiske 3971.
Troubadour of Willowmoor 6459.	1910	...do	15.1	1,135	By Troubadour 5125; dam, Bob Morgan 4549.

TERMS.

The terms under which mares may be bred to these stallions are as follows: The owner of the mare agrees in writing at the time of breeding to give the Government an option on the resulting colt as a 3-year-old at a stated price which so far has been $150. No service fee is charged unless the owner of a colt wishes to be released from the option, in which case it is $25 for a mature stallion. This means that practically no money is invested in service fees. If the colt is purchased by the Government no service fee is charged. If the colt is offered to the Government and purchase refused, no service fee is charged. The breeder does not have to pay a service fee on a colt which dies, which is deformed, or which is seriously injured.

LOCALITIES.

In order to facilitate the supervision of the remount-breeding work the territory used was divided into three districts, that known as the first district, including the States of Vermont and New Hampshire; the second, the States of Virginia and West Virginia; and the third, the States of Kentucky and Tennessee. Morgan stallions alone were assigned to the first district. In the second district Thoroughbred, Standardbred, and American Saddle stallions are in use. In the third district the stallions belong to the Standardbred and American Saddle breeds.

Assignment of stallions to localities, by years.

Stallion.	Locations each year.				
	1913	1914	915	1916	1917
Beechwold Chester	Leitchfield, Ky	Leitchfield, Ky	Leitchfield, Ky	Leitchfield, Ky	Leitchfield, Ky.
Be Gue	Shelbyville, Ky	Shelbyville, Ky	Henderson, Ky	Henderson, Ky	Henderson, Ky.
Belfry	Staunton, Va	Staunton, Va	Staunton, Va	Staunton, Va	Staunton, Va.
Bennington	Northfield, Vt	Williamstown, Vt	Randolph Center, Vt	Alburg, Vt	Alburg, Vt.
Black Dick				Reform, Va	Orange, Va.
Boola Boola	Lexington, Va., and Gloucester, Va.	Washington, Va	Washington, Va	Front Royal, Va	Front Royal, Va.
Captain Perry	Clinton, Ky	Clinton, Ky	Clinton, Ky	Clinton, Ky	Clinton, Ky.
Castor	West Fairlee, Vt	Chelsea, Vt	Chelsea, Vt	Chelsea, Vt	
Charcot	Aldie, Va., and Orange, Va.	Orange, Va	Harrisonburg, Va	Harrisonburg, Va	Orange, Va.
Dandy Rock	Gainesville, Va	Fredericksburg, Va	Fredericksburg, Va	Middletown, Va	Middletown, Va.
Daniel Webster Lambert.		Grand Isle, Vt	Alburgh, Vt		
Demodus	Boyce, Va	Boyce, Va	Not used after 1914		
Donlyn	Hartland Four Corners, Vt.	Woodstock, Vt	Woodstock, Vt	Woodstock, Vt	Woodstock, Vt.
Fair Acre King	Gallatin, Tenn	Gallatin, Tenn	Gallatin, Tenn	Gallatin, Tenn	Gallatin, Tenn.
Footprint	Gainesville, Va	Gainesville, Va	Gainesville, Va	Gainesville, Va	Washington, Va.
Ganadore	Orange, Va	Bluemont, Va	Bluemont, Va	Washington, Va	Bluemont, Va.
Glacier B	Huntington, W. Va	Huntington, W. Va	Huntington, W. Va	Huntington, W. Va	Harrisonburg, Va.
Gold Heels	Gainesville, Va	Gainesville, Va	Gloucester, Va	Washington, Va	
Hamlin McKinney	Falmouth, Ky	Henderson, Ky	Not used after 1914		
Hamilton's Chief	Stanford, Ky	Stanford, Ky	Stanford, Ky	Stanford, Ky	Stanford, Ky.
Henry of Navarre	Front Royal, Va	Front Royal, Va	Front Royal, Va	Front Royal, Va	Front Royal, Va.

Highland Cloud	Morgantown, W. Va	Died in 1915			
High Vine	Point Pleasant, W. Va	Point Pleasant, W. Va	Point Pleasant, W. Va	Point Pleasant, W. Va	
Jack Parker	Harrisonburg, Va	Harrisonburg, Va	Not used after 1914		
Jesse Dare	Albany, Ky., and Huntington, W. Va.	Falmouth, Ky	Falmouth, Ky	Falmouth, Ky	Falmouth, Ky.
Judge Collins	Falmouth, Ky	Not used after 1913			
Kind Sir	Crabbottom, Va	Huntington, W. Va., Point Pleasant, W. Va.	Middletown, Va	Nokesville, Va	Nokesville, Va.
King Spier	Barber, Va	Barber, Va	Barber, Va	Barber, Va	Huntington, W. Va.
Lord Rion	Gallatin, Tenn	Gallatin, Tenn	Gallatin, Tenn	Gallatin, Tenn	Kevil, Ky.
Loyal D			Gallatin, Tenn	Gallatin, Tenn	Clinton, Ky.
Lynchburg	Monterey, Va	Gloucester, Va	Madison, Va	Madison, Va	Gainesville, Va.
MacNunne	Morgantown, W. Va	Woodstock, Va	Woodstock, Va	Woodstock, Va	Fredericksburg, Va.
Madison Lambert	West Claremont, N. H	Piermont, N. H			
Myles O'Connell	Sweet Briar, Va	Lexington, Va	Not used after 1914		
Octagon	Front Royal, Va	Front Royal, Va	Front Royal, Va	Front Royal, Va	Front Royal, Va.
Red Oak	Plainfield, Vt	Plainfield, Vt	Middlebury, Vt	Middlebury, Vt	Middlebury, Vt.
Richford Jay	Fredericksburg, Va	Fredericksburg, Va	Fredericksburg, Va	Fredericksburg, Va	Woodstock, Va.
Richmond Choice	Front Royal, Va	Staunton, Va	Staunton, Va	Staunton, Va	Point Pleasant, W. Va.
Sigler	Terra Alta, W. Va	Terra Alta, W. Va	Falmouth, Ky	Falmouth, Ky	Falmouth, Ky.
Single File	Madison, Va	Madison, Va	Not used after 1914		
Snoqualmie	Woodsville, N. H	Woodsville, N. H	Monroe, N. H	Tunbridge, Vt	South Peacham, Vt.
The Tribesman	Dixon, Ky	Dixon, Ky	Dixon, Ky	Dixon, Ky	Dixon, Ky.
Troubadour	Orfordville, N. H	West Claremont, N. H	Perkinsville, Vt	Perkinsville, Vt	Perkinsville, Vt.
Twilight M	Kevil, Ky	Kevil, Ky	Kevil, Ky	Kevil, Ky	Gallatin, Tenn.
Victor Peavine	Front Royal, Va	Front Royal, Va	Front Royal, Va	Washington, Va	Staunton, Va.
Young Bill	Mount Sterling, Ky	Mount Sterling, Ky	Mount Sterling, Ky	Mount Sterling, Ky	Mount Sterling, Ky.

Within these districts Government stallions are sent to particular localities where there is a local demand for them. The class of mares in such localities, the lack of good light stallions, the topography of the soil, and the accessibility of the locality are all given consideration before stallions are assigned to particular points. So long as the results justify it, remount stallions are returned to their respective localities each season. For the season of 1917, however, the localities at which remount stallions stood remained practically the same as they were in 1916, but in many instances a different stallion was assigned to a particular point. This was deemed advisable in order that any 3-year-old fillies sired by remount stallions might be bred to other remount stallions provided they were sufficiently well developed. This plan of changing a stallion every four years has recently been made even more desirable because of an agreement with the War Department that owners of 3-year-old fillies might retain them without the payment of a service fee. It is assumed that many of these fillies will eventually be bred if they are not bred as 3 or 4 year olds. This will permit of a grading-up process for particular types of horses that will be discussed in detail further on. (For assignment of stallions to localities see table on the two preceding pages.)

CLASS OF MARES BRED.

On account of the provision for free service, mares possessing the following unsoundnesses are not bred to Government stallions: bone spavin, ringbone, heaves, stringhalt, roaring, periodic ophthalmia (moon blindness), and blindness, partial or complete. Mares are selected for breeding to Government stallions that approach either a cavalry or light artillery type. The selection of mares proves an important educational feature as well as assures a much better class of army horses from the first cross. Following are the specifications for cavalry and light artillery types, as appearing in the War Department pamphlet issued in 1916 giving specifications for horses and mules:

Mature cavalry horses and saddle horses for mountain artillery, Signal Corps, Engineer Corps, infantry, and other purposes:

The mature horse must be sound, well bred, of a superior class, and have quality; gentle and of a kind disposition; well broken to the saddle, with light and elastic mouth, easy gaits, and free and prompt action at the walk,

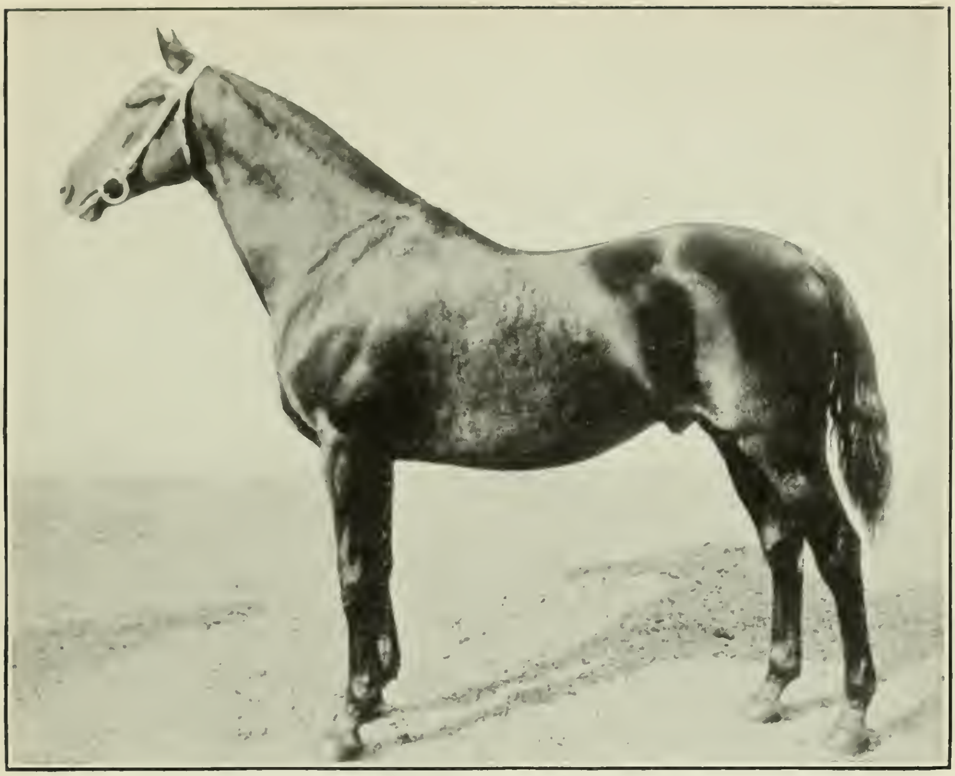


FIG. 1.—THOROUGHBRED STALLION, HENRY OF NAVARRE

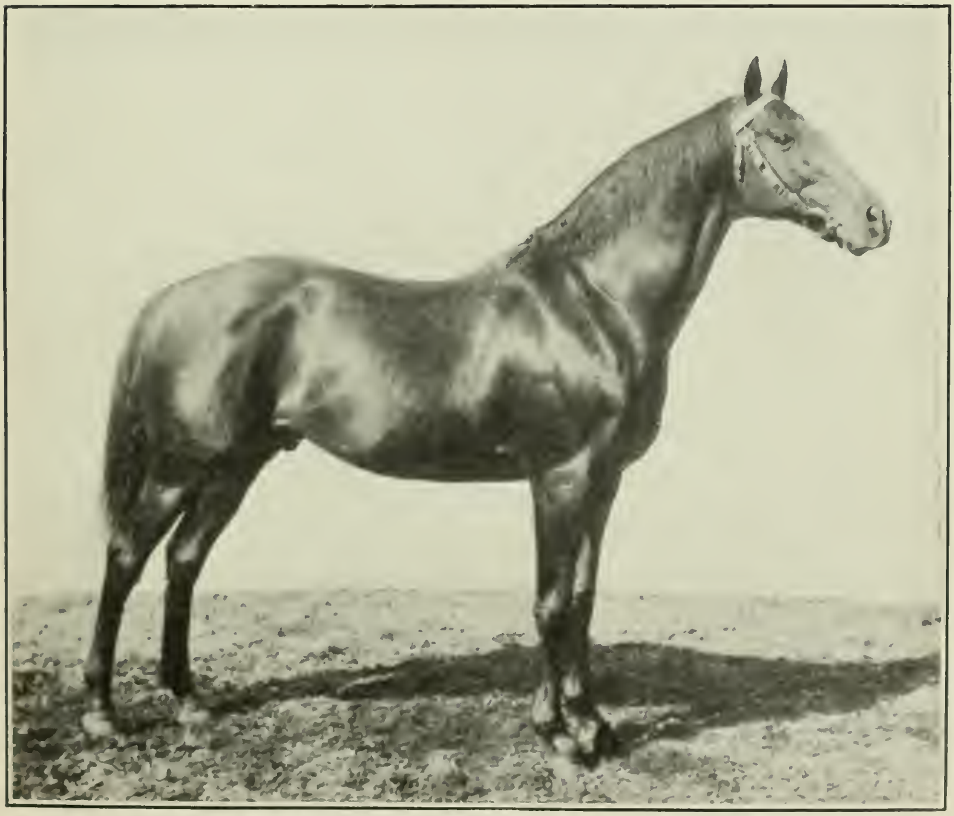


FIG. 2.—THOROUGHBRED STALLION, FOOTPRINT.

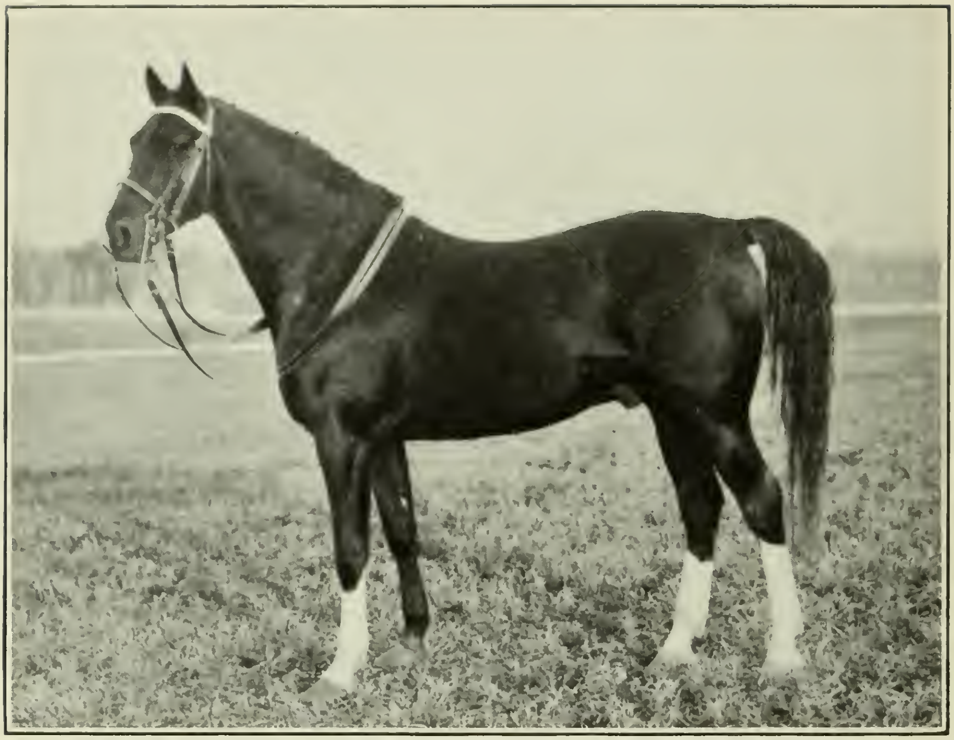


FIG. 1.—SADDLE STALLION, FAIR ACRE KING.

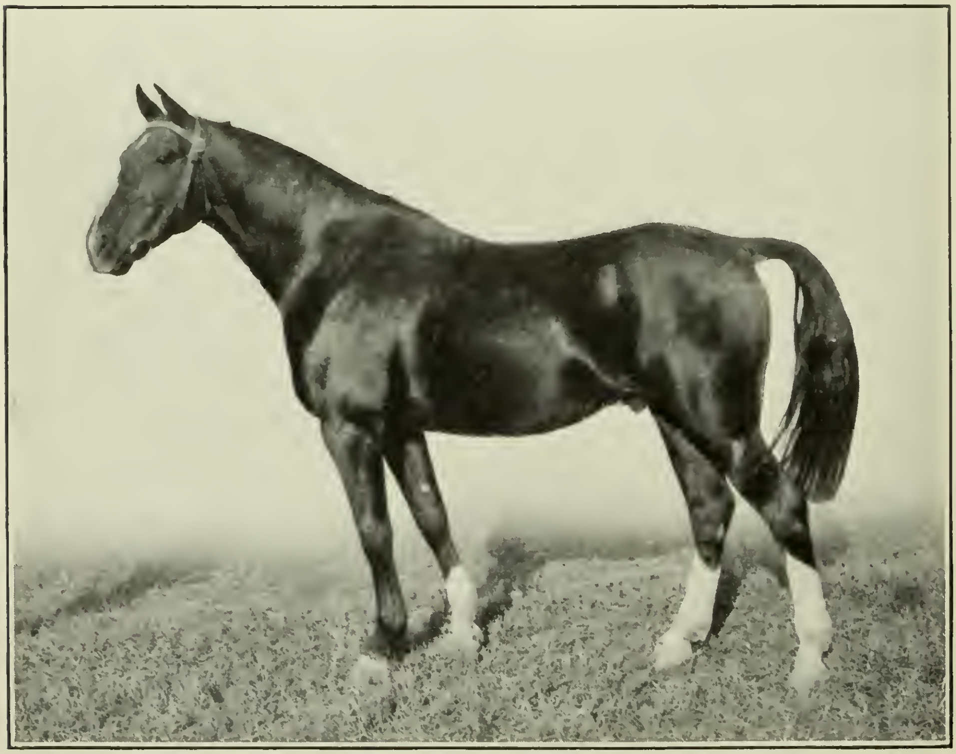


FIG. 2.—STANDARDBRED STALLION, TWILIGHT M.

FIG. 1.—MORGAN STALLION, BENNINGTON.

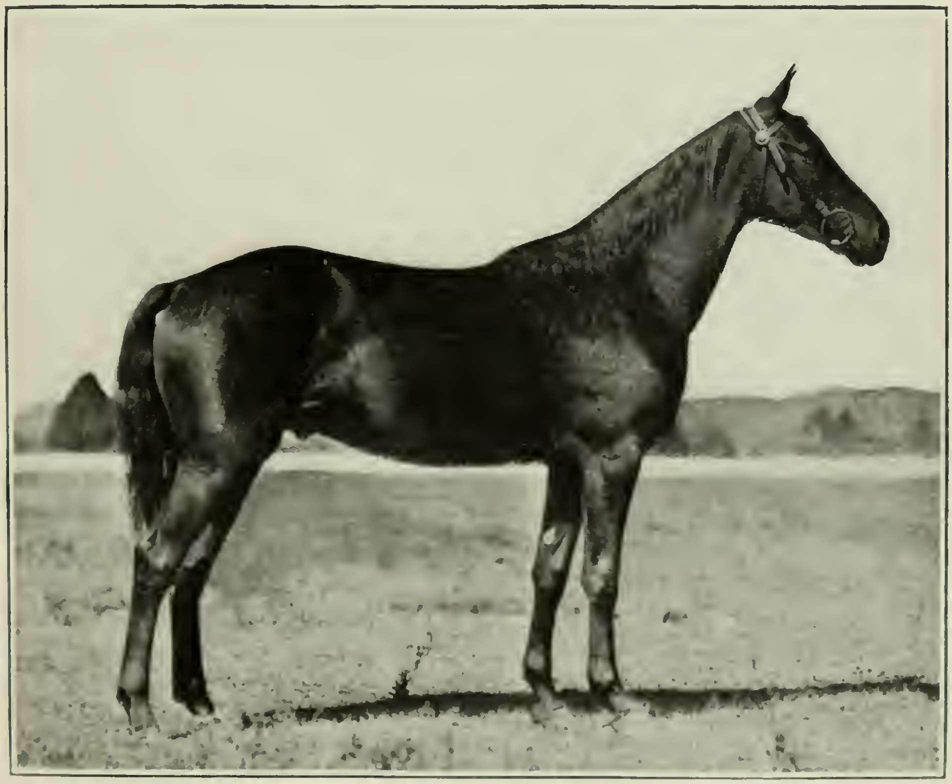


FIG. 2.—THREE-YEAR-OLD COLT SIRED BY GOVERNMENT STALLION.

FIG. 1.—SADDLE STALLION, JESSE DARE.

FIG. 2.—FOUR-YEAR-OLD SIRED BY GOVERNMENT STALLION.

Initials U. S. R. mean United States remount.

trot, and gallop; free from vicious habits, without material blemish or defect.

A gelding of specified color, in good condition, from 5 to 8 years old at time of purchase; weighing from 950 to 1,200 pounds, depending on height, which should be from 15 to 16 hands, and otherwise to conform to general description for horses.

Artillery horses for light and horse batteries:

The artillery horse for light and horse batteries must be sound, well bred, of a superior class, and have quality; of a kind disposition, well broken to harness, and gentle under the saddle, with easy mouth and gaits, and free and prompt action at the walk, trot, and gallop; and free from vicious habits; without material blemish or defect.

A gelding of specified color, in good condition, from 5 to 8 years old at time of purchase; height from 15½ to 16 hands; weight from 1,150 to 1,300 pounds, depending on height, and otherwise to conform to general description for horses, except that the neck and shoulders of the artillery horse should be somewhat more heavily muscled than the cavalry horse, and shoulders so formed as to properly support the collar.

Horses otherwise satisfactory which fall short of or exceed these limits of weight by not more than 50 pounds, due to temporary conditions, may be accepted.

The artillery horse for light and horse batteries is required for quick draft purposes, and should be heavy enough to move the carriage ordinarily by weight thrown into the collar rather than by muscular exertion. Long-legged, loose-jointed, long-bodied, narrow-chested, coarse, and cold-blooded horses, as well as those which are restive, vicious, or too free in harness, or which do not upon rigid inspection meet the above requirements in every respect, will be rejected.

RESULTS OBTAINED FROM STALLIONS.

Summary of stallions' records.

Breeding season.	Number of stallions.	Number of mares bred.	Average number of mares bred per stallion.	Living foals.	Aborted or dead foals.	Number of mares failing to get with foal.	Per cent of mares impregnated.
1913	41	1,551	38	606	111	834	46
1914	43	2,014	47	818	109	1,087	46
1915	37	2,150	58	948	129	1,073	50
1916	36	2,019	56	[a] 717			
1917	35	[a] 1,448					

[a] Includes only reports received to June 30, 1917.

Sterility in various forms is the chief cause of stallions not getting a larger percentage of mares in foal. In the Army horse-breeding work an effort is made to eliminate mares thus afflicted as quickly as they are detected. With all precautions, however, a certain percentage of sterile mares will be bred. The failure of the owner to return his mare at the proper time to have her tried and rebred if necessary is another cause of stallions not foaling a larger percentage of their mares. To counteract these conditions mares bred to remount stallions are given artificial services when practicable, as this form of service sometimes impregnates mares after a natural service has failed.

Allowing for the above-mentioned disadvantages, remount stallions have made a good showing in the number of colts obtained, 3,089 having been dropped since the beginning of the work to June 30, 1917. There has been an increase in the number of colts obtained annually per stallion, which signifies that a better class of mares is being bred each year and that the remount breeding work is undergoing conservative development.

PURCHASES BY THE WAR DEPARTMENT IN 1917.

As previously stated, the first appropriation for the remount breeding work was made available for the breeding season of 1913, making the first crop of 3-year-old colts available for inspection and purchase by the War Department in 1917. The inspection was made during the months of April and May, and the results are summarized in the accompanying table. An early inspection of the first crop of 3-year-olds was deemed advisable in order that farmers would be assured that the Government was anxious to purchase those colts which were up to the specifications, and it was thought this would be apt to stimulate the breeding of desirable mares in 1917. Also, as the War Department was expecting soon to purchase a large number of mature horses for the European conflict, it was necessary to have the purchase of colts completed at an early date. While an early inspection had its advantages, it also had disadvantages, due to the fact that the previous winter had been a hard one on stock generally and many colts were submitted which were too thin to be accepted by the War Department. A few were under the required height and were not purchased. Many such colts would probably have passed had they been inspected after having been on good pasture two or three months; consequently, circumstances permitting, colts will be inspected in the middle of the summer in the future.

Results of inspection and purchase of 3-year-old colts in 1917.

Stallion	Colts available.	Colts died.	Service paid.	Fillies retained.	Not shown at inspection.	(Rejected causes.) Undersized.	Poor conformation.	Physical defects.	Color.	Uncastrated.	Purchased. Colts.	Fillies.
Beechwold Chester	15	1	0	3	2	3	1	1	1	0	2	1
Be Gue [a]	4	0	0	1	0	1	0	1	0	0	0	0
Belfry	17	4	2	3	1	2	0	1	2	0	1	1
Bennington	21	6	0	4	1	0	.0	3	0	0	4	3
Boola Boola [b]	15	0	1	2	0	2	0	2	0	0	4	5
Captain Peary	19	2	0	8	3	2	0	0	0	0	3	1
Castor	23	3	1	3	1	7	1	0	0	2	2	3
Charcot	14	4	2	1	3	2	1	0	1	0	0	0
Dandy Rock	6	2	0	0	1	2	0	0	0	0	0	1
Daniel Webster Lambert	1	0	1	0	0	0	0	0	0	0	0	0
Donlyn	13	4	1	1	0	3	0	0	0	2	1	1
Fair Acre King	7	0	0	3	0	1	0	0	0	0	2	1
Footprint	21	2	2	0	10	0	0	0	0	0	4	3
Ganadore	21	3	1	3	2	3	0	1	1	0	2	5
Glacier B	21	5	1	4	2	1	3	0	3	1	1	0
Gold Heels	10	1	0	1	3	1	0	0	0	0	1	3
Hamilton's Chief	16	0	0	9	0	1	1	0	0	0	2	3
Henry of Navarre	16	4	0	1	1	1	0	0	0	0	5	4
Highland Cloud	11	1	0	3	1	2	1	0	1	0	2	0
High Vine	26	3	1	2	4	2	0	4	0	0	6	4
Jack Parker	6	0	1	0	1	1	0	0	0	0	0	3
Jesse Dare	26	0	1	16	2	0	0	0	0	5	2	0
Judge Collins	12	0	0	1	0	0	2	0	1	0	4	4
Kind Sir	3	0	0	0	3	0	0	0	0	0	0	0
King Spier	17	2	0	1	0	6	0	1	0	1	2	4
Lord Rion	7	0	1	1	0	1	1	0	0	0	2	1
Lynchburg	5	0	0	0	3	0	0	0	0	0	0	2
MacNunne	11	0	1	5	0	2	0	1	0	0	1	1
Madison Lambert	13	1	1	1	0	2	2	0	0	4	1	1
Octagon	20	0	2	1	5	0	1	0	0	0	7	4
Red Oak	14	6	0	2	0	1	1	0	2	0	2	0
Richford Jay	27	1	2	2	1	1	3	1	2	0	11	3
Richmond Choice	1	0	0	0	1	0	0	0	0	0	0	0
Sigler [c]	13	1	0	2	3	1	1	....	....	....	0	0
Single File	23	4	0	4	1	2	1	0	1	0	4	6
Snoqualmie	14	2	0	2	0	2	6	0	1	1	0	0
The Tribesman	19	1	0	9	1	1	1	0	0	0	4	2
Twilight M	28	1	0	4	0	3	1	4	0	0	8	7
Young Bill	19	0	0	8	4	0	0	0	0	0	4	3
Total	575	64	22	111	60	59	28	20	16	16	94	80

[a] One Be Gue colt passed inspection, but was not purchased, as shipping expenses would have made it impracticable.

[b] One Boola Boola colt purchased on which service fee had previously been paid.

[c] Purchasing officer decided not to incur shipping expenses on the few Sigler colts available, as owners preferred to keep them.

One hundred and seventy-four colts were purchased by the War Department, and 60 colts were not submitted for inspection. Service fees will be paid on some of the latter, and the others will be inspected later. One hundred and eleven fillies were retained by their owners, and it is probable that a large per cent of these will eventually be used as brood mares. Also, some of the 59 undersized 3-year-olds were fillies, and these too may add to the future brood-mare supply. This feature must be given due credit because the subsequent use of these fillies for breeding purposes will be a far-reaching one, both to the communities in which they are owned and to the Government.

The undersized colts will be inspected again as 4-year-olds, and the War Department will purchase any which have developed sufficiently to meet its requirements. In the meantime, or after the first inspection, the owner is relieved of the option and may dispose of the colt as he sees fit. Sixteen colts were submitted which had not been castrated, and they were not purchased, although they will be in the future, provided that in the meantime they are castrated and otherwise come up to the specifications. The five uncastrated colts by Jesse Dare were so much superior to anything else in the vicinity of Albany, Ky., that the owners wished to keep them for breeding purposes. Service fees were paid on 22 colts, and 64 had died or were reported dead, between the time of making up the statements of the number available and the time of inspection.

Such conditions, together with the fact that this is the result of the first year's breeding, accounts for the War Department's not getting so large a number of colts as may well be expected in the future when the work has been brought to greater proficiency and breeders better understand the working of the plan and the class of colts required by the Government. The first few years' work must be regarded partially as pioneer work. At that, a very large percentage of the colts were desirable. Deducting the number of dead colts and the number not brought in for inspection from the number available, leaves 451 that were actually inspected. The colts which the War Department purchased, the fillies which were retained by their owners, and the colts on which the service fees were paid constitute over 68 per cent of those inspected. These are desirable colts and as a class are considerably above the average. The colts rejected on account of their color were mainly excellent individuals. As just pointed out, many of the undersized colts will very probably average high as to individuality, and some of them may be purchased at a future inspection. Considering these facts, to state that 68 per cent of the colts were above the average does not tell the whole story, as this percentage will undoubtedly be considerably higher after subsequent inspections have been made. Had the off-color colts been graded and included in computing the percentage, it would have been higher.

ADVANTAGES OF REMOUNT PLAN.

Another plan that has been suggested for the production of Army horses is for the Government to maintain sufficient brood mares from which to raise its own horses. This would necessitate the purchase and maintenance of several thousand mares, practically all of which would be idle. Under very favorable conditions and with maximum results each colt produced would readily cost considerably over $100 the day it was foaled, and with the cost of rearing added to this, the cost to the Government of colts reared in this way would be far in excess of the cost of colts produced under the plan now in operation, besides taking an important side line from farmers. Under the present plan the brood mares are usually farm work mares which generally pay for their feed by doing farm work, and the colts are produced at birth without cost.

Under present market conditions there is little opportunity for an owner to make money by standing a high-class light stallion, because farmers generally prefer to breed to a draft horse. Consequently, where light stallions are available in farming sections they are likely to be very cheap horses, because such horses have some chance of doing a fairly profitable business by standing for a low service fee. Cheap stallions also are usually peddled from farm to farm, and some farmers persist in using such horses on account of their convenience and low fee. Inferior stallions are largely responsible for the scrubs and misfits. By furnishing high-class stallions at a nominal fee and offering a market for the colts, as the Government is doing, this condition will be largely corrected.

Community breeding has been of inestimable value to the live-stock interests of England and France. It has been successful in this country where given a fair trial. The chief difficulty with this plan of breeding in this country is to get farmers to organize and stay organized. Under the remount plan of breeding the Government takes care of all necessary organization, and it is not necessary for the farmer to do anything more than breed the mares and raise colts. This plan of breeding will eventually lead to community breeding if localities fortunate enough to be selected by the Government as a stand for their stallions will give the support which the system justifies.

No constructive effort has heretofore been made in this country to produce horses of cavalry and artillery types. Horses of these types have been selected from among those that were bred to trot fast, for running speed, for high action, or for saddle gaits, but which did not inherit these characteristics in sufficient degree to make them valuable for the purpose for which they were bred. The object of the remount breeding work is to select for and breed sound horses with quality, stamina, and endurance, and conforming to the cavalry or artillery types. Such animals will also be useful, especially in mountainous sections, for riding and driving purposes and for general farm work.

Records of the Department of Agriculture show just where the colts are. They are in limited areas and are readily inspected and assembled for shipment. Much money will consequently be saved by the Government in travel and shipping expenses.

IMPROVEMENTS AS WORK PROGRESSES.

The Government must make light-horse breeding as attractive in certain localities as is the raising of draft horses and mules. This must be accomplished largely by paying a suitable price for the colts, and this price must be based on the cost of production, plus a reasonable profit, and not on the present market price of light horses.

Farmers should retain their best mares for breeding purposes and properly feed and "grow out" their colts. Because of insufficient feeding some farmers do not realize the possibilities in their colts.

High-class stallions should be obtained to take the place of those which die or are no longer used. This will be possible only when sufficient funds are allowed for the work. In case a stallion fails to sire a sufficient number of the proper types of colts he is castrated.

With the provision made by the War Department for allowing owners to keep the filly foals without the payment of a service fee, a grading-up process can be carried out after the plan has been in operation for sufficient time to make a large number of mares sired by remount stallions available. As already stated, stallions will be changed in most localities every four years, and an effort will be made to return a stallion of the same breed. At some points at least it may be found desirable to do some line breeding in order more rapidly to fix and perpetuate type. Artificial insemination of mares will be relied upon more and more as the number of good mares obtained exceeds the number which can be taken care of by natural service.

AN AGRICULTURAL AS WELL AS A MILITARY PROJECT.

Notwithstanding the necessity for the remount-breeding work from a military standpoint, this work is nevertheless largely an agricultural proposition. While it is true that the draft horse is to-day looked upon as the agricultural horse in this country, still there are sections where strong, robust, light horses are preferred for farm work and are necessary for other purposes. Take the mountainous and semimountainous sections of Virginia, for instance. There are many such sections in other States as well. For soils of such topography light horses are well suited because of their activity, sure-footedness, superior lung capacity, and endurance. On such farms heavy agricultural machinery is practically out of the question, so that heavy horses will very probably never be an economic necessity. A considerable portion of such land is usually used for grazing purposes and the owners require saddle horses for getting over their farms. The roads are generally none too good, and consequently horses must be the means of transportation, during the winter at least. Many such sections do not enjoy the advantages of railroads, and farm produce must be transported many miles by wagon. For such purposes horses carrying an infusion of thoroughbred blood are very popular, and it is a common sight to see six active horses with quality, and weighing around 1,200 pounds, drawing a heavily loaded canvas-covered wagon up a mountain grade at a smart walk. It is not unusual for young horses to be purchased out of such teams and in a few months developed into officers' mounts or hunters. As an example of the usefulness of horses carrying thoroughbred blood may be cited a pair of half-bred horses that, after serving their time as hunters, were used as leaders in a farm team and in that capacity wore out three pairs of wheelers which were worked behind them. In mountain grazing sections it is practicable to raise a few colts from the farm mares and under such conditions light colts frequently pay better than draft, because such conditions are more apt to develop sure-footedness, good feet, endurance, and quality rather than weight, which is the predominant requisite of a draft horse.

In short, the Government's plan of aiding farmers in such sections in producing Army horses is giving them material aid as well as educational aid in developing an important phase of their farming operations. Good horse power is indispensable to successful farming, and good horses can not be produced without good sires. From the agricultural standpoint alone, the remount-breeding work should be extended to other suitable localities, to say nothing of the resultant effect of adding to the defensive strength of the country in a military way.

BUTTERFAT AND INCOME.

By J. C. McDowell,
Agriculturist, Dairy Division, Bureau of Animal Industry.

THE profitable dairy cow helps to feed our armed forces and will help us win the war, but the low-producing, unprofitable scrub is little better than a slacker. The unprofitable cow may enjoy perfect health and have a large appetite; she may even belong to one of the best cow families, but if she is not an economical producer she should be converted into meat.

The present, however, is not the time to dispose of dairy herds; rather it is the time to enlarge and improve them. The city, the country, and the Army need more dairy products; the dairy cow also assists greatly in maintaining permanent soil fertility; and the carefully selected, well-bred, well-fed dairy cow may still be kept at a profit. Let our slogan, therefore, be: *Careful selection, intelligent breeding, and skillful feeding.*

SELECTION.

It is well known that dairy cows, to be profitable, must be comparatively large producers, yet few people fully realize the remarkable rate at which income advances as production increases. Tabulations of 5,587 cow-testing association records from various parts of the United States, covering a period of four years, show that as the average butterfat production increased from 150 to 200 pounds, the income over cost of feed advanced from \$21 to \$34; that is, a gain of 50 pounds, or 33⅓ per cent, in production gave an increased income of 62 per cent over feed cost. The next gain of 50 pounds raised the income over cost of feed to \$50, the next to \$63, the next to \$74, the next to \$87, the next to \$100, and the last to \$118. (See Table 1.)

As the butterfat production increased from 150 pounds to 300 pounds, the income over cost of feed advanced from \$21 to \$63; in other words, as production doubled, income over cost of feed advanced three times. When the butterfat production increased from 150 pounds to 450 pounds—that is, trebled—the income over cost of feed advanced from $21 to $100, or almost five times as much. (See fig. 8.)

TABLE 1.—*Relation of butterfat production to income over cost of feed. Average results from 5,587 yearly records of 40 cow-testing associations.*

Average production of butterfat.	Average income over cost of feed.	Average production of butterfat.	Average income over cost of feed.
100 pounds per year	$5.00	350 pounds per year	$74.00
150 pounds per year	21.00	400 pounds per year	87.00
200 pounds per year	34.00	450 pounds per year	100.00
250 pounds per year	50.00	500 pounds per year	118.00
300 pounds per year	63.00		

If no expenses except the cost of feed had been considered, 1 cow that produced 450 pounds of butterfat a year would have shown as much income over cost of feed as 20 cows belonging to the group where average production was 100 pounds. Had all expenses been considered, the results would have been even more striking. As applied to any par-

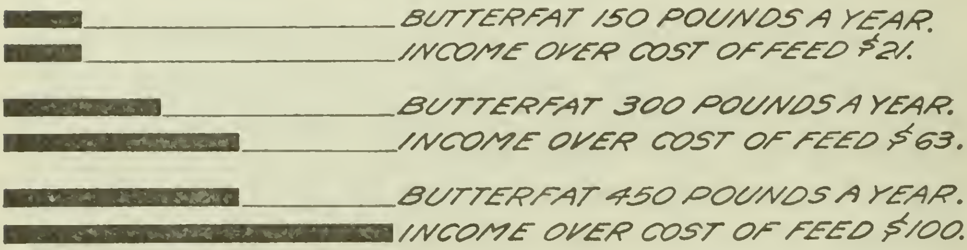


FIG. 8.—Relation of butterfat and income.

ticular herd of dairy cows, the figures are only approximate, and doubtless they are true only within a limited range of production when applied to any group of cows, yet within reasonable limits of production they appear to hold true of all classes of dairy cows regardless of breed, age, weight, date of freshening, or geographical location.

Figure 9 shows the relation between butterfat production and income over cost of feed for 5,587 cows for one year's time. These records were from 40 cow-testing associations and included all cows that were on test for the entire year and whose breed and age were given. Within the limits of production shown by the curve, the point of diminishing returns does not seem to have been reached.

A further study of the records showed that the cost of roughage was about the same for all groups, regardless of production. The cost of grain was considerably higher for the more productive cows than for the low producers, but it

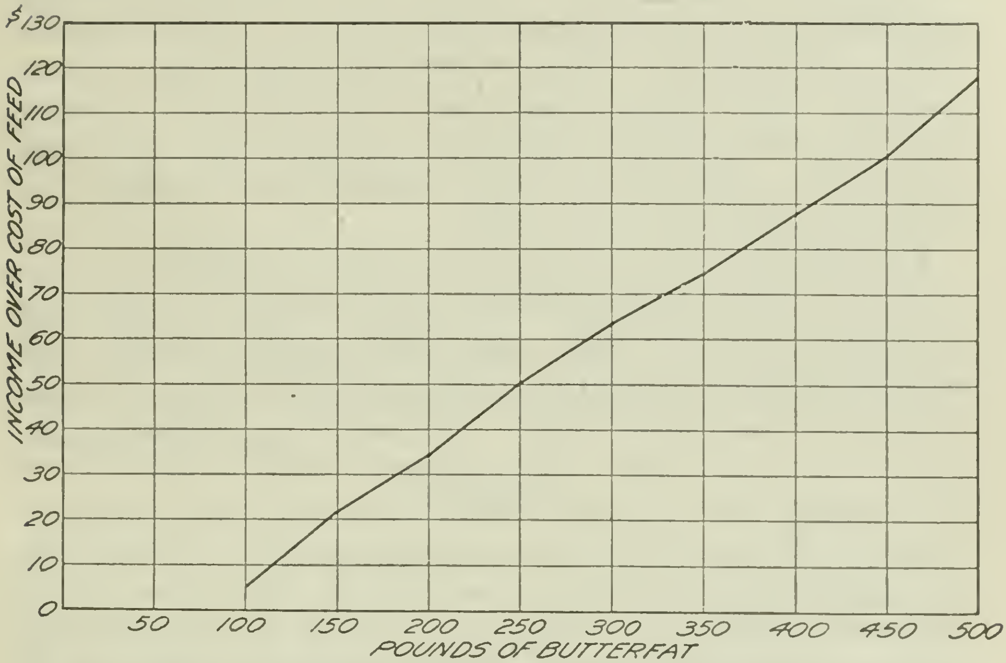


FIG. 9.—Chart showing the relation between butterfat and income over cost of feed.

was much lower per pound of butterfat. The increased income, therefore, though it should be credited in part to better feeding, was evidently more largely due to better cows.

A herd of 91 cows in one association produced in 12 months a total income of $58. over cost of feed, or 64 cents for each cow. When the owner sends that herd to the block he is to be congratulated. The country is not yet so short of dairy products that anyone need milk such cows. A farmer who owned a very large farm of poor land is reported to have said: "I know that my land is worthless, but it makes a fellow feel good to think he owns a thousand acres." Possibly it made the owner of the scrub herd "feel good" to think he owned 91 cows.

In a herd of cows in another association, the poorest produced only income enough over cost of feed to buy a two-cent postage stamp. For labor and miscellaneous expenses of all kinds the owner had only the manure, skim milk, and calf. It seldom pays to sell a good cow; it never pays to keep a poor one.

It has been estimated that the average production of all the dairy cows in the United States is 160 pounds of butterfat a year. The average production of all the cows in the 40 associations studied was 247 pounds a year. Careful tabulations of the records of the 40 associations show that a production of 160 pounds of butterfat a year gave an income of $23 over cost of feed, while the average income over cost of feed for all the cows in these associations was $47, or a little more than twice as much.

Undoubtedly the dairymen who join cow-testing associations are more progressive than the average, and own cows and farms that are much above the average, but the fine showing made by association cows should be credited, in large measure, to association work. Certainly the cow-testing associations return many dollars more than they cost. It is encouraging also to know that the cow-testing association records indicate that the large-producing dairy cows are the least affected by the increased cost of feeds. Therefore, every dairyman should aim to keep all his good cows, or to place them where they will continue the economical production of human food. Economical production can be obtained not only through careful selection of dairy cattle but through intelligent breeding and skillful feeding.

BREEDING.

Cow-testing association records show the great value of intelligent breeding. Of the 17 daughters of carefully selected bulls in one association 16 excelled their dams. The bulls were owned by the local bull association, whose members were also members of the cow-testing association. On an average the daughters of association bulls produced 1,145 pounds more milk than their dams and 63 pounds more butterfat. The average production of the daughters for the year was 6,919 pounds of milk and 301 pounds of butterfat. The record of the highest-producing daughter was 410 pounds of butterfat, which was 209 pounds above the record of her dam. These figures show the possibilities of increasing production through intelligent breeding.

Not every dairy farmer can afford to own a good registered bull, but the bull association has made it possible for each of its members to own a share in one. Fifty dollars may buy a scrub bull, but if five farmers will join an association and pay $50 each, they may own a $250 pure-bred bull. A cooperative bull association is a farmers' organization whose purpose is the joint ownership, use, and exchange of high-class, pure-bred bulls. The 36 cooperative bull associations that are now in successful operation have demonstrated that such organizations are practicable. Doubtless the cheapest way to bring about more economical production is through better breeding. Every dairyman knows that with the same feed and care one cow may produce more than twice as much as another. First-class dairy cows are very efficient producers of human food and we should have more of them. Truly we need more cows, but what we need most is better cows.

FEEDING.

Tabulations of association records show that production depends largely upon the feed as well as upon breeding. Legume hay and corn silage formed a large part of the rations of the cows where income over cost of feed was high. Therefore, while grain is high priced and needed for other purposes, the dairy cow should get a large part of her protein and carbohydrates from legumes and silage. In this way large production can be combined with economical production, and the income over cost of feed can be increased. Economical production benefits both the producer and the consumer.

The feeding of concentrates to dairy cows should be based on known production. Farmers who are too busy to test their own cows may now have the work done for them at nominal cost by joining a cow-testing association. As ordinarily conducted, a cow-testing association is an organization of about 26 dairy farmers who cooperatively employ a man to test their cows for economical production. The tester not only weighs the milk and the feed but he tests the milk for butterfat and assists the farmers in feeding their cows according to production. Often he helps the farmers to organize for the economical purchasing of feeds in carload lots, and for the efficient marketing of their dairy products and surplus live stock.

Before the formation of a cow-testing association in a certain dairy district, few farmers fed grain to their dry cows, and none fed a balanced ration to any of their cows; prepared feeds of unknown merit were largely used; and some farmers dished up the grain with a scoop shovel and fed all their cows alike, regardless of production. As is usually the case under such circumstances, many excellent cows were underfed and many worthless ones ate up the profits made by the larger producers.

Through the active cooperation of all the members of the association those conditions were rapidly changed. Better feeding of dry cows increased the milk flow during the next lactation period; the use of a well-balanced ration brought about more economical feeding, and abandoning the scoop-shovel method and feeding concentrates according to production greatly reduced the cost of feed. However, the elimination of low producers that did not respond to better feed and care effected the greatest saving of all. In some herds these changes more than doubled the income over cost of feed. The dairymen belonging to that association demonstrated that it pays to keep good cows and to feed them well.

The cow-testing association records clearly show that the most practical, far-reaching, and vitally important facts connected with the economical production of milk may be grouped logically under these three heads: Selection, breeding, feeding. Careful and intelligent feeding, care, and management lift the dairy business to a certain level, but the highest level can be reached only when to these are added careful selection and intelligent breeding.

THE SERVICE OF COLD STORAGE IN THE CONSERVATION OF FOODSTUFFS.

By I. C. Franklin,
Specialist in Storage, Bureau of Markets.

FACTORS LEADING TO DEVELOPMENT OF COLD STORAGE.

BEFORE the days of railroads the individual farm in the United States was self-sustaining in so far as its food supply was concerned. The urban population drew its food supplies from the surrounding farms, and, with respect to perishable commodities, was limited to a short radius. Rail transportation has made possible our present industrial life with its coincident growth of large cities. Cold storage and the development of the refrigerator car have lengthened the radius of the circle from which any given city of to-day draws its food supplies until it includes all of continental United States.

Since 1900 the increase in population in the United States has been approximately 26,000,000, and it is of interest to note that while our general population has grown rapidly there has been a gradual change in its distribution between rural and urban dwellers. The urban population has increased from 29.5 per cent of the whole in 1880 to 46.3 per cent in 1910. Therefore, the change in rural residence has been from 70.5 per cent to 53.7 per cent between the same years. Moreover, in 1910 more than 80 per cent of the urban population lived in cities of 10,000 or more.

Thus, because the population has tended to become more centralized, it has been increasingly necessary to concentrate foodstuffs in stock yards, packing houses, grain elevators, flour mills, and storage plants, for the use of these large centers of population. The storing of perishable foodstuffs under a plan of refrigeration probably possesses greater possibilities of future development than any of these other systems of concentration. From an economic point of view, the cold-storage warehouse deserves great credit for its service in preserving and conserving the surplus of extremely perishable foodstuffs from the season of plenty to that of scarcity, thus furnishing the consumer at all times with an adequate and wholesome food supply, stimulating production, and providing for the producer a year-round market.

INCREASE IN STORAGE SPACE.

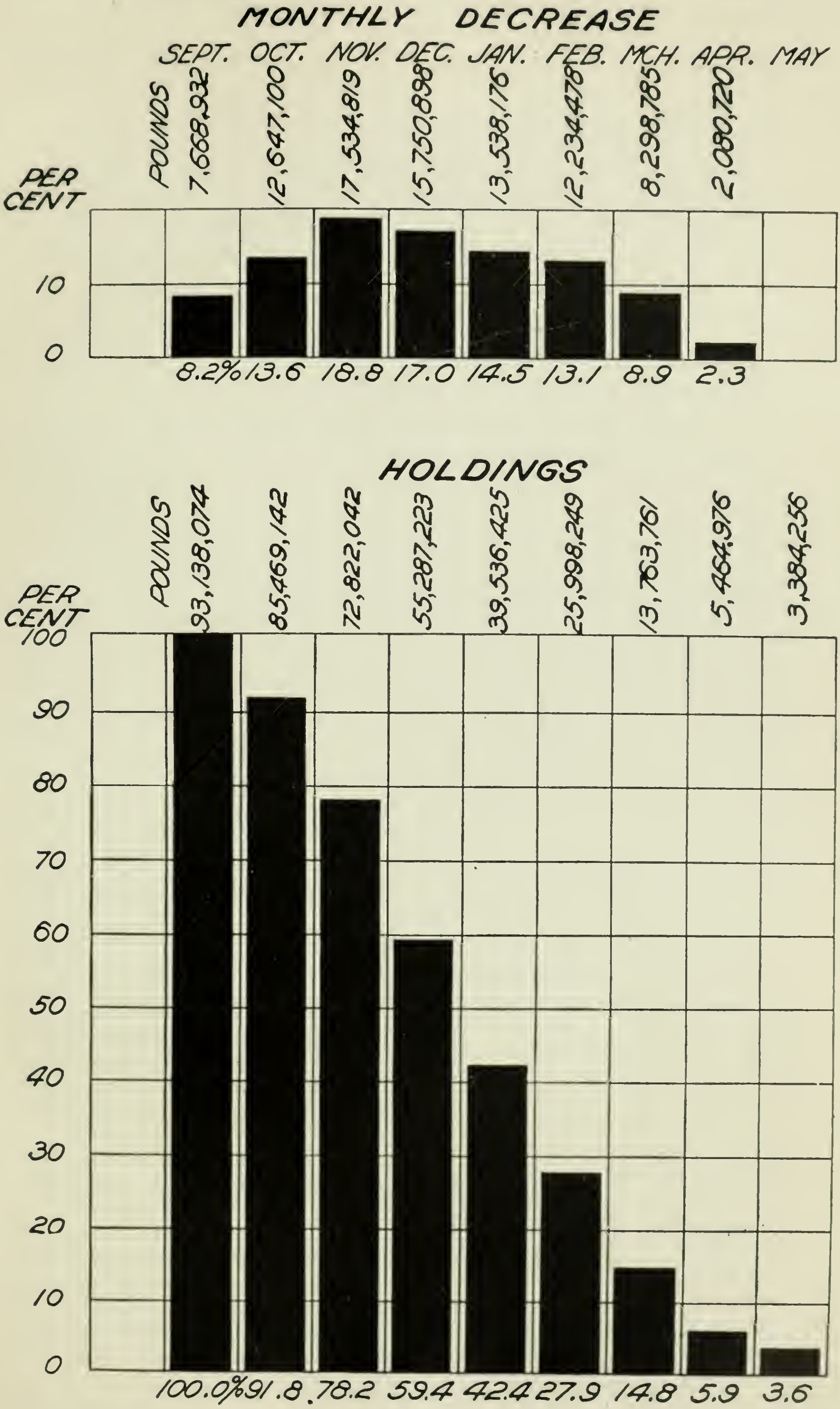
The first storage houses in the United States were cooled by a mixture of crushed ice and salt. During the period when this method was being used the largest cold-storage house in the world was located in the Central West and contained a total capacity of 1,800,000 cubic feet. In the late eighties and early nineties the first installations of mechanical refrigeration in large commercial units were made. In 1887, as nearly as may be estimated now, there were less than 3,000,000 cubic feet of storage space in Chicago, while in Greater New York as late as 1902 there were less than 6,000,000 cubic feet. To-day Chicago has approximately 60,000,000 and Greater New York 40,000,000 cubic feet.

The increase in storage space throughout the entire country has been enormous. At the present time we have a storage space of 212,310,000 cubic feet, in round figures, in packing houses, exclusive of their branch sales rooms, and 237,000,000 cubic feet in public cold storages, making a total of 449,310,000 cubic feet. In addition, there are under construction and will be completed and in operation in the United States by the time this article is printed, facilities to afford additional space of approximately 25,240,000 cubic feet, making a grand total of 474,534,000 cubic feet. This large growth of total holding space has taken place during the period of our greatest increase in population.

CLASSES OF FOODSTUFFS HELD IN STORAGE.

The classes of foodstuffs stored under artificial temperatures are many and various, the principal ones being apples, seed potatoes, butter, eggs, cheese, meats, poultry, fish, dried and frozen fruits, frozen cream, nuts, rice and sirups.

The use of mechanical refrigeration in the cold-storage house and the refrigerator car has made it possible to supply the eastern cities and export trade with meats, poultry, butter, and eggs from the great Mississippi and Missouri



COLD STORAGE BUTTER MOVEMENT AS REPORTED TO THE BUREAU OF MARKETS, DEPARTMENT OF AGRICULTURE, SEASON 1916–1917.

River Valleys; apples from the Pacific Northwest; and fish from the Pacific Ocean and the Gulf of Mexico.

By far the largest proportion of cold-storage space is at the large market centers, and practically all of the foodstuffs stored in them are owned by distributors who buy from the producers at times when they must sell their products and when the markets are most heavily loaded.

TEMPORARY STORAGES AT PRODUCING POINTS.

At some of the producing points the farmers have combined to build their own storages, so they may bring their products to the consuming centers more nearly as they are needed by the public and, by so doing, find better marketing conditions.

Unfortunately, however, not all products lend themselves to storage at the producing points. Poultry and eggs are produced only in small quantities by the individual farmer, and in relatively small quantities by single communities. A cold-storage plant must be large in order to be operated economically, and a small storage for a few carloads for long holding can not expect to compete with those in the larger cities when the cost of construction, the installation of machinery, and the cost of operation per cubic foot of space are twice as great in such small storage houses. However, some producers and the collectors of storage products in various communities have found that they can well afford to have a refrigerated room of somewhat more than a carload capacity for collecting purposes, so that stocks may be cared for properly until the shipment can go forward in carload lots under refrigeration. The saving in freight and the prevention of loss by deterioration, together with the higher prices obtained on account of the better condition of the food, in many cases pays a good profit on the investment.

In various parts of the country, especially in the South, where there are fewer meat packing houses than in the North, good results have been secured by using ice storage houses connected with ice manufacturing plants as temporary storages for the protection of pork prior to and during the curing processes. At points where such ice storage houses are not available, small refrigerators, cooled with ice, are used.

During the early development of the cold-storage industry, when data were lacking as to the proper construction of a cold-storage house with respect to its insulation, its ventilation, and the circulation of air within it, and when no information was available as to the exact temperature at which a given commodity should be held or as to the length of time it could be held without serious deterioration, practices were followed which created doubts in the public mind as to the efficacy of this method of the preservation of perishable foodstuffs and as to the healthfulness of all foodstuffs that have been in cold storage. Unfortunately, in many cases the shortsightedness of the owners of such products and of the operators of the cold-storage houses, both of whom failed to recognize the fact that their own financial success depended ultimately upon good service to the public, aggravated the prejudices of consumers and was responsible for much of the proposed legislation designed to improve the service of cold-storage houses and to protect consumers.

The methods followed in the handling of eggs well illustrate the general system of handling all commodities in those days. Eggs were eggs till they reached the ultimate consumer, who drew a sharp distinction between a good egg and a bad egg. The warehouseman concerned himself only with the service of storing them, and with his remuneration for that service. The individual who assembled large quantities of eggs to hold in storage either assumed that they were all good eggs or counted on evading responsibility for their unsoundness. Neither dealers nor warehousemen gave any attention to containers and methods of packing, nor were eggs candled to make sure that only sound eggs went into storage. Retailers bought them out of storage in the blind faith that some magic property of cold storage had made good eggs of all the bad eggs, or else accepted the situation as one for which they were not responsible and which they could not remedy.

CRITICISMS OF COLD-STORAGE INDUSTRY.

The popular criticism of cold-stored foodstuffs is that they have been held in storage to a point of deterioration when they become neither palatable nor wholesome. Coupled with this is the belief that they are often held unduly long for the purpose of manipulating the market. That former practices justified the first criticism has been shown; that there is a basis for the second criticism can not be denied. It may be added, however, that there are limits beyond which holding for market manipulation can not go, which are not so well understood by the general public.

The construction of cold-storage warehouses is more scientific than formerly and methods now used in their operation are more efficient, but some warehousemen still follow practices that account for the persistence of the first criticism against all cold-storage warehouses in general. Among such practices is the holding of products on display in the market by customers of warehouses until deterioration has set in and then sending them to cold storage. Better judgment in the display of products in the market, stringent sanitary regulations on the part of the Government, and a system of inspection on the part of warehousemen themselves in cooperation with the Government will do much to correct these practices.

TIME LIMITS OF STORAGE.

Reference has been made to the limits beyond which storage for the purpose of manipulating prices can not go. The limit is the very practical one of time. From voluntary reports received from approximately 98 per cent of the cold storage warehouses in the United States the Bureau of Markets of the United States Department of Agriculture for some time has been compiling monthly figures showing the stocks of various foodstuffs held in cold storage on the last day of the month. Plate LIX represents graphically the movement of butter as shown by these reports. This chart indicates clearly the decrease of the holdings with the season's advance. The history of the movement of butter thus portrayed is typical also of the movement of eggs, cheese, and poultry.

Economic forces are always exerting pressure to bring about the reduction of the stocks in storage when the new season's product is soon to become a factor in the market. To the original cost of the stocks must be added the costs of insurance, interest, storage charges, shrinkage, and a probable depreciation of value if the stocks are held too long. All of these costs increase month by month. It is also a common practice for storage houses to make advances to owners of stocks held in storage, accepting these stocks as collateral to the loans. If there is a possibility that the old stocks will come into competition with the new stocks, a condition which naturally is bound to be to the disadvantage of the former, the warehouseman or banker is likely to call in the loans or ask for additional margins. It is apparent that this condition makes the holding over of stocks a decidedly precarious venture. It is universally agreed in trade circles that it is bad business to carry stocks over the seasonal period, as the practice is almost always attended by financial loss.

RESULTS OF INVESTIGATIONS BY UNITED STATES DEPARTMENT OF AGRICULTURE.

The Department of Agriculture for a number of years has been engaged in extensive research work regarding the wholesomeness and palatability of foodstuffs that have been in cold storage for various periods. It has been found that poultry, meats, fish, butter, eggs, and some other products, if they are received in good condition and are properly stored can be held from 9 to 12 months without appreciable loss in flavor, and for much longer periods without loss in food value or general wholesomeness.[1]

Many hundreds of cold-storage chickens have been studied by the chemists of the Department of Agriculture and compared with chickens held for the ordinary length of time in wholesalers' or housewives' refrigerators. Such studies show that there is a greater deterioration after a couple of days in the housewife's ice box than after 14 days in the well-chilled box of the wholesaler or after 8 months in the freezer of the cold-storage warehouse where the temperature is about 10° F. Even at the end of 12 months in the freezer, the deterioration is frequently less than that which has occurred in the so-called fresh chicken which has gone promptly from the producer to the consumer, but which has not been kept constantly at a temperature below 40° F. The Federal chemists also find that cold-storage chickens do not spoil any more rapidly after removal from the warehouse than do un-

[1] These investigations have been carried on by the Food Research Laboratory of the Bureau of Chemistry.

frozen chickens, provided they are allowed to thaw in cold air and are not placed in water to draw out the frost.

The length of time that eggs can be kept in a properly operated cold storage depends mainly on their condition when they enter. Eggs laid during cool weather keep best and longest. Therefore, the March and April pack of eggs is kept for midwinter use, while the June pack is used in late autumn and early winter, when seasonal production first begins to decrease. If the early eggs have been carefully graded and packed before going into storage, they can be acceptably served poached or soft boiled up to six months and are still good food at the end of nine months.

Experience and scientific research alike have shown that fish properly frozen retain flavor and food value for more than 12 months. In fact, epicures are learning that the only way to preserve the flavor which makes fish just out of the water so palatable is to freeze them just as soon as they are caught. The "freezers" which are scattered along our coasts are so close to the pound nets, and the catches from the boats are landed so frequently, that very often a flapping fish must be pushed into its place in the pan which goes into the zero-cold room where the quick freezing is done. Such fish when thawed in cold air, not water, make the usual ice-packed market stock seem flat and tasteless by comparison.

CONCLUSION.

Dealers and warehousemen now have learned that cold storage does not improve foodstuffs, but that if products are in excellent condition when placed in storage and are properly cared for while in storage they will serve as wholesome food when withdrawn for market within certain time limits. The lesson learned in regard to the storage of eggs is typical of the whole field of perishable food products that go to the warerooms. In general, the wholesale distributors are men of large experience, who carefully safeguard the condition of the products which they handle. Another restraining influence is the fact that many, if not most commodities will not stand storage for more than one season without deterioration. When offered for sale after two seasons' holding, unaccompanied by the history of their storage, such products tend to create prejudice against all storage stocks

With advances in the science of refrigeration engineering, a more enlightened spirit on the part of distributors, and proper care on the part of the operators of cold storage houses, the cold storage industry, with the aid of constructive legislation, might be expected to solve some of the more pressing problems in the conservation of the country's food supply. If the traditional prejudice against cold-storage food stuffs were removed and the storage space of the country largely increased, much more could be done toward stabilizing both production and prices of perishable foodstuffs.

PIG CLUBS AND THE SWINE INDUSTRY.

By J. D. McVean,
Animal Husbandry Division, Bureau of Animal Industry.

EVIDENCE in abundance indicates that the pig-club work plays a prominent part in stimulating the swine industry. The direct effects are very evident in various sections of the country. They show that the work is fulfilling its mission, that it is a practical and constructive means of meeting the problems in swine husbandry and stressing economy of production through the utilization of wastes, by-products, and grazing crops; through the use of good breeding stock, and their proper care, feeding, and management. These objects are accomplished through the innate appeal of animal life to young people, and their faith, optimism and determination, which, together with their responsiveness to instruction, lead to successful achievement (Pl. LX).[1]

PLAN OF WORK.

To provide work that may meet the need in the different sections of the country and the need of the members as they advance, the following projects are offered and are in common use:

1. *Feeding project.*

(*a*) Fattening phase, in which the member feeds a pig or a number of pigs for pork production.

(*b*) Breeding phase, in which a weanling pure-bred sow pig (or boar and in some cases both) is raised by the member to breeding size and age.

2. *Sow and litter project.*

In this project the member has a sow (either the one raised in Project 1, or another bred gilt) which he or she cares for until the sow has weaned the litter; that is, this project covers the practical breeding and raising of pigs.

3. *Herd project.*

[1] In the preparation of this paper a letter was sent out to the professors of animal husbandry in the States in which cooperative pig-club agents are located, calling for their frank opinion of the pig-club work in order that this article might be representative of the work and not the author's personal opinion. The various pig-club agents were also asked for their opinions of the effect of the pig-club work on the swine industry. Thanks are due these men for their cooperation.

In sections where the swine industry is well established the members in many cases have had experience in caring for swine and are not interested in a unit of one or two pigs, such members may, with their parents' consent, handle all the hogs on the farm in either meat production or breeding work, under the father's direction, yet following the club regulations and instructions.

BASES OF AWARD IN PRIZE CONTESTS.

In order that the work over the country may be on a uniform and comparable basis, the following bases of award to govern the various State-wide prize contests have been used very commonly and satisfactorily; while arbitrary, they are designed to show the relative importance of the various points from an animal husbandry and practical standpoint:

	Points.
1. *Fattening phase of feeding project:*	
(*a*) Best pig according to purpose it is to serve, i. e., individuality	30
(*b*) Greatest daily gain	20
(*c*) Cheapest cost of production	30
(*d*) Best record and written report of work done by member	20
2. *Breeding phase of feeding project:*	
(*a*) Individuality (as above)	40
(*b*) Greatest daily gains	15
(*c*) Cheapest cost of production	25
(*d*) Record and report	20
3. *Sow and litter project:*	
(*a*) Best sow and litter according to purpose they are to serve [1]	25
(*b*) Average rate of gain per pig	15
(*c*) Cost of gains including keep of sow from one breeding period until pigs are weaned	30
(*d*) Number of pigs raised from total number farrowed	10
(*e*) Record and story	20

4. The herd project can be handled under basis of award No. 3 by substituting "herd" in place of "sow and litter." Special prizes for phases of the work not covered by the regular basis of award should be offered. The member may select a pig or pigs from the herd to show under bases of award No. 1 or 2. In such cases the average rate and cost of gain for all the pigs would be used.

[1] The "individuality" rating of the pig is determined at the State Fair or Fat Stock Show or at such other place as the State Round-Up is held; the official judge of the swine show to place the pigs in the order of their merit.

INTRODUCTION OF BETTER FEEDING METHODS.

One of the outstanding effects of the pig-club work is the improvement in the feeding methods employed by adults who have followed the lead of some club member. Even in the leading hog-producing States, where the quality of the hogs is high, very noticeable changes in feeding practices have come about as the result of the demonstrations made by club members. This statement is backed by two very prominent animal husbandmen in different corn-belt States, while the following table shows the results obtained by a pig-club boy in still a third corn-belt State.

Self-feeder results obtained by Arthur Rodekohr, a Nebraska pig-club champion.

FEED AND WEIGHT TABLES.

Seven pigs fed.	June 26 to July 27—31 days.	July 27 to Aug. 27—31 days.	Aug. 27 to Sept. 27—31 days.	Sept. 27 to Oct. 30—33 days.	Totals for 7 pigs.
Corn	6 bu., 34 lbs.	8 bu., 46 lbs.	15 bu., 41 lbs.	24 bu., 11 lbs.	55 bu., 20 lbs.
Tankage	18 lbs.	20½ lbs.	34 lbs.	12 lbs.	84½ lbs.
Skimmed milk	77.5 galls.	77.5 galls.	77.5 galls.	80 galls.	312.5 galls.
Alfalfa pasture	25 days	31 days	30 days		86 days.
Initial weight	245 lbs.	450 lbs.	675 lbs.	917.5 lbs.	245 lbs.
Final weight	450 lbs.	675 lbs.	917.5 lbs.	1,435 lbs.	1,435 lbs.
Gain	205 lbs.	225 lbs.	242.5 lbs.	517.5 lbs.	1,190 lbs.
Gain per day	6.61 lbs.	7.26 lbs.	7.82 lbs.	15.68 lbs.	9.44 lbs.
Cost of gain	$6.095	$7.388	$12.08	$16.69	$42.253.
Cost per pound of gain	$0.029	$0.032	$0.049	$0.032	$0.035.

NOTE.—Seven pigs of April farrow were weaned June 26, 1915. Average initial weight of 35 pounds, total 245 pounds, which at $0.06 gives $14.70 as the initial value. Feed cost $42.25. corn at 60 cents per bushel; tankage at $2.50 per cwt.; skimmed milk 1½ cents per gallon; alfalfa pasture 0.3 cent per pig per day. The alfalfa was grazed until Oct. 4, when pigs were put on self-feeder and gained an average of 2¼ pounds per pig per day. Average rate of daily gain for the period of 126 days, 1.34 pounds. Gains cost $0.0358 per pound. Final weight 1,435 pounds (average weight 205) at $0.0685 gives $98.28. Net profit (not charging work) $41.33.

The boy's father and several neighbors have decided to use the self-feeder. The boy's work drew much attention in the neighborhood.

In some instances it has been the use of a self-feeder for fattening hogs by a club member (see Pl. LXI) that was the means of causing the farmers of that community to adopt the same method. In other sections the use of a balanced ration by a club member caused the farmers in his neighborhood to realize that corn alone is a poor and expensive hog feed, or that grazing crops or good pastures are essential to economical gains on swine (Pl. LXII, fig. 1). In one county in Kentucky the pig-club demonstrations were the means of increasing the use of tankage, as a supplement to corn, from 2 tons to 75 tons per year in two years' time. In Alabama the pig-club agent obtained a pound of rape seed for each member who made a preliminary report on his or her pig. As a result of this small beginning one store in one county sold over 1,000 pounds of rape seed that fall and 1,500 pounds the following spring, and now that county is green with grazing crops for hogs (Pl. LXII, fig. 2). Since rape has made a place for itself in that county, the use of soy beans, cowpeas, velvet beans, etc., is now being pushed. Similar results, though perhaps less striking, have obtained in other States. Sixty-nine per cent of the members who completed their work last year report the use of grazing or pasture crops.

The demonstrations by the boys are closely watched by the adults (Pl. LXIII, fig. 1). The keeping of records showing the initial and final weights, the amounts and kinds of feeds used, the length of the feeding period, and the number of days the pigs were on grazing crops is interesting; the rate and cost of gains is definite information the adult has wanted to know. The club work, then, is a point of contact by means of which county agents may reach adults when the direct approach brings little or no response.

INTRODUCTION OF BETTER BREEDING STOCK.

The quality of the pigs to be fed is equally as important as the feeding method. In some sections of the country the need for better breeding stock was outstanding. In such cases the pig-club agents have practically insisted that only pure-bred pigs could be used in the breeding projects. This necessitated the importing of registered pigs of both sexes. The results of the demonstrations made by members handling these pigs under instruction from the pig-club leader have caused a great demand for pigs "just like Sonny's." The club members' demonstrations of the advantages and possibilities of well-bred swine when intelligently fed and managed have caused a great increase in demand for breeding stock from the pure-bred breeders. At first the breeders were inclined to be skeptical, as they expected the boys to buy registered stock, allow it to deteriorate, then offer pure-bred scrub pigs at meat prices—thus destroying the demand for the breeders' pigs. The breeders were happily disappointed and are now lending their support and backing to the work. One professor says: "Pig-club work has created the greatest demand for breeding stock that this State has ever experienced."

In some cases the refusal of club members to accept anything but registered pigs has induced breeders to have their herds registered in order that they might share in the demand for pigs by club members. A typical case of the influence the pure-bred pigs brought in by pig-club members is given by a county agent in Arkansas. When the agent began work there were two breeders in the county producing pigs of sufficient merit to meet the demands of the club work. In the first year of his work he had 35 pig-club members. Four of these members procured registered boars. These boars sired 58 litters of pigs from scrub sows, thereby improving the blood of 402 pigs (Pl. LXIII, fig. 2). They also sired 47 pure-bred hogs for farmers. Farmers also purchased three boars and 36 sows. The second year in the work the club had 42 members who had 6 pure-bred boars. They sired 71 litters from scrub sows, producing 496 pigs. They also sired 104 pure-bred pigs. The agent adds, "I think I can trace 7 boars and 41 sows (pure-breds) purchased by farmers, as a result of pig-club work in communities, during the second year of the club."

Arkansas typifies the manner in which pure-bred breeding stock is being introduced into sections where it is needed. Last year 1,800 pure-bred gilts were placed with as many pig-club members. The bankers of the State financed the members. This year between 2,200 and 2,400 pigs also were placed in a similar manner. Another instance of the introduction of well-bred breeding stock and the reestablishment of a waning industry is taking place in the free range cholera-infested section of eastern Texas. The pig-club agent, assisted by the Fort Worth Stock Yards Co. and the State and Federal veterinarians, is sending many car lots of immunized sows to the club members in this region, where the industry was being destroyed by the ravages of hog cholera (Pl. LXIV).

Demonstrations of the sort are of far-reaching importance. The swine-breeders' and swine-record associations bear witness that there is great demand for pure-bred breeding stock, especially in the Southern States. The pig-club members take many pure-bred pigs and have been a powerful stimulus in creating demand among the adults. It is interesting to note that of the four States, Mississippi, Georgia, Virginia, and Delaware, reporting increases in the number of swine on September 1, 1917, over September 1, 1916, Mississippi and Georgia stand second and third in pig-club enrollment. These two States report an increase of 90,000 hogs, while the country at large shows a decrease of over 5,000,000.

FOSTERS COMMUNITY BREEDING.

Not only has the pig club stimulated the demand for better breeding stock, but also has been the means of introducing community breeding or breed standardization in numerous counties in various States where the pure-bred part of the industry was practically new and where there were not numerous breed preferences to contend with. Louisiana, Georgia, Arkansas, Kentucky, Alabama, and in fact every State where the "endless chain" plan of financing pig-club members has been in effect for one or more years, have many communities where but one breed of pure-bred swine prevails and even many counties where but one or two breeds are prominent. Kentucky, for instance, reports that "pig-club work has been responsible for the standardization of 14 counties to one breed of swine." Twenty-nine county agents also report that pig-club work was the best single piece of demonstration work conducted by them. The establishment of community breeding has been an ideal toward which adults have striven but which few have succeeded in reaching, owing to the individualism of adults with whom they had to deal. The value of the demonstrations by the boys is not easily measured.

The members are not only centering their attention on community breeding, but are maintaining the quality of their pigs. The members of the older clubs in organized counties sell their surplus breeding stock to the new members in counties taking up the work. One county agent, in referring to the quality of the pigs produced by the members,

THE 1916 GEORGIA PIG-CLUB CHAMPION AND HIS PIG RAISED ON GARBAGE. SETTING THE PACE FOR ECONOMY OF PRODUCTION.

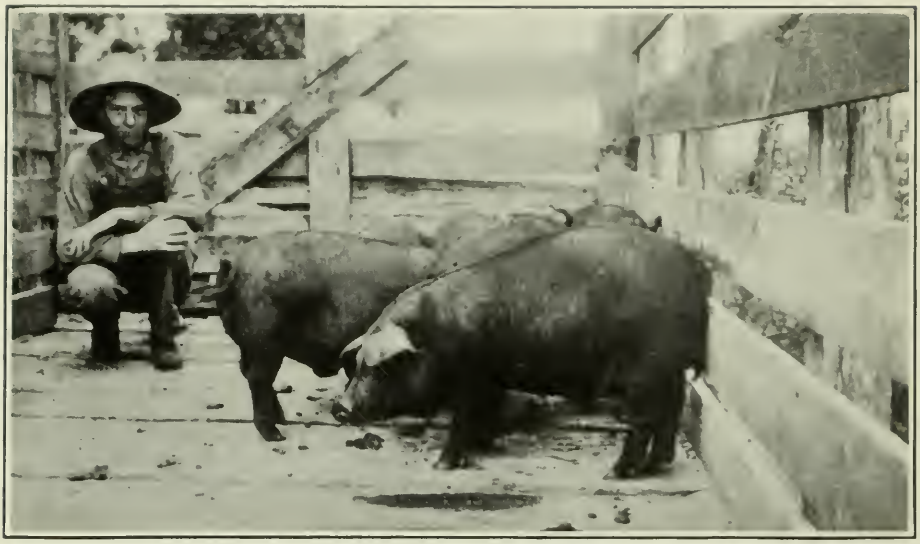


FIG. 1.—ARTHUR RODEKOHR AND HIS PIGS.

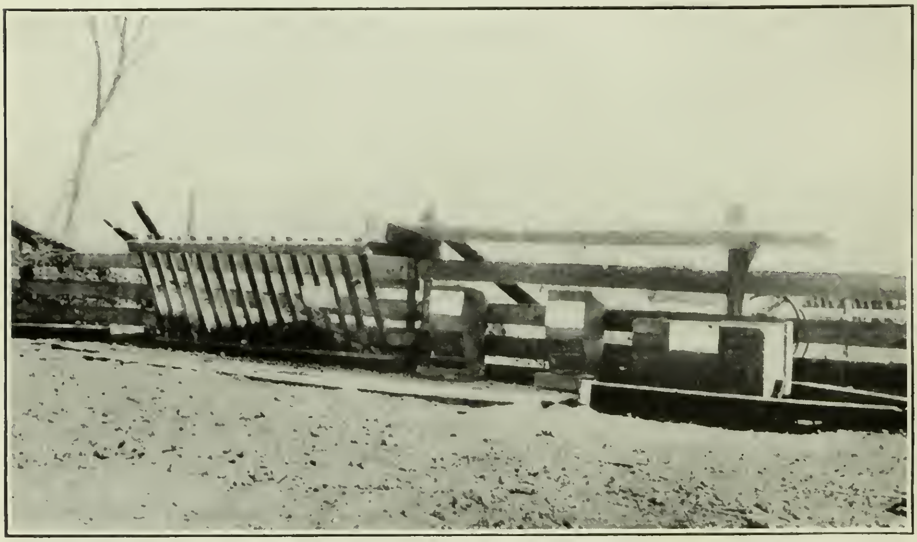


FIG. 2.—THE SELF-FEEDERS USED BY ARTHUR RODEKOHR.

This boy used three self-feeders and an alfalfa rack instead of one with three compartments to hold the corn, tankage, and charcoal or tonic mixture.

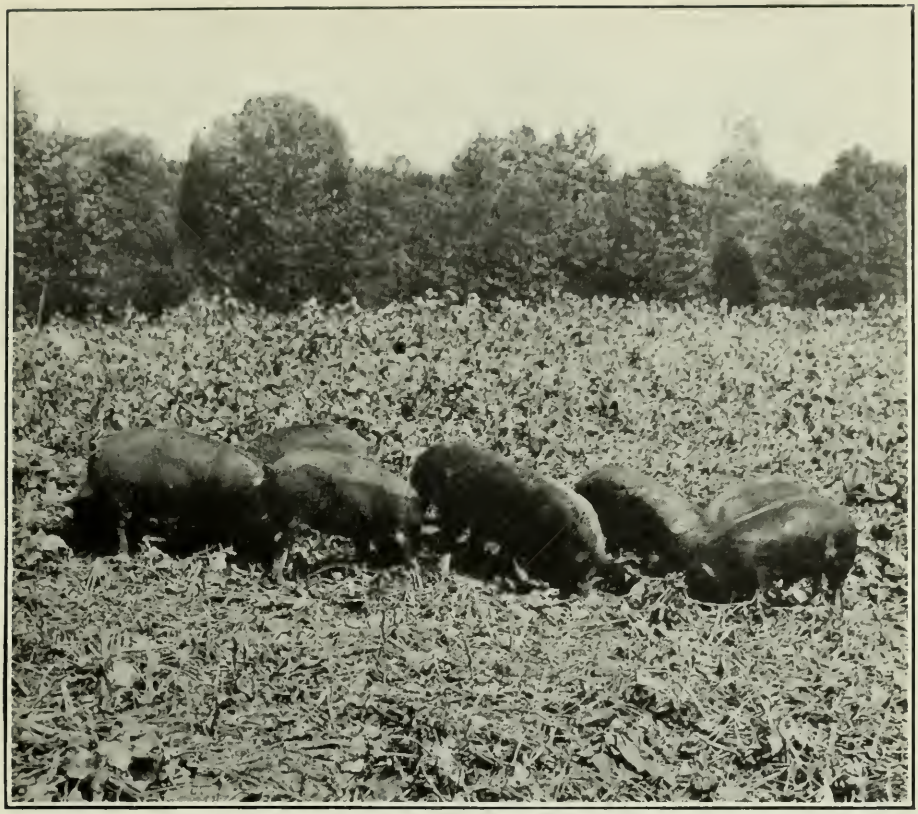


FIG. 1.—SOY BEANS MAKE A SPLENDID GRAZING CROP FOR HOGS AND REDUCE THE COST OF GAINS.

FIG. 2.—RAPE, WHILE NOT A LEGUME, IS ONE OF THE BEST GRAZING CROPS WHEN ALL SEASONS AND SECTIONS OF THE COUNTRY ARE CONSIDERED.

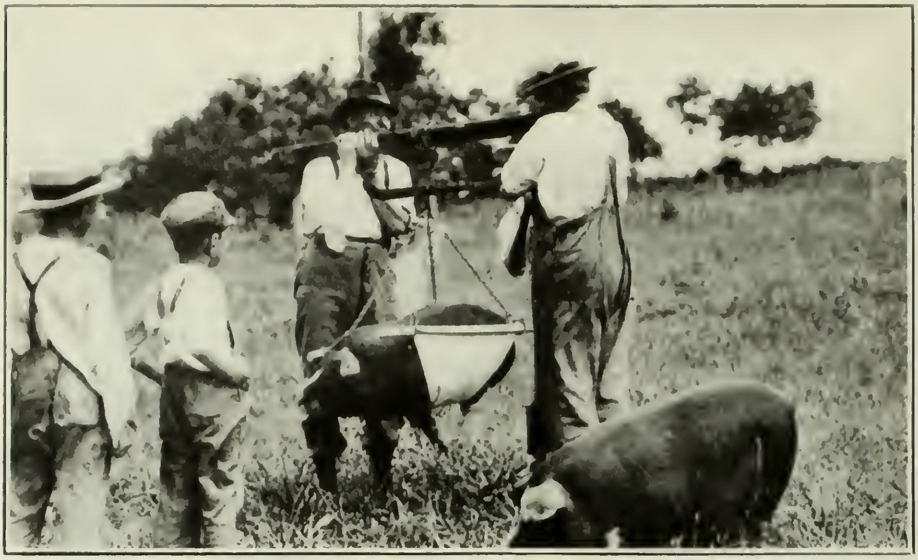


FIG. 1.—"WHERE THERE IS A WILL THERE IS A WAY."

Weighing pig-club pigs to determine rate of gain. Records of feed consumed enable members to compute cost of gains per pound. Such data are unknown to many a father.

FIG. 2.—"A STUDY IN FEEDING AND BREEDING."

All the pigs in the picture have the same sire—a registered Berkshire boar. The pig on the left is pure bred. The others have a "razorback" mother. The large ones were owned by a pig-club boy and fed by him with the same feed and out of same trough. The runts were raised by his neighbor. The pure bred is 3 days older than the others. At the State fair they weighed 305 pounds, 48 pounds, 205 pounds, and 49 pounds, respectively. This demonstrates the value of breeding; also the possibilities of razorbacks in pork production when mated to pure-bred sires and properly fed and cared for.

"YOUTH SETTING THE PACE."

An Arkansas pig-club member demonstrating the use of anti-hog-cholora serum (single treatment). This boy vaccinated over 1,000 head of swine for his neighbors, wearing out his instruments. He was presented with a new set by the State veterinary department. Note.—There are not sufficient practicing veterinarians in some of the Southern States to take care of the work. The county agents in such States teach the farmers to administer the serum—alone or single treatment.

FIG. 1.—COPELAND COMMUNITY BOYS' PIG CLUB, LIMESTONE COUNTY, ALA.

The boys organized and adopted a breed and then bought their pigs through the assistance of a local bank. This is but one of several community clubs in that county alone. Some of the best gilts are not in the picture because it is too near time for them to farrow. The club expects to hold an auction sale in the fall.

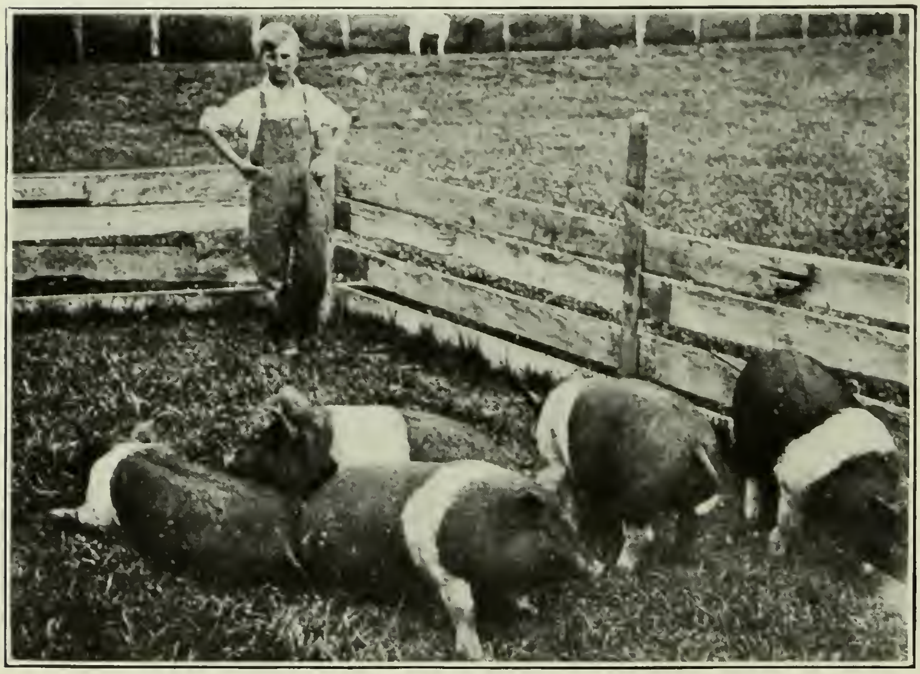


FIG. 2.—WARREN BONER, OF OREGON, AND A FEW OF THE 40 REGISTERED HAMPSHIRES OWNED BY HIM.

This boy started his father in the pure-bred breeding business. They are in partnership now and have over 100 head.

PIG-CLUB BOYS JUDGING PIGS, AN IMPORTANT PART OF THE TRAINING OF THE MEMBERS.

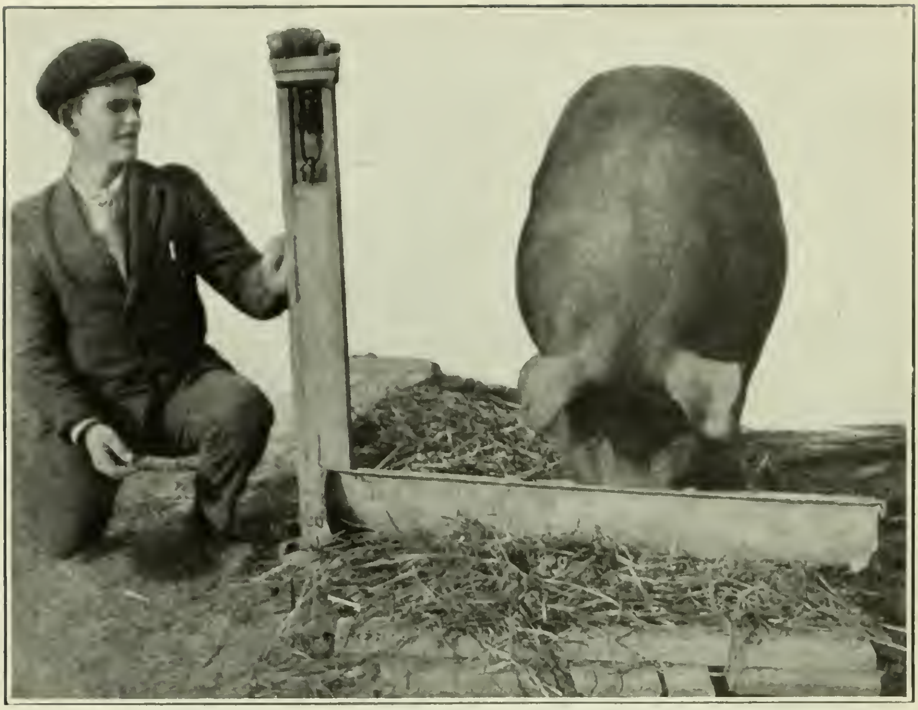


FIG. 1.—WALTER WHITMAN AND HIS PIG "JUMBO" AT THE END OF FOUR MONTHS' FEEDING PERIOD.

At the beginning of the feeding period Walter built a creep in which to feed his pig, but the pig outgrew the creep and had to be fed outside.

FIG. 2.—THE CITY HAS NO ATTRACTIONS FOR THIS YOUNGSTER.

says: "Out of 10 pure-bred pigs obtained last spring for my club members, the one best pig was secured from a club boy in an adjoining county."

The pig-club boys have not only taught the adults, where the industry is new, the superiority of the pure-bred over the scrub; they have taught them that good individuals bring good prices. One county agent expresses the thought in these words: "Before this year it was hard to get a farmer to pay $10 for a good hog, now they pay $50 to $100."

STIMULATES PORK PRODUCTION.

The practical stimulus to the swine industry through the pig-club work by demonstrating the superiority and the possibilities of pure-bred swine, thereby increasing the demand for well-bred breeding stock, is especially valuable at this time, when a large and immediate increase in production is needed and when high-priced feeds make efficient feeding and economy of production imperative. The members, in addition to stimulating the market for well-bred breeding stock, are playing an increasingly important part in the production of meat—of pork and pork products. The pig-club members of to-day are the nucleus of a great organization of trained meat producers. Packing houses are springing up in the wake of the pig club. In 1917 the 45,000 pig-club members, if their results are comparable to those of members who made complete reports in 1916, will produce at least 10,000,000 pounds of dressed pork. The importance of this work in feeding the armies can be appreciated readily.

Everywhere may be found men who are enthusiastic over the possibilities of the work. A banker says: "Since we started club work we have financed adults and boys in securing several hundred registered sows and boars. It will not be long until we shall be shipping out carload lots of high-grade hogs." A county agent when asked in regard to the effect of the pig club on the swine industry in his county reports: "One hundred per cent increase in numbers of hogs since pig club was introduced and 200 per cent increase in quality and weight. The boys are meeting the demand for breeding stock as well as shipping many pigs out of the county." Another agent says: "It is estimated that the pig clubs have been worth $10,000 to this county. Out of 152 boys and girls who bought pigs with borrowed money there was not a single delinquent note. The bankers consider pig-club notes the best paper they have." Still another county agent states: "The club members have revolutionized the hog industry in this county." (His members have 348 pure-bred pigs in one-half of the county.)

These statements are astonishing, yet true, and they concern sections of the country where the industry is young. Just what the ultimate influence of the work is to be on increase of pork and pork products it is hard to say, but a startling development may be expected if results already obtained may be taken as a criterion. To realize the opportunity there is for development we must consider that in some of the States the farmers have been raising razorbacks, taking two years to produce a hog of marketable size (not over 150 pounds). Contrast this result with that obtained by Walter Whitman, in Indiana. His pig gained 18 pounds, 21 pounds, 27 pounds, and 24 pounds in four consecutive weeks. The pig was weighed each week by the club supervisor. When it was 6 months and 7 days old it weighed 297 pounds, and at 8 months it weighed 456 pounds (Pl. XLV, fig. 1).

HOME CURING OF MEATS.

As a means of stimulating the home curing of meat "ham and bacon" clubs were organized in Georgia several years ago among the pig-club boys. For three years North Carolina has had cured-meat contests in which the pig-club members were allowed to compete. That State is putting on a special campaign for meat curing and storing in an effort to introduce better methods among the adults. In Massachusetts the work consists largely in the production of meat hogs for the home-meat supply. In Nebraska the pig-club agent is putting on killing and cutting demonstrations for the members, which are also creating keen interest among the adults. The need for teaching the farmers of to-morrow the art of the home curing of meats is evident in the warmer sections, where trouble is experienced in curing the meat and especially in storing it successfully. Enormous quantities of meat can be saved if proper methods are successfully introduced. The youth of the land offer the best educational medium (Pl. XLV, fig. 2).

IMPROVED MARKETING METHODS.

Poor markets are a problem that face any new industry during the time it is becoming established. This has been true of the live-stock situation until recently, but since the possibilities have been demonstrated with the advent of packing plants and better shipping facilities, marketing conditions are rapidly improving. Cooperative "club" shipments in which a number of individuals have stock have helped the situation materially. The carloads thus formed sell for much better prices than the local dealers would pay. Another improvement in marketing, in which the club members are helping to set the pace, is in vogue in the South in sections where individuals do not have sufficient hogs for car lots. All who have hogs for sale bring them to the county seat on designated sales days. All the hogs are graded and grouped, then sold to representatives of the packers or cantonments. The producers realize at least 2 cents a pound more for their hogs than they could get from local dealers.

EDUCATIONAL EXHIBITS.

A live-stock show is universally classed as an educational institution. Farmers flock to the various fairs and expositions eagerly seeking the latest and best information on equipment, conveniences, methods, etc. They want to keep abreast of the times. They get definite and concrete suggestions to carry home and apply. They refresh their minds and eyes as to what is best in type and finish in the various classes and breeds of live stock. Experience has taught that the participation of children in the activities of a fair, show, or exposition multiplies its educational value. This is because the children themselves learn more definitely in this manner than in any other and because their presence in the competition lends "human interest" and thereby increases the interest of the adult. In many instances youth has shown the way in live-stock production and by his demonstration has won the respect and emulation of the adult.

Anyone who has witnessed the pig-club exhibits at State fairs will bear out this statement. The intelligence displayed by club members, the responsiveness of the pigs to good care and kind treatment, the high quality of the exhibit, and the businesslike air of the contestants has stimulated men to the point where they, too, want to produce high-class stock and enjoy the thrill that goes with successful achievement. The pig club stimulates adults to greater effort to increase quality and merit in their live stock. It centers public attention and interest on rural affairs. It puts the swine industry on a higher plane.

JUDGING CONTESTS.

The judging contest is one of the important phases of the work that merit comment, for if the club member is to become a successful breeder or producer of pork he or she must be able to read at a glance the merit of a pig as an individual and its probable value as a breeding animal, also its ability to utilize feed as a meat producer. He or she must know breed type and characteristics and know how to detect quality or its absence. No better means of training pig-club members in this important work has been discovered. The competitive idea grips the youngsters' interest and holds their minds open in a way that has not been approached by any other system—incidentally the open mind is being indelibly impressed with the points that indicate strength or weakness, merit, type, breediness, quality, vigor, prepotency, etc., in the pigs or other classes of live stock that come before them either in a contest, in college, or in business life.

The intelligence displayed, the accuracy with which boys or girls of even 12 years of age size up the pigs in a judging contest, and the faithfulness and interest manifested by the contestants furnish abundant proof that young people can do intelligent stock judging. The judging contests have had an important part in winning the support of the swine breeders to the pig-club work. Incidentally many adults, after witnessing the club members in judging contests and observing their methods, have gone home to examine their hogs with a more critical eye, with subsequent improvement in their herds. Judging contests are educational and as such are worth while (Pl. LXVI).

INDIRECT RESULTS.

This article would be incomplete if no mention were made of the indirect results of the work. It establishes a point of contact between father and son, awakening a new spirit of comradeship between them. As a result more boys stay on the home farms. Fathers learn to appreciate their children and to give them fair play; that is, they learn that in club work it can not be a case of "Sonny's pig but Daddy's hog." The financing of members by bankers teaches intelligent borrowing and good business methods. The associations of the members, the contests, the trips to fairs, etc., open the minds, broaden the vision, and awaken the spirits of the members. The club work is a feeder of the agricultural colleges. It leads to community action and spirit as it gives a rallying point of interest, a community interest. It is a means of tying up the heart interests of the members with life on the farm (Pl. LXVII). It is a character-building work. In short, the indirect results of the pig-club work are perhaps of equal importance with the direct results, though not so easily measured. The consciousness of successful achievement, by a boy or girl, has a value that can not be measured in dollars and cents.

HOW THE WORK IS MANAGED.

The pig-club work is carried on through cooperation between the Animal Husbandry Division of the Bureau of Animal Industry and the States Relations Service, representing the Department of Agriculture, and the various State agricultural colleges, represented by their respective extension departments. A swine specialist, supported by funds appropriated by Congress for the work of the Animal Husbandry Division, is placed in each of the States desiring such a man (so far as funds permit). The specialist's work is administered by the director of extension, who furnishes office room and equipment, stenographic assistance, and pays his travel expenses. He is a unit in the extension staff and works in closest cooperation with the State leader of other club work. All the work is done in cooperation with the county-agent force and the various interested departments of the college and extension force. The subject matter taught by the specialists is agreeable to the animal husbandry department of the college and the Animal Husbandry Division of the Department of Agriculture. A simple project or agreement covering the work is arranged by the States Relations Service between the extension service of the agricultural college and the Animal Husbandry Division.

The pig-club agent is the leader of the animal-club work in the State. It is his duty to provide technical instruction for the club members; to provide supervisors or local leaders and to train them so that they may impart the information to the members. In some cases the duty of organizing the pig clubs falls to the lot of the State agent, while in other States the State leader of general club work and his staff attend to the organization. He works with and through the county-agent force and makes use of such local leaders as are available. He projects his vision of the work into the minds of the local leaders and through them into the lives and minds of the members. He must impart his technical information in terms that can be understood by the local leaders and applied by the members. He meets the swine breeders of the State and seeks to win their approval, support, and cooperation. His work must be constructive and must strike at the swine-husbandry problems of the State. He will plan and arrange for the State-wide exhibits, judging contests, etc., supplying rules and regulations concerning them. He visits individual members on their home farms and helps them solve their problems. He conducts demonstrations, simple in nature, yet effective in solving the problems of the members and the adults. His work must win the support of the parents of the members if it is to be successful.

The individual effort of the agent would accomplish little were it not for the splendid cooperation extended by the extension forces, by the bankers and business men, breeders, local interested people, etc. The work succeeds because the agent multiplies his influence through all the cooperating agencies.

As the work grows there is a tendency among directors of extension in a number of States to delegate to the pig-club agent the supervision of all the animal-club work in the State—that is, the pig clubs, the calf clubs, in which calves of beef breeding are used, and the sheep or lamb clubs. Doubtless this will come about gradually as organization and local supervision increase.

This work is the outgrowth of the crop clubs, especially the corn club. The members of the corn club, having learned to produce corn (representing feed crops), needed to be taught to market their crops through live stock, thus teaching them to get the feeder's profit as well as the grower's profit, and at the same time maintain or increase the fertility of the soil, or, in other words, to maintain a balanced husbandry. The innate appeal of animal life to children insured the popularity of the work. The first pig-club work is generally recognized as having been started in Caddo Parish, La., in 1910, under the leadership of E. W. Jones.

STATUS OF THE WORK.

The work has spread rapidly, until practically every State is doing more or less pig-club work as a part of the general club work. Twenty-one States have pig-club agents employed in cooperation with the Animal Husbandry Division and the States Relations Service. Since emergency funds became available for increasing pork production, five men have been placed in as many States to handle not only the pig-club work, but the swine-extension work with adults as well. Fourteen assistants to pig-club agents have been placed. In these States work with adults to stimulate pork production will be carried on in addition to the pig-club work.

The enrollment in the pig-club work is approximately 45,000 members. Complete reports on their work for 1917 are not yet at hand, but splendid work has been accomplished, as the pigs exhibited at the various State and county fairs attest. For example, at the three large fairs in Georgia, pig-club members showed 509 pigs and won prizes to the extent of over $3,200—part of which was in competition with the adult breeders and showmen, as is shown by the winnings at the Georgia-Florida Fair, where pigs belonging to members won two grand championships, one junior championship, and one reserve championship.

At the Louisiana State Fair car lots of fat hogs shipped cooperatively by pig-club members from different parishes or counties were on exhibit, contested for prizes, and were sold to the packers. Oklahoma is planning a similar demonstration at the Fat Stock Show in March. One car lot from each county in the work is the aim of the agent. Oregon reports an exceptionally strong exhibit of 180 pig-club members' hogs. Splendid and effective exhibits were made in every State in the work.

Needless to say, some of the best work done is never reported, owing to failure of the member to keep satisfactory records. There are doubtless boys in the background who do work quite as definite and constructive as do those who get into the limelight. The faithful, plodding member who perseveres in spite of obstacles and discouragement and completes his or her club work, even though the pig be the veriest scrub, has accomplished much in the way of character building and will be a better man or woman as a result of the effort made.

People familiar with the pig-club work realize that it means more than the mere feeding of a pig to make a few dollars' profit. They are realizing that where the club work is followed to its fruition it is a means of creating and broadening the vision, of awakening spirit, and of character building. The improvement in the quality of the breeding stock; the increased interest in live-stock production; the improved methods and the greater resulting profits are important factors in the economic and social development of the sections in which pig-club work is carried on.

AIMS FOR 1918.

In view of the great success attending the work thus far, and because of the great need of increasing the production of pork and pork products, the department is seeking to enroll 200,000 boys and girls as "junior soldiers of the commissary" for 1918. It is expected that every boy who can do so will raise one or more pigs for Uncle Sam and thus furnish the meat supply for a soldier.

NOTE.—The Animal Husbandry Division, Bureau of Animal Industry, Department of Agriculture, Washington, D. C., will supply literature pertaining to the detail of club work or answer questions concerning it.

COOPERATIVE MARKETING—WHERE? WHEN? HOW?

By C. E. Bassett, *Specialist in Cooperative Organization*, and O. B. Jesness, *Assistant in Cooperative Organization, Bureau of Markets.*

A RAPID development of cooperative marketing activities among the farmers of the United States has taken place during recent years. The popular faith in cooperation as a means of improving marketing methods has been very strong and has brought about the formation of a large number of associations. Indeed, the term cooperation has been employed in such a way that many people have come to believe that a cooperative organization offers a solution for almost all difficulties encountered in the marketing of farm products. While a great deal may be accomplished through organized effort when it is properly applied and correctly employed, too much emphasis can not be placed on the fact that cooperation is not automatic and is not a panacea for all the ills of mankind. Faith in the possibilities of cooperation is essential to its success, but this faith must be expressed in deeds as well as in words.

WHERE AND WHEN COOPERATIVE MARKETING SHOULD BE UNDERTAKEN.

CONDITIONS NECESSARY FOR SUCCESS.

Under certain conditions, a farmers' cooperative marketing organization may be the means of improving the business conditions of its members. Cooperation may be considered a remedy which, when properly applied at the proper time to the proper patient, may be expected to give relief. When the farmers of a district undertake cooperative activities, they must have faith in the remedy. Each must be willing to lay aside his individual desires and take the whole remedy, the bitter portions as well as the sweet. This means that each must be willing to surrender a portion of his freedom of action; must abide by the will of the majority; must be willing to bind himself to a definite contract and then live up to that agreement, even though there may come a time when to do so would result in a temporary loss.

Each member must realize that the management of the business must be intrusted to one or more persons selected because of superior skill and experience, and that the management can not be expected to accomplish satisfactory results if it is hampered by the interference of those whom it attempts to serve. If the members of a cooperative organization do not feel that the men to whom they have intrusted the management are better qualified to know what to do and when and how to do it than they themselves, why have such men been employed? When we consider how seldom the management of a farmers' cooperative association has any real control of the business, the wonder is that the success of such organizations has been as great as it has.

Not only must the personal attitude of the members be favorable to a business plan of organization, but local conditions must be such as to make organized marketing advisable. Too many cooperative organizations are formed when conditions are not ripe for the undertaking of such an enterprise. Many organizations fail because they are not founded on necessity. Every cooperative organization should result from a widespread demand based on a well-felt need.

Ordinarily, a community which specializes on one or a few products offers a more promising field for a cooperative marketing organization than one which produces small amounts of a large number of different products. A farmer naturally will devote more attention to an organization which markets his principal products than one which handles products which are raised by him as side lines.

If the service rendered by existing marketing agencies is unsatisfactory, a cooperative marketing organization is likely to receive heartier support than if the farmers are satisfied with the existing system. This factor should be given careful consideration when a cooperative organization is proposed. An association should be formed only when it can perform profitably some definite service, for an organization without a definite purpose is not likely to accomplish very much. Prejudice and misconception make a very insecure foundation for cooperative effort.

PRECAUTIONS TO BE OBSERVED.

There are a number of precautions to be observed in the organization of cooperative associations. One of these is that the demand for organized effort should come from those who unite to form the organization. Another important point to be observed is that the organization should grow from below upward. The mistake frequently is made of attempting to form a large central organization before organized effort in a small way has been tried out successfully and the details of the plan carefully worked out. A number of cooperative organizations fail because of lack of support, and on that account every possible precaution should be taken to hold the members together. Ordinarily a cooperative association should cover only a limited area. If a large territory is included, the membership is scattered and it is more difficult to keep the organization intact.

One of the principal obstacles to successful cooperation is the selfishness of the individual. The success of a cooperative undertaking depends largely on the support it receives from its members. On this account it is important that the members understand clearly the purposes of the organization and the methods by which it expects to accomplish the desired results, in order that they may realize fully the responsibility resting upon them. The members should not be led to expect impossible results from an organization. The making of sweeping claims may serve to attract people to the association and may assist in its organization, but unless the organization is able to come up to expectations these claims are likely to react very strongly against the movement. Each member should understand very clearly that the success of his organization depends upon him and that it is his duty to do his part. Selfishness and petty jealousies have no place in any cooperative undertaking.

Lack of sufficient business to make the operation of a marketing organization practicable has been the cause of many failures. A cooperative marketing association should not be undertaken unless the volume of business available is sufficient to make it worth while. As large a membership as possible should be secured, because there is a direct connection between membership and the support accorded to an organization. Disregard of this fact has resulted in the failure of some organizations.

The attitude of farmers in a community toward cooperative effort can not be ignored in organizing an association. The statement that a cooperative organization must be founded on a definite and well-felt need in order to be successful is true to a large extent at least. If the growers have not reached the stage where they are ready to give up individual effort for cooperative effort, the necessary support to make an organization successful is likely to be absent.

SOCIAL AND EDUCATIONAL ORGANIZATIONS.

There is a close relationship between cooperative marketing organizations and the more general associations formed for educational and social purposes. Many communities are not ready for cooperative marketing activities, and frequently a social or educational organization in such a neighborhood is invaluable in teaching its members the value of cooperation and how to cooperate. Just as a child creeps before it learns to walk and run, so a community has to understand the fundamentals and the requirements of cooperation before great results can be obtained from organization. An educational or social association, when properly directed, furnishes an excellent place for a full and free discussion of organization and marketing problems and in this way lays the foundation for future cooperative marketing activities.

HOW TO ORGANIZE A COOPERATIVE ASSOCIATION.

PRELIMINARY SURVEY.

When the organization of a cooperative purchasing or marketing association comes up for consideration, it is advisable to conduct a preliminary survey of the local situation in order to ascertain whether or not conditions are ripe for cooperative work. Since organizations founded on a well-felt need are more likely to be successful than organizations which are not, the need for a cooperative organization should be ascertained in the preliminary survey, as well as the amount of business available, and the attitude of the people in the community toward cooperative undertakings. The existing agencies which the proposed organization intends to replace or supplement should be studied, to determine whether they are rendering satisfactory service, and information should be gathered relative to the outlets for the products to be marketed and the sources of supplies to be purchased.

OUTSIDE ASSISTANCE.

A community contemplating the formation of a cooperative organization should secure assistance from the outside whenever such assistance seems necessary. Outside assistance, however, should not be depended upon for all the work of organizing, for it is very desirable that those who will become members of the association take an active part in developing the plans. The main purpose of securing assistance from outside sources should be to gain the benefit of information possessed by persons who are experienced in organization matters and who have made a special study of cooperative organization. If personal assistance from the outside can not be secured, it may be possible to obtain considerable information through correspondence. When this is done, detailed information relative to local conditions and the purpose and plans of the proposed organization should be furnished in order that the person addressed may be able to advise intelligently. Specific questions should be asked, because when this is done the exact information desired is more likely to be secured. Helpful information usually can be secured from literature on cooperation. The bulletins issued by the Bureau of Markets of the United States Department of Agriculture and the State agricultural colleges and experiment stations, articles in farm papers, and various well-known books on cooperation will be found helpful.[1] Any suggestions secured should be considered, of course, in relation to the local situation and should be modified to suit local needs. While outside assistance often is desirable, the importance of efficient local leadership can not be overestimated. The services of professional "promoters" should be carefully guarded. While enthusiasm is essential it will not take the place of sound business judgment or overcome unfavorable local conditions.

PRELIMINARY MEETINGS.

Before forming a cooperative organization, it is well to hold preliminary meetings, at which the question of organizing can be discussed, in order to prevent rushing into any

[1] U. S. Department of Agriculture Bulletin 547 contains a selected list of references on cooperation.

ill-advised ventures and to give ample opportunity for a careful development of the plan of organization. Preliminary meetings should also serve a very useful purpose in acquainting the farmers of the community with the details of the proposed organization and in giving them an understanding of the limitations, as well as the possibilities, of cooperation, and the requirements for the success of a cooperative enterprise. Preliminary meetings also provide a means for securing committees around which the activities may be centered. Thus there may be one committee on organization to develop the plans for the association, another committee to make a survey of local conditions and needs, another committee to assist in procuring a large attendance at the meetings, and so on.

ORGANIZATION MEETING.

After the question of organizing has been considered carefully, a meeting should be held to decide whether or not an organization is advisable. A special effort should be made to secure a large attendance at this meeting. The plans, scope, and purpose of the organization should be discussed, and a free expression of opinion should be sought in order that every one present may have an opportunity to suggest improvements. After the discussion a vote should be taken on the question of organizing. If the vote is favorable, steps should be taken to bring about the formation of an association. If a membership committee has not already been selected, one should be appointed for the purpose of creating interest and securing a large membership. The organization committee should be instructed to draw up complete plans and prepare a set of suitable by-laws. The date of the final organization meeting should be decided upon before adjourning.

FINAL MEETING.

At the final meeting the plans of organization and by-laws which have been prepared by the committee should be given careful consideration. It is advisable first to read the by-laws through without interruption, so that those present will have a general idea of their contents, and then to take them up section by section, giving ample opportunity for discussion. After each section of an article has been considered, a vote on that article may be taken while the points under discussion are still fresh in the minds of those present. After each article has been voted on, the matter of voting on the by-laws as a whole is a mere formality.

FORMS OF ORGANIZATION.

An association may be formed with capital stock or it may be a nonstock organization. The capital stock form of organization is the common form employed by farmers' organizations in many lines of business. The principal advantage of a stock organization is that the capital required may be secured more readily through the sale of shares of stock than through other means. This is one reason for the large number of stock organizations. Another reason is that the laws in most States do not provide for the incorporation of nonstock cooperative purchasing and marketing associations. The capital stock form, however, has some decided disadvantages. It is difficult to keep the shares of stock entirely in the hands of patrons of the company, and there is an ever-present danger that persons not directly interested in the principal purpose of the organization may gain control of the business, if it becomes sufficiently prosperous to be attractive to capital. Where organizations are formed with capital stock, the stock dividends should be limited to a fair rate of interest on the capital invested, and, instead of allowing each share a vote, each member should have one vote. The association should also regulate the transfer of shares of stock.

In the case of the nonstock cooperative organization there is less danger of the association being turned into a mere profit-making organization than there is with capital stock associations. One difficulty with the nonstock form for organizations which require considerable capital at the outset is the difficulty of securing the necessary funds. Whatever initial funds are necessary must be secured through membership fees, dues, loans, or contributions. The importance of the nonstock form of organization is emphasized by section 6 of the Clayton Act. Exemption from the operation of the United States antitrust laws is provided by the

Clayton Act for cooperative agricultural organizations which meet certain requirements. One of these requirements is that the organization must be without capital stock.[1]

PRINCIPLES OF COOPERATION.

The fact that many farmers' organizations are cooperative in name only shows that the underlying principles of cooperation are not clear in the minds of many. In drawing up a plan of organization these principles should be kept in mind in order that a truly cooperative association may result. A cooperative organization is a democratic institution in which it is customary for all members to have equal voting power, while in a noncooperative stock company each share usually has a vote. Thus the basis of representation in one is men, while in the other it is money. Another principle usually followed by cooperative organizations is to limit the financial interests of individuals as a further safeguard against allowing one member to gain control of the organization. It is customary for cooperative associations to admit as members all who desire and are qualified to become members and agree to abide by the rules. While noncooperative stock companies distribute their profits in the form of dividends on their capital stock, cooperative organizations having capital stock make a practice of limiting the dividends to a fair rate of interest on the capital invested and distribute the surplus, if any, on the basis of the business done through the association.

ROCHDALE PLAN OF ORGANIZATION.

Persons interested in cooperative associations frequently refer to the "Rochdale plan" of organization. Briefly, this takes its name from an organization started at Rochdale, England, in 1844, by a small group of flannel weavers. This organization followed the true principles of cooperation as outlined above. The term "Rochdale plan" often is used to describe an association which is organized and operated in accordance with these principles.

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[1] See U. S. Department of Agriculture Bulletin 547; and Office of Markets and Rural Organization Service and Regulatory Announcements No. 20.

BY-LAWS.[1]

The by-laws of a cooperative organization are very important, and great care should be taken in framing them. They should furnish the organization with a complete working plan. Among the factors in regard to which provisions should be made in the by-laws, may be mentioned the following: The objects of the organization, membership requirements, fiscal year, meetings, quorum, board of directors and officers, manager, membership fee, capital stock or any other method of financing to be employed, grading and inspection of products marketed, contracts and agreements, duties and rights of members, expenses and payments, distribution of savings, auditing, purchasing supplies, and amendments.

INCORPORATION.

Incorporation usually is advisable for cooperative marketing organizations on account of the advantages to be gained thereby. The method of incorporating an association is not the same in all States, and it is impossible, therefore, to outline the exact procedure to be followed. Each association should find out the requirements of the incorporation laws of its State. Some of the States have more than one act providing for the incorporation of associations, in which case the one most adapted to the needs of the association should be selected and the by-laws drawn accordingly. A competent local attorney will be of assistance in furnishing the necessary information relative to the procedure to be followed in incorporating an association and also may render valuable assistance in drawing up the articles of incorporation and by-laws. In case incorporation is decided upon, a committee may be selected for this purpose at the time of organization.

After the association has been incorporated, the by-laws have been adopted, and directors and officers have been selected, the organization is ready to engage actively in the business for which it has been formed.

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[1] A suggested form of by-laws for a farmers' cooperative marketing association may be obtained by applying to the Bureau of Markets, U. S. Department of Agriculture.

A WASTED SUGAR SUPPLY.

By E. F. Phillips,
Apiculturist, Bureau of Entomology.

THE AMOUNT of nectar secreted by the multitude of flowers from coast to coast is large beyond our comprehension. Secreted to the end of attracting insect visitors in order that cross-pollination may be effected, this nectar is poured out freely by hundreds of species. The percentage of sugar in nectar varies with different plant species and also with climatic differences, but it is well within the bounds of truth to state that the total sugar thus secreted far exceeds the amount of all sugars consumed by the American people now obtained from cane and sugar beets.

Unfortunately this nectar soon disappears as the flowers wither and is lost to human use. Any method of conserving this abundant resource must be through an agency which is ever on the alert for each fresh supply. Individuals of a multitude of insect species seek out this nectar for their food, and as many of these insects are economically valuable, the nectar they consume is turned to a useful purpose when viewed from the standpoint of human economy. Of all these nectar-seeking species, however, the honeybee alone is capable of being used by man as an instrument for collecting this sugar supply, and even this useful species can scarcely be considered as an example of brilliant efficiency when viewed solely from man's selfish point of view. It is the object of this article to show that beekeeping may be increased so as profitably and economically to help us save more of this now wasted sugar.

THE HONEY CROP.

In times of war or other emergency our normal supply of sugar may be curtailed, and in the present crisis the American people would fare better if beekeeping had been more fully developed. The present honey crop of the United States rarely exceeds 250,000,000 pounds. That the country produces even this much is unknown to most people, for, while honey was the chief form of sugar used in ancient times, the ease of getting cane or beet sugar has placed honey in the background. Now that our sugar supply is reduced by reason of supplying our allies with part of the sugar they need, the demand for honey has increased, not only domestically but for export. It is now openly a matter of regret that the United States did not have enough skilled commercial beekeepers to harvest several times the honey crop of 1917.

WHY YIELDS ARE FREQUENTLY SMALL.

It must not be assumed that the only requirement for obtaining honey is to buy some colonies of bees and permit them to forage for nectar. To keep bees profitably requires study, and labor at just the right time. Because of lack of attention, fully half the bees now kept in the United States are virtually useless to their owners, and consequently beekeeping is often condemned as unprofitable. The reasons for the unprofitableness of most colonies of bees will be discussed briefly.

Bees gather nectar for their immediate use, to provide food for the developing brood, and to provide stores for periods when no nectar is available. Except in the extreme South, there is no nectar available during the winter season, and provision must be made to carry the colony over this period, for, unlike other insects, the honeybee does not hibernate. The amount of honey used by a colony simply to maintain its existence during the year is large. Just how much is used by an average colony has never been determined with accuracy, and there are many complicating factors which make this a difficult question to solve. It will perhaps not be far from the truth to assume that this amount is at least 400 pounds.

On this assumption, then, every colony must gather its 400 pounds before there is any honey for the beekeeper. The honey removed for human use is usually spoken of as "surplus" by beekeepers, and this is literally its correct name. When weather conditions are unusually favorable for nectar secretion the task of gathering this amount is easy, and under such circumstances there is some surplus for every bee-

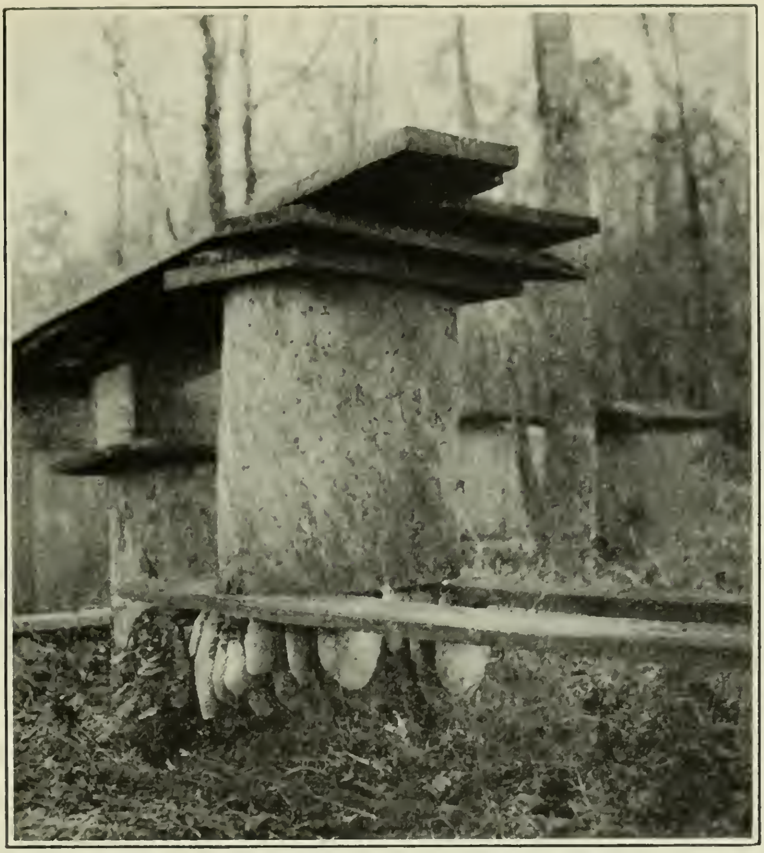

FIG. 1.—POOR EQUIPMENT, POOR MANAGEMENT, POOR RESULTS.

The owner of these bees claims that beekeeping does not pay, yet the bees insisted on storing honey even outside the "gum."

FIG. 2.—GOOD EQUIPMENT, POOR MANAGEMENT, POOR RESULTS.

This apiary was almost destroyed by disease before the trouble was discovered.

FIG. 1.—GOOD EQUIPMENT, GOOD MANAGEMENT, GOOD RESULTS.

From apiaries such as this the country's honey crop is secured.

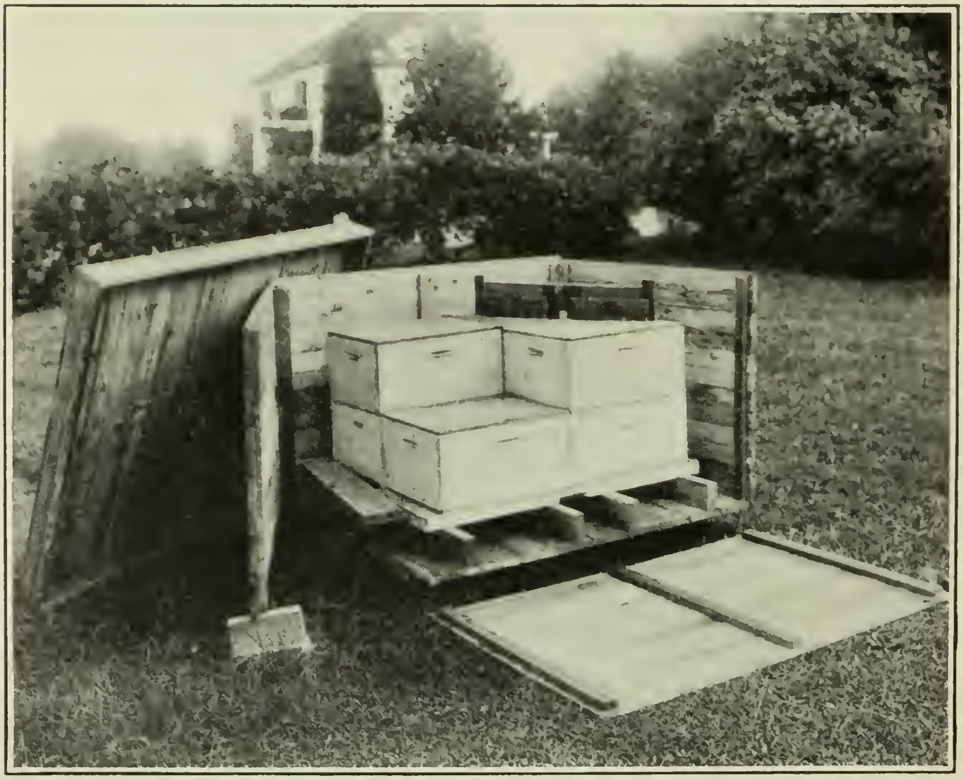

FIG. 2.—WINTER PACKING CASE FOR FOUR COLONIES OF BEES.

It is impossible to overpack bees in winter.

keeper. In most seasons, however, nectar is not secreted so freely, and only the beekeeper who properly manipulates his bees gets a surplus. Probably in an average season, for the United States as a whole, the surplus honey obtained by good beekeepers will scarcely exceed 50 pounds per colony.

This average of 50 pounds surplus represents, then, only one-ninth of the nectar gathered by the bees. In such an average season an apiary of 100 colonies may gather nectar equivalent to 22½ tons of honey, whereas the "honey crop" or surplus honey will be only 2½ tons. That 100 colonies of bees can find nectar sufficient for 22½ tons of honey within a radius of about 2 miles will give one some idea of the amount of sugar available in the form of nectar. This amount is doubtless much below the actual sugar at hand, for when nectar is flowing freely bees do not get it all. Furthermore, in many places more than 50 pounds surplus is obtained, and often more than 100 colonies can be kept profitably in one place.

In the face of these facts it is regrettable to find so many beekeepers who fail to get even the small percentage which belongs to the beekeeper. There are parts of the United States where nearly 90 per cent of all colonies of bees are in hollow logs (Pl. LXVIII, fig. 1) or plain square boxes, in which combs and bees can not be handled. There are few parts of the country where the box hive is not found, and probably one-third of all the bees in the country are so housed. In this case both equipment and management are poor and the energy of the bees is misdirected.

Even of those who keep their bees in modern hives with movable frames, the vast majority do not get the full crop. By failing to control swarming, by providing insufficient room for storage, or by lack of proper care in winter their crop is often reduced one-half or more. The equipment is good, but the management is poor and much of the energy of the bees is wasted.

GOOD MANAGEMENT THE PRICE OF SUCCESS.

The bright side of the picture is seen in the minority of apiaries where the bees are properly housed in good hives, where swarming is controlled, where surplus room is given on time and in abundance, and where the bees receive adequate protection and care in winter. (Pl. LXIX, figs. 1, 2.) Beekeepers who so manipulate their bees receive an adequate return for their labor, and since it is only the good beekeepers who get all the available surplus, it may be safely stated that surplus honey is directly traceable to study and care. Many good beekeepers in the United States receive a good living from their bees and have incomes equal to that of a prosperous farmer in other lines of agriculture. This results from properly directing the energy of the bees.

The productive colony of bees may be figuratively likened to a machine which consumes in friction 90 per cent of the energy applied. This is not a high degree of efficiency when measured by this standard. The colony in a box hive, then, is likened to such a machine in bad repair and with no attention, in which all the energy is used simply to drive the wheels. Such a machine is totally unproductive. The properly housed colony, which is badly manipulated, is, then, comparable to a machine in good repair but in the hands of a poor mechanic. Such a machine may do fair work for a time, but the mechanic fails to do the necessary work at the right time and the machine is only occasionally productive. Finally, the productive colony is like a good machine in the hands of a good mechanic. While energy is consumed simply to run the machine, the good mechanic does the right work at the right time and obtains the greatest possible reward in the machine's output. Such a figurative comparison must not be carried too far and is used here only to point out the lamentable waste in much present-day beekeeping.

SOURCES OF LOSS.

Of the major sources of loss the greatest is the death and weakening of colonies in winter. By starvation or exhaustion of vitality the average winter loss of most localities is fully 10 per cent. Strangely enough this loss is practically as high in the South as in the far North. An industry which can continue to exist while suffering a 10 per cent loss annually must be one of great promise if this loss can be reduced. Furthermore, of those colonies which remain in the spring, the population is often lamentably reduced. Normally no brood is reared in winter, although abnormal and unseasonal brood rearing is so common as to be considered almost normal by many beekeepers. The reduction in numbers and especially in vitality of the bees still remaining makes it impossible for many colonies to gather a surplus from the earlier nectar sources, and much honey is lost while the colony is regaining its strength. It is not at all unusual for the honey crop to be reduced one-half by poor wintering. Yet the winter loss can be reduced readily to less than 1 per cent.

A second source of loss is from two infectious diseases of the brood of bees, European foulbrood and American foulbrood. Within the past few years many of the States have provided for apiary inspection, and in all but a few States these diseases are sufficiently controlled to permit commercial beekeepers to conduct their work with virtually full returns. In spite of such success the annual loss of colonies from disease is probably $2,000,000, and many beginners in beekeeping are discouraged by the disease situation. This source of loss is therefore a serious one. (Pl. LXVIII, fig. 2.)

When a colony becomes populous during a good honey flow it normally makes preparation to swarm, thus dividing itself into two colonies. While this instinct is advantageous to wild bees, it results in a reduction in the honey crop if the division occurs, as it usually does, just before or during the time when nectar is especially abundant. Rarely can swarming be entirely prevented, even with the best of care, but the proper measure of a beekeeper's skill is his success in reducing this activity. A failure to attempt this causes untold loss in honey every year, and the methods of swarm prevention and control can be understood only by careful study and experience.

The proper giving of room for surplus honey is important in this connection. It is an unusually good locality in which nectar is abundant all summer and this room must be given at just the right time. This necessitates watchful study of the nectar-producing flowers. It is quite a common practice for beekeepers to put on one "super" for the storage of surplus honey and to wait until this is entirely filled before giving more space. This results in the loss of much honey from lack of storage space, and often too much is stored in the part of the hive which should be devoted to brood rearing. The proper placing of room for surplus honey requires vigilance and study, and a failure to provide this room on time and in the proper way often may reduce the crop to one-third.

BEEKEEPING AN EXACTING CALLING.

These more common sources of loss are mentioned to show that a failure to make a success of beekeeping almost always results from a lack of study of the needs of the bees, combined with a failure to do things on time. Beekeeping is therefore essentially an industry which requires studious care, and in consequence the proper development of this branch of agriculture necessitates to an unusual degree the dissemination of information of a rather detailed nature. While there are published bulletins and books which contain the needed information, these have not proved adequate in developing beekeeping to the extent that is possible and to a degree which would be profitable.

It is quite possible for the American beekeeping industry to be developed so that the honey crop will be ten times what it is at present. Not only would such a development be valuable in an emergency, such as the present crisis, but in normal times the beekeeping industry can provide a concentrated nutritious food, almost universally liked and assuredly an article of diet preferable to the inferior sirups and jams so commonly used. The beekeeping industry may be the means of conserving a national resource now largely wasted, changing it into nature's own sweet. The raw material is free on every hand; the investment for equipment is small in comparison with other branches of agriculture; the profits are fully commensurate with the study and labor involved. It would seem profitable to stop such a waste of so desirable a supply of sugar. This waste can be prevented only by the education of beekeepers.

WOOL: PRODUCTION, FOREIGN TRADE, SUPPLY, AND CONSUMPTION.

By George K. Holmes,
Statistical Scientist, Division of Crop Records, Bureau of Crop Estimates.

WOOL grows on sheep to obstruct the radiation of heat from their bodies, and thus serves to economize their consumption of heat-producing food and conserve their vitality. Millions of the human race have appropriated this body covering of sheep throughout the ages for the same purposes.

In the course of time, as human demands have exceeded the supply of wool, substitutes have been utilized, and thus cotton fiber has become indispensable to most of the population of the world as a substitute for wool, and flax fiber has acquired subordinate importance. For the purpose of conserving body heat, however, wool excels its substitutes, because not only does its woven fabric diminish the radiation of body heat, but its fiber is a poor conductor of heat. So, wool has become a choice fiber for cloth for clothing and for bed covering. Furthermore, wool can be spun into more bulky yarn than cotton or flax, and hence is often preferred for making textile fabrics when thickness is desired, as in the case of carpets. It is true, however, that human habits and fancies with respect to woolen fabrics in various uses have contributed much to the prominence that they occupy.

NUMBER OF SHEEP THROUGHOUT THE WORLD.

Sheep have not multiplied in the world in recent years at so great a rate as has the wool-consuming portion of the human race. Farm management has not provided, perhaps has not been able to provide with economic results, a place for sheep sufficient to maintain undiminished the consumption of wool, and the supply of wool must have been sorely restricted had not great areas of range and cheap pastures been appropriated for sheep feeding in the United States, Argentina, Australia, New Zealand, Russia, Uruguay, and other countries.

The general fact appears to be that throughout the world sheep are declining in number, not only per capita of population, but absolutely, notwithstanding the utility of these animals in producing both wool and meat.

IN THE UNITED STATES.

The first census report of the number of sheep on farms was for 1840. The censuses for 1840 and 1850 expressly excluded spring lambs. In subsequent censuses, to and including the census of 1890, they were not mentioned, and were presumably largely omitted. In 1900 and 1910 spring lambs were included. Sheep on farms grew in number from 19,000,000 in 1840 to 22,500,000 in 1860, to 35,000,000 in 1880, to 36,000,000 in 1890 and to 61,500,000 in 1900, including ranges in 1880 and later. In 1910 the census date was April 15 instead of June 1 as before, and the number of sheep on farms and ranges at the earlier date was 52,450,000. Had the census been taken for June 1, the number would probably have been about 63,000,000 or about 1,500,000 above the number in 1900. Taking the number of sheep, 52,450,000 as reported April 15, 1910, as the base, the number estimated by the Bureau of Crop Estimates has been a declining one to 47,600,000 in 1917, a loss of about 5,000,000 in seven years. The number increased to 48,900,000 in 1918. Apparently sheep in this country reached their largest number about 1910. The number of sheep not on farms and ranges in 1910 was about 400,000.

SHEEP IN OTHER IMPORTANT COUNTRIES.

As far back as 1887 Algeria had 10,900,000 sheep, but the number declined with great fluctuations to 8,300,000 in 1912.

Argentina had over 43,000,000 sheep in 1914, or nearly 5,000,000 less than are now in the United States. As far back as 1888 the number was 67,000,000. It may be that the maximum number of sheep has not yet been reached, because Argentina has vast areas not now utilized that can be used for sheep grazing.

Australia has experienced great variations in number of sheep. The largest number ever reported was 106,000,000 in 1891, but there was afterwards a decline, somewhat broken, to 54,000,000 sheep in 1902, or about one-half the number of eleven years previous. A tendency to gain followed 1902, resulting in 93,000,000 sheep in 1911, or a greater number than in any year since 1894, but again there has been a strong decline, so that in 1915 Australia had 70,000,000 sheep. Australia is subject to droughts that are destructive to a large number of sheep in one season, but the great recuperative power of the flocks of that Commonwealth has more than once been demonstrated.

It is estimated that Brazil had 10,700,000 sheep in 1914. This seems to be the only estimate available.

British South Africa, including the Union of South Africa, is a vast region with extensive areas suitable for sheep raising, and hence has been possible the enormous increase of sheep from 16,000,000 in 1904 to 36,000,000 in 1913. This notable progress has been made in spite of droughts and of sheep parasites and diseases.

Canada had 2,600,000 sheep in 1891, 2,500,000 in 1901, 2,200,000 in 1911, all census years, and the estimate for 1917 is 2,000,000. Apparently the high-water mark was reached in 1908, for which year the estimate is 2,800,000 sheep.

According to the census of 1902, Mexico had in that year 3,400,000 sheep. There is no information for any other year.

New Zealand is an important sheep-producing country that has steadily increased its sheep, although fluctuations are apparent. From 1891 to 1917 the sheep increased from 18,000,000 to 25,000,000. This industry seems to be strongly established in New Zealand and offers no evidence of weakening.

In Asiatic Russia 36,000,000 sheep were estimated for 1908, and the estimate for 1913 is 3,000,000 larger. In European Russia the estimated number of sheep was nearly 50,000,000 from 1890 to 1904; in 1905 Northern Caucasia was added to the area for which estimates were made, and this increased the number to 53,400,000. From that year a decline has followed, with some fluctuations, until in 1913 the estimate fell to 41,000,000. In the entire Russian Empire the number of sheep declined from about 89,000,000 in 1903–1908 to 80,000,000, or 10 per cent, by the time that the European war began.

The census of 1900 found 18,600,000 sheep in Uruguay and that of 1908 reported 26,300,000. No information has been obtained for any subsequent year, but the growth of the sheep industry in Uruguay has been conspicuous and makes that country prominent among the sheep countries of the world.

Notwithstanding its severity and extent, the European war has not prevented a large degree of conservation of sheep in the belligerent European countries that have not been mentioned, yet there has been a perceptible decline in the number of sheep in those countries since the war began.

The foregoing survey of prominent sheep-producing countries confirms the general statement previously made that the sheep of the world are declining in number, not only per capita of the population but absolutely.

PRODUCTION OF WOOL IN THE WORLD.

Many difficulties are encountered in making a compilation of the world's production of wool, but, subject to imperfections on this account, such compilations have been made by the Bureau of Crop Estimates for 1901–1906, and by the National Association of Wool Manufacturers for 1908–1916. For 1901 the total for all countries for which estimates could be made, and these countries produce almost all of the world's wool, was 2,807,000,000 pounds. By 1909 the quantity had increased to 2,953,000,000 pounds, and by 1911 to 2,971,000,00 pounds, and this is the largest total production reported. Since 1911 the world's wool production has steadily declined to 2,717,000,000 pounds in 1916.

Within the period covered by the record Australia has been the most prominent country in wool production, and its clip has amounted to about one-fifth of the world's total until in 1916 the fraction fell considerably below one-fifth on account of great loss of sheep because of drought. Australia and New Zealand together have produced from 21 to 30 per cent of the world's total during the period under review.

Argentina follows next after Australia in order of importance in wool production at the beginning of the period under review, its fraction of the world's total being 18 per cent in

1901, with decline to 13 per cent in 1906, followed by great loss to the present time.

The Russian Empire produced nearly as much wool as Argentina did in 1901, its fraction of the world's clip being 15 per cent in that year. The fraction was as high as 17 per cent in 1902 and 1903, but in recent years it has been steady at about 14 to 15 per cent.

At the beginning of this period the United States occupied fourth place as a wool producer with a fraction of 11 per cent of the world's production, and the fraction has remained quite constant at 10 to 12 per cent since 1901.

A comparison of the prominent wool-producing countries in 1916 finds that Australia and New Zealand combined produced 25 per cent of the world's wool clip, the Russian Empire 15 per cent, the United States 12 per cent, Argentina 6 per cent, the Union of South Africa 6 per cent, Uruguay 5 per cent, the United Kingdom 4.5 per cent, Turkey in Asia 3.3 per cent, and France 2.8 per cent. The high degree of geographic concentration of the wool production of the world appears when it is stated that Argentina, Australasia, the Russian Empire, and the United States produced 56 per cent of the world's wool in 1916, and the geographic concentration would be emphasized if the principal producing areas of these countries were defined.

Among the grand divisions of the earth, Europe was most prominent in 1916 in wool production and had 32 per cent of the world's wool clip to its credit. The fraction for Oceania, including Australia and New Zealand, was 25 per cent, for South America 14 per cent, for North America 12 per cent, for Asia 10 per cent, and for Africa 8 per cent.

IN THE UNITED STATES.

In statistics bearing upon wool production in the United States it was not until 1895 that an attempt was made to establish the number of sheep of shearing age, but with poor success until the census of 1900 was taken. Of the total number of sheep on farms and ranges in that year 64.8 per cent were of shearing age, and in 1910, the following census year, 73.4 per cent. In recent years the percentage of the total sheep that stands for those of shearing age is about 71 to 74. At the present time over 35,000,000 sheep supply the wool clip of this country, and this number is lower than for any year, except 1916 to 1918, at least as far back as 1900, when sheep of shearing age were first trustworthily indicated.

Pounds of wool produced.—It may not be easy for any two estimators or compilers of the wool production of this country to agree, for the reason that they may choose different factors or different authorities, or adopt different processes. The statistics accepted for the preparation of this article have been provided as follows: Bureau of the Census—1840, 1850, 1860, 1870, range and pulled wool excluded, 1880, spring clip only, 1890, 1900, 1909, fleece-wool production on farms and ranges to which have been added pulled wool estimates made by the National Association of Wool Manufacturers or approved by the Bureau of the Census; Bureau of Crop Estimates—1871–1879, 1881–1889, 1891, 1892, 1914–1917, range and pulled wool apparently included throughout; National Association of Wool Manufacturers—1893–1899, 1901–1908, 1910–1913.

From 1840 to 1870 the wool clip on farms, the range clip and pulled wool being excluded, increased from 36,000,000 to 100,000,000 pounds. In 1871 the wool production, including range and pulled wool, amounted to 160,000,000 pounds; by 1877 the amount had reached 200,000,000 pounds; by 1884, 300,000,000 pounds; by 1900, 305,000,000 pounds; and by 1909, 330,000,000 pounds, the highest quantity reported by any census. Estimates for years since 1909 declined to 289,000,000 pounds for 1917, and it is necessary to go back to 1890 to find a lower census production. The average annual production of the 10 years 1905–1914 was 306,500,000 pounds, and this average is larger than the production for the years that follow.

Average weight per fleece.—By the census process the average weight of a fleece is obtained by dividing the total weight of fleece wool by the number of fleeces. By the process of the Bureau of Crop Estimates and of the National Association of Wool Manufacturers the average weight is directly ascertained by States and the United States average is a weighted one. From 1840 to 1917 the average fleece weight has increased in this country 3.8 times. This expresses in numerical form what might be an elaborate story of efforts to improve the breeds of sheep, and to acquire those that produce more wool as well as that of finer quality.

The average fleece weight of 1840 was only 1.85 pounds; 10 years later it had grown to 2.42 pounds, and by 1866 the average had reached 3.25 pounds. When 1880 arrived the average fleece weight was 4.80 pounds, and the estimate for 1884 was 5.20 pounds; 6.38 pounds were reached in 1893; the average for 1900 was 6.29 pounds; for 1909 it was 6.84 pounds. The estimate for 1911 almost touches 7 pounds, and the one for 1917 is exactly 7 pounds, the largest ever estimated.

In the decade 1895–1904 the mean fleece weight was 6.38 pounds, and in the following decade the average was 6.76 pounds; for 1915 the estimate is 6.80 pounds, for 1916 it is 6.86 pounds, and for 1917 it is 7 pounds.

Production per capita of the population.—The production of wool in this country in relation to the number of the population may now be examined. Pulled and range wool being included, the annual average wool production for the 10 years 1875–1884 per capita of the population was 4.70 pounds, and the average increased in the following decade to 4.74 pounds. A period of decided decline ensued and in the 10-year period 1895–1904 the per capita average production fell to 3.79 pounds, succeeded by the still lower average of 3.35 pounds in the 10 years 1905–1914. The average for the single year 1914 was 2.9 pounds; for 1915, 1916, and 1917, 2.8 pounds.

The production of wool in this country reached its highest point, absolutely, apparently in 1909, since which time there has been a decline from each year to the next, with the exception of two years. Relative to population, wool production has declined more emphatically, as the per capita averages above mentioned indicate. At the present time this country's wool production per capita is scant 60 per cent of what it was on the average in the 10 years 1875–1884.

Production as a percentage of supply.—The supply of wool to this country consists not only of the production within the country, but also of the gross imports less reexports. It is important to know the relationship between the supply and the production. On account of stocks held at the beginning and end of each year, the yearly computation of this relationship, without taking account of stocks, often produces erratic results. This error, however, may be almost entirely eliminated by extending the computation to the total of, say 10 years. Upon doing this, it plainly appears that wool production in this country greatly declined from 77 per cent of the supply in 1875–1884 to 53 per cent in 1895–1904, followed by some recovery to 56 per cent in 1905–1914. The imports used in these computations include estimates of the raw wool contained in such fabrics in the foreign trade as permit estimates.

A comparison for the same period may be made with the supply of raw wool. Of this supply, the production was 76.7 per cent in the 10 years, 1875–1884, and the ratio declined to 52.5 per cent in 1895–1904, followed by a contrary movement to 56.3 per cent in the following 10 years.

Percentage of the consumption.—Still more important is it to know the relationship between the production of wool and the quantity consumed. As nearly as it is possible to estimate the consumption of wool in this country, such consumption much exceeds the production. In the endeavor to include an estimate of the raw wool contained in imported fabrics and to exclude the raw wool contained in exported ones, it is not possible to determine this consumption continuously during a long period of years. For the four years 1911–1914, the production of wool was 61.1 per cent of the consumption of domestic and foreign wool.

If the comparison be confined to the consumption of raw wool, it is possible to extend it so as to cover a much longer period of time. Of the consumption of raw wool, the production was 79.4 per cent in the 10 years 1875–1884, 70.2 per cent in the following 10 years, 62 per cent in the 10 years next following, and 59.5 per cent in 1905–1914.

IMPORT RECORD FOR PRINCIPAL COUNTRIES.

The main features relating to the production of wool have now been touched upon briefly. During recent years the number of sheep has declined in this country, and also the production of wool, both absolutely and per capita of population. At the same time the number of sheep and the production of wool are declining throughout the world, although exceptions may be found in a country here and there. A majority of the sheep in principal countries belong to the range and to cheap pastures.

What may be regarded as the world's import trade in wool increased from 1900 to 1912, when the largest international wool movement, as recorded, was made. The total for 1900 was 1,566,000,000 pounds, and the total for 1912 was 2,572,000,000 pounds. In the following year the total declined slightly and in 1914 it declined enormously on account of the beginning of the European war and fell to 1,436,000,000 pounds. It is to be borne in mind that some of the wool that figures in the import trade is duplicated in statement, as, for instance, when Argentine wool is imported into England and reshipped to the United States.

Prior to the present war, France led all countries in magnitude of wool imports, the quantity beginning the period under review with 418,000,000 pounds in 1900, and reaching as much as 623,000,000 pounds in 1909. The United Kingdom follows France in order of importance as an importer of wool under prewar conditions, having received 382,000,000 pounds in 1900, and as much as 889,000,000 pounds in 1915. Germany stands third in order of importance before the present war, with wool imports ranging from 346,000,000 pounds in 1900 to 517,000,000 pounds in 1912. Fourth in order of importance is the United States, and Belgium fifth (fourth, in place of the United States, in 1910–1913). Russia was added to the list of countries that imported more than 100,000,000 pounds of wool in 1910 and became the sixth country in order of importance.

FOR THE UNITED STATES.

In compiling the imports of wool into the United States the reexports have been subtracted from the gross imports. A large quantity of wool has at times come into this country in woven fabrics and an attempt has been made to estimate the quantity of wool in such fabrics. The process undoubtedly is crudely performed, but the error, although it may be considerable as a percentage of the wool imported in fabric form, becomes much smaller as a percentage of the total wool imports including raw wool. Whatever the facts may be, raw wool has been kept separate in the compilation from the wool in the manufactured form. The manufactures of wool mentioned in the import statistics for which estimates of raw wool have been made are the classes of cloths, women's and children's dress goods, yarn, and tops. When a fiscal year is mentioned it is one beginning and not ending in the year specified.

Raw and manufactured wool, the latter estimated to the extent above mentioned, were imported to the amount of 112,000,000 pounds in 1861, but after 1866 the quantity was usually much below 100,000,000 pounds until the imports exceeded that quantity in 1883 and in nearly all subsequent years. The imports reached 205,000,000 pounds in 1891, 348,000,000 pounds in 1894, 535,000,000 pounds in 1895, 701,000,000 pounds in 1896, and that was by far the largest amount of wool imports ever received in this country in any one year. Since that time these imports have usually ranged between about 150,000,000 and 300,000,000 pounds until 1914, when the imports reached 369,000,000 pounds, followed by 555,000,000 pounds in 1915, and 392,000,000 pounds in 1916.

By 10-year averages the imports of raw and of manufactured wool as far as estimated amounted to 82,000,000 pounds annually as the average of 1865–1874; 71,000,000 pounds, of 1875–1884; 197,000,000 pounds, of 1885–1894; 259,000,000 pounds, of 1895–1904; and after that period the average declined to 232,000,000 pounds in 1905–1914.

The largest quantity of raw wool ever imported into this country in one year was 524,000,000 pounds in 1915; second in order in 1916 with 364,000,000 pounds; and third in order is 1896 with 347,000,000 pounds.

As far back as 1840 some 15,000,000 pounds of raw wool were imported. From 1849 to 1854 the annual average imports were 21,000,000 pounds, during the 10 years 1855–1864 they were 41,000,000 pounds, in the next 10-year period the average was 57,000,000 pounds, followed by 61,000,000 pounds in the next, and by continuous increase to 209,000,000 pounds per year in 1905–1914.

The raw wool contained in cloths and dress goods averaged as high as 82,000,000 pounds in 1895–1904 and as low as 10,000,000 pounds in 1875–1884.

During a few years before the European war the clothing wool was imported into this country almost entirely from Argentina, Australia, and the United Kingdom; combing wool, mostly from the United Kingdom, with much subordinate contributions from Argentina, Canada, Peru, and Turkey in Europe; carpet wool, chiefly from China, Russia in Europe, and the United Kingdom, with secondary accessions from Argentina, British India, France, Russia in Asia, and Turkey in Asia.

Percentage of production.—The imports of raw and manufactured wool, as far as the latter has been estimated, have had a wide range of numerical relationship to the national production of wool. As far back as the 10-year period 1875–1884 these imports were 30 per cent of the production, and the ratio increased to 90 per cent in 1895–1904, but during the 10 years 1905–1914 the ratio fell to 78 per cent, or more than three-quarters of the national production. In the following year, 1915, the ratio reached 194 per cent of the production, followed by 136 per cent of the production in 1916. From 1914 to 1916 the imports of wool exceeded the quantity of the domestic production, and this statement is good for only three preceding years, 1894–1896.

If raw wool alone is considered, its imports, by 10-year periods, have uninterruptedly increased in relation to production from 26 per cent in 1875–1884 to 68 per cent in 1905–1914. For the single year 1915 the imports of raw wool were 184 per cent of the production or nearly double, and in 1916, 126 per cent.

Percentage of supply.—Of the supply of wool or the production plus the imports less reexports, the imports were as low as 23 per cent in 1875–1884, including estimates of wool in the mentioned imported manufactures. The fraction reached almost one-half of the national supply, or 47.5 per cent, in 1895–1904, followed by 44 per cent in 1905–1914. More than one-half and as much as two-thirds of the national supply was imported yearly from 1914 to 1916.

If wool in manufactures is excluded, the raw wool imports were 20.7 per cent of the raw wool supply in 1875–1884, and the ratio increased continuously to 40.6 per cent in 1905–1914.

NATIONAL SUPPLY OF WOOL.

The national supply of wool, including wool in imported manufactures as far as estimated, has increased from 301,000,000 pounds, the yearly average for 1875–1884, to 546,000,000 pounds in 1895–1904, after which there was a slight decline to 544,000,000 pounds in 1905–1914. The unprecedented supply of 841,000,000 pounds was reached in 1915, while for 1914 the quantity was 659,000,000 pounds, and for 1916, 680,000,000 pounds.

Raw wool alone being under consideration, the supply averaged 294,000,000 pounds yearly in 1875–1884, and the amount grew steadily to 516,000,000 pounds in 1905–1914, followed by a supply of 810,000,000 pounds in 1915, and 653,000,000 pounds in 1916.

PER CAPITA SUPPLY.

Undoubtedly the per capita supply of wool in this country has generally declined since the 10-year period 1885–1894, during which period the annual average was 7.89 pounds. In the next 10-year period the average fell to 7.22 pounds, while in 1905–1914 there was a conspicuous drop to 5.96 pounds per capita. The per capita supply of 8.39 pounds in 1915 was the highest since 1896. From 1894 to 1896 the per capita supply increased from 9.88 to 13.75 pounds. These averages have been equaled at no time. The foregoing averages include imported manufactured wool as far as estimated.

The raw wool supply per capita averaged 5.92 pounds in 1875–1884, and increased to 6.75 pounds in 1885–1894, after which it fell to 5.64 pounds in 1905–1914. The per capita averages of raw wool for 1915 and 1916 were 8.08 and 6.41 pounds, respectively.

EXPORTS OF DOMESTIC WOOL.

According to the definition of domestic exports, they are goods produced or manufactured in this country from either domestic or imported raw materials and which are shipped to foreign countries. Foreign exports or reexports are goods which have been imported into this country either for reexport or for consumption and are afterwards exported, having undergone no change in form or condition or enhancement in value by the application of labor in the United States. These reexports should not be combined with domestic exports in compilation, in order that the statement for domestic exports may not be impaired, but they should be subtracted from imports in order that the net imports entering into the uses of this country may be known.

CHIEF EXPORTING COUNTRIES IN THE WORLD.

Since 1903 Australia has been the principal wool-exporting country of the world. It held this place in 1900, but in 1901–1903 it was displaced by Argentina. In 1900 Australia exported 336,000,000 pounds of wool; in 1901, 452,000,000 pounds; in 1906, 523,000,000 pounds; in 1907, 638,000,000 pounds; and the highest wool export of that country was reached in 1910 with 734,000,000 pounds. Since that year the quantity has declined continuously to 603,000,000 pounds in 1913, and 414,000,000 pounds in 1914.

Argentina's wool exports were 223,000,000 pounds in 1900; 503,000,000 pounds in 1901, and this export has not since been equaled. On the contrary, the exported quantity has on the whole declined until in 1905 it was 421,000,000 pounds; in 1909, 390,000,000 pounds; in 1911, 291,000,000 pounds; in 1913, 265,000,000 pounds; and in 1915 and 1916, 259,000,000 pounds each year.

Third in order of magnitude is New Zealand, whose wool exports in 1900 amounted to 141,000,000 pounds; in 1910, to 212,000,000 pounds; and after that year a little under two hundred million pounds, except that the exports of 1914 were 227,000,000 pounds, and of 1915 a little over 200,000,000 pounds.

The wool exports of British South Africa have rapidly increased from 28,000,000 pounds in 1900, and in recent years have nearly equaled those of New Zealand.

Uruguay has maintained a large wool export since 1900, the quantity for that year being 59,000,000 pounds; the quantity rose above one hundred million pounds in 1908, and equaled 178,000,000 pounds in 1912, but a decline followed to 98,000,000 pounds in 1914.

The total wool exports of all countries amounted to 1,166,000,000 pounds in 1900, followed by increase to

1,671,000,000 pounds in the following year. By 1907 the total had risen to 1,888,000,000 pounds, and by 1912 to 2,359,000,000 pounds, the largest total ever reached, followed by a decline to 2,079,000,000 pounds in 1913, and 1,493,-000,000 pounds in 1914.

Thus it appears that the international movement of wool during the period under review was on the whole a progressive one until 1912, since which year the decline has been very large. It is to be borne in mind that the export statistics of many countries include large quantities of imports, and consequently there is considerable duplication in the foregoing totals. The apparent great decline since the European war began may be largely due to the elimination of much of this duplication.

THE UNITED STATES.

As may be expected, the United States exports only small quantities of domestic wool, for the reason that for some years preceding the European War two-fifths of its wool consumption was of foreign origin, while since 1913 considerably more than one-half of its consumption is of such wool. Although the exports of raw wool are insignificant, the exports of woolen rags, especially when converted to an equivalent of grease wool, are of large account; shoddy, waste, and mungo also are included when reported.

The exports of domestic raw wool and of manufactured wool as far as estimated are ascertainable as a total for only 15 scattered years preceding the fiscal year beginning in 1911, and the totals range from 104,000 to 4,140,000 pounds. In 1911 the total wool export, defined as above, amounted to 61,000,000 pounds and in the following year to 83,000,000 pounds, but a decline followed to 43,000,000 pounds in 1916.

The exports of domestic raw wool, not including any manufactured wool, average only 102,000 pounds from 1849 to 1854; the annual average for the 10 years 1855–1864 was 682,000 pounds, and there was a marked decline to an average of 114,000 pounds during 1875–1884. In the following 10-year period the average increased to 818,000 pounds, followed by 1,751,000 pounds during 1895–1904, from which the average declined in the following 10 years to 1,155,000 pounds, the size of the average being due almost entirely to an export of 8,158,000 pounds in 1914; no raw wool exports were reported for 1910 and 1911. The largest raw wool export for any one year was for the fiscal year beginning in 1914, above stated, and from that figure the quantity declined to 2,148,000 pounds in 1916.

The exports of domestic raw wool in recent years before the European War were mostly to Canada and the United Kingdom, and of woolen rags mostly to the United Kingdom, but considerably to Belgium and Germany.

Per capita exports.—Preceding 1911 little is known concerning the per capita exports of raw and manufactured wool combined. From 1865 to 1874 the ratio has been computed for seven years with an average of 0.034 of 1 pound. During six of the years from 1875 to 1884 the average was 0.007 of 1 pound. For the four years 1911–1914 the average was 0.800 of 1 pound. The ratio declined from the highest recorded point, 0.874 of 1 pound in 1912, to 0.424 of 1 pound in 1916.

Raw wool exports declined per capita from 0.022 of 1 pound in 1855–1864 to 0.002 of 1 pound in 1875–1884, followed by an increase to 0.013 of 1 pound during 1885–1894, after which during the 10 years 1895–1904 the highest per capita average of domestic exports of raw wool was reached, 0.023 of 1 pound. During 1905–1914 the average amounted to 0.013 of 1 pound, or the same as for 20 years previous.

Percentage of production.—As far as can be ascertained the exports of domestic raw and manufactured wool have averaged much below 1 per cent of the production until during the years beginning with 1911. From that year to 1914 the per capita exports of domestic raw and of manufactured wool as far as estimated, increased from 19.1 to 28.4 per cent of the production, after which a decline was to 16.2 per cent in 1915 and 15 per cent in 1916.

For raw wool alone the percentage of the production exported has been very small in periodical averages, and the highest ratio for one year is 2.8 per cent in 1914. During only six years for a long period of time has the ratio exceeded 1 per cent.

Percentage of the supply.—If the total supply of wool to the United States be compared with the domestic exports, the ratio appears only as a trace until recent years, even though woolen rags be combined with raw wool. In 1911, however, the wool export amounted to 11.6 per cent of the supply, and this ratio grew to 16.3 per cent in the following year, from which there was a decline to 5.5 per cent in 1915, followed by 6.4 per cent in 1916.

Percentage of consumption.—The exported domestic raw wool as a percentage of the consumption of wool in this country has always been very small, but if the equivalent raw wool of the exported woolen rags is included the combined exports are found to have been 13.1 per cent in 1911, followed by the highest point reached, in 1912, 19.5 per cent. The ratio declined to 5.8 per cent in 1915, with some recovery to 6.8 per cent in 1916.

FOREIGN TRADE SURPLUS.

By means of subtractions the quantity of the foreign wool received above the quantity of domestic wool exported is readily ascertained. This surplus of imports amounted to 15,000,000 pounds of wool in the grease in 1840, and the periodical averages increased to 194,000,000 pounds in 1905–1914, with a continuous upward movement except a recession in 1875–1884. Equivalent raw wool in manufactures in foreign trade as far as estimated is included.

The highest surplus of imports above domestic exports was 509,000,000 pounds of wool in the fiscal year beginning in 1915. The quantity was unusually large in the preceding year and amounted to 348,000,000 pounds in the following year, 1916.

For raw wool alone the import surplus has grown from 15,000,000 pounds in 1840 without interruption of the advance in 10-year averages to 208,000,000 pounds in 1905–1914. For 1915 the import surplus was 520,000,000 pounds of raw wool, followed by 362,000,000 pounds in 1916.

IMPORT SURPLUS PER CAPITA.

Although the surplus imports of wool are large in total number of pounds, they seem small when regarded as an average amount per capita of the population. For raw and manufactured wool in foreign trade as far as estimated, the ratio declined from 2.20 pounds per capita in 1855–1864 to the low average of 1.42 pounds in 1875–1884, after which there was an increase to 3.43 pounds in 1895–1904, followed by decline to 2.60 pounds in 1905–1914. For 1915 the ratio was 5.54 pounds per capita and for 1916 3.84 pounds.

PERCENTAGE OF PRODUCTION.

To look at the surplus imports of wool from another angle, comparison may be made with the national production of wool. Of this production the surplus imports increased from 26.5 per cent in 1875–1884 to 63.3 per cent in 1905–1914. By 1914 the ratio had grown to 98.6 per cent of the production, and in 1915 it reached the extraordinary ratio of 178.1 per cent, followed by 120.7 per cent in 1916. The raw equivalent of manufactured wool is included.

For raw wool alone the surplus imports as a percentage of production continuously increased from 26 per cent in 1875–1884 to 68 per cent in 1905–1914. The ratio for 1914 was 99 per cent; for 1915 it was 182 per cent; and for 1916, 125.5 per cent of the production.

PERCENTAGE OF CONSUMPTION.

Perhaps the most important comparison of all for the surplus imports is with the consumption of wool. The raw equivalent of manufactured wool in foreign trade being included to the extent of the estimates, the surplus imports of wool during six years of the period 1875–1884 averaged 22.6 per cent of the consumption. For 1911–1914 the average was 38.9 per cent of the consumption, followed by 64 per cent in 1915 and 54.7 per cent in 1916. By 1914 the surplus imports had all but equaled domestic wool entering into consumption. The surplus imports of raw wool afford about the same comparisons with the consumption of wool that are mentioned above for the combination of raw wool and the raw equivalent of manufactured wool.

CONSUMPTION.

The stage has now been reached where the main features of statistical information relating to wool may be employed to indicate its consumption. In the case of some commodities it is feasible to determine consumption by ascertaining family experience by direct investigation with ample labor at command and at large expense, and sometimes consumption may be estimated by averaging the opinions or judgments of a large number of correspondents, but in the case of wool the only feasible procedure is the common formula of production plus gross imports less reexports minus domestic exports. The production year is a calendar year, and to this is related the foreign trade year beginning July 1 of the production year.

The formula above stated may not in the case of a commodity indicate the quantity of its consumption in any one year, because of the difference between stocks in the country at the beginning and end of the year. Indeed, the indicated annual per capita consumption by this process is often highly variable. The error of the process, however, may be almost entirely eliminated by combining years in periods, say of 10 years, and taking the annual average for each period.

The consumption indicated for wool is for all purposes. For raw wool consumption ends with its employment in manufacturing, regardless of what becomes of the products, and for raw wool no account is taken of imports and exports of wool in the form of textiles and other wool products. In this investigation wool consumption has been determined also for manufactures of wool in the foreign trade as far as feasible.

NUMBER OF POUNDS.

During six years of the period 1875–1884 the average annual consumption of raw and manufactured wool in foreign trade as far as estimated, was 281,000,000 pounds, and the annual average for 1911–1914 was 495,000,000 pounds, followed by 795,000,000 pounds in 1915, and 637,000,000 pounds in 1916.

The consumption of raw wool has been a little larger than the combined consumption of raw and manufactured wool in foreign trade for the reason that the exports of manufactured wool have been larger than its imports within the limits of the estimates. During the 10 years 1875–1884 the raw wool consumption averaged 294,000,000 pounds annually; during the next 10 years the average was 420,000,000 pounds; again, in the next 10 years it was 462,000,000 pounds; and in 1905–1914 the average was 515,000,000 pounds, after which followed the indicated consumption of 806,000,000 pounds in 1915 and 651,000,000 pounds in 1916.

PERCENTAGE OF DOMESTIC AND OF FOREIGN WOOL.

The foregoing figures for consumption include foreign as well as domestic wool. Each of these classes of wool has been converted into a percentage of the total consumption. For raw and manufactured wool in the foreign trade as far as estimated the consumption of domestic wool during six years of the period 1875–1884 averaged 77.2 per cent, and during 1911–1914 it averaged 45.5 per cent. For 1915 the indicated fraction of domestic wool consumption is 30.1 per cent, and for 1916 it is 38.5 per cent.

The complementary percentages express the relative consumption of foreign wool, and this consumption has increased from 22.8 per cent of the total consumption in six years of the period 1875–1884 to 54.5 per cent of the total consumption in 1911–1914. To the extent that the computed consumption for a single year can be trusted, the foreign wool consumption of 1915 was 69.9 per cent of the total and of 1916 it was 61.5 per cent. Apparently the foreign wool consumption became greater than the domestic wool consumption for the first time in 1913, except the one previous year 1896.

PER CAPITA CONSUMPTION.

The fragmentary record of the consumption of raw and of manufactured wool in the foreign trade as far as estimated, indicates that the per capita consumption of this wool averaged 5.85 pounds in six of the 10 years 1875–1884, and 5.14 pounds per capita from 1911 to 1914, followed by 7.93 pounds in 1915 and 6.25 pounds in 1916.

The record for raw wool indicates that the per capita consumption during the 10 years 1875–1884 averaged 5.92 pounds, and that the average rose to 6.74 pounds in the next decade, after which there was a decline to 6.11 pounds in 1895–1904 and to 5.63 pounds in 1905–1914, followed by the extraordinary consumption, as computed for the single year 1915, of 8.04 pounds, and of 6.39 pounds for 1916.

Raw-wool consumption per capita was clearly declining after 1885–1894, and this decline was arrested apparently about 1914, possibly in a small degree in 1913.

PERCENTAGE OF PRODUCTION.

The consumption of wool may now be related to its production, with the knowledge already acquired that the consumption much exceeds the production. For raw and manufactured wool in the foreign trade as far as estimated the consumption of domestic and foreign wool during six of the years 1875-1884 averaged 129.3 per cent of the production; that is to say, the consumption equaled the production and 29.3 per cent more. During 1911-1914 the consumption of this wool was 163.7 per cent of the production, followed by 278.1 per cent of the production in 1915, and 220.8 per cent in 1916.

The long record for raw wool presents an unbroken increase in 10-year averages for the ratio between consumption and production. For the 10 years 1875-1884 the consumption of domestic and foreign raw wool averaged 126 per cent of the production, and the average advanced continuously to 168 per cent in 1905-1914, after which the ratio rose enormously to 282 per cent in 1915, followed by 225.5 per cent in 1916.

Of the domestic wool production all but a fraction of 1 per cent is usually consumed in this country, but if the exports of wool in domestic manufactures as far as estimated are subtracted, the consumption during 1911–1914 was as low as 74.6 per cent of the production, after which may be noticed 83.8 per cent for 1915, and 85 per cent for 1916.

PERCENTAGE OF THE SUPPLY.

With the understanding that the supply of wool equals the production plus the gross imports less the reexports, the relationship of consumption to it may readily be determined. During six of the years in the period 1875–1884 the consumption of raw and manufactured wool in the foreign trade as far as estimated was 99. 8 per cent, but the fraction much decreased during the four years 1911–1914, or to 86.5 per cent. In 1915 and 1916, however, the fraction rose to 94.5 and 93.6 per cent, respectively, of the supply

PRICES OF SHEEP AND WOOL.

Sheep produce meat as well as wool and the course of the prices of sheep is determined by various causes and not solely by the price of wool, yet the price of wool is doubtless an element of sheep price. The Bureau of Crop Estimates has a record of the average price per head of sheep at the farm for January 1 as far back as 1867. All ages and qualities of sheep are included in the average. A series of upward and downward tendencies is apparent, usually corresponding with periods of industrial elevation and depression.

From the average of $2.50 per head in 1867 there was a decline to $1.64 in 1869, after which there was increase to $2.71 in 1873. Accompanied by fluctuations, a decline followed to $2.07 in 1879, with increase to $2.53 in 1883, decline to $1.91 in 1886, increase to $2.66 in 1893, decline to $1.58 in 1895, increase to $2.98 in 1901. and after that a general upward movement to $4.02 in 1914, $4.50 in 1915, $5.17 in 1916, $7.14 in 1917, and $11.82 in 1918. The average price of sheep at the farm January 1, 1918, was seven and a half times the average of 1895, the lowest of record, and was nearly thrice the average of 1914.

Beginning with 1910 the Bureau of Crop Estimates has estimated the average farm price of unwashed wool on the 15th of each month. For September 15 the averages begin with 17.7 cents per pound of unwashed wool in 1910, and continue with 15.6 cents in 1911, 18.7 cents in 1912, 15.8 cents in 1913, 18.6 cents in 1914, 23.3 cents in 1915, 28.4 cents in 1916, and 54.2 cents in 1917. The 1917 price of unwashed wool at the farm was about three and a half times the price of 1913.

There are elaborate records of the wholesale prices of wool. In the Boston market, which is the principal one in this country, the recorded "low" price of Ohio unwashed fine wool in 1912 was 21 cents per pound. In 1914 the "low" of the year was 20 cents, in 1915 it was 23 cents, in 1916 it was 26 cents, and in 1917 it was 38 cents, but during 1917 the "low" of the market increased rapidly from 38 cents in January to 62 cents in September, and 65 cents in December.

The Boston market record for "high" for Ohio unwashed fine wool was 25 cents in 1912 and 1914, 29 cents in 1915, 38 cents in 1916, and 67 cents in 1917. During the last-named year the "high" price of the market increased from 40 cents in January to 67 cents in December.

To take another class and condition of wool, fine territory staple wool, scoured, is selected. The "low" price of this wool in 1912 was 60 cents, and from that figure the increase was to 73 cents in 1916, and $1.10 in 1917; while at the other extreme the "high" of 1912 was 67 cents, 75 cents for 1915, $1.12 for 1916, and $1.85 for 1917. All records exhibit a marked increase in the price of all kinds of wool in 1916 and more especially in 1917.

STOCKS IN HANDS OF DEALERS AND MANUFACTURERS.

In the summer of 1917 the Bureau of Markets ascertained the quantity of wool held by dealers and manufacturers in the United States, and repeated the inquiry quarterly thereafter. The report for December 31, 1917, states that 244,000,000 pounds of wool were in stocks held by manufacturers and that 209,000,000 pounds were in stocks held by dealers. The classes of wool so held were wool in the grease, scoured wool, pulled wool, tops, and noils, and nearly three-quarters of the wool in stocks was wool in the grease. The total amount of the stocks held by both the manufacturers and dealers was 453,000,000 pounds, and the quantity would have appeared much larger had the scoured wool and the tops and noils been reckoned into wool in the grease. After this reckoning, the total becomes 617,000,000 pounds of grease or raw wool.

Accepting the grease weight of the wool in stocks as the total, this wool may be compared with the annual production, which in 1917 was nearly 285,600,000 pounds. Therefore the wool stocks for the date mentioned were 116 per cent greater than the production of wool in 1917, were 73 per cent greater than the imports less reexports of raw wool in the fiscal year beginning in 1916, and 5 per cent less than the raw wool, domestic and foreign, consumed in 1916. The sum of these stocks and of the prospective clip of this country in 1918 is over 900,000,000 pounds, or much more than the very high consumption of either 1915 or 1916, and this is so without including any import supply.

SUMMARY OF CONDITIONS.

From the foregoing it will be seen that at the beginning of the European war this country was confronted with a persistent decline in the number of sheep and in the production of wool, a condition, however, in which nearly all sheep-raising and wool-producing countries found themselves. Various explanations of this general decline have been advanced. It has been asserted that sheep raising in old countries with long-established farming can not compete with the industry in countries having ranges and cheap pastures. In some range countries farm holdings are encroaching upon sheep pastures; in two or three important countries droughts are limiting or reducing sheep herds; disease and parasites are contributing to these results.

In this country the demand for wool has increasingly exceeded the domestic production until at the beginning of the European war quite one-half of the wool consumption was of foreign wool. Otherwise stated, this country depended as much upon foreign wool as upon the domestic production. Since 1913 much more foreign than domestic wool has been consumed. At the beginning of the European war, also, this country was confronted with a diminishing per capita consumption of wool, which had continued for 30 years.

In the meantime substitutes have been employed in making fabrics. By far the most useful and economically possible substitute on a large scale has been cotton. Linen fiber has been too costly and too restricted in supply. Silk can hardly be regarded as a substitute in any proper sense. Some of the animal hairs, the supply of which is relatively very small, may perhaps be regarded as doing substitute duty. In place of carpets extensive use is made of mattings composed of straw, cocoa fiber, rattan, grass, and other vegetable substances, and these mattings may be regarded as substitutes to some extent for woolen carpets and rugs. Cotton also is used to a large extent for making fabrics for covering floors. Therefore it appears that cotton is almost exclusively the potential substitute for wool, except to the extent mattings are used, and this substitution has occurred not only by mixture or combination with wool in the same fabric, but also by entirely displacing wool. Substitute fibers and matting materials therefore have prevented the wool-consuming world from feeling the pinch of scarcity.

HIDES AND SKINS: PRODUCTION, FOREIGN TRADE, SUPPLY, AND CONSUMPTION.

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WORLD-WIDE CONDITIONS.

FROM the time when the dried and tanned skins of animals, without removal of fur, hair, or wool, covered some of the nakedness of the human body, these materials have been in demand for increasing and more diversified uses, until in recent years demand has so pressed on supply that substitutes have been provided for some uses to an appreciable degree, and economies in the employment of leather have been forced upon industries.

Irrespective of the belligerent countries in Europe, the general fact remains that throughout the world cattle are barely increasing absolutely, and apparently are not even holding their own in numbers in relation to population, while the number of sheep is declining both per capita and absolutely.

ANIMALS IN IMPORTANT PRODUCING COUNTRIES.

CATTLE ON FARMS IN THE UNITED STATES.

In the United States the number of cattle on farms was ascertained for the first time in the census of 1840, when nearly 15,000,000 head were counted. The number had increased to 25,600,000 in 1860, to nearly 36,000,000 in 1880, to 51,400,000 in 1890, and to 67,700,000 in 1900, including cattle on ranges in 1880 and later. In 1850 calves were excluded from reports by instructions to enumerators, and for subsequent census years to 1890 no instructions were given concerning them and it is probable that a few calves, but not all, were reported. At the time of the census of 1910, taken April 15 instead of June 1 as before, 61,800,000 cattle including calves were counted on farms and ranges, but the number would have been about 65,500,000 had they been counted June 1, or about 2,200,000 less than in 1900. As nearly as can be determined, the number of cattle reached its height about 1907, when the number estimated by the Bureau of Crop Estimates was 72,534,000.

According to the estimates of this bureau, the census number of cattle for 1910—61,800,000—declined year by year to 56,500,000 in 1913, and the number remained about the same in 1914, but there was a perceptible increase in 1915, and again in 1916, when the number of cattle on farms and ranges was estimated to be 61,920,000. In 1917 the number had increased to 64,583,000, and in 1918 to 66,830,000, or to 5,000,000 more than were found in the census of 1910. The number of cattle not on farms and ranges in 1910 was nearly 2,000,000.

The two geographic divisions just west of the Mississippi River contained 34,300,000 cattle on farms and ranges in 1900, or a little more than one-half of the total for the whole country. By 1914 the number of cattle in these two divisions had declined to 24,660,000, or to 42 per cent of the total, a loss of about 10,000,000 head, equal to one-third of the cattle of Argentina or of Brazil. The West North Central group of States lost nearly 5,000,000 of its 20,000,000 cattle; the West South Central division lost nearly the same number of its 14,000,000 cattle, or a larger fraction than did the West North Central States. The East North Central division lost over 1,000,000 of its 10,500,000 cattle from 1900 to 1914, and during the same 14 years all of the other divisions of States lost cattle except the South Atlantic and Pacific.

In 1915, however, there was some recovery of cattle in the two divisions of States just west of the Mississippi River, and this was continued in 1916; the gain of 1916 over 1914 is estimated at 1,776,000 cattle in the West North Central States, and 542,000 cattle in the West South Central States. New England appeared to be slightly gaining, and there were more distinct gains in all other divisions of States.

The decline in the number of cattle since about 1907 seems to have been arrested in 1914, and a turn toward a gradual increase was indicated in 1915 to 1918.

When 1917 arrived, cattle were still increasing in number, and their total on farms and ranges was 64,583,000, a gain of 2,663,000 since the preceding year, nearly half of which was in the two geographic divisions just west of the Mississippi River. There was distinct gain also in the East North Central States and in the Mountain States, while there were gains in every one of the other divisions.

The census of 1910 established a cattle ratio of 0.67 of 1 animal per capita of the population, and the estimates for subsequent years show a continual decline to 0.57 of 1 animal in 1914, but in the movement toward recovery that followed a per capita ratio of 0.58 of 1 animal was reached in 1915, of 0.60 of 1 animal in 1916, of 0.62 of 1 animal in 1917, and of 0.64 of 1 animal in 1918. Thus it appears that cattle have increased since 1914 not only absolutely but per capita of the population, although the absolute increase since 1910 has not also been a per capita increase.

In partial explanation of the decline of cattle on farms and ranges from 1900 to 1914 it should be remembered that in the great corn belt cattle breeding has largely changed to cattle feeding since about 30 years ago. While this change was taking place in the corn belt, range and ranch began to supply feeders more cheaply than they could be raised on the farms, or, at any rate, the farmers bought feeders more easily than they could raise them. But limitations to the production of feeders began to appear, and were found in the enforcement of the no-fence law on the public land, in homesteading, in dry farming, and in the corn belt itself in dairying, in the increasing cost of stockers and feeders, and in neglect to feed roughage. The considerable increase in the number of cattle in the corn belt since 1914 indicates a beginning in changes in farm and animal husbandry, management, and practices; and the considerable increase in the number of cattle in the Mountain States also indicates broader farming practices than were feasible to a new agriculture on farms and better use of the forest grazing lands.

SHEEP AND GOATS IN THE UNITED STATES.

Spring lambs were expressly excluded from enumeration in the census of 1850; they were not mentioned in the censuses of 1840, 1860, 1870, 1880, and 1890, and were presumably largely omitted; but in 1900 and 1910 they were included. Range sheep were included in 1880 and later census years. From 19,000,000 sheep in 1840 the national flock of sheep on farms grew to 22,500,000 in 1860, to 35,000,000 in 1880, to 36,000,000 in 1890, and to 61,500,000 in 1900. The census date had been June 1 until 1910, when April 15 was adopted, and this automatically reduced the number of census sheep as compared with the June 1 numbers of previous censuses. The sheep counted April 15, 1910, were 52,450,000, the equivalent of which, June 1 following, was about 63,000,000, or about 1,500,000 above the number in 1900.

The annual estimates of the number of sheep made by the Bureau of Crop Estimates subsequent to 1910 have constantly declined to 47,616,000 in 1917, a loss of about 5,000,000 in seven years. The estimate for 1918 is 48,900,000 sheep. It seems probable that 1910 indicates approximately the time when there was the largest number of sheep in this country. About 400,000 sheep were not on farms and ranges in 1910.

The number of goats on farms and ranges in this country was not ascertained until the census of 1900, when 1,871,000 goats were found June 1. In 1910 at the earlier date of April 15 the number was 2,915,000. Since that census the number of goats in existence has not been estimated, but the number of goats inspected for slaughter by the Bureau of Animal Industry has increased since about 1910 by a very large ratio. In the fiscal year beginning in 1910 the inspected goats numbered 54,000; in 1913, 122,000; in 1915, 180,000; and in the fiscal year beginning in 1916 they numbered 175,000. The increase of goats inspected for slaughter may not indicate a corresponding increase in number of goats in existence, but may indicate an increasing disposition to utilize goats for meat.

The production in this country of hides and skins of animals other than cattle, sheep, and goats is so small, especially relative to the number of animals on hand, that an examination of the number of these animals would not be pertinent.

CATTLE IN OTHER COUNTRIES.

The number of cattle in Argentina has been nearly stationary in recent years, although the number decreased from 29,124,000 in May, 1908, to 25,867,000 in June, 1914. Yet that country has vast ranges and the Argentine cattlemen are enterprising and progressive. Disease and drought have made some inroads upon the herds, but these causes do not account for the failure of Argentina to increase the number of cattle. The explanation is offered that the rapidly increasing prices of cattle, and the greatly increased facilities for slaughtering and exporting in recent years, have induced cattlemen to oversell, or to slaughter beyond the limit.

Australia is another country with stationary cattle herds. The severity of the droughts is much greater than in Argentina, and although Australia had about 10,000,000 cattle in December, 1915, yet this number is about the same as it was in 1890. Perhaps Australia has been slaughtering to the limit under the inducements of high prices and increased facilities for slaughtering and marketing meat.

The census number of cattle in Brazil in 1913 was over 30,000,000, and the cattle of that country have been for many years a prolific source of hides.

Including Native States with British India, the number of cattle in India, counting calves and young buffaloes, has risen to a total of 137,000,000.

The conditions found in the vast region of British South Africa, including the Union of South Africa, have made the cattle industry uncertain and sometimes disastrous. The census number of cattle was 4,062,000 in 1904, and 7,176,000 in 1911, but the indicated increase was greater than normal because of recovery from the Boer War. Since the European war began cattle raising in Rhodesia has made much progress on a large scale.

Whatever available cattle-range area Canada had was rapidly passing into farm status before the war under the immigration of farmers and the multiplication of farms on new land. Since 1913 the cattle industry of Canada has suffered a decline, so that the number of cattle has declined from 6,656,000 in that year to 5,968,000 in 1917. A prominent cause of decline of number has been the high prices of cattle and beef and the demands of the European war.

Madagascar has a growing importance in the supply of cattle hides. The cattle are of the Cebu breed and numbered 2,000,000 in 1898 and 5,500,000 in 1912, and continuation of increase is expected.

Little is known about the present number of cattle in Mexico. The last census was taken in 1902, which reported 5,142,000 cattle.

The vast region of Asiatic Russia is practically a new country in cattle raising; from 1905 to 1911 the number of cattle increased from 5,600,000 to 14,700,000, and by 1913 the number had reached 18,400,000. In European Russia, however, the number of cattle hardly increased from 1900 to 1913, but remained quite constant at a little under 32,000,000. In 1913 Asiatic and European Russia had about 50,000,000 cattle.

A promising cattle country is Uruguay, which had 8,200,000 cattle in 1908, according to the census of that year. The understanding is that the number of cattle in that country has increased steadily since the census.

Endeavors have been made in the warring countries of Europe and in neighboring neutral countries to preserve their stock of cattle without great deterioration in numbers, but nevertheless it is supposed that there has been diminution because of war conditions.

SHEEP AND GOATS IN OTHER COUNTRIES.

The great sheep-raising countries of the world, in addition to the United States, are Argentina, Australia, British India, British South Africa, New Zealand, Turkey, Asiatic and European Russia, the United Kingdom, and Uruguay, and considerable numbers are found in Algeria, Brazil, France, and Spain.

In Argentina the number of sheep has declined since 1908 from 67,000,000 to 43,000,000, although, as far as pasturage is concerned, great increase in the number would seem to be possible.

Australia is subject to prolonged and destructive droughts that sometimes reduce the number of sheep in one season by many millions, and yet rapid recovery has often followed. The largest number of sheep ever possessed in Australia, as far as is known, was 106,000,000 in 1891. After enormous fluctuations, 95,000,000 sheep were reported for 1911, followed by a strong decline, so that in 1915 the number was reduced to 70,000,000 sheep.

British South Africa has extensive areas suitable for sheep raising, and these have made possible the great increase from 16,000,000 sheep in 1904 to 36,000,000 in 1913.

Sheep have steadily increased in number in New Zealand, where the industry seems to be strongly established. From 1891 to 1917 the sheep increased from 18,000,000 to 25,000,000.

In Asiatic and European Russia combined the number of sheep declined from about 89,000,000 in 1903–1908 to 80,000,-000, or 10 per cent, by the time that the European war began.

The census of 1908 in Uruguay reported 26,300,000 sheep, or an increase of 7,700,000 in eight years, and it is supposed that the increase has continued.

While it is known that the number of sheep has declined since 1914 in most of the belligerent countries of Europe, and it is supposed that their numbers may have been somewhat reduced in some of the European neutral countries, yet the general fact has been that efforts have been made to conserve the flocks of sheep and to limit the reduction as much as possible.

Algeria has a stock of goats which for many years has ranged from about 3,500,000 to 4,000,000. In Argentina the number of goats has increased from nearly 2,000,000 in 1888 to nearly 4,000,000 in 1908, and 4,325,000 in 1914. A census of goats in Brazil, taken in 1913, shows a total of 10,049,000.

For no other country is so large a number of goats reported as for British India; for that large country with its enormous population the number of goats in 1914 reached the total of 30,673,000. In Mexico the number of goats in 1902 according to the census was 4,206,000, and about the same number, or 4,791,000, is reported for Asiatic Russia for 1913. Spain had 3,265,000 goats in 1904, practically the same as for 1910, but a distinct increase over the 2,534,000 reported in 1891.

Asiatic and European Turkey has more goats than any other country except British India. In 1912 the number was reported to be 20,269,000, or somewhat less than in 1910, but an increase of about one-third over the number of 1905.

It appears that in the more important countries the number of goats has generally been about stationary in recent years, although large increases are found when comparison is made with the goats of 15 or 20 years ago. In less important countries, which after all possess a large number of goats in the aggregate, it is observable that the number has been about stationary for a considerable period of time.

BUFFALOES AND HORSES.

The supply of buffalo hides comes almost entirely from India. Including the Native States, the number of buffaloes in India, not including young buffaloes, was 20,000,000 in 1914. Other countries that raise buffaloes are the Philippine Islands, with 1,222,000 in 1915, and Bulgaria, with 415,000 in 1910.

The countries that are specially noticeable in the supply of horse hides to the United States are Argentina, Canada, Russia, and this country, and for these countries the number of horses on hand may be briefly noticed. In Argentina the number of horses in 1914 was 8,323,000; in Canada the horses of 1917 numbered 3,000,000; for Asiatic Russia, 12,000,000 horses are reported for 1913, and for European Russia 23,000,000 horses, or 35,000,000 horses for the total. The horses of the United States it is estimated numbered 21,563,000 in 1918.

PRODUCTION OF HIDES AND SKINS.

In a general view of the situation with regard to the production of hides and skins throughout the world, it is evident that the production, for some indefinite period in the past, has been inadequate to meet the multiplying uses of an increasing population—a population that can elaborate its wants for leather and leather products, and can increase the total of all wants in greater degree than the number of animals that supply hide and skin increase. A new industry may arise, almost in a night, that will add enormously to the demand, as did the automobile industry.

IN THE UNITED STATES.

Estimates of hide and skin production in the United States, some of them rough, may be made for calves, cattle, goats, horses, and sheep. The production may be determined by different processes of estimation with approximate agreement, but it is not to be expected that different estimators will arrive at precisely the same number for any class of hides or skins. For the uses of this article the production of calf and sheep skins and of cattle hides for 1900 is derived from the meat production estimated by the Bureau of Crop Estimates; the goatskins and horse hides are roughly estimated. For 1909 the production of calf, sheep, and goat skins, and of cattle hides is the census slaughter for meat plus the "fallen" skins and hides estimated or approved by the Bureau of Animal Industry. "Fallen" applies to skins and hides of animals that died or were accidentally killed without being utilized for meat. The horse hides are roughly estimated. For the production of hides and skins of meat animals of years subsequent to 1909, the ratio between the inspections by the Bureau of Animal Industry to the total animal slaughter in 1909 has been applied to the inspections, year by year. It is evident that the figures for 1909 are more trustworthy than those of any other year, for the reason that they alone were mostly determined by the census process of enumeration, the only element of estimate being the comparatively small number of "fallen" meat animals.

The slaughter of meat animals during the present war may have been so affected by unusual conditions as to cause considerable error in the application of the process of estimation to these years, and yet it is not certain that this suspicion is altogether justified. The estimates of production made for the purposes of this article end with the first full calendar year of the war, 1915.

The estimated production of calfskins in 1900 was 5,899,000, in 1909 it was 6,575,000, and the number rose to 6,790,000 in 1912, from which it fell to 5,060,000 in 1914. In the rebound the number rose to 5,424,000 in 1915.

Cattle hides were produced to the number of 13,121,000 in 1900, 13,765,000 in 1909, followed by decline to 11,944,000 in 1914, after which ensued increase to 12,645,000 hides in 1915.

The production of goatskins has increased at a strong rate. The estimate for 1900 is 191,000 skins. The production for 1909 was 297,000 skins, and after a rapid decline to 110,000 skins in 1911, there was a remarkable increase to 432,000 skins in 1915.

Subject to considerable variations, sheepskins increased in production from 14,359,000 in 1900 to 19,460,000 in 1912, followed by rapid decline to 15,865,000 skins in 1915. These estimates accord with the known period of overslaughter of sheep, followed by diminution of stock from which to derive normal slaughter.

There is no production in this country of buffalo hides and dog and kangaroo skins, but there is some production of pigskins, the number being unknown. The contribution of skins of various members of the deer and antelope families, once large, has become much smaller, and there is a small production of alligator skins.

Various ratios for production, foreign trade, supply, and consumption have been computed for 1900, 1909, 1914, and 1915.

There has been a marked decline in the per capita number of pounds of all skins produced since 1900, except goatskins, although some recovery followed 1914.

The weight of hides and skins produced may be related to the weight of those that are consumed, and in applying this process it appears that the production of calfskins in 1900 was 67 per cent of the consumption (excluding domestic exports of calf upper leather), and but 36 per cent in 1915; of cattle hides 94 per cent in 1900 (excluding domestic exports of sole leather), and but 56 per cent in 1915; and of sheepskins 75 per cent in 1900 and but 48 per cent in 1915.

By 1915 production as a fraction of consumption was a little over one-third for calfskins, somewhat over one-half for cattle hides, a mere trace for goatskins, and a little less than one-half for sheepskins.

IMPORTS OF HIDES AND SKINS.

WORLD MOVEMENT.

Nearly all of the imports of hides and skins are into a comparatively few countries, and these countries are prepared to tan them and more or less to manufacture the leather into numerous products. The total import trade of substantially the world in 1901 amounted to 1,232,000,000 pounds of hides and skins in all sorts of commercial condition, no attempt being made to reduce the weights to a uniform green-salted basis. Doubtless there is much duplication in this total, because it often happens that some of the imports of one country are exported and become the imports of another. The world total increased from the quantity mentioned steadily almost year by year to the maximum amount ever reached, 2,115,000,000 pounds in 1912. In the next year there was a very slight decline, and in 1914 a very large one to 1,149,000,000 pounds. Perhaps some of this loss was one of duplication on account of the reduction of imports by many countries affected by the war.

As an importer of calfskins and cattle and horse hides, Germany had long been the leading nation at the outbreak of the present war, the United States usually being in second place; but as an importer of goat and sheep skins the United States has for years been in the lead, and by a long distance. Other prominent countries in the import trade in hides and skins have been Austria-Hungary, Belgium, France, Russia, and the United Kingdom.

IMPORTS INTO THE UNITED STATES.

The fiscal years of the foreign trade of the United States are mentioned in this article by the years in which they begin. The gross imports are adopted to 1897, after which the imports for consumption are taken.

The imported buffalo hides are mostly dry and have nearly all come from British India, but in 1915, on account of war disturbances, the record indicates that nearly one-half of these hides came from China and the Dutch East Indies.

More than one-third of the calfskins received in dry condition in 1910 came from Russia in Europe and the fraction increased to more than one-half in 1913, but by 1915 the trade was extinguished. From one-sixth to nearly one-third of the imports of these skins came from Germany until the trade ceased in 1915. In 1915 the countries had much changed the former order of importance, and in this year British India leads as contributing more than one-third of the imports, and Argentina follows with nearly one-quarter.

In 1913 about 21 per cent of the imported green or pickled calfskins were received from the Netherlands, 19 per cent from Germany, 10 per cent each from Canada, France, and

Russia in Europe; but when 1915 arrived the Netherlands contributed 22 per cent of the imports, France 20 per cent, Denmark 13 per cent, and Canada 12 per cent.

Prior to the war from one-third to one-half of the imported dry cattle hides were received from Argentina; China, Colombia, and Venezuela have also been prominent as sources of these imports. In the rearrangement of order in 1915, Brazil had the leading place as the source of the imported dry cattle hides of this country, and contributed over 18 per cent; Argentina's declining fraction fell to less than 18 per cent; and British India's formerly low fraction had risen to 11½ per cent.

When received in green or pickled condition cattle hides have come with increasing fraction from Argentina. In 1913 this fraction was 27 per cent, next below which was 22 per cent for Canada, followed by 11 per cent for Mexico. In the order of 1915 Argentina's fraction had become 44 per cent, Uruguay gained to 12 per cent, Brazil to 11 per cent, and Mexico was still noticeable with 9 per cent.

Dry goatskins come from many countries; their principal source has been British India, with China in second place, and Russia in Europe third, until the last-named country dropped from the list in 1915.

Nearly all of the goatskins received in green or pickled condition have come from British India.

Prior to the beginning of the war, Russia was almost the sole source of supply of dry horse and colt hides. Green or pickled horse and colt hides had five principal sources, according to the record, and the order of these sources in 1913 was Canada, the Netherlands, Germany, France, and the United Kingdom. Under the new conditions of 1915 the United Kingdom supplied more than four-fifths of the green or pickled hides and Canada about one-tenth, or much less relatively than before.

Dry sheepskins have been contributed to the import trade of the United States by many countries. In 1913 Russia in Europe contributed 30 per cent, the United Kingdom 14 per cent, British India 13 per cent, and British South Africa, Australia and New Zealand, and France 6 per cent each. In 1915 British South Africa and Argentina sprung into relative prominence, and both countries contributed more than 35 per cent of the imports.

More than one-half of the green or pickled sheepskins imported in 1913 were consigned from the United Kingdom, and one-fifth from Australia and New Zealand, and both fractions increased in 1915.

In expressing the total weight of imports, dry weight has been converted to green or pickled weight where possible. From 1897 to 1911 the weight of the imported buffalo hides ranged from 6,000,000 to 20,000,000 pounds, but in 1912 the quantity suddenly increased to 57,000,000 pounds, followed by decline to 44,000,000 pounds in 1914, and by 47,000,000 pounds in 1915.

The import trade in calf and kip skins has had an enormous increase since 1898, when they weighed 25,000,000 pounds. In 1908 the imports increased nearly one-half over those of each of the preceding four years and reached 74,000,000 pounds. By 1911 the quantity had reached 193,000,000 pounds, followed by decline to 76,000,000 pounds in 1914, and to 113,000,000 pounds in 1915.

This country has long had an enormous import trade in cattle hides. In 1897 these imports weighed 105,000,000 pounds, by 1908 the weight had increased to 159,000,000 pounds, and in the following year it was 330,000,000 pounds. Accompanied by some fluctuations in following years the quantity increased until 667,000,000 pounds of cattle hides were imported in 1915.

Compared with other countries, the United States is far in the lead as an importer of goatskins. In 1894 the imports of these skins weighed 54,000,000 pounds; 111,000,000 pounds were reached in 1905, and the quantity rose to 177,000,000 pounds in 1912, after which there was a drop to 121,000,000 pounds in 1914, followed by an enormous increase to 190,000,000 pounds in 1915.

There was only a small import trade in horse, colt, and ass hides in 1897—hardly more than 1,000,000 pounds, but the imports increased until the highest figure, 46,000,000 pounds, was recorded for 1912, after which there was a drop to 23,000,000 pounds in 1914, followed by 35,000,000 pounds for 1915.

Subject to fluctuations, the import trade of this country in sheepskins has increased from 28,000,000 pounds in 1901 to 104,000,000 pounds in 1915.

Dogskins have figured in the import statistics of this country in a small way; 6,700 dry skins weighing 2,000 pounds were imported in 1913, 18,000 skins weighing 3,900 pounds in 1914, and 6,000 skins weighing 1,200 pounds in 1915.

Kangaroo-skin imports had not been maintained at former figures before the revival of 1913 and 1915. During the eight years from 1897 to 1904 the import of these skins had the dry weight of 1,200,000 pounds annually, and the weight dropped to 600,000 pounds in 1907; but there was a subsequent increase and the former magnitude of imports was restored in 1913 and 1915.

Pigskins have grown into imports of some importance, and their weight of 500,000 pounds in 1910 became 941,000 pounds in 1915.

Various dry hides and skins classified as "other" contribute a considerable quantity to the national imports. These include the skins of the deer and antelope varieties for glove making. The imports for 1910 were 7,000,000 pounds, followed by decline to 4,400,000 pounds in 1912, after which there was increase to 8,900,000 pounds in 1915.

The supply of hides and skins is to be regarded as the sum of the production and the imports. Of the total supply of calfskins in 1900, 36 per cent of the weight was imported; in 1909, 53 per cent; in 1914, 59 per cent; and in 1915, 67 per cent.

For the supply of cattle hides a still greater increase of reliance on foreign sources is indicated. The imports of 1900 were only 11 per cent of the supply, but in 1909 they had risen to 29 per cent, in 1914 to 42 per cent, and in 1915 to 49 per cent.

The imported goatskins constitute nearly the entire supply, leaving only 1.5 per cent to domestic production in 1915.

Foreign sheepskins also have had a growing part in the national supply. Their percentage in 1900 was 25, and this increased to 43 in 1909; after a recession to 35 per cent in 1914, the fraction rose to more than one-half of the supply, or 52 per cent, in 1915.

NATIONAL SUPPLY OF HIDES AND SKINS.

The sum of the production and imports of calfskins has been an increasing one since 1900. In that year the supply of these skins weighed 96,000,000 pounds; in 1909, 146,000,000 pounds; in 1909, 146,000,000 pounds; in 1914, 129,000,000 pounds; and in 1915, 170,000,000 pounds.

The same tendency is exhibited in the supply of cattle hides. This amounted to 928,000,000 pounds in 1900, 1,156,000,000 pounds in 1909, 1,133,000,000 pounds in 1914, and to the unprecedented total of 1,363,000,000 pounds in 1915.

Goatskins also have participated in the general advance. Their supply in 1900 weighed 78,000,000 pounds; in 1909, 118,000,000 pounds; in 1914, 124,000,000 pounds; and in 1915, 193,000,000 pounds.

For many years the weight of the sheepskins constituting the national supply has been second only to that of cattle hides, which, however, far exceeds the weight of sheepskins. For 1900 the latter weighed 115,000,000 pounds; for 1909, 156,000,000 pounds; for 1914, 171,000,00 pounds; and for 1915, 198,000,000 pounds.

For the purposes of a grand comparison, the weights of all kinds of hides and skins constituting the national supply have been added, with the result that the grand total of 1,283,000,000 pounds in 1900 has grown to over 2,023,000,000 pounds in 1915, an increase of nearly three-fifths in 15 years.

DOMESTIC EXPORTS.

INTERNATIONAL MOVEMENT.

The world's exports of hides and skins do not balance the imports year by year, and need not do so exactly nor even closely for reasons that can not be explained here. Exports of hides and skins increased greatly from the calendar year 1901 to 1912, or from a total of 1,221,000,000 pounds to 2,117,000,000 pounds. A slight decline followed in 1913 and a very large one in 1914, when the total exports were 1,268,000,000 pounds, showing the effects of war conditions. The great exporting countries are naturally the countries possessing large stocks of animals that produce hides and skins, but there are some countries that do not possess these stocks, which have a large international trade in forwarding these commodities from producing to consuming countries. Primarily the principal exporting countries are Argentina, Australia, Brazil, British India, Uruguay, and secondarily before the war, Belgium, France, Germany, the Netherlands, and the United Kingdom.

FROM THE UNITED STATES.

Exports of domestic hides and skins are in green-salted condition. Nearly all of the calfskins exported from this country go to Canada, and also the bulk of the cattle hides, but before the war a considerable fraction of the exported cattle hides was sent to France, Germany, Japan, and the Netherlands; in 1915 over 90 per cent of the exports of these hides were shipped to Canada and Japan. Germany before the war was the principal receiver of exported horse hides.

During the 10 fiscal years 1895 to 1904 the exports of all hides and skins averaged 18,000,000 pounds annually, and during 1905–1914 the average was 21,000,000 pounds.

The exported calfskins increased from 500,000 to 1,600,000 pounds from 1911 to 1915. The exported cattle hides ranged from 13,000,000 to 18,000,000 pounds from 1911 to 1915, and the exported horse hides declined from 6,000,000 pounds in 1913 to 300,000 pounds in 1915.

The domestic exports of hides and skins thus far mentioned are of raw skins, but this country loses from its supply a large total of leather which, as far as is practicable, should be deducted from the supply to arrive at a more nearly correct figure for consumption. To a considerable extent exported leather may be converted to terms of green-salted hides and skins, which is the condition in which the raw hides and skins are exported. The only export classes of leather that can be so treated are sole leather, which can be added to cattle hides in 1883 and subsequent years; calf upper leather, which has been added to calfskins; and glazed-kid upper leather, which has been added to goatskins, the latter two beginning in 1910. The imports of leather and tanned skins can not practically be thus converted, but the quantity relatively is not very large, and is more than offset by the domestic exports that are not amenable to conversion.

The equivalent green-salted weight of the exported sole leather increased from an annual average of 36,000,000 pounds in 1883 and 1884 to 57,000,000 pounds in 1905–1914, and to 111,000,000 pounds in 1915.

From 1910 to 1912 the exported calf-upper leather converted to green-salted weight increased from 4,100,000 to 4,700,000 pounds, fell to 3,500,000 pounds in 1914, and rose to over 9,900,000 pounds in 1915; and the glazed-kid upper leather converted to raw-skin weight had a range of exports from 10,000,000 to 14,000,000 pounds from 1910 to 1915. No raw goatskins are mentioned in the record of exports.

Upon adding to the exported hides and skins the leather before mentioned after conversion to terms of hides and skins, the total exports of domestic hides and skins on a green-salted basis averaged 36,000,000 pounds in 1883 and 1884, followed by increase to an average of 72,000,000 pounds in 1895–1904, and an average of 120,000,000 pounds in 1905–1914. From 1908 to 1915 the domestic exports of all hides and skins increased from 60,000,000 to 220,000,000 pounds. Necessarily excluded from this total are domestic exports of leather belting, carriage and automobile leather, glove leather, patent leather, "all other" upper leather, "all other" leather, boots, shoes, and slippers, harness and saddles, and "all other" manufactures of leather.

Calfskins and calf upper leather converted to green-salted weight increased in domestic exports from 4,000,000 to 12,000,000 pounds from 1910 to 1915. Cattle hides and sole leather converted as already mentioned had annual average domestic exports of 36,000,000 pounds in 1883 and 1884, and the annual average increased to 64,000,000 pounds in 1905-1914. These domestic exports increased from 45,000,000 in 1907 to 82,000,000 pounds in 1911, after which they declined to 54,000,000 pounds in 1913, followed by a large increase to 125,000,000 pounds in 1915.

The per capita exports of hides and skins including converted leather as far as feasible decreased from 0.81 to 0.73 of 1 pound from 1900 to 1909, but the per capita ratio greatly increased to 1.33 pounds in 1914, and 1.38 pounds in 1915.

Tendency to increase in their domestic exports is exhibited by hides and skins in relation to their production in this country. The fraction has increased from 6.3 per cent in

1900 to 6.7 per cent in 1909, to 15.8 per cent in 1914, and to 16.2 per cent in 1915.

The exports of domestic hides and skins may be related also to their supply. For the total of all hides and skins the exports as a fraction of the supply were 4.8 per cent in 1900, 4.1 per cent in 1909, 8 per cent in 1914, and 6.8 per cent in 1915.

The exports of domestic hides and skins may now be related to their consumption. In the total for all hides and skins it appears that the ratio for 1900 is 5 per cent; for 1909, 4.2 per cent; for 1914, 8.7 per cent; and for 1915, 7.4 per cent. Consumption would be increased by these percentages if there were no domestic exports.

CONSUMPTION OF HIDES AND SKINS.

As nearly as can be determined by statistical facts and estimates, the consumption of all kinds of hides and skins in this country increased from 1,221,000,000 pounds in 1900 to 1,557,000,000 pounds in 1909, followed by nearly the same consumption in 1914, or 1,509,000,000 pounds. Under the extraordinary demands caused by the war the consumption of 1915 increased enormously to 1,885,000,000 pounds. These figures refer almost entirely to green-salted or pickled skins.

By far the principal item in these grand totals of consumption is cattle hides. The consumption of these in 1900 is placed at 877,000,000 pounds, in 1909 at 1,101,000,000 pounds, in 1914 at 1,009,000,000 pounds, and in 1915 at 1,238,000,000 pounds.

In order of weight sheepskins stand next to cattle hides in consumption, the quantity for 1900 being 115,000,000 pounds, followed by increase to 171,000,000 pounds in 1914, and 199,000,000 pounds in 1915.

Closely following sheepskins is the item of calfskins, the consumption of which in 1900 totaled 92,000,000 pounds, with an increase to 142,000,000 pounds in 1909, followed by decline to 124,000,000 pounds in 1914, while the greatest consumption of calfskins for any year occurred in 1915, with a weight of 158,000,000 pounds.

Goatskins for many years have had a large and important demand in this country, and in order of pounds of consumption they follow calfskins, except that in 1915 they exceed calfskins and follow next after sheepskins. The goatskins consumed in 1900 weighed 78,000,000 pounds, 124,000,000 pounds in 1914, and 193,000,000 pounds in 1915.

Buffalo hides have supplemented cattle hides in consumption to such an extent that they stand fifth in order. Notwithstanding a large falling off in consumption of buffalo hides in 1909, the general fact is that their consumption increased from 19,000,000 pounds in 1900 to 47,000,000 pounds in 1915.

The consumption of horse hides is but vaguely known for the reason that the production in this country has been estimated only by guesswork; but as the figures stand the consumption of horse hides has increased from 3,000,000 pounds in 1900 to 29,000,000 pounds in 1914, and 41,000,000 pounds in 1915.

The comparatively small consumption of kangaroo skins for each of the four years under examination has ranged from about 750,000 to 1,250,000 pounds; the range for pigskins is from about 500,000 to nearly 1,000,000 pounds, and for dogskins from 6,000 to 18,000 pounds. There remains a class of skins under the indefinite class of "other," which consists of imports and is composed mostly of deer and antelope varieties, used chiefly for gloves. The weight of these skins consumed in 1900 was 36,000,000 pounds, and there was great decline by 1914 to 6,700,000 pounds, with small recovery in 1915 to 6,900,000 pounds.

PER CAPITA CONSUMPTION.

After adding to the exports of domestic hides and skins three classes of leather, as explained previously, and after placing substantially all hides and skins and the three classes of leather exports on a green-salted basis, the per capita consumption of hides and skins, including both foreign and domestic, has varied considerably from 1900 to 1915; the average for 1900 is 16.1 pounds; for 1909, 17.2 pounds; for 1914, 15.3 pounds; and for 1915, 18.8 pounds. Apparently war demands raised the average for 1915.

The averages of per capita consumption do not take account of exports of leather other than sole leather, calf upper, and glazed-kid upper, nor of any leather products, and consequently to this extent the averages are too high as expressing ultimate consumption, although they do closely express a tanners' consumption.

DOMESTIC HIDES AND SKINS AS A PERCENTAGE OF CONSUMPTION.

Notwithstanding the fact that the consumption of hides and skins is much greater than the production, some domestic exports find their way out of the country, so that the consumption of domestic hides and skins is less than the production. Of the domestic hides and skins that remain the consumption was 75.3 per cent of the total consumption in 1900, including foreign hides and skins. This fraction declined to 59.4 per cent in 1909, to 46.3 per cent in 1914, and to 38.1 per cent in 1915. In 15 years the domestic consumption has diminished in relative importance from three-quarters of the total consumption to about three-eighths, or about 50 per cent less.

PERCENTAGE OF PRODUCTION.

In 1900 the consumption of all hides and skins was 24 per cent greater than the domestic production, and the deficiency increased until in 1915 the consumption was 120 per cent greater than the production.

The consumption of calfskins was 49 per cent greater than their production in 1900, and the deficiency increased to 1915, for which year the consumption of these skins was 179 per cent greater than the production.

Cattle hides show the same trend; in 1900 the consumption was only 6 per cent greater than the production, and the deficiency increased until 1915, when the consumption was 78 per cent greater than the production.

Again, in the case of sheepskins, the consumption for 1900 was 33 per cent greater than the production; for 1914, 54 per cent greater; and for 1915, 109 per cent greater.

Thus for many years the production of hides and skins in this country has played a losing part in its efforts to meet the demands of consumption, and during all these years this country has been growing more dependent on foreign countries for its hides and skins, and consequently for its leather. By means of increasing foreign help the people of this country have been enabled to maintain an increasing per capita consumption of hides and skins; that is, a tanners' consumption, certainly from 1900 to 1915; this is for the total of all hides and skins, as well as for the chief varieties, but the progression of the average was reversed in 1914 for the total because it was reversed for calfskins and cattle hides.

COURSE OF PRICES.

Independent of any other influences upon the prices of hides and skins, the increasing demands, their increasing varieties and quantities, must find expression in prices. The Shoe and Leather Reporter has published the wholesale prices of 10 classes of "packer" hides as far back as 1892, and these prices have been reduced to means for these 10 classes combined, and for the 12 months of each year, so that a broad basis for the mean prices is afforded. The lowest mean price recorded for this period is 5.16 cents per pound for 1894, a period of severe industrial depression. By 1898 the mean had risen to 10.04 cents per pound, and by 1911 to 13.21 cents. In the next year, 1912, the mean price of the 10 classes of packer hides was 15.70 cents per pound, followed by 16.92 cents in 1913, 18.26 cents in 1914, 21.17 cents in 1915, 23.54 cents in 1916, and 28.90 cents in 1917. From 1908 to 1917 the mean price increased 149 per cent. These prices are for the Chicago market.

A similar compilation of price means has been made for 10 classes of "country" hides. The mean was as low as 4.92 cents per pound for these hides in 1894, and had risen to 12.06 cents in 1911, after which followed 14.99 cents in 1913, 16.90 cents in 1914, 18.71 cents in 1915, 21.97 cents in 1916, and 25.39 cents in 1917, the last-named mean being 163 per cent greater than the mean for 1908.

Great gains in wholesale prices were made also by sheep and goat skins and horse hides. In the Chicago wholesale market, "packers" sheep pelts rose from a mean of $1 per pelt in 1908 to $2.19 per pelt in 1916, and to $3.94 in 1917, a gain for the last-named year of 294 per cent over the mean of 1908.

The trend of the prices of goatskins also was strongly upward. In the New York wholesale market "Monterey, saltillo" goatskins had a mean price of 31 cents per pound in 1908, and the mean increased to 38 cents per pound in 1915, to 54 cents in 1916, and to \$1.07½ in 1917, a gain in 1917 of 247 per cent over the mean of 1908.

Again, in the case of horse hides a remarkable increase in mean price has been recorded. In the Kansas City market the mean price per horse hide, "cities and countries," for 1s and 2s, was \$2.66 in 1908. The mean price had grown to \$4.75 per hide in 1915, to \$6.35 in 1916, and \$8.38 in 1917. The gain of the last year over the first in this period of nine years was 215 per cent.

The rising prices of hides and skins have induced, if not compelled, the adoption of materials other than leather for the same sorts of products. For many years the wants of man for leather and its products have tended to outstrip the supply, and hence there has been recourse to substitutes within practical and economic limits, and sometimes for greater utility. Rubber, fiber, and wood are used for the heels of shoes, patented materials for soles, and cloth is substituted for the uppers and tops of shoes. For the upholstering of furniture and automobiles, in which the consumption of leather has been large, substitutes that are not leather at all have been invented and are in extensive use. Cotton is woven into belts for transmitting power; sheet iron, tin, and wood have displaced leather in trunk making; chair seats are now rarely made of leather; and straw, rattan, wood, and cloth are often used for making traveling bags and suit cases. Harnesses consume a large amount of leather, but in place of leather are found chains for traces, rope driving lines, cloth and fiber collars, and cotton saddle girths. Numerous other uses of leather have been encroached upon by other and cheaper materials within the scope of every one's daily observation.

SUGAR SUPPLY OF THE UNITED STATES.

By Frank Andrews,
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SUGAR CONSUMPTION in the United States for the five years ending with 1915 amounted annually to 8,000,000,000 pounds, in round numbers. This includes sugar used not only in the household as sugar, but also in the manufacture of confectionery, preserved fruits, condensed milk, cakes, and similar products. This total consumption divided by the number of people in the United States gives a yearly average of about 84 pounds for each person, or 378 pounds for an average family (4.5 persons). Computing in like manner, the number of pounds of flour consumed per family in one year would amount to about 1,039 pounds, while potatoes would amount to about 1,000 pounds. On this basis of comparison, taking the country as a whole, the average family consumes more than one-third as much sugar as potatoes or as flour. In other words, for every pound of sugar consumed in one form or other, 2.7 pounds of flour and nearly as many pounds of potatoes are consumed.

When cost is considered, sugar occupies a still more important position. Taking the average retail price of sugar for the five years 1911–1915, 6 cents a pound, of flour 3½ cents, and of potatoes 2 cents, the retail cost of a year's supply for a family of average size would be about $23 for sugar, $36 for flour, and $20 for potatoes. In estimating the retail value of potatoes, however, for the country as a whole, the retail city price would be too high, because approximately one-half of the population is at or very near the source of production. An average between farm value and city retail value of potatoes gives an average of about 1½ cents per pound. This average applied to the family consumption would give about $15 per family as the household value of potatoes consumed. With this modified reckoning, therefore, flour would be valued at $36, sugar $23, and potatoes $15 in a year's consumption in an average household. In like manner, a year's consumption of butter is estimated (for 1909) as about $23, and eggs at $18. The meat used by an average family may be estimated as slightly over 800 pounds a year (1914), and the retail cost at possibly $200. Milk is consumed in somewhat larger quantities than is sugar, but the yearly cost is probably less.

The figures just quoted emphasize the well-known fact that sugar is a principal item of food both as to quantity and cost. It is so thoroughly recognized that frequent comments are made comparing the present status of sugar as a staple food with its status of a few generations ago as a material for flavoring. A century ago the people of this country consumed less than one-tenth as much sugar as they do now. In 1821–1825 the average per capita consumption was 8.3 pounds, and was practically the same 20 years earlier. In 1791–1795 the estimated consumption was only 7.5 pounds per capita.

INCREASE IN CONSUMPTION OF SUGAR.

A great change occurred in the consumption of sugar between 1825 and 1850. In the five-year period 1851–1855 per capita consumption of sugar had reached 30 pounds, or nearly four times the figure of 1821–1825. The home production in the later period was more than ten times that of the former, and imports were more than seven times as large. These figures do not include maple sugar, which furnished a large fraction of the supply no doubt in the Northern States. The first census of agriculture, that for 1839, reports 31,000,000 pounds of sugar made on farms in the Northern States; this may be assumed to be maple sugar. The total population of the United States in 1840 was 17,000,000, hence the maple-sugar consumption at that time was about 1.8 pounds per capita. During 1851–1855 the home production of sugar nearly equaled the net imports. Great changes were taking place in the economic conditions in this country in that period. Steam was rapidly coming into use as an important factor. The old horsepower mills in Louisiana were being replaced rapidly by steam-driven mills and by other improvements in machinery. In 1845 there were reported 630 sugar mills operated by steam power and 610 by horsepower. In 1850 there were 907 steam mills and 588 with horsepower, and in 1855 the steam mills numbered 938 and the horsepower mills only 361. This period also marked a high point in the river traffic of the Mississippi Valley. Steamboat trade, of which sugar was an important article carried, had not yet been affected seriously by railroad competition. Railroads themselves were just beginning to be connected so as to form through lines of traffic. Heretofore they had been chiefly local, whereas the great river system was the principal route for freight in the Middle West. In 1851–1855 ocean steam navigation had reached a high point of efficiency compared with earlier years. This development meant larger cargoes, quicker service, and, above all, lower freights. The small vessels of a century ago had to charge relatively high rates compared with the large carriers of later times. Since much of our sugar is carried by water from foreign countries, this lowering of the ocean freights helps to make possible our large supply of sugar and its relatively low cost. These are but examples of a general and rather radical change in economic life in this country, and one of the incidents of this change was that of adding another important food to the diet list of the Nation. Just as cotton became common in household use through the invention of the cotton gin, so sugar was transferred from the list of flavoring materials to that of staple foods by means of improvements in mechanical, commercial, and transport facilities.

Thirty years later than the period just discussed—that is, in 1881–1885—the per capita consumption of sugar had risen to 46 pounds, and the imports had increased from an average of about 420,000,000 pounds in 1851–1855 to nearly 2,500,000,000 pounds in 1881–1885. During this period, however, the domestic production had fallen off; our sugar consumption was largely dependent upon foreign supplies.

After another 30 years, in 1911–1915, an average of 8,150,000,000 pounds of sugar a year were required in this country, or about 84 pounds per capita.

MAJOR SOURCES OF SUPPLY.

The principal sources of supply for the sugar consumed in the United States at present may be classified as foreign, insular, and continental. The foreign sources supply approximately one-half of the sugar we use; our island possessions, about one-fourth; and our domestic cane and beets, the remaining one-fourth. These fractions are only roughly approximate, as the proportion from each source varies from year to year. During the five years ending June 30, 1915, the domestic sugar production amounted to about 1,873,000,000 pounds; Hawaii, Porto Rico, and the Philippines shipped in 2,130,000,000 pounds; while the imports from foreign countries, after subtracting exports, amounted to 4,147,000,000 pounds, making a total supply of 8,150,000,000 pounds. According to these figures the domestic cane and beet fields supplied 23 per cent of the sugar we used in 1911–1915, the planters of Hawaii, Porto Rico, and the Philippines furnished 26 per cent, while Cuba, supplemented by small amounts from other foreign countries, furnished 51 per cent.

During the five years ending with the season of 1915–16 the sugar consumption of the United States averaged almost 160,000,000 pounds per week. The supply for 27 weeks came from foreign countries, our island possessions furnished supplies for 13 weeks' consumption, while the product of the United States proper was equivalent to 12 weeks' average consumption. The Cuban crop, all but a small fraction of which goes to the United States, has increased greatly in recent years. The crop of 1915–16 was estimated at 6,738,000,000 pounds and was the largest on record for the island. A still larger output was expected for 1916–17, but an uprising took place which interfered to some extent with sugar making, and the crop, according to early estimates, was from 6,300,000,000 to 6,700,000,000 pounds, the second largest ever made in Cuba. The sugar season, beginning in December, 1911, and ending the following summer, resulted in about 4,300,000,000 pounds, the largest on record to that date; and the fourth largest crop was made in 1906–7, amounting to 3,200,000,000 pounds, or less than half the crop of 10 years later. The long grinding season, large cane area, and the efficient transportation facilities make Cuba a natural source of our sugar supply. Not only is there steamship service, but the car ferry between Key West and Habana has established a railway connection over which a car may pass carrying raw sugar from a Cuban factory to a United States refinery without unloading. This route has been found advantageous in recent times, especially owing to the scarcity of ships and high freight rates on the water.

HAWAII A GOOD PRODUCER.

Of our island possessions Hawaii has the most highly developed sugar industry. There are some 50 mills, practically all of which are large or medium sized, the annual production of a mill ranging from about 4,000,000 to 100,000,000 pounds. The season in Hawaii is long, beginning nominally about October 1 and continuing for a large part of the following 12 months. An average of the running time of all mills is from 180 to 200 days. Nearly all the crop consists of raw sugar and is shipped for refining to San Francisco and to north Atlantic ports. The shipments of Hawaiian sugar to the United States in 1911–1915 were somewhat less than 1,200,000,000 pounds a year. The area of cane in Hawaii, according to the census for 1909, was 183,230 acres, and the total of reports made to the Bureau of Crop Estimates for the season ending September 30, 1916, was 246,332 acres—an increase of about 63,000 acres, or 34 per cent. Owing to the long growing season for cane in Hawaii only about one-half of the growing acreage is cut each year. The harvested area in the season 1915–16 was 115,419 acres, or 47 per cent of the total. The yield of cane is heavy in these islands, ranging from 39 tons per acre in 1912–13 to 46 tons in 1914–15, and the cane is high in sugar content, yielding an average of 245 pounds of sugar per ton of cane in the five seasons ending with 1915–16. The average yield of sugar per harvested acre of cane was 10,495 pounds during these five seasons; and the average sugar yield based upon total acreage—harvested and not harvested—was about 5,400 pounds per acre in 1914–15 and 4,800 in 1915–16, or 5,100 as an average for both years together. Hence an acre of growing cane in Hawaii represents, on an average, a year's supply of sugar for 13½ families. Cane is by far the most important crop of Hawaii, constituting in 1909 over 92 per cent of the total value of all crops. Also in manufactures sugar took the lead; its value was equal to 76 per cent of the value of all manufactures, and was about 16 times the value of the manufacture which was second in rank, namely, rice cleaning and polishing.

PORTO RICO'S LEADING INDUSTRY.

In Porto Rico in 1916 there were 65 establishments for making sugar, of which 37 each produced 4,000,000 pounds or over, 7 produced less than 4,000,000 pounds each, but at least 1,000,000 pounds, while 21 had each a crop of under 1,000,000 pounds. There were 4 large factories or centrals which made in 1916 more than 40,000,000 pounds each, and their total production was 350,000,000 pounds, or 36 per cent of the entire crop. Porto Rico's shipments to the United States, which, like Hawaii's, consist almost wholly of raw sugar, furnished in 1911–1915 over 680,000,000 pounds a year. Since the outbreak of the war (1914) the Porto Rican crops have increased greatly. The crop of the season ending in the summer of 1916 was reported officially at 967,000,000 pounds, while the 1916–17 crop exceeded 1,000,000,000 pounds. Porto Rico's average production during the five years ending in the summer of 1915 was 727,000,000 pounds, or considerably more than double the five-year period 1901–1905, and more than five times the average production of 1891–1895. The acreage of cane in Porto Rico increased 40 per cent from 1909 to 1915; the Federal Census reported 145,000 acres in 1909, and the treasurer of the island accounted for 203,000 in 1915. This gain corresponded to a gain ranging from 260,000,000 to 275,000,000 pounds in the sugar crop. An acre of cane in Porto Rico yields on an average about 4,500 to 4,800 pounds of sugar. The reported acreage divided into the sugar production for 1916 gives an average of 4,750 pounds per acre; while figures for 1913–14, in reports of 21 factories, give an average of 4,537 pounds of sugar per acre of cane. Hence an acre of cane in Porto Rico represents a year's supply of sugar for eleven or twelve families in the United States. Cane is the principal crop of Porto Rico, the acreage (1915) of 203,000 being 36,000 more than coffee, which is the second crop in area, and 87,000 more than the total for fruits and coconuts.

Sugar holds first place in the manufactures as well as in the agriculture of Porto Rico. That industry had, in 1910, a capital of $20,700,000, or four-fifths of the total capital for all manufacturing industries of the island; and the products (sugar and molasses) were valued at $20,600,000, or nearly three-fifths of all manufactured products.

PRODUCTION ON THE INCREASE IN THE PHILIPPINE ISLANDS.

Until within the last several years Philippine sugar production was confined almost wholly to the small mills of the natives, and the product was crude sugar of a primitive type. The Philippine Government estimates the sugar production of the islands in 1915–16 as 825,000,000 pounds, while the census for 1902 reported a total of about 397,000,000 pounds. Philippine shipments to the United States during the five years 1911–15 averaged about 280,000,000 pounds a year, or about 400,000,000 pounds less than the Porto Rican shipments.

LOUISIANA INCREASING ITS SUGAR-CANE ACREAGE.

The oldest source of our domestic sugar is a section of Louisiana beginning a few miles east of the left bank of the Mississippi River and extending roughly for 100 miles westward, and on the north, from an east and west line passing not far above Baton Rouge, the sugar belt extends southward to the Gulf coast. Outside of this region cane is grown generally throughout the Gulf States, but is there used almost exclusively to make sirup and not sugar. Practically the only other cane sugar from our Southern States, outside of this Louisiana region, is made in a few scattered localities in Texas. Cane is said to have been introduced into Louisiana about 1751, and an attempt was made to make sugar eight years later but without success. It was not until 1795 that the first successful sugar mill was erected in Louisiana. The industry was originally part of farming, and the equipment was rather simple, consisting of a set of rollers for crushing the cane and some kettles for boiling the juice. The introduction of improved machinery was followed by a decline in the number of plantations having their own mills.

As early as 1845 over 45 per cent of the sugar planters in Louisiana were without sugar mills and their cane was sent to neighboring plantations for grinding. Steam power was rapidly being introduced at this time and the making of sugar increased also. About 1849 there were 1,536 sugar houses in Louisiana, or about 300 more than in 1845. The increase was largely due to steam mills, there being 235 more in 1849 than in 1845, but the horsepower mills had increased also from 610 in the earlier year to 671 in 1849. With the increase in machinery and its consequent cost and larger efficiency, the number of mills decreased and a still larger number of planters sent their cane to neighbors' mills for sugar making. One of the most important improvements in the mill was the vacuum pan, the purpose of which is to boil the cane juice in a vacuum or under low pressure. The older mills or open-kettle concerns boiled the juice in open kettles of a few feet in diameter at the top and tapering downward, of a shape similar to half an egg. The kettles were superseded to a limited extent by open pans, which are more efficient than the kettles, but not so good as the vacuum pans. The open pans are used now largely for making cane sirup. The vacuum-pan process extracts more sugar than does the open kettle, and accordingly leaves a smaller amount of sugar in the residual molasses. This improvement has changed the quality of molasses to such an extent that molasses has come to mean not the sirup for table use but a by-product from sugar making, weak in sugar content, and usually of a more unpleasant taste than is desirable for table use. In 1849, out of 1,536 sugar houses, only 11 were reported as having vacuum pans, while in 1916, out of 150 operating sugar factories, 141 were vacuum-pan houses. Numerous other improvements were introduced. Better methods for crushing the cane and extracting the juice were used, improved systems for boiling the juice, and labor-saving devices for handling materials about the factory were adopted, and these improvements have been followed by larger and still larger outputs per factory.

In 1849 the factories averaged each about 150,000 to 175,000 pounds of sugar for the season; in 1916 the average exceeded 4,000,000 pounds. The factories had increased in size and efficiency, not only producing more sugar but getting more in proportion to the quantity of cane used. Within the Louisiana sugar belt cane is by far the most important commercial crop. In the 23 sugar parishes the cane area in 1909 amounted to 16.4 per cent of the total area of the improved land in farms. The 10 leading sugar parishes showed an area in cane equal to 35 per cent of the total improved land, and in corn 33.1 per cent of the total. The large number of mules required in the cane fields makes corn an important product for farm consumption rather than for sale. In the parishes of St. Mary, Lafourche, and Terrebonne cane occupied 41.6 per cent of the total area in improved land, corn 30 per cent, while hay and forage occupied 16.1 per cent. Hence, practically 87 per cent of all improved farm lands in those parishes may be regarded as devoted directly or indirectly to the sugar-cane industry. Of the total amount of sugar made in Louisiana in 1916, amounting to 607,800,000 pounds, 238,000,000 pounds, or 39.2 per cent, was produced in the three parishes just mentioned. These parishes contained also 51 of the State's 150 operating factories.

The sugar belt is well served with transportation facilities. A number of railroads with branch lines and spurs deliver cane to the mills and haul sugar to market. Water transportation facilities also are good. A network of bayous and canals extends from the western side of the sugar belt to the Mississippi River. Steamboats and barges traverse these waterways carrying cane to the mills and taking sugar to New Orleans.

A large fraction of the sugar made in Louisiana is raw sugar, which is sent to the refineries to be refined and granulated; while the rest of the Louisiana product consists of high-grade sugar fit for immediate consumption.

In 1912 the sugar classed as "raw" amounted to 72 per cent of the total output, and the better grades made 28 per cent, according to the Louisiana Sugar Planters' Association. Two years later, in 1914, the higher grades constituted 59 per cent of the total, but they declined to 47 per cent in 1915 and to 35 per cent in 1916. These higher grades of sugar are not all white granulated, but include light yellow sugar.

One of the characteristics of the Louisiana sugar industry is its uncertainties. Cane does not mature there, for the growing season is too short. Cane is harvested before it is fully ripe, and the cutting season is limited to the few weeks beginning about the latter part of October and ending shortly after the cane is killed by frost. Working immature cane results in a lighter tonnage per acre than is obtained in Cuba or other tropicial countries, and it also results in a smaller sugar content in Louisiana than in the Tropics. In spite of these limitations, this State is producing a considerable part of the Nation's supply of sugar. The harvested area increased from 183,000 acres in 1915 to 221,000 in 1916, and a further increase was made in 1917. At this rate of increase the area would soon equal that of 1911 (310,000 acres), and the total output of Louisiana would be expected to range from 500,000,000 pounds in a very unfavorable year to nearly 900,000,000 pounds under the best of crop conditions.

DOMESTIC PRODUCTION OF BEET SUGAR.

The beet-sugar production of the United States is comparatively new, amounting to an inconsiderable total only a generation ago. The industry being new, the equipment is modern, and instead of turning out a crude product, as many European mills do, our beet factories make white granulated sugar. Accordingly figures for United States production are in terms of "refined" (pure) sugar. Up to 1891–1895 the average production was slightly below 39,000,000 pounds. Five years later the average annual production (1896–1900) was about 117,000,000 pounds; the next five-year period showed an average exceeding 479,000,000 pounds, and in 1911–1915 beet sugar averaged 1,449,000,000 pounds, or more than three times the yearly average of 1901–1905. This large output in 1911–1915, however, was equal to only about nine weeks' average consumption for the United States. The crop of 1915, the largest beet-sugar crop ever made in the United States, was slightly more than 1,748,000,000 pounds, equivalent to about 11 weeks' consumption. Had the same crop conditions prevailed in 1916 as in the preceding year, the crop of 1916 would have been about 2,000,000,000 pounds instead of the actual yield of 1,641,000,000 pounds. Unfavorable weather early in the season followed by further damage resulted in a loss of 103,000 acres between planting and harvesting. The remaining 665,000 acres yielded a poor return, especially in the East, the average yield per acre in Michigan being about 5½ tons in 1916, whereas in 1915 the average in that State was 9 tons per acre. The beet-sugar factories are distributed over a wide territory, extending from northern Ohio to the Pacific coast, and from Montana almost to the Mexican border. East of the Missouri River the principal beet-sugar State is Michigan, where two-thirds of the beet acreage east of the Missouri River was located in 1916. This eastern region produced in 1916 about 108,000 tons of sugar, while the region west of the Missouri River produced 712,000 tons. The principal beet-sugar States in the West are Colorado and California, but the industry is also important in Utah, Idaho, Nebraska, and Montana. One of the western regions begins on the east with the factory at Grand Island, Nebr., on the Platte River, and follows that river and its branches, including at its western end factories and fields as far north as Billings, Mont., on the Yellowstone River, and on the south reaching almost to Denver. Another region between the crest of the Rocky Mountains and the Missouri River includes the valley of the Arkansas River from Garden City, Kans., to the Royal Gorge in Colorado, and extends southward into New Mexico. West of the Rocky Mountains the factory at Grand Junction works the beets raised in the irrigated fields along the Grand and Gunnison Rivers; a large industry is carried on in northern Utah and southern Idaho; and new fields are being developed in western Montana. In the Pacific northwest are two new factories, one that opened at Grants Pass, Oreg., in 1916, and the other at North Yakima, Wash., in 1917. The California factories are located along the coast south of San Francisco, also in the valleys of the Sacramento and San Joaquin Rivers.

There were 17 more beet-sugar factories operating in 1917 than in 1916, of which 14 were new. These new concerns were located at Tracy, Cal.; North Yakima, Wash.; Paul and Shelly, Idaho; Cornish, Delta, Moroni, and Smithfield, Utah; Missoula and Hamilton, Mont.; Worland, Wyo.; Brighton, Colo.; Bayard, Nebr.; and Mason City, Iowa. The factories idle in 1916 which resumed work in 1917 were at Corcoran and Hamilton City, Cal.; Janesville, Wis.; and Ottawa, Ohio. One factory which operated in 1916 was idle in 1917.

A large fraction of the beets used is produced by farmers who sell to factories. The industry is not, as in Louisiana, the outgrowth of home sugar making, but, on the other hand, is primarily a factory industry. Contracts are made between the factory operators and the beet growers before planting, and these contracts fix the basis of payment for the beets. In some cases the exact price per ton is specified, in other contracts a minimum price is specified for beets containing a certain percentage of sugar, and a fixed amount is paid for each additional percentage of sugar in the beets above the minimum. A third modification, which has become quite general, is to offer the farmer an additional amount per ton of beets for every increase in the price of sugar of a certain fraction of a cent over a specified minimum price. This latter is a form of profit sharing by which the grower shares with the factory an increase in sugar prices. A large acreage, however, is planted and harvested by the sugar companies themselves, especially in the region west of the Missouri River.

AMERICAN REFINERIES.

Nearly all the beet sugar made in the United States comes out of the factory granulated and ready for household use, but imported sugar, the insular crop, and more than one-half of the Louisiana product are sent to refineries before being sold for consumption. There were 18 of these refineries in the United States in 1914, and their combined product was 6,666,000,000 pounds of sugar, or about four-fifths of a year's supply for the nation. The refinery differs from other sugar factories in that it does not handle cane or beets, but merely takes the lower grades of sugar and converts them into higher grades. The working season of a cane-sugar factory is limited by the length of the harvest period and the keeping qualities of harvested cane; and beet-sugar factories, for like reasons, are unable to work more than a few months in a year. A refinery, on the other hand, is not prevented by natural causes from operating throughout the year. The refineries are much larger than the mills that work beets or cane. The average output of a refinery in 1914 was 370,000,000 pounds, or 17 times the average output of a beet-sugar factory in 1916, and more than 90 times the average product of a Louisiana factory the same year. Practically all the refineries are located near the seaboard, for a large part of their raw material comes by sea. Of the 18 refineries reported in the Census of 1914, 12 were near the Atlantic coast, 4 near the Gulf of Mexico, and 2 on the Pacific coast.

MINOR SOURCES OF SUPPLY.

All but a small fraction of the sugar used in the United States is made from cane or beets. Other products contributing to our supply of sweet foodstuffs, however, are worth noting. They include maple sugar and sirup, honey, cane sirup, sorghum sirup, and such cane molasses as is fit for household use. The total yearly production of these articles may be estimated roughly as about 500,000,000 or 600,000,000 pounds. To this total should be added, if figures were available, the net imports of edible molasses and the net domestic supply of glucose and grape sugar, including corn sirup.

The maple-sugar crop, according to the last census, 1909, was about 14,000,000 pounds; and maple-sirup production equaled 4,000,000 gallons, which is equivalent to about 32,000,000 pounds of sugar; making the total maple products equivalent to 46,000,000 pounds of sugar. While these figures refer to 1909, it is probable that the annual production has not changed much since then.

The honey crop of 1909 was 55,000,000 pounds, which, added to the sugar equivalent of the maple products, makes a total of 101,000,000 pounds of sweet foodstuffs.

Our domestic production of table sirup made from sugar cane was 23,000,000 gallons in 1909, while molasses, a residual product from sugar making, equaled 25,000,000 gallons. At that time the imports of foreign and insular molasses were averaging about 32,000,000 gallons a year, and exports of molasses averaged about one-tenth that amount. The present supply of molasses is probably larger, owing to recent large increases in the importation of low-grade molasses, much of which was probably for use as a raw material in manufacture. In the fiscal year ending June 30, 1917, imports of foreign and insular molasses amounted to 140,000,000 gallons, and our exports of molasses were about 3,000,000 gallons.

No official figures for the total quantity of glucose and grape sugar made in this country are available, but the census for 1914 gives the value of glucose production as $18,541,000 and grape sugar as $3,766,000. No estimate of quantity is given for the former item, but grape-sugar production amounted to 174,000,000 pounds. The glucose and grape-sugar production not only goes to meet a general demand in this country, but is exported in large quantities. In the fiscal year ending June 30, 1917, exports of glucose, or corn sirup, were 170,000,000 pounds, and of grape sugar, about 45,000,000 pounds.

THE WORLD'S SUPPLY OF WHEAT.

By O. C. Stine,

Assistant in Farm Economics, Office of Farm Management.

WHEAT is grown in nearly all parts of the inhabited world. (See fig. 10.) The great surplus-producing regions, however, are limited to the United States, Canada, Argentina, Australia, India, and Russia. When the world is at peace, the surplus wheat of each of these countries begins soon after harvest to move along the customary channels to the countries whose demand exceeds their supply. A low yield in one country in any year may be offset by a high yield in others, so that normally the world's supply is maintained and all countries receive their share of bread.

Table I shows the estimated annual production of wheat in the world from 1909 to 1916 inclusive.

Table I.—*World production of wheat.*

(Bureau of Crop Estimate's Monthly Crop Report, May, 1917.)

Year.	Bushels.
1909	3,582,000,000
1910	3,575,000,000
1911	3,552,000,000
1912	3,792,000,000
1913	4,127,000,000
1914	3,586,000,000
1915	4,145,000,000
1916	[a] 2,984,000,000

[a] Most of Central Europe, Poland, and Asiatic Russia not included. The countries included produced in 1915 3,433,000,000 bushels.

The world wheat crop of 1913, amounting to over 4 billion bushels, was the largest produced before the war. Short crops in Canada and Australia in 1914 reduced the total for that year to somewhat below the figure for 1913, but the increase in the acreage sown in many countries under the stimulation of high prices and patriotic appeals, together with good yields everywhere, resulted in the production in 1915 of the largest wheat crop ever harvested. In the next year there was a marked decline, and in 1917, though the total is not yet estimated, it is believed the crop is but little larger than that of 1916.

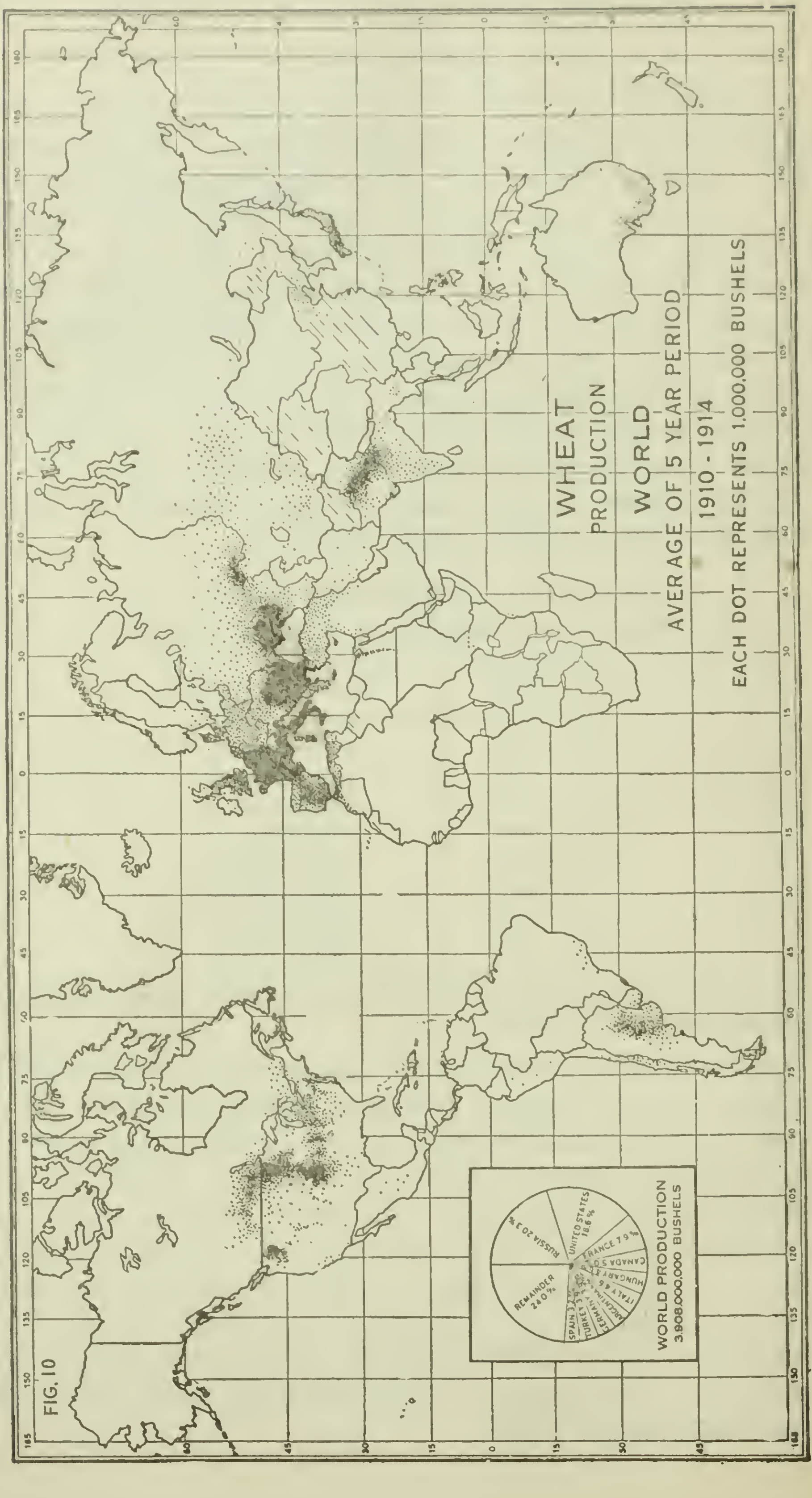


FIG. 10
WHEAT
PRODUCTION
WORLD
AVERAGE OF 5 YEAR PERIOD
1910 - 1914
EACH DOT REPRESENTS 1,000,000 BUSHELS
RUSSIA 20.3%
UNITED STATES 18.6%
FRANCE 7.9%
CANADA 5.0%
ITALY 4.6
REMAINDER 24.0%
WORLD PRODUCTION
3,908,000,000 BUSHELS

EFFECT OF THE WAR ON WHEAT ACREAGES.

Table II shows the acreage of wheat in the principal countries prior to the war as compared with that harvested since.

TABLE II.—*Wheat acreage, principal countries; average 1909–1913 and annual 1913–1917.*[a]

(Thousands of acres.)

Country.	Average, 1909–10 to 1913–14.	1913 and 1913–14.	1914 and 1914–15.	1915 and 1915–16.	1916 and 1916–17.	1917 and 1917–18 (preliminary estimates).
Allied western European countries:						
France	16,160	16,165	14,974	[b] 13,563	[b] 12,429	[b] 10,439
Italy	11,722	11,722	11,784	12,501	11,679	10,556
United Kingdom	1,888	1,791	1,905	2,333	2,051	2,104
Total	29,770	29,678	28,663	28,397	26,159	23,099
Russia, European	58,926	59,739	61,580	[b] 58,224	[b] 48,525	....
Asiatic, 9 Governments	9,521	12,360	13,618	[c] 14,532	[c] (14,532)	....
Asiatic, other Governments	7,287	8,248	(8,248)	....	....	....
Total	75,734	80,347	83,446	....	....	....
English and French colonies and dependencies:						
Canada	10,494	11,164	10,294	14,675	12,879	14,757
Australia	7,603	9,286	9,651	12,530	11,530	8,644
India	29,217	30,042	28,463	32,474	30,142	33,039
Egypt	1,315	1,354	1,300	1,581	1,447	1,116
Algeria	3,494	3,447	3,368	3,210	3,272	3,222
Tunis	1,310	1,520	1,003	1,112	1,482	1,310
Total	53,433	56,813	54,079	65,582	60,752	62,088
The United States and South American exporting countries:						
United States	47,095	50,184	53,541	60,469	52,785	45,941
Argentina	16,052	16,244	15,471	16,420	16,089	17,581
Chile	1,004	1,018	1,074	(1,074)	(1,074)	(1,074)
Uruguay	791	912	783	949	780	1,014
Total	64,942	68,358	70,869	78,912	70,728	65,610
Neutral European countries:						
Spain	9,548	9,644	9,681	10,037	10,148	10,223
Switzerland	104	104	104	114	124	139
Netherlands	138	141	148	161	134	(122)

[a] Year of harvest in the northern hemisphere; in the southern hemisphere, year sown and harvested.

[b] Excluding territory in enemy occupation.

[c] Ten Governments.

TABLE II.—*Wheat acreage, principal countries; average 1909–1913 and annual 1913–1917*—Continued.

(Thousands of acres.)

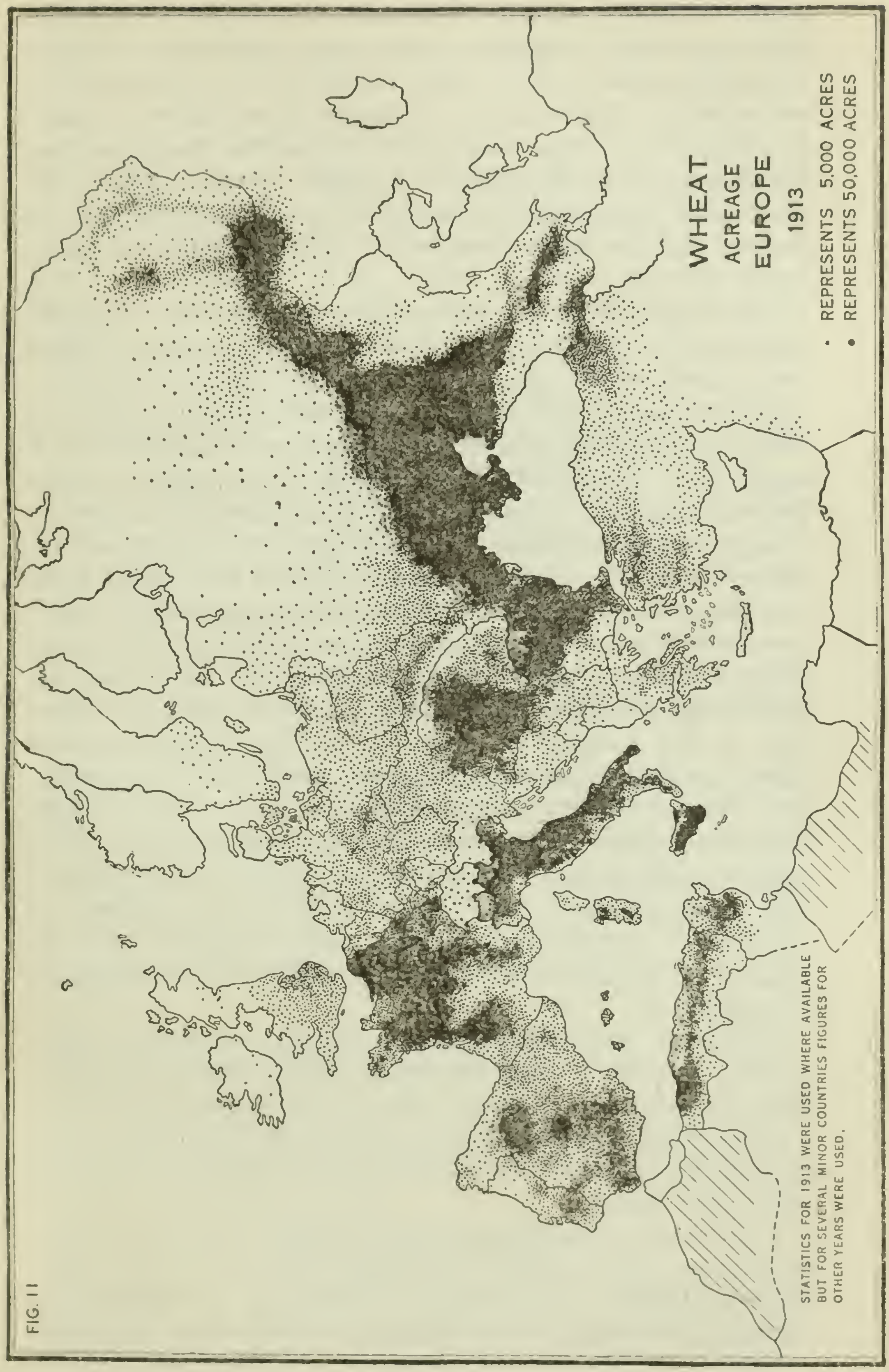
Country.	Average, 1909–10 to 1913–14.	1913 and 1913–14.	1914 and 1914–15.	1915 and 1915–16.	1916 and 1916–17.	1917 and 1917–18 (preliminary estimates).
Neutral European countries—Con.						
Denmark	114	133	133	166	152	131
Norway	12	12	12	12	11	(14)
Sweden	247	288	269	299	307	329
Total	10,163	10,322	10,347	10,789	10,879	10,958
Total above, excluding Russia	158,300	165,171	163,958	183,680	168,518	161,755
Central Powers and their allies:						
Germany	4,769	4,878	4,932	4,949	....	....
Hungary (Kingdom)	9,088	7,700	8,624	8,204	....	....
Austria	[a] 3,012	2,997	[b] 1,661	....	....	....
Bulgaria	2,654	2,511	2,639	....	....	....
Turkey	....	....	....	....	....	....
Total	19,523	18,086	17,856	....	....	....
Territory occupied wholly or in part by the Central Powers:						
Roumania	4,576	4,910	5,219	4,705	4,843	....
Serbia	8,742	10,524	....	....	....	....
Belgium	395	393	400	....	....	....
Luxemburg	27	27	27	30	27	....
Total	13,740	14,954	....	....	....	....

[a] All Hungary. [b] Exclusive of Galicia and Bukowina.

Much of the data for Tables II, III, and IV, as well as for the text, are taken from Statistical Notes on Cereals by the Bureau of Statistics, International Institute of Agriculture. Figures in parenthesis estimated by interpolation.

THE ENTENTE ALLIES.

The war has weakened the producing power of the allied European countries. In the first year a large number of farmers were withdrawn from the fields of France and the United Kingdom, fertilizers and machinery became scarce and expensive because of the need of the materials for war purposes, while at the same time the German armies overran and occupied about half a million acres of the wheat lands of France. (For the distribution of wheat acreage in Europe see fig. 11.) The result of the first year in France was a


WHEAT
ACREAGE
EUROPE
1913
· REPRESENTS 5,000 ACRES
• REPRESENTS 50,000 ACRES
STATISTICS FOR 1913 WERE USED WHERE AVAILABLE
BUT FOR SEVERAL MINOR COUNTRIES FIGURES FOR
OTHER YEARS WERE USED.
FIG. 11

decline of nearly one and a half million acres, with a further decline of over a million acres in 1916, and then of nearly two million acres more in 1917. Italy had not entered the war when her 1915 wheat crop was sown, which was nearly a million acres larger than usual. After this first year her wheat acreage declined about a million acres a year. In the United Kingdom the acreage increased the first year of the war and has since remained a little above the average before the war.

The reasons why the United Kingdom has been able to maintain her wheat acreage better than France or Italy deserve a word of explanation. It is less difficult to increase the wheat production of the United Kingdom than that of France or of Italy, because there is a greater proportion of arable land uncultivated but available for wheat in the United Kingdom. Great Britain, which formerly cultivated a large acreage of wheat, has, owing to the importation of cheap wheat free of duty, turned much of the wheat land into meadow and pasture, whereas Italy and France have constantly maintained a large acreage of wheat and of other cultivated crops. In the first year of the war the farmers of the United Kingdom increased their wheat acreage in the face of the scarcity of labor, of machinery, and of fertilizers, in part by sowing less barley and in part by plowing more land. The resulting shortage of barley induced the farmers to return to that crop the next year, nor were they able to maintain the total acreage in crops, and wheat declined nearly 300,000 acres. In 1917 there was a slight increase of wheat in Great Britain, and a large increase in Ireland, so that the total for the United Kingdom was greater than in 1916.

In Russia some of the wheat-producing areas have been overrun by armies, while the wheat acreage of the remainder of the country has declined, owing in part, perhaps, to the withdrawal of men from the farms, but mostly to the economic disorganization and to the lack of a foreign market for the surplus wheat.

The colonial possessions of Great Britain and France have been drawn upon for men and supplies and at the same time have succeeded in increasing the acreage of wheat harvested. The wheat of the principal dependencies averaged

53,000,000 acres before the war, to which 12,000,000 were added in the first year, 1915. Canada contributed over 4,000,000 acres of this increase. The small grain in Canada ripened early in 1914, was expeditiously thrashed and marketed, and favorable weather conditions enabled the western farmers to complete an unusually large proportion of the fall plowing in readiness for the next year's crop. (For the distribution of the wheat acreage of the United States and Canada see fig. 12.) A larger acreage than usual of winter wheat was sown. The spring of 1915 opened early, and the conditions for seeding spring wheat were generally favorable. Good prices and favorable seasons induced Australia also to increase her acreage in wheat from 9,000,000 to 12,000,000, and India increased her acreage from about 28,000,000 to 32,000,000. In these countries the increase in the wheat area was not obtained at the expense of other crops; and in India the acreage in other crops also showed a large increase. In Canada and Australia the increase was probably mostly on newly broken land, while in India the increase required a curtailment of the fallow land. The wheat acreage of Egypt also increased, while no unusual change took place in the other North African districts.

Since 1915 the wheat acreage of the principal French and English possessions has been greater than the acreage before the war but has not again reached the high point of that year. India, however, in 1917 harvested a larger acreage than in 1915. Canada and Australia have lost men, not only by enlistment but also through a decline in immigration. In Canada immigration amounted to over 384,000 in 1913–14, as compared with only 49,000 in 1915–16, and in Australia to 37,000 in 1913, as compared with only 1,000 in 1916. Another reason for the decline in wheat acreage in 1916 is found in the relatively low prices received for the crop of 1915, while in Australia the large accumulated left-over stock from 1916 has tended to decrease the acreage of 1917.

THE CENTRAL POWERS.

The data on the wheat acreage of the Central Powers after 1914 are insufficient to make possible any comparisons of the acreages before and after the war began. Bulgaria

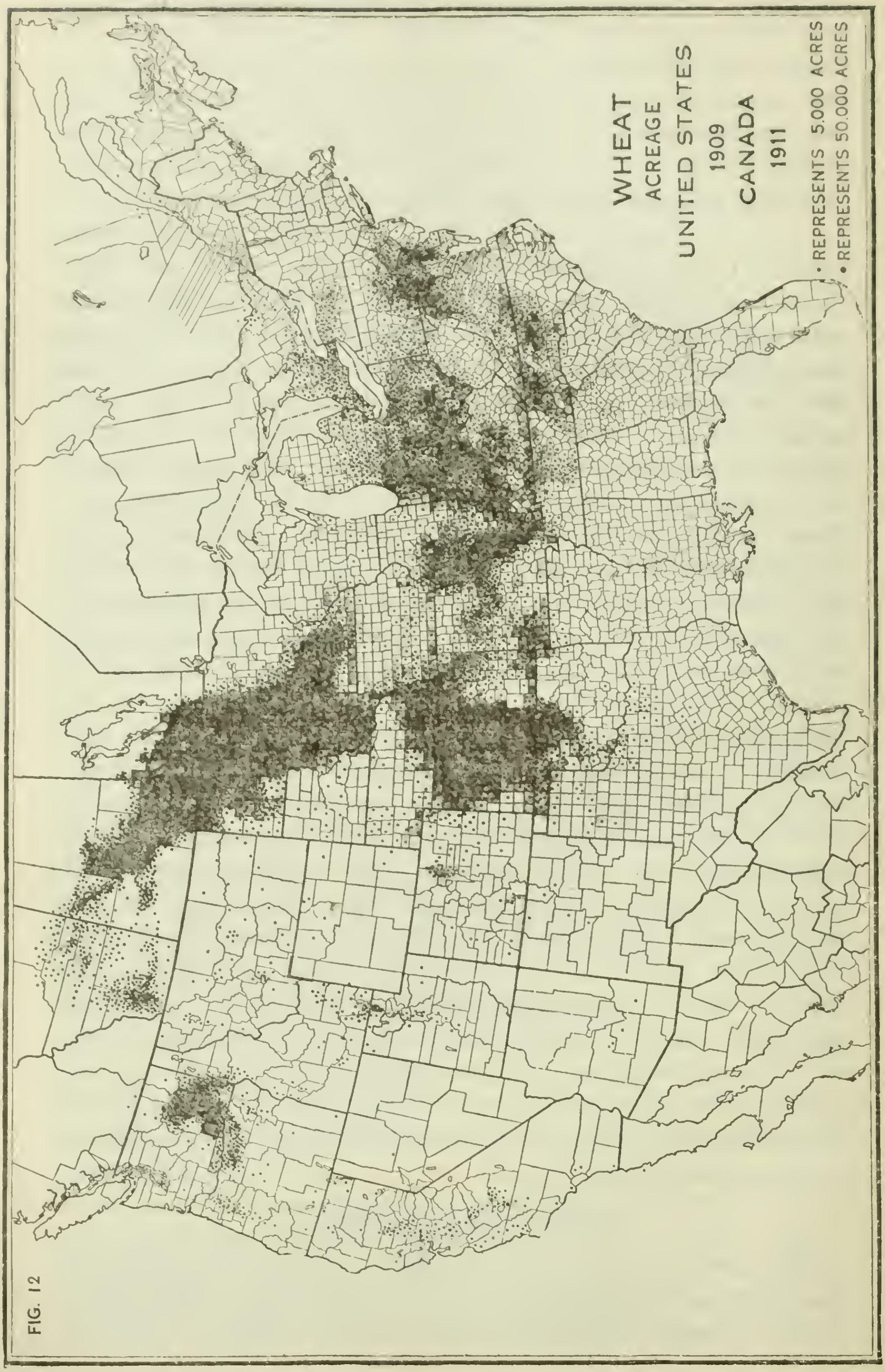

WHEAT
ACREAGE
UNITED STATES
1909
CANADA
1911
· REPRESENTS 5,000 ACRES
• REPRESENTS 50,000 ACRES

FIG. 12

entered the war in 1915, and in 1916 a large part of Roumania was added by conquest, which greatly increased the capacity of the Central Powers to produce wheat. The northeastern section of France and the invaded parts of Russia also have contributed something to the total wheat acreage of these Powers, but, on the other hand, Austria has been deprived for part of the time of the wheat of Galicia and Bukowina.

EUROPEAN NEUTRALS.

The neutral European countries had only a small acreage before the war, but the uncertainty of the supply from other countries and high prices caused them to increase their acreage to some extent. Spain is the only country in this group which has any considerable area suitable for growing wheat, and in 1917 she had added three-fourths of a million acres to the average before the war, this increase alone being more than equal to the total acreage of all the other neutral European countries.

UNITED STATES AND SOUTH AMERICA.

The acreage of wheat in the United States and in the South American exporting countries has been affected by the war, even though at the time of seeding wheat for the harvests of 1915, 1916, and 1917 these countries had neither withdrawn their own men from their fields for service in war nor been in position to urge upon their farmers the sowing of more wheat as a patriotic duty. The total acreage of this group of countries was normally increasing before the war, owing in large part to an advance in settlement that brought into cultivation new lands physically and economically suitable for wheat production. When war broke out in Europe immigration to the New World declined and many of the former immigrants returned to fight for their mother countries. The high prices in the autumn of 1914, however, stimulated farmers in the United States greatly to increase the wheat acreage, 7,000,000 acres being added. There was an increase in Argentina of 1,000,000 acres, and a relatively large increase also in Uruguay. The lower prices received for the 1915 crop had the same effect in America as elsewhere. The higher prices in 1916 again stimulated greater activity in the sowing of wheat for 1917, but in the

United States an unusually bad season for winter wheat reduced the acreage to be harvested to the lowest point in recent years. Argentina and Uruguay, however, have the largest acreage in their history to harvest in 1917–18. The net result in the United States and in South American countries in 1917 is, at the end of a period of three years of war, an acreage only slightly larger than that before the war began.

CHANGES IN WHEAT PRODUCTION.

Table III shows the changes in wheat production which have occurred in the principal countries since the beginning of the war. Production, being affected by weather conditions as well as by acreage, is not a reliable criterion of the effects due to war, but, on the other hand, statistics of production are of greater significance than those of acreage as regards the food supply of the world.

TABLE III.—*Wheat production in principal countries; average 1909–10 to 1913–14 and annual 1914–1917.*[a]

(Thousands of bushels.)

	Average 1909–10 to 1913–14.	1914 and 1914–15.	1915 and 1915–16.	1916 and 1916–17.	1917 and 1917–18 (preliminary estimates).
Western allied European countries:					
France	317,635	282,689	[b] 222,775	[b] 204,908	[b] 144,149
Italy	183,335	169,582	170,541	176,530	139,999
United Kingdom	59,638	62,431	73,913	60,630	63,824
Total	560,608	514,702	467,229	442,068	347,972
Russia, European [c]	624,615	573,376	749,862	595,418	....
Asiatic, 9 Governments	82,371	....	98,740	....	....
Total	706,986	....	848,602	....	....
English and French colonies and dependencies:					
Canada	204,708	161,281	426,748	262,781	231,730
Australia	90,499	24,894	179,627	143,475	122,880
India	351,762	312,028	376,726	318,002	379,303
Egypt	34,814	32,830	39,146	36,543	30,000

[a] Year of harvest in the northern hemisphere; in the southern hemisphere, year sown and harvested.
[b] Excluding territory in enemy occupation.
[c] Forty-eight Governments not invaded.

TABLE III.—*Wheat production in principal countries; average 1909-10 to 1913-14 and annual 1914-1917*—Continued.

(Thousands of bushels.)

	Average 1909-10 to 1913-14.	1914 and 1914-15.	1915 and 1915-16.	1916 and 1916-17.	1917 and 1917-18 (preliminary estimates).
English and French colonies and dependencies—Continued.					
Algeria	34,998	19,165	34,653	29,151	28,979
Tunis	6,224	2,205	11,023	7,165	7,000
Total	723,005	552,403	1,067,923	797,117	799,892
The United States and South American exporting countries:					
United States	686,692	891,017	1,025,801	639,886	650,828
Argentina	147,062	169,166	172,650	70,224	237,913
Chile	20,062	19,000	21,145	(21,145)	(21,145)
Uruguay	6,518	3,597	9,867	5,390	10,000
Total	860,334	1,082,780	1,229,463	736,645	919,886
Neutral European countries:					
Spain	130,446	116,087	139,298	152,329	141,008
Switzerland	3,314	3,278	3,957	3,821	4,556
Netherlands	4,898	5,688	5,681	4,710	3,452
Denmark	5,342	5,787	7,984	6,044	(6,004)
Norway	305	268	283	316	243
Sweden	8,117	8,473	9,171	8,979	7,496
Total	152,422	139,581	166,374	176,199	162,799
Total above excluding Russia	2,296,369	2,289,466	2,930,989	2,146,884	2,241,944
Central Powers and their allies:					
Germany	152,117	145,945	[a] 141,675	....	....
Hungary (Kingdom)	156,523	105,237	151,405	....	....
Austria	60,840	....	....	....	....
Bulgaria	42,439	25,981	46,212	....	....
Total	411,919	....	....	....	....
Territory occupied wholly or in part by the Central Powers:					
Roumania	87,791	46,297	89,786	78,521	....
Serbia	[b] 14,775	....	....	....	....
Belgium	14,896	....	....	....	....
Luxemburg	614	525	514	433	390
Total	118,076	....	....	....	....

[a] Incomplete. [b] Two years' average, 1910-11.

Figures in parenthesis estimated by interpolation.

The production of wheat in both France and Italy has declined more rapidly than the acreage. The production in France decreased 60,000,000 bushels during the first year of the war, and in 1917 is estimated at only about half the average crop before the war began. This is owing in part to the loss of considerable wheat land now in German occupation. The yield per acre, however, has decreased from an average of 20 bushels before the war to an average of 16 bushels during the past three years. In Italy the yield per acre has decreased from an average of 17 bushels to 14 bushels. In the United Kingdom, although the acreage was greater in 1917 than before the war, the production was practically the same. The preliminary estimates for 1917 for the western European Allies as a whole are 200,000,000 bushels less than the average before the war.

It seems reasonable to expect that the scarcity of labor would result in less efficient cultivation and consequently in lower yields, but another reason for the general decline in yields in western Europe is the shortage of fertilizers. In these countries fertilizers are a requisite for the maintenance of yields. The war stopped the exportation of German potash fertilizers, and very little is available outside of Germany and her allies. The cost of the transportation of materials, shortage of labor and inability to get sulphuric acid, which is so essential in the manufacture of superphosphates and other dissolved manures, have made it very difficult for farmers to secure any commercial fertilizers. In the United Kingdom sulphate of ammonia has taken the place of nitrate of soda, which is required for the manufacture of explosives, and since January 19, 1917, the exportation of sulphate of ammonia has been prohibited. In countries outside of Europe commercial fertilizer is not a very important factor in wheat production.

In Russia the crop of 1915 was estimated to be over 100,000,000 bushels larger than the average crop before the war, and the 1916 crop was but little below normal. No estimates are as yet available for the crop of 1917.

In the British and French colonies the increase in production has kept pace with that of acreage, the production during the past two years being about 100,000,000 bushels more than the average before the war.

The combined production of the United States and South American exporting countries for 1917 and 1917–18 is greater than the average before the war.

The neutral European countries increased their production in 1915 and in 1916, and the crop of 1917, while less than those of the previous years, is above the average before the war. The wheat production of the Central Powers and their allies since 1914 is unknown.

WAR MEASURES IN REGARD TO WHEAT.

Special efforts to increase wheat production have been made by the Governments of the countries engaged in the war. In Prussia in 1914 all uncultivated State lands were by decree placed at the disposal of agriculture, and in 1915 decrees were issued by Germany, Austria, and Hungary to compel the cultivation of private lands that had been neglected or that lay waste. In France by a law enacted in October, 1916, communal authorities were empowered to cultivate any arable land not in use. In the United Kingdom occupiers were required under penalties to cultivate their land to the fullest extent possible, and the Government claims the right to enter upon the premises, make a survey of the holding, and if not satisfied with the cultivation, to take measures to improve it. In 1917 the farmers in Ireland on holdings of 10 acres and over were required to cultivate the same areas as in 1916 plus 10 per cent of the whole extent of their holdings, if not over half was already under cultivation. The cantonal governments of Switzerland are requested by the Federal Council in a decree dated February 16, 1917, to undertake the cultivation for 1917, and for 1918 if necessary, of all agricultural land left untilled or not adequately farmed.

In some cases guaranteed prices, in other cases bounties or premiums have been offered to encourage production. Beginning with the harvest of 1917 and until the requisitioning of wheat is at an end, France will pay a premium equivalent to about 16 cents per bushel for wheat, and in 1917 the equivalent of $1.56 for every acre under wheat beyond the area cultivated on the farm in the previous year. The Italian Government pays a premium equivalent to 36 cents per bushel for wheat grown upon soil brought into cultivation in 1917 and has furthermore granted the ministry of agriculture the equivalent of about $38,000 for the encouragement of cereal cultivation. In order that the farmers of the United Kingdom may not hesitate to break up pasture land the Government has guaranteed a minimum price for home-grown wheat for the next six years.

By act of Congress approved August 10, 1917, the President of the United States was empowered to fix a reasonable guaranteed price for wheat in order to assure producers a reasonable profit,[1] and by the same act at least $2 per bushel for No. 1 spring wheat or its equivalent of the crop of 1918 is guaranteed at the principal interior markets until May 1, 1919.

It is very difficult in the belligerent countries to secure labor to cultivate and harvest the crops, since the men most capable of doing such work are nearly all in the Army. In Hungary and Italy the communal or municipal bodies have been authorized to requisition all labor available in the country, including women, girls, and boys. In France prisoners of war are being employed in agriculture, and mobilized men have been periodically placed at the disposal of directors of agriculture in busy seasons. A law of January, 1917, provides a credit equivalent to $5,790,000 for the direct organization of agricultural labor. In the United Kingdom prisoners of war and interned aliens have been put to work cultivating the soil, and soldiers have been brought back and employed temporarily in the fields. The Governments of both the United Kingdom and France have provided aid for farmers wishing to purchase or secure the use of tractors and other farm machinery. The Cantons of Switzerland are empowered by the Federal Council to requisition labor and agricultural machinery. In the United States the Department of Agriculture in cooperation with the Department of Labor has organized a system of distribution of labor with a view to facilitating the movement of farm laborers in response to local demands.

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[1] The price for the 1917 crop was fixed at $2.20 per bushel (No. 1 northern spring wheat, or its equivalent, at Chicago).

EFFECT OF THE WAR ON INTERNATIONAL TRADE IN WHEAT.

TABLE IV.—*Net exports and imports of wheat,*[a] *principal countries; average 1909–10 to 1913–14 and annual 1914–15 and 1915–16.*

(Thousands of bushels.)

Country.	Average 1909–10 to 1913–14.		1914–15		1915–16	
	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.
Allied western European countries:						
France	....	43,673	....	70,136	....	90,965
Great Britain and Ireland	....	216,054	....	204,065	....	211,263
Italy	....	53,219	....	59,719	....	77,172
Total net imports	....	312,946	....	333,920	....	379,400
Russia	164,147	....	7,400	....	13,591	....
Russia and her European allies: Excess imports over exports	....	148,799	....	326,520	....	365,809
English and French colonies and dependencies:						
Canada	94,820	....	83,845	....	267,785	....
India	49,589	....	28,866	....	27,222	....
Australia	53,101	....	....	5,916	55,637	....
Algeria	5,284	....	3,527	....	5,126	....
Egypt	....	7,815	....	1,426	243	....
Tunis	....	761	....	1,565	364	....
Excess exports over imports	194,218	....	107,331	....	356,377	....
United States and South American exporting countries:						
United States	106,934	....	311,036	....	233,056	....
Argentina	83,169	....	97,965	....	85,814	....
Chile	1,032	....	....	3,068	213	....
Uruguay	687	....	18	....	801	....
Excess exports over imports	191,822	....	405,951	....	319,884	....
Neutral European countries:						
Denmark	....	6,283	....	4,360	....	3,538
Spain	....	6,189	....	14,436	....	12,662
Netherlands	....	21,916	....	29,942	....	22,799
Switzerland	....	16,924	....	20,514	....	15,487
Sweden	....	7,047	....	6,555	....	9,660
Norway	....	3,836	....	7,433	....	5,853
Total net imports	....	62,261	....	83,260	....	69,999

[a] Including wheat flour reduced to wheat.

TABLE IV.—*Net exports and imports of wheat, principal countries; average 1909–10 to 1913–14 and annual 1914–15 and 1915–16*—Continued.

(Thousands of bushels.)

Country.	Average 1909–10 to 1913–14.		1914–15		1915–16	
	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.
Central Powers:						
Germany[a]	....	68,339	....	....	....	....
Austria[b]	....	51,341	....	....	....	....
Hungary	40,829	....	....	....	....	....
Bulgaria	11,089	....	....	....	....	....
Excess imports over exports	....	67,762	....	....	....	....
Territory partly in possession of Central Powers:						
Roumania	53,642	....	3,674	....	22,347	....
Belgium	....	49,390	....	....	....	....
Serbia	3,567	....	....	....	....	....
Excess exports over imports	7,719	....	....	....	....	....

[a] Includes Luxemburg, which forms a part of the German customs union.
[b] Includes trade of Bosnia and Herzegovina.

Table IV shows the changes effected by the war in the international trade in wheat. It was inevitable that war should cause a great change in the movement of wheat. Immediately after war was declared all nations involved and many of the neutral countries took drastic measures to secure and conserve their own supply of breadstuffs. Indeed, prior to her entrance into the war, the United States, alone among the great producers, did not restrict or direct the exports of wheat. Before the war Russia exported large quantities to the United Kingdom, Italy, and France. Roumania exported large quantities to France and Italy. The neutral importing countries also received large quantities from Roumania and Russia. After war began the western European allies imported more wheat than before the war, and, with Russia out of the market, they were compelled to turn to their dependencies and the United States and South American countries not only to make up the loss of supplies from Russia and the Balkan States, but also for wheat to meet the increased demand and diminished production. The neutral European countries also have needed more wheat from countries outside of Europe, not only because of their loss of the wheat from Russia and Roumania, but also because they could get no rye from Russia or the Central Powers; and more wheat was necessary to take its place.

The wheat that was formerly sent from non-European countries to Germany helps to meet the extra demand of the Allies and neutrals, but most of this extra demand must be met by a world-wide increase in production as well as by a decided decrease in consumption. In 1914–15 owing to a shortage in Canada and a failure of the wheat crop in Australia the great bulk of the extra wheat for Europe had to come from the United States and Argentina. The United States had harvested a large crop and, consuming less than usual (Table V), was enabled to export 311 million bushels, 200 millions more than the average before the war. The good crops of 1915 enabled all countries to contribute toward making up the deficiencies of European countries. In 1916-17 the Argentine crop was almost a failure, which together with the shortage of tonnage for moving wheat from Australia caused the burden of supplying the European countries in 1917 to fall heavily upon the United States and Canada.

TABLE V.—*Supply and distribution of the wheat of the United States, 1908–1917.*[a]

SUPPLIES.

Harvest year ending—	Crop harvested.	Supply on hand July 1.		Total supply.
		In farmers' hands.	In second hands.	
	Thousands of bushels.	*Thousands of bushels.*	*Thousands of bushels.*	*Thousands of bushels.*
1908	665,000	34,000	35,000	734,000
1909	683,000	15,000	28,000	726,000
1910	635,000	36,000	49,000	720,000
1911	621,000	34,000	58,000	713,000
1912	730,000	24,000	54,000	808,000
1913	763,000	35,000	55,000	853,000
1914	891,000	32,000	44,000	967,000
1915	1,026,000	29,000	26,000	1,081,000
1916	640,000	74,000	89,000	803,000
1917	651,000	16,000	32,000	699,000

TABLE V.—*Supply and distribution of wheat of the United States, 1908–1917*—Continued.

DISTRIBUTION.

Year beginning July 1.	Population.	Consumption per capita.	Total consumption for food.	Required for seeding.	On hand at close of year. In farmers' hands.	On hand at close of year. In second hands.	Exports.
	Thousands.	*Bushels.*	*Thousands of bushels.*	*Thousands of bushels.*	*Thousands of bushels.*	*Thousands of bushels.*	*Thousands of bushels.*
1908	88,939	5.72	509,000	68,000	15,000	28,000	114,000
1909	90,556	5.30	480,000	74,000	36,000	49,000	87,000
1910	92,175	5.23	482,000	77,000	34,000	58,000	69,000
1911	93,793	5.15	483,000	72,000	24,000	54,000	80,000
1912	95,411	5.28	504,000	71,000	35,000	55,000	143,000
1913	97,028	5.66	549,000	82,000	32,000	44,000	146,000
1914	98,646	5.01	494,000	86,000	29,000	26,000	332,000
1915	100,264	5.89	591,000	84,000	74,000	89,000	243,000
1916	101,882	4.70	479,000	80,000	16,000	32,000	196,000
1917	103,500						
Hypothetical distribution for 1917-18:							
Normal consumption		5.3	549,000	87,000	15,000	25,000	23,000
Last year's average consumption		4.7	486,000	87,000	15,000	25,000	86,000
Very low average consumption		4.0	414,000	87,000	15,000	25,000	158,000

[a] Chicago Daily Trade Bulletin, July 16, 1917; Monthly Crop Report, December, 1917 Yearbook, U. S. Dept. Agr., 1916.

Before the war the Central Powers, including Bulgaria, imported on an average about 68,000,000 bushels of wheat. On the other hand, Germany exported about 26,000,000 bushels of rye more than she imported. Austria lost wheat and rye by the Russian occupation of Galicia and Bukowina, but on the other hand the occupation of Serbia, Roumania, parts of Russia, and northern France have more than made good these losses. If the Belgians are left to feed themselves, assisted by the Entente Allies and neutral countries, the Central Powers and their allies under normal weather conditions should produce sufficient breadstuffs to supply their own needs very nearly, if not entirely, provided labor and fertilizer are available for production.

PRESENT WHEAT SITUATION AMONG THE ENTENTE ALLIES.

The combined wheat production of the neutral countries and of the Entente Allies, exclusive of Russia and Roumania, for the period of 1909–1913 averaged 2,296 million bushels annually, and they retained for consumption and carry-over 2,287 millions, or 9 millions less than they produced. In 1914 the same countries produced only 2 millions more than they had annually retained before the war, but in 1915 they produced 653 millions more than this average, which gave them a larger surplus than usual to carry over into 1916. However, their 1916 crops were short, amounting to only 2,152 million bushels, and estimates of requirements for 1916-17 by the Bureau of Statistics of the International Institute of Agriculture amount to 2,408 million bushels, which is 256 millions more than was produced in 1916. It is evident, therefore, that the large stocks that accumulated from the 1915 crop are considerably reduced. The visible supply in Canada June 30, 1917, was estimated to be 20 million bushels, against 49 millions on July 1, 1916, and in the United States 18 millions against 49 million bushels on the earlier date. Owing to the shortage of tonnage for moving wheat from Australia, a large stock has accumulated there, but nowhere else is there any considerable quantity of surplus wheat available for export. The Russian Central Statistical Committee has published figures of stocks mostly in dealers' hands January 14, 1917, amounting to 22 million bushels, and there may be large stocks in farmers' hands which are not being offered for sale on account of the chaotic conditions and the uncertainty as to the future policy; but Russia's stock of wheat is not available for her allies.

The situation at the beginning of the year 1917–18 may be summarized as follows: The total production of the neutral and entente allied countries, exclusive of Russia and Roumania, is greater than in 1916–17 (see Table III), but stocks are low, except in Australia. The allied western European countries have produced 213,000,000 bushels less than their average before the war, but the exporting countries which supply their deficiencies are harvesting more grain this year and will probably reduce consumption, so that they may export a larger proportion of their crops. Argentina, the United States, and Canada, the three countries which are in a position to export grain in largest quantities and most easily, are harvesting this year nearly 150,000,000 bushels more than last year, and slightly more than before the war.

A large share of the needs of the Entente Allies of western Europe must be met by exports from the United States. The annual distribution of the wheat crop of the United States is shown in Table V. It will be seen that America enters into the war with a short crop and with a low stock on hand. The problem is to reduce domestic consumption of wheat products to a minimum in order that there may be as much as possible left for export to the allies.

The estimated stocks on hand July 1 added to the estimated production of the year give 699 million bushels to be distributed between July 1, 1917, and July 1, 1918. This is the lowest supply that has been available in any year. The per capita consumption of wheat varies from year to year, the highest shown in the table being 5.80 bushels in 1915 and the lowest 4.70 bushels in 1916. The Bureau of Crop Estimates has estimated that the normal consumption in the United States amounts to 5.3 bushels per capita. Estimating the population of the United States this year to be approximately 103,500,000, normal consumption would require 556 million bushels; the seed requirements for next year are 87 million bushels, and by leaving only very small stocks on hand July 1, 1918, there will be only 23 million bushels left for export. If we consume wheat at the rate computed for last year, 4.7 bushels per capita or 0.6 bushel less than the normal amount, there will be approximately 86 million bushels for export. The investigations of the Bureau of Crop Estimates determined that the normal consumption of wheat in some of the Southern States, where little wheat is raised and the people eat much corn bread, was only 4 bushels per capita. If the people of the entire United States will substitute corn and potatoes for wheat to the extent that some of the Southern States do, the per capita consumption may be lowered to 4 bushels, and then there will be 158 million bushels available for export. Even this amount is considerably below what the United States has contributed to the allies during the previous years of the war, for the exports of domestic wheat during 1914–15 were 332 million bushels and during 1915–16 they were 243 million.

CEREAL DISEASES AND THE NATIONAL FOOD SUPPLY.

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IMMEDIATELY the eye of the lay reader meets with the expression "cereal diseases," he is apt to think merely of smuts and rusts. To the average farmer there are, practically speaking, no other diseases of cereal crops; while to the man of the street, whose knowledge of the farm and its problems is limited or wholly wanting, what he may know of these diseases may be—nearly always is—knowledge gained through hearsay or from the press. To be sure, the smuts and rusts are, of all our cereal diseases, the most obvious, because of their occasional epidemic abundance and their great destructiveness. Frequently their presence is so marked and the damage wrought is so great as to obscure entirely the presence of any other disease except to the eye of the trained observer. In 1916 this country suffered from the biggest cereal-disease toll ever paid in any one season by the wheat growers of the spring-wheat States. The report went out over the country that the spring-wheat crop of the four States of Minnesota, North Dakota, South Dakota, and Nebraska had been damaged to the amount of 181,000,000 bushels. All this destruction was popularly attributed to the ravages of black rust, *Puccinia graminis*, though we know as a matter of fact that approximately one-third of it was certainly attributable to the combined effect of scab, smut, hot, dry winds, and possibly other less obvious factors.

In late years we have learned to recognize the fact that our cultivated cereal crops are subject to several diseases other than the relatively long-known smuts and rusts. Moreover, many of these, as, for example, the stripe disease of barley, not infrequently result in damage amounting in some fields to as much as 10 to 50 per cent of the crop affected. Then there are those more or less ill-defined root diseases concerning which there seems to be a paucity of real facts and a disproportionate amount of speculation. It is probably true that fungi such as Fusarium, Helminthosporium, Colletotrichum, and Alternaria present in the soil, on the seed or within it, under growth conditions favoring their development may seriously reduce the vigor and subsequent producing power of affected plants. Indeed, it has been demonstrated by field and greenhouse experiments that seed wheat, either naturally or artificially inoculated with the spores of these ubiquitous molds, shows a reduction in germinability amounting in some instances to as much as 30 per cent of the total number of seeds planted. Added to this failure to germinate, we find that in such seed there is often a certain percentage of weak, stunted seedlings which, if they grow to maturity, serve only to depress the curve of normal production. Among these more obscure diseases of cereals are to be included the root rot of maize, the canker and wilt diseases of flax, and straighthead of rice. The last mentioned of these diseases seems in no sense traceable to parasitic causation, and in the accepted sense in which we apply the term is hardly to be classified as a disease, for, instead of manifesting symptoms of disease lesions, as in the rusts, or the destruction of organs, as in the case of the smuts, plants affected with straighthead become vegetative monsters in that they fail altogether to produce blossoms and seed. More accurately are they to be compared to plants suffering from a glut of nitrogen than to plants infected with some disease-producing organism.

In recent years our attention has been called to the fact that in addition to the smuts, rusts, mildews, blights, and wilts of cereal crops traceable to parasitic fungi, certain more or less destructive cereal diseases are attributable solely to specific bacteria. A well-known example of such a malady is Stewart's disease of maize, to which the sweet varieties show greatest susceptibility, while in the ordinary field-corn varieties it has been but infrequently observed. Within the last three years a serious bacterial disease of wheat, affecting practically every organ of the plant, including the leaves and glumes and extending from the latter to the immature kernel, has been observed in several of the Mississippi and Missouri Valley States and in California. The disease has been traced to the parasitism of a specific organism which has been found very generally present on or within the wheat grains. The investigation of this important bacterial disease is now being vigorously pushed by the Office of Plant Pathology, Bureau of Plant Industry, in cooperation with the agricultural experiment station of Wisconsin. Whether the disease is identical with that of barley now being studied by Jones, Johnson, and Reddy is yet to be determined. That it is of considerable economic importance can no longer be doubted, but our knowledge of its relation to climatic factors is so meager as to make it impossible at this time to foretell what may be its annual effect on the wheat crop of those sections where it is known to have established itself.

CEREAL SMUTS.

From the standpoint of their importance to the Nation's food supply, the smuts and rusts of cereals easily take first rank. Of the smuts, 11 are known to occur in the United States, 8 of which are of economic interest and are here named in the order of their importance. They are: Bunt or stinking smut of wheat; covered and loose smuts of oats (Pl. LXX, fig. 1); covered smut of barley (Pl. LXX, fig. 2); loose smuts of wheat and barley; the smuts of corn and allied crops; the stem and loose smuts of rye; and rice smut. The distribution of these smuts is, generally speaking, universal and as widespread as is the culture of the crop concerned. With the possible exception of the stem smut of rye, they have probably been exacting their yearly toll from our flour and feed stocks since the beginnings of American history. And now, notwithstanding the fact that many of these smuts are easily preventable, those most easily subject to control are the smuts which to-day, according to reasonably conservative estimates, are annually destroying 20,000,000 bushels of wheat, upwards of 50,000,000 bushels of oats, and 6,000,000 bushels of barley. In the same class of preventable smuts are to be included the kernel smuts of sorghum and broom corn (Pl. LXXI, fig. 1) and the stem smut of rye, but concerning the losses occasioned by these we lack the information that would enable us to make trustworthy estimates. Then there are the loose smuts of wheat and barley, also preventable, but only by the more laborious and exacting hot-water treatment, which in this country has not been generally adopted. These smuts probably cause a combined annual loss of 6,000,000 bushels of wheat and half as many bushels of barley. It would doubtless be safe to say that we are paying out annually as a price for what amounts to national negligence grain enough to fill an elevator of 90,000,000 bushels capacity. And this vast and really inexcusable toll is exacted by preventable smuts. To this we must add for corn smut one-half of 1 per cent of the total annual crop, or approximately 15,000,000 bushels.

CEREAL RUSTS.

While the destruction wrought by the smuts is in very great measure preventable, the same is not true of the cereal rusts, and in epidemic years the losses are sometimes, as, for example, in 1916, so serious as to amount to almost a complete crop failure in the spring-wheat States, where in years of normal production the yield amounts to 160 million bushels or more.

The cereal rusts, of which there are 12 in this country common to wheat, oats, barley, and rye, may, for our convenience, be divided into three groups, i. e., stem rusts, leaf rusts, and yellow-stripe rust. Of these the stem or black rust (*Puccinia graminis*), particularly that of wheat, is in this country the most important. There is seldom a year when the losses occasioned by the stem rust of wheat are not to be figured in millions of bushels. But it is in epidemic years, such as that of 1916, that this menace gives real concern to a bread-hungry world. Added to these losses are those caused by leaf rust; insignificant, to be sure, in contrast to those caused by stem rust, but important enough in these times of declining total yields to call for thought and investigation with a view to developing varieties which may possess some degree of immunity from this and other rusts. Leaf rust of wheat (*Puccinia triticina*), like stem rust, varies from year to year in its severity and economic importance and is most destructive in the more humid Southern and Southeastern States, where, indeed, it may sometimes actually constitute a limiting factor to wheat production. Leaf rust, known among most farmers as red rust, has received little attention from the pathologist interested in cereal rusts, for the reason that it has generally been regarded as incapable of doing more than slight, almost negligible, damage.

Of the other leaf rusts, that of barley (*Puccinia simplex*) is not widely distributed in this country and is not generally known to cause serious damage, though records obtained by the writer from varietal test plats at Arlington, Va., indicate that under favorable rust conditions it can actually kill affected plants.

Leaf rust of oats, commonly called crown rust (*Puccinia coronata*), is not infrequently responsible for pronounced losses in different parts of the United States, particularly in the South, where its ravages have reduced the growing of oats to a few resistant varieties belonging to the red-oat group, such, for example, as Burt or Early Ripe, Appler, and Cook. Resistance to crown rust is more frequently met with than resistance to stem rust, but thus far this quality has not been observed in any varieties of the white or yellow oat group in which we find our highest yielders. It follows that in order to get the desired combination of rust resistance and yield in a hybrid resembling its white-oat parent we must again have recourse to breeding and selection.

A cooperative study of both the stem and crown rusts of oats was undertaken in 1914 with the agricultural experiment station of Iowa. During the observations of 1914 it was found that the variety known as White Tartarian was more or less resistant to stem rust, but not at all so to crown rust. By crossing and selection we may obtain varieties showing resistance to stem rust, coupled with good grain quality and high yielding capacity.

A preliminary study of the progeny arising from a cross of the Burt and Sixty-Day varieties has shown that resistance to crown rust is a heritable character, capable of being transferred to hybrid individuals, some of which may be expected to have all the desirable characters of the white-oat parent plus the rust resistance of the red variety. Thus do we hope in course of time to develop suitable and well-adapted varieties of oats resistant to both of the rusts which now make it impossible to grow, except more or less locally, the most productive and generally acceptable sorts.

One of the most interesting and important developments in the history of cereal-rust investigations in the United

States in late years was the discovery of the stripe rust, *Puccinia glumarum*, in the summer of 1915. It was first observed, almost simultaneously, by F. Kølpin Ravn, of Copenhagen, on wheat in Arizona, and by A. G. Johnson, of Madison, Wis., on a species of wild barley near Tehachapi, Cal. Since then it has been found on barley and rye and on nearly a score of wild grasses and is known to have been collected in this country 25 years ago, but referred to another species. Thus far it has not been found east of the Black Hills, nor has it been observed beyond the confines of the western mountain flora. Why, in all these years, this rust has not reached down from the mountains and their valleys into the Great Plains and the more humid valleys tributary to the Mississippi is a question that yet remains to be answered. We know that the selfsame rust in Europe works havoc among the wheat and barley fields of Denmark, Sweden, Germany, and other European countries with climatic conditions of summer not unlike those of many sections of the United States where this rust is still unknown, but where other cereal rusts abound and are occasionally the most destructive of all our grain-crop pests. It may be here, as in the case of the western form of stem rust, that we have a variety of the yellow stripe rust, typical not of Europe nor indeed of the United States save in the Pacific Coast and tributary Intermountain States.

CONTROL MEASURES FOR SMUTS.

Of fundamental importance to our knowledge of plant-disease control is a thorough understanding of those factors and conditions which contribute to disease. We have spent and are spending annually much money and time in the investigation of parasitism and in working out the details of the life histories of organisms known to induce plant disease. Before we can apply known methods of control or intelligently proceed with the devising of new ones, we must know something of the factors inducing the condition which we desire to control. So, preventing the stinking smut of the Pacific Northwest was found to call for something more than a knowledge of the life history and habits of the causative organism, something more than a knowledge of seed treatment technique. In fact, the solution of this problem will require an understanding of soil management, of spore distribution, and of those meteorologic factors which influence the development of both host and parasite.

In all countries where cereal production is an important source of income, a knowledge of the control of the more serious diseases has become more or less general. In the United States, for example, the Federal Government and State experiment stations have spent vast sums of money in getting at the facts concerning the smuts and rusts and in getting these facts before the public in the form of bulletins, press notices, extension lectures, and in other ways. As a result, knowledge of the smuts and methods of controlling them has become general; in fact, much more so than the application of that knowledge. With the organization of the extension service in the several States there has come about a revival of interest in the value of seed treatment, to the end that in some States, as, for example, in New York, Nebraska, and Illinois, well-organized and successful campaigns against oat smut have been conducted which have resulted in a saving to the farmers of each State amounting in these times of high prices to many times the annual cost of maintaining the entire staff of county agents in the States concerned. But the county agent has other duties, and we have found that, save in a few States where seed-treatment campaigns have been specially featured, there exists great need of an extension of our knowledge of seed treatment by demonstration. Treatment of the seed wheat, oats, or other cereal has been found to be a profitable practice, not alone because of its value as a smut preventive but because of its generally salutary effect on germination (Pl. LXXI, fig. 2); not that it has been demonstrated that the action of formaldehyde or the salts of copper or mercury really exerts a stimulating influence, but rather it is more reasonable to infer that such improvement in germination and seedling development as follows seed treatment is to be accounted for in the established evidence that the commonly recommended chemical baths, formaldehyde in particular, prevent in very large measure the development of superficial, harmful fungi that are present on the seed or in contact soil.

As a part of the nation-wide campaign for a billion-bushel wheat crop in 1918 and for increased cereal production generally, the Department of Agriculture, in cooperation with the extension service of the several States in which cereal-crop production is an important source of income, initiated this year a campaign for the prevention of smuts. For this work forty or more men have been employed since early September. Without exception these field men have been selected with particular regard to training and experience in agronomy and plant pathology, supplemented by actual farm experience. They are working in conjunction with county agents and farm advisers wherever practicable, in some instances offering these men instruction regarding the cereal smuts and methods of seed treatment. In others, the work is being incorporated as a part of the agricultural teaching of public schools, where all the details pertaining to seed treatment are actually performed by the students themselves. Not infrequently the men engaged in this work have carried the campaign into farming communities, where they have conducted a farm-to-farm course of practical instruction and have thereby succeeded in getting many growers to treat their grain when otherwise but little, if any, would have been treated. Farmers' organizations have been addressed, demonstrations before county and State fairs have been made, and every reasonable opportunity has been used not only to bring the people to a realizing sense of the importance of seed treatment, but, what is more to the point of the present-day emergency, thousands of bushels of wheat, oats, barley, and rye have this fall been properly treated where last year there were but 10, and much of the 10 but indifferently or improperly sprinkled or dipped.

On completion of the present season's work of seed treatment in the Southern States, the campaign will be carried into those States where spring planting is the rule and practice. Here the work will consist chiefly of the treatment of oats and barley, save in the States of Minnesota and the Dakotas, where spring wheat is the leading grain crop. With the completion of this phase of the campaign the men will return to the Southern States, where they will begin a field survey in order to determine the results of seed treatment on those farms where treated seed has this year been planted. In addition to this, observations and records will be made on the occurrence and damage wrought by the vari-

FIG. 1.—THE TWO SMUTS OF OATS.

Covered smut on the left; loose smut on the right. These two smuts, easily prevented by chemical treatment, destroy annually enough oats to feed 1,000,000 horses for the period of a year.

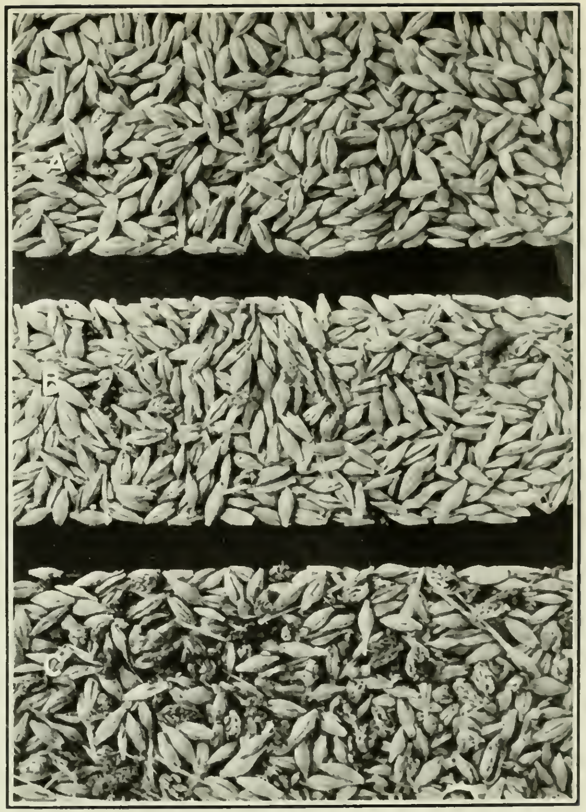

FIG. 2.—COVERED SMUT OF BARLEY.

A, Original seed, crop of 1907; *B*, result in next year's crop without seed treatment; *C*, result in third year's crop without seed treatment. The use of formaldehyde would have prevented these losses.

FIG. 1.—THE TWO KERNEL SMUTS OF SORGHUM.

Normal heads of blackhull kafir in the middle, with head of loose-kernel smut on left and head of covered-kernel smut on right. The two kernel smuts are more common in this country than is head smut of sorghum. They are known to cause as much as 25 per cent loss in some fields of the Southwest. Head smut can not be prevented by chemical treatment.

FIG. 2.—PREVENTION OF SMUT IN OATS.

Row on left planted to seed treated with cresol. Check row alongside shows a high percentage of smut. The use of formaldehyde would have resulted in an equally good percentage of control with less seed injury.

FIG. 1.—FLOWERING SPRAY OF THE COMMON BARBERRY.

The barberry, widely planted for ornamental purposes, is a secondary host of the stem rust.

FIG. 2.—RESULT OF CROSSING A RUST-RESISTANT DURUM VARIETY ON A RUST-SUSCEPTIBLE COMMON OR BREAD WHEAT.

Bread wheat of the Preston (Minn. 188) variety on the left: Female parent. Durum or macaroni wheat of Iumillo variety (C. I. 1736) on the right: Male parent. Partially resistant hybrid in middle.

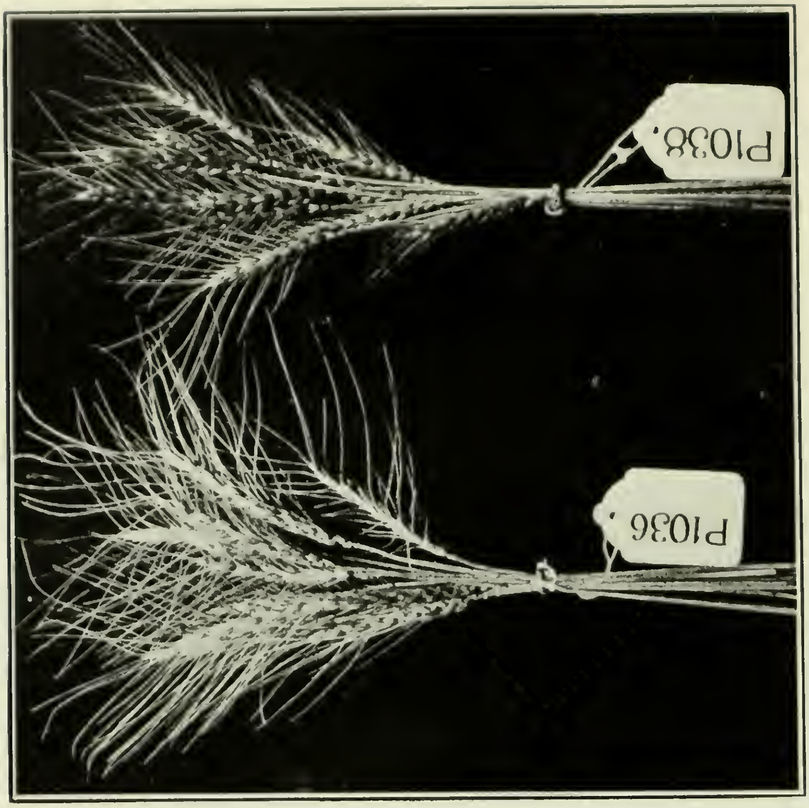

FIG. 2.—SAMPLES OF TWO RUST-SUSCEPTIBLE VARIETIES GROWN CLOSE TO THE PLAT FROM WHICH THE HEADS OF KANRED SHOWN IN FIGURE 1 WERE TAKEN.

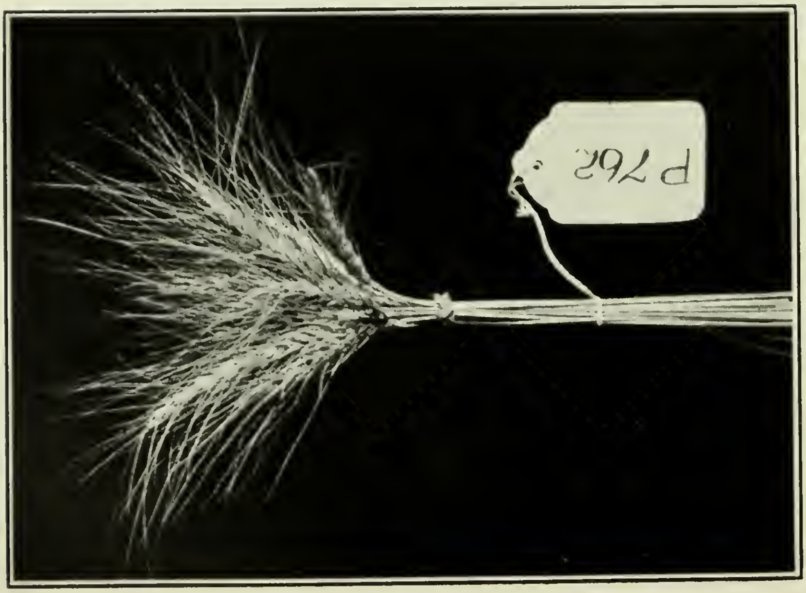

FIG. 1.—KANRED, A VARIETY BELONGING TO THE TURKEY (CRIMEAN) GROUP OF COMMON WHEAT AND POSSESSING A HIGH DEGREE OF IMMUNITY TO STEM RUST.

ous grain smuts, in order that we may the more intelligently and effectively conduct the seed-treatment campaign of 1918 in the event that provision be made for continuing the work now under way.

It would be difficult, indeed, to predict what may be the return in bushels of grain saved from smut as a net result of our cooperative effort to eliminate the enormous waste we have so long permitted—a waste of sufficient wheat to supply our allies with 4,000,000 barrels of flour, and oats enough to feed 1,100,000 horses for the period of a year. But, all things considered, if this salvage work be even 50 per cent efficient, we shall certainly not have labored in vain.

Not a little has been said and written on the subject of seed treatment according to the community-center plan; but, advisable and desirable as it may be to establish control treating plants on a community basis, it is felt that the time is not ripe for getting the thing done. Public concern must first be thoroughly aroused to the importance, yes, the necessity, of smut prevention before we shall see any general adoption of the community-center idea. That the campaign of education now being conducted by county agents and special field agents will result in a widespread demand for seed treatment can hardly be doubted; and it is not unlikely that the community-center plan will ultimately find favor as an economical and convenient system of seed disinfection. Already an occasional report comes in from this or that section of the country where part or all of the seed wheat of a neighborhood has been treated at a grain elevator, a mill, or a cooperative creamery or cheese factory, and with general satisfaction.

Loose smuts of barley and wheat are yearly destroying enough grain to purchase outright a full-rigged superdreadnaught. These smuts are controlled only by the hot-water treatment, the proper application of which is so difficult as to make it unpopular with the individual farmer. The community-treatment plan would make it easily possible to treat seed wheat and barley for the prevention of these two smuts, and if each treatment plant could be operated by a trained expert all seed could be given standard treatment according to the kind of smut. Each lot of seed when treated should be tested for germination, and the owner could then be supplied with a certificate giving information as to kind and character of treatment and percentage of germination after treatment.

CONTROL OF STEM RUST.

While it is true that all ordinary control measures, such as seed treatment, soil management, and spraying, are useless in our efforts to control the rusts, the situation is not necessarily hopeless. In certain European countries, notably Denmark, laws have been enacted compelling the eradication of the barberry (*Berberis vulgaris*), the secondary host of the common stem rust (Pl. LXXII, fig. 1). It is now a well-known fact that the enforcement of the barberry law in Denmark has actually reduced by a very considerable amount the frequency and severity of stem-rust epidemics in that country. With the Danish results as an incentive the Department of Agriculture last year initiated a barberry and stem-rust survey of the Mississippi Valley in order to obtain data on the distribution of the barberry, on the probable relation of this shrub to the occurrence of stem rust on the four common cereals, and on the distribution and number of wild-grass hosts and the relationships existing between the wild-host forms of stem rust and the cultivated cereals. In the event that we should establish the fact that the recurrence of serious stem-rust epidemics in the United States is chargeable to the presence of bridging hosts among the wild grasses and to the common barberry, a general campaign looking to the gradual elimination of these more or less useless hosts will be launched. Indeed, it should be said that already this phase of the rust survey has not been overlooked, for much has been done toward arousing effective public sentiment against the barberry in the spring-wheat States. North Dakota went so far last year as to enact a barberry law, the subsequent enforcement of which has done much to rid that State of its hedges and other barberry plantings.

RUST-RESISTANT VARIETIES.

In addition to the barberry and rust survey as a possible measure leading to some degree of control of stem rust, definite progress has been made in the development of rust-resistant varieties of wheat by breeding and selection. It is now nearly 15 years since the beginning of serious work in this country on this phase of the rust problem. During this time we have had a number of "rust" years, which have afforded opportunity to make valuable observations on the behavior of a large number of recognized varieties as well as a very numerous progeny derived from artificially crossed parent strains. Little more can be said here than that we have made a fair beginning and that the work thus far accomplished has opened a field full of promise. Recognizing the difficulties and temptations which beset the path of the plant breeder and the imperfect knowledge we have of what constitutes varietal resistance, it can still be truthfully said, generally speaking, that of the eight so-called species of wheat, but one (*Triticum durum*) shows any marked degree of rust resistance as a species. And yet we should not for a moment accept the idea that merely because a variety is a durum or macaroni wheat it is rust resistant. Many of the durum varieties show little or no resistance. On the other hand, quite recently there has been found among the common bread wheats a limited number of varieties which exhibit marked resistance to stem rust and give promise of making excellent wheats for those parts of the country to which they are best adapted.

In cooperation with the experiment stations of Minnesota, Kansas, and Tennessee, the Department of Agriculture is conducting important research work with a view to developing rust-resistant sorts of wheat which at the same time will satisfy the most rigid agronomic requirements and possess all the virtues of the best milling and baking varieties of the common bread wheats. At St. Paul, in cooperation with the Minnesota Agricultural Experiment Station, the work has been in progress since 1907 and has consisted (1) of extensive variety testing of hundreds of varieties of the several species of wheat, but more particularly of the common bread wheats and the durum sorts; and (2) crossing rust-resistant durums and emmers with the common wheats to secure rust-resistant hybrids. From the many variety tests, comprising literally hundreds of different spring sorts of bread wheats, we have yet to find a single variety in which we have the ideal combination of the desired qualities, i. e., resistance to stem rust, high yield, strength of straw, and high milling and baking quality. Only a single variety, Black Persian, shows well-defined resistance to stem rust, but it is otherwise so disappointing as to make it of inferior value for culture.

Resistance to stem rust among the durum wheats has been satisfactorily demonstrated for a number of varieties at St. Paul and elsewhere, in entire agreement with earlier observations and tests. Strains of Kubanka and Iumillo have shown a degree of resistance amounting almost to immunity, and this regardless of the field or greenhouse conditions under which we have grown them (Pl. LXXII, fig. 2). Almost equally resistant are the varieties D1 and D5 introduced into the United States by Bolley, and a variety known as Acme, selected and distributed by the South Dakota experiment station. This last-named sort has given a very good report of itself in South Dakota, but has proved somewhat disappointing when grown under more humid conditions. The variety Mindum, now being increased by the Minnesota experiment station, has given particular promise as a rust-resistant durum well suited to the more humid conditions of the country about St. Paul.

In our study of the emmers, two outstanding examples of stem-rust resistance, falling little short of immunity, have come to light. Many types of emmer are quite susceptible, but the short, vigorous, and extremely early East Indian variety known as Khapli has never, in our experience, been seriously rusted, even when grown under most severe epidemic conditions. Still more remarkable has been the behavior of a white spring emmer, Minnesota No. 1165. Rarely in this variety do rust sori develop beyond the fleck stage.

Admitting the desirability or even possibility of growing durum varieties universally throughout the area devoted to the hard spring wheats, we might find in this an easy solution of the rust problem. But, since the durum wheats are not successfully grown in the eastern and more humid portion of this area, and since the millers and bakers insist upon the production and supply of the common bread wheats, there seems at present to be no direct approach to a solution of this the most important of all the cereal-disease problems.

Coincident with the selection studies, we have sought through hybridization to produce, if possible, a new variety of wheat representing a combination of the desirable characters of the best varieties of both groups, namely, the rust resistance of the durums or emmers with the yield, adaptability, and milling and baking qualities of the common wheats. None of our emmer and common-wheat crosses has resulted in any hybrid of great promise, for the reason that thus far it has been difficult to obtain rust-resistant segregates of the common-wheat type; but from the durum and common-wheat crosses have come several exceptionally resistant forms, most of which, however, had little else to recommend them, while, from among the thousands of hybrid types produced, a few have stood out as promising embodiments of all the coveted qualities of the ideal wheat. Particularly has this been true of hybrids obtained by crossing Kubanka with Haynes and Kubanka with Preston wheat.

As has already been noted, some of these durum and common-wheat hybrids give much promise, but our ideal must be a variety equal or superior to present-day types, a combination that will meet the requirements imposed upon it by the pathologist, the farmer, the miller, and the baker. As to what may be expected to come out of the future it may be asserted, and we think correctly, that the goal has been all but reached. In fact, results thus far obtained, and those now in sight from a new and more extensive series of crosses made and to be studied intensively from the standpoint of the geneticist, make it possible to predict that within a few years there may be available for distribution to the farmers of the hard spring-wheat belt a rust-resistant, high-yielding bread wheat.

In like manner studies of winter-wheat varieties have been in progress since 1913 in cooperation with the Kansas Agricultural Experiment Station. In 1916 out of the many varieties of hard red winter wheats tested for stem-rust resistance were three, now known as Kanred P762, P1066, and P1068, which were remarkably resistant (Pl. LXXIII). More noteworthy and valuable than the mere discovery of such marked resistance to stem rust in winter varieties of common wheat is the excellent showing thus far made by this new variety Kanred. According to the agronomic records of the

Kansas station, it is the highest yielding hard wheat of that State and has met the standard set by miller and baker alike. Because of its many-sided excellence this new variety has this fall been distributed to farmers in quantities aggregating more than 8,000 bushels.

To the Kansas or Nebraska farmer, so far as concerns its resistance to stem rust, Kanred wheat is of but secondary interest. But to the plant breeder in quest of resistant sorts, without recourse to the more laborious and time-consuming durum and common-wheat route, the discovery of Kanred has heralded the dawn of a less remote victory. Kanred offers him his golden opportunity.

In cooperation with the agricultural experiment station of Tennessee it is our aim to accomplish for the Southern and Southeastern States what is being done in the spring-wheat belt and in the hard red winter-wheat section. It may be a long road we are traveling, but at the end we hope to find those varieties of wheat whose resistance to the rusts which prey upon them is so great as to make wheat production once more profitable, once more well worth while, in sections of the United States where now the rusts constitute a limiting factor.[1]

IMPORTANCE OF RACE IMPROVEMENT.

Recognizing, as we must, the vital importance of varietal improvement by breeding and selection as the one practical thoroughly tested method of controlling the rusts (pending results from the eradication of the barberry), we are equally impressed by the fact that by the same method we must finally seek to control virtually all cereal diseases.

We can ill afford at any time, and least of all in the present, to annul by neglect of any commendable farm practice the benefits derived through the development of disease-resistant varieties; but, added to this, if we are not to betray a trust and squander a precious heritage, we must avail ourselves of every known means of increasing cereal-crop production.

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[1] The writer wishes to acknowledge his appreciation of the assistance afforded him by Mr. John H. Parker and Mr. Leo M. Melchers, of the Kansas State Agricultural College, Manhattan, Kans.

In this great campaign against the enemies of our most important food plants we must present a united front, we must wage a consistent and continuous offensive; we must give more and more attention to the development of varieties of disease-resistant cereals. Then we shall have enough and to spare and shall make for better days in postwar times.

THE SEED SUPPLY OF THE NATION.

By R. A. Oakley.

Agronomist in Charge of Seed Distribution, Bureau of Plant Industry.

IN ADDITION to the thousands of tons of seed potatoes, seed sugar canes, and other vegetative planting stocks, the American farmer puts into the ground every year upward of 7,000,000 tons of seed in order to produce the prospective harvest.[1] A small but important part of this is not taken from his own crops. In normal years the matter of his seed supply gives the farmer relatively little concern. Most of it he produces and saves as an incidental routine feature of his ordinary farming operations, and the remainder he purchases from local merchants, who frequently are hardware or implement dealers handling field or garden seeds as a side line. It is only when unusual conditions obtain or when he wishes to try a new crop that he evinces any considerable interest in the seed business.

The country's seed supply is indeed of but casual interest to the layman under ordinary conditions. Since the beginning of the war in Europe, however, conditions affecting America's seed supply have departed from the normal sufficiently in many cases to stimulate a general interest in the subject, even among those who are not directly concerned with it. It is safe to say that commercial geography as it relates to agricultural products is more studied and better known by the average American to-day than ever before, and commerce in seeds has come in for its share of study. The present emergency brings very forcibly to our attention the vital necessity of a large food supply and directly, also, the importance of the seed to produce it. Furthermore, it brings to us the realization that we have not been independ-

[1] Many of the statistical data presented in this paper were furnished by the Bureau of Crop Estimates, United States Department of Agriculture. The author wishes to express his thanks for the valuable assistance rendered by that bureau in the preparation of the article.

ent of foreign countries in the matter of the seeds needed by our farmers and gardeners.

The situation growing out of the war has caused us not only to look carefully to our own seed growing as already established and to consider the production of that portion of our supply normally obtained from abroad, but also to grow for export certain seeds that we had formerly imported. The change in conditions has been rapid, and the outcome has caused considerable uncertainty in the minds of our producers, dealers, and users as to the adequacy of the supply of seeds for use at home. The market reflects this uncertainty in many instances.

The question very frequently has been asked, "Why has this country not been self-reliant so far as her seed supply is concerned?" To arrive at the answer, although not altogether a simple problem, is not particularly difficult. It was primarily for economic reasons, augmented by soil and climatic factors, and not in the main because of any great lack of business foresight on our part. Custom, and possibly horticultural prejudice likewise, has played a minor rôle. In fact, many of the seeds needed here could be produced more cheaply, and in some cases apparently more satisfactorily, abroad. Labor was cheaper in Europe and the Orient than in America, and seed production requires a relatively large amount of hand labor. The cost of transportation of seeds from the larger European markets to points east of Chicago was less than from certain of our Western States, where seeds are grown commercially, to these points. A suitable climate and the accumulated experience of skilled seed growers also favored foreign production in many cases.

At one time Europe was depended upon to furnish us with practically our entire supply of certain important seeds. Now, with the European supply unavailable, or at best to be secured only with great difficulty, the charge of shortsightedness against our seed growers for not being in a position quickly to produce seed to meet our requirements at home might appear to be warranted, but is really not justified. The case of sugar-beet seed at once comes to mind, but it should be remembered that our sugar companies have been actively investigating the possibility of domestic sugar-beet seed production for years. Horticultural prejudice has operated, and is still operating to some degree, against the domestic production of seed of certain kinds. However, such prejudice is rapidly being overcome, much to the benefit of our farmers and market gardeners.

Economic conditions and other contributing factors have brought to our farms undesirable as well as desirable seeds, seeds of low quality as well as those of high quality and, unfortunately, much potential trouble and loss in the form of noxious weed seeds and adulterants which our seed-importation laws could not entirely prevent.

SPECIALIZATION IN SEED HANDLING NECESSARY.

It would be difficult accurately to estimate the percentage of the seed used by the American farmer that passes through commercial channels. Suffice it to say that the percentage is relatively small, though the total quantity is very great, and the handling of it is so important as to have resulted in the development of extensive and rather complex commercial machinery, including in its make-up the farmer who grows seed incidentally, the commercial seed grower, both small and large, the jobber, wholesaler, and retailer. Whether or not the system is unnecessarily complex, the fact remains that on the whole it is a valuable adjunct to our agriculture. Experienced seed growers and legitimate seedsmen are highly essential to crop production. The growing of certain important seeds can not safely be left to untrained hands, and storing, cleaning, grading, and distribution can be successfully accomplished only by experienced dealers.

SEED BREEDING BY COMMERCIAL AGENCIES.

Experienced seed growers have done much in the way of maintaining and developing improved varieties of crop plants. In this, it is true, they have followed "rule-of-thumb" methods to a very large degree, but it is safe to say their total accomplishment in crop improvement is greater than that of the technical plant breeder. With few exceptions, horticultural varieties of garden vegetables or truck crops are directly attributable to the efforts of enterprising seed-growing seedsmen. It is with this class of crops that seed growers have done their best work in plant breeding, prob-

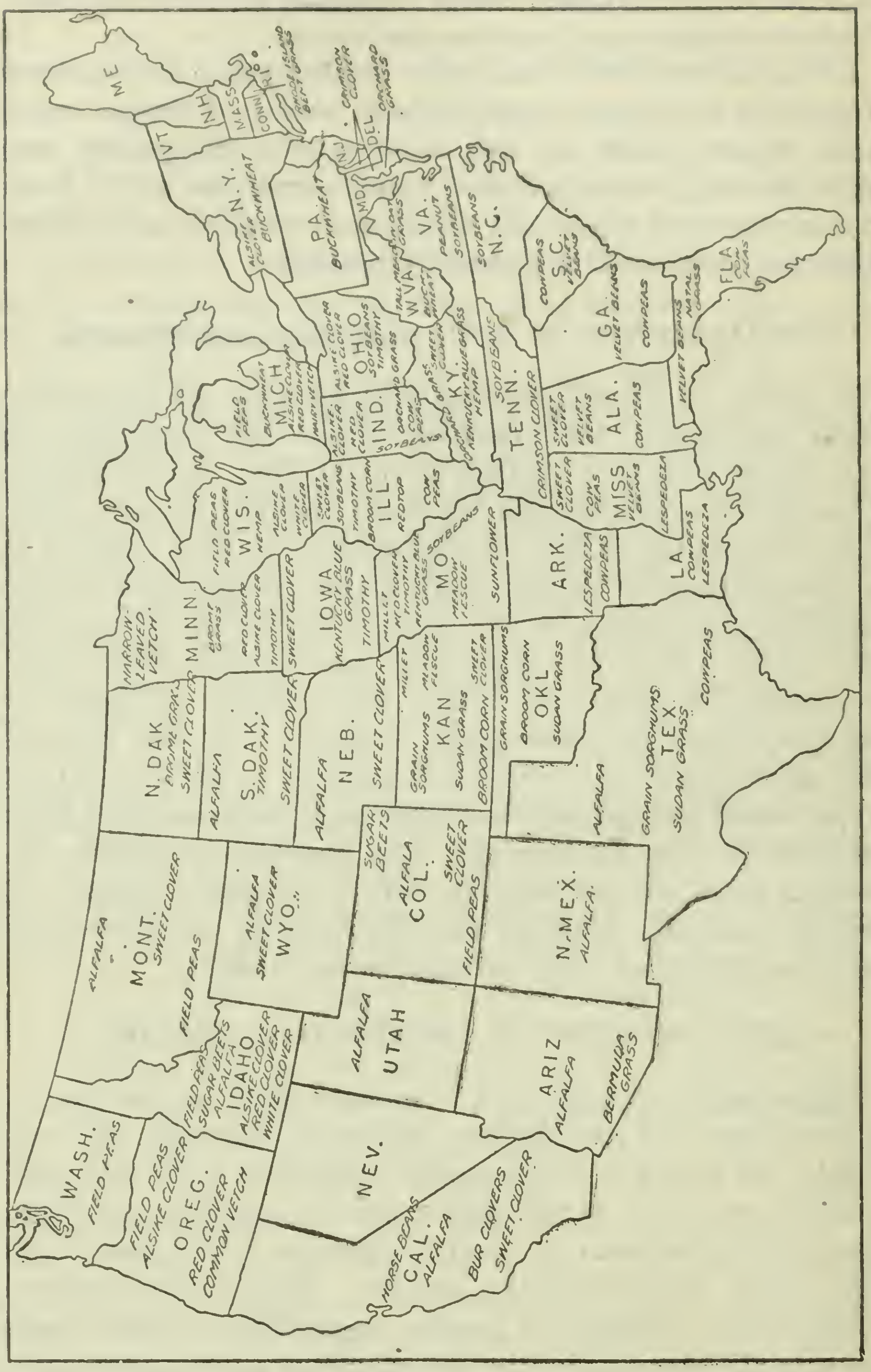


FIG. 13.—Map of the United States, indicating special sections where field seeds are produced commercially.

ably because these crops are more susceptible to improvement than the common field crops and the margin of profit in handling seed of them has made their improvement economically possible. Seedsmen have done much in establishing improved varieties or strains of our common farm crops, but with the advent of modern technical plant breeders attached to Government and State institutions, this has been left very largely to them, which is as it should be. The cost incident to the development of improved strains of such crops is relatively so great that individual seedsmen are scarcely warranted in undertaking the work, since immediately their improved strains are released to the public these seedsmen have a very slight, if any, advantage over competitors in their sale. With improved varieties of vegetables, the case is somewhat different. Seedsmen can control the stock seed supply of these for a sufficiently long period to establish a special trade and consequently gain a very considerable financial advantage. It has come very generally to be recognized that it is the proper function of the Federal Department of Agriculture and the State agricultural experiment stations to bear the great burden of plant breeding.

PURE-SEED LAWS.

Of the 48 States, 27 now have seed-control laws, more or less satisfactorily and efficiently administered. These laws aim primarily to prevent misbranding and the sale of adulterated and poorly viable seed; likewise to prevent the sale of seed containing noxious weed seeds or a high percentage of any weed seeds. There is no national pure-seed law, but authority is given the Secretary of Agriculture to investigate and publish the names of dealers selling misbranded or adulterated seeds of grasses, clover, or alfalfa. In 1912 Congress passed the Seed-Importation Act, which was intended "to regulate foreign commerce by prohibiting the admission into the United States of certain adulterated grains and seeds unfit for seeding purposes." This law has corrected many of the bad practices engaged in by importers. It is a very helpful piece of legislation.

In May, 1917, the Secretary of Agriculture requested the seedsmen of the country to supply certain important information with all packages of field seeds weighing 10 pounds

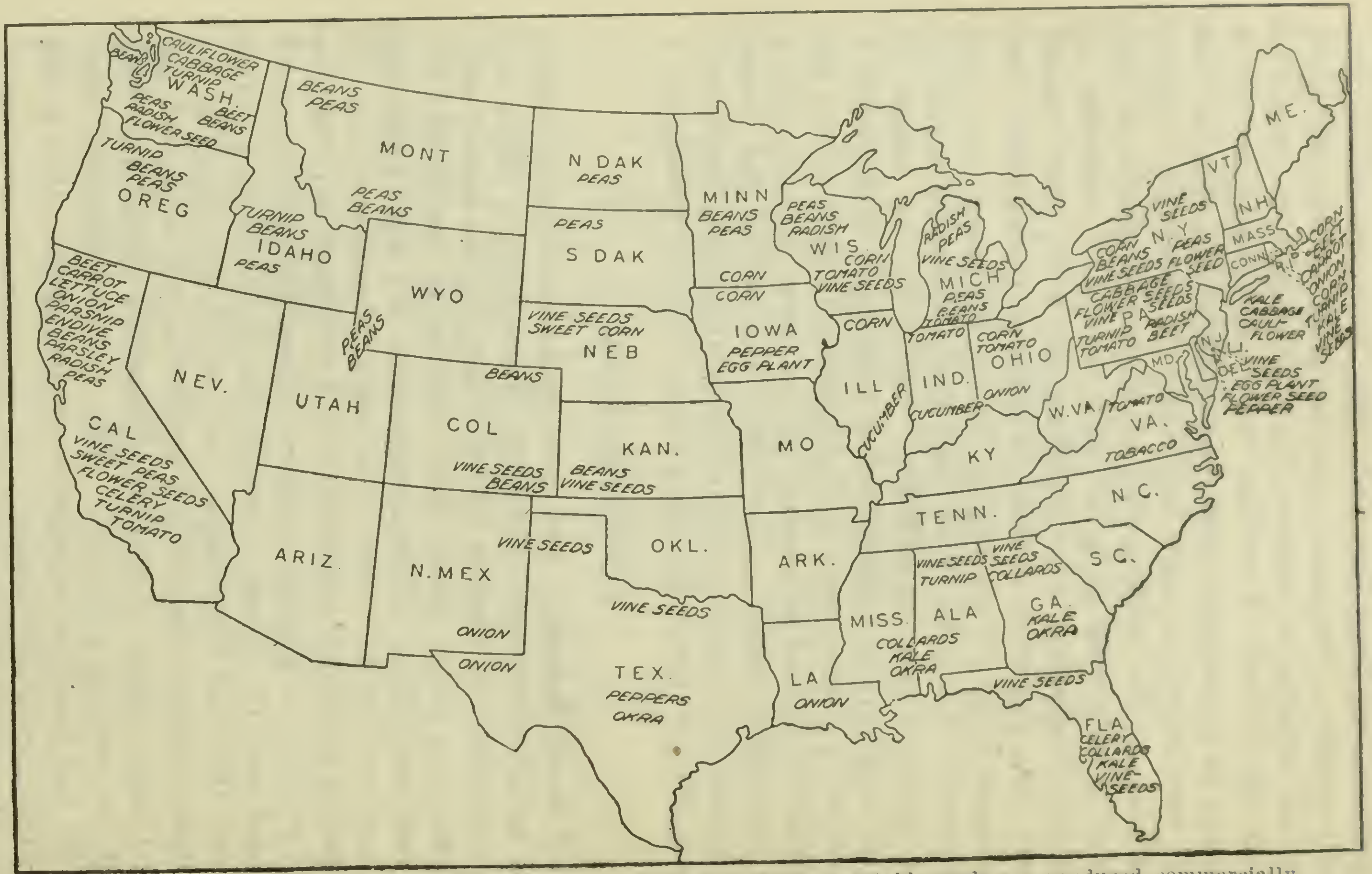


Fig. 14.—Map of the United States, indicating special sections where vegetable seeds are produced commercially.

or more. This they assented to, and after conference with representatives of the Department of Agriculture, they agreed to label their packages with: (1) Name of seedsman, (2) kind of seed, (3) proportion of pure live seed present, with month and year of germination test, and (4) country or locality of origin in the case of the following imported seeds: Beans, soy beans, Turkestan alfalfa, and red clover from southern Europe and Chile.

This was a long step in the right direction, and seedsmen are to be commended for the attitude they have taken toward it, but the education of the American farmer to know and appreciate the value of good seed will accomplish more in improving the quality of commercial seed than the best of seed laws. He will then demand a higher quality of seed when purchasing and will use more intelligent methods in growing, harvesting, storing, and cleaning the stocks he produces for his own use.

SEED GROWING SPECIALIZED IN CERTAIN SECTIONS.

Very largely for the same reasons that we, as a nation, in normal times draw upon other countries for our seed supply, we have encouraged the development of more or less specialized commercial seed-growing sections in this country. However, the reasons have not quite the same relative importance.

A glance at the accompanying maps (figs. 13 and 14) shows some of the important commercial seed-growing sections of the United States. California, it will be noted, is preeminently a State of vegetable-seed production, and only in scattered sections west of the hundredth meridian is alfalfa seed produced on a commercial scale. Climate in both cases is largely accountable. The maps show also where other seeds are grown commercially. The reasons why they are produced in their respective sections will be discussed briefly in certain cases. It may be stated, however, that so far as natural conditions are concerned, the possibilities of commercial seed growing in the United States have been only slightly developed and that when the economics of the case warrant, the industry in its many features will find ample room for expansion.

While climate and soil have had much to do with determining commercial seed-growing sections, custom and economic factors have combined to determine market centers. For example, Toledo has long enjoyed the distinction of being the market center for clover seed. Custom, probably more than all other factors together, is responsible for this distinction. Other, although probably less striking, examples of market centers might be cited.

CEREAL SEEDS.

For almost obvious reasons, the farmer to a very large degree is his own seedsman so far as his supply of cereal seeds is concerned; in fact, the percentage of seed of this great group of crops that is handled by any part of the seed-trade machinery is very small indeed. Cereal crops are grown primarily for their seed, and it is relatively an easy matter for each farmer to reserve a small portion of his harvest for future sowing.

WHEAT.

The most important of all bread grains is wheat, yet it is the least important from a seedsman's standpoint. With the exception of a very small quantity imported from Canada, the seed supply is produced at home. It is estimated that 72,082,000 bushels of seed wheat were required to sow the 52,785,000 acres for the 1917 harvest. This estimate is based on the average of 1.37 bushels of seed per acre. In the winter of 1916–17, an unusually heavy killing of winter wheat occurred, resulting in a large reduction and even a total loss of acreage in many important wheat-growing sections. This condition was followed by severe drought over a vast area of the Great Plains spring-wheat belt, which destroyed much of the crop in many places. These conditions, coming as they did when maximum production was essential to the Nation and to those across the sea dependent upon us for food, combined to make the seed-wheat problem for the 1918 harvest probably more serious than it has ever been in the history of the country.

Appreciating the necessity of securing the sowing of a large acreage of winter wheat in the fall of 1917, the Secretary of Agriculture urged the various States in which this crop is grown to increase their acreages in accordance with a maturely considered program of production. On the outskirts of the winter-wheat area this involved the sowing of wheat by farmers who had never sown it before, and it meant seeding in as large a measure as possible in the sections that had just previously sustained severe loss by winterkilling. When it came to seeding the large acreage recommended by the department, it was found that the question of seed in the winterkilled area and the outer zones was of vital importance. Under these abnormal conditions the commercial agencies played a larger part in furnishing seed wheat than ever before. Recognized seedsmen, grain dealers, and other commercial agencies were called upon to assist to the fullest extent possible. Although a very large acreage was sown in the fall of 1917, it fell short of the mark set by the department's program. This was especially true in the sections where the previous sowings were winterkilled and in those where wheat was comparatively a new crop. Difficulty in getting seed, and also the high price at which seed was held, played a large part in the failure to sow the desired acreage.

In the drought-stricken portions of the spring-wheat belt special efforts have been made to insure an adequate supply of seed wheat for sowing in the spring of 1918. Grain dealers were enlisted in this campaign, and a three-sided cooperation was established between the United States Food Administration Grain Corporation, the Department of Agriculture, and the elevator and warehouse men, which resulted in the inspection and storage of seed wheat in local elevators and warehouses in sufficient quantities to supply the farmers whose previous crops had failed. The Grain Corporation permitted the holding of wheat that the Department, upon inspection, found to be suitable for seed, but specified that the price at which it could be sold should not be more than 15 per cent in excess of the purchase price, based on the Food Administration's price for No. 1 Northern wheat. The plan had the advantage, so far as the farmer was concerned, of making available a supply of inspected seed at a fair price. Certainly not in recent years has the seed wheat supply of the Nation received so much attention. Fortunately, varieties of wheat in the main have a rather wide range of adaptation, which permits dealers with comparatively little experience to handle them in a fairly satisfactory manner.

RYE.

As a bread grain, rye is practically interchangeable with wheat, especially so far as the European demand is concerned. It is estimated that it required 4,367,000 bushels of seed rye to sow the 3,096,000 acres put out for the 1917 grain harvest. This was based on the average seeding rate of 1.41 bushels per acre. A smaller percentage of the rye sown is harvested for grain than of wheat, much of it being grown for forage and green manuring; therefore it is a relatively more important item of the seedman's trade.

In the program of production formulated by the Secretary of Agriculture rye was considered in conjunction with wheat, and the sowing of an increased acreage over the 1916 seeding was advocated. It developed that the lack of seed rye in the Eastern, Southern, and Pacific Northwestern States was a material handicap to attaining the desired acreage. In these States seedsmen and grain dealers were called upon to a greater extent than is customary to furnish farmers with seed, but the supply of seed of adapted varieties was not sufficient, or at least not sufficiently available, to meet the demands; consequently the acreage fell short of expectations in these States. In the other rye-producing States, generally speaking, the supply was adequate and with some to spare, so that for the country as a whole a very large acreage was seeded.

The rye grown in this country is mostly winter rye, and practically no seed of it is imported. Its varieties and strains are not as wide in their range of adaptation as those of wheat; therefore more care is required in the commercial handling of the seed.

BARLEY.

Only in North Dakota, Minnesota, California, South Dakota, and Wisconsin can barley be called an important grain crop. These five States contain more than five-sevenths of the total area of barley in the United States. At the average rate of seeding of 1.80 bushels per acre, it required

13,819,000 bushels of seed to sow the 7,647,000 acres for the 1917 harvest of grain. Although of considerable importance as a hay crop, the farmers utilizing barley for this purpose also harvest a part of their crops for grain; consequently they provide to a very large extent their own seed supply. Improved varieties of barley have been developed and introduced in this country within recent years, and seedsmen have assisted materially in their dissemination.

OATS.

The acreage of oats sown in this country annually is very large, and more bushels, although fewer pounds, of seed are required to sow it than to sow our entire wheat acreage. For the 1917 harvest of grain, it is estimated that 41,539,000 acres of oats were sown, which, at the average rate of seeding of 2.33 bushels per acre, required 96,641,000 bushels of seed. In the spring-oats belt proper very little seed oats is handled by seedsmen or grain dealers, but in the South, where the winter-oats acreage is rapidly being extended, commercial agencies do quite a volume of business in seed. This was especially true of the fall planting of 1917, which followed a season of severe winterkilling and the consequent heavy loss of acreage. Many sections lost their winter-oats crop almost completely, which necessitated the bringing of seed from localities where adapted varieties could be had.

At least 85 per cent of the oats grown in this country is of the spring varieties, and all but an insignificant proportion of the seed is home grown. Rarely, if ever, does the oat crop present a really serious seed problem so far as available supplies are concerned.

RICE.

The Southern States and California comprise the rice-growing areas of this country. Rice is grown solely as a grain crop, and largely because of this the seed trade proper handles but a small proportion of the seed that is used. Approximately 870,000 acres of rice were sown in 1916, which, at the average seeding rate of 80 pounds per acre, required about 1,546,000 bushels of seed. There is, of course, good seed and poor seed of rice, but no serious problem is involved so far as the adequacy of the supply is concerned. Practically no seed rice is imported, and when the farmer does not have enough for his own needs he has no difficulty in filling his requirement from the mills or warehouses.

BUCKWHEAT.

There are only five States that normally sow more than 20,000 acres of buckwheat for grain, and the total area sown for this purpose in the United States in 1916 was only 845,000 acres. Of this acreage, more than 60 per cent was in New York and Pennsylvania. In 1917 the area sown for grain was estimated at 1,000,000 acres, which required approximately 1,000,000 bushels of seed, since the average rate of sowing is one bushel per acre. Inasmuch as buckwheat is grown as a green-manure crop, as well as for grain, a fair proportion of the seed is handled by the seed trade, much larger, in fact, than is the case with the other cereals. The trade is called upon especially to supply farmers outside of New York and Pennsylvania. There is a good demand for buckwheat for milling purposes. Buckwheat flour is a minor, but desirable, article of human diet. There is also a good export demand for the grain, especially from Holland and Scandinavian countries. Buckwheat hulls are used extensively as a packing for Dutch bulbs. Occasionally these demands for buckwheat threaten the American farmers' seed supply. Such was the case in the spring of 1917, when it became necessary to check exports to Europe and to urge millers to release a considerable quantity from their stocks for seeding purposes.

CORN.

Although ranking below wheat as a breadstuff, corn stands alone as a cereal from the standpoint of money value and size of crop. More attention is given to the seed of this crop than to that of any other. It represents the only case where annual seed selection is the rule and not the exception. In 1917 approximately 121,045,000 acres of corn were planted in the United States, for which nearly 20,000,000 bushels of seed were required. Some form of selection, although in a majority of cases not a very rigid one, was practiced with nearly every bushel of this seed, and the selection was made, for the most part, by the farmer himself.

In the aggregate much seed corn is handled by seedsmen, but in proportion to the entire quantity used the total is very small. In the northernmost part of the corn belt, where the crop matures with a considerable degree of uncertainty and where a rather large proportion of that grown is utilized for silage, seedsmen are called upon to supply a relatively large quantity of seed; but in the corn belt proper the farmers select and cure or get from their neighbors most of the seed required for their own crops.

To select, store, and test seed corn properly requires a considerable degree of skill, and effort in this direction is well expended, as the ratio of the cost of seed per acre to the value of the crop is very small. This fact has made it possible to develop a few large commercial seed-corn concerns in the very heart of the corn belt. These concerns are examples of what can be accomplished in this enterprise. One thing that has militated against the handling of seed corn by seedsmen is the fact that varieties or strains are decidedly local in their adaptation. The farmer, in his endeavor to get high-yielding strains of corn, has selected large ears for seed. Large ears are generally correlated with lateness of maturity, and therefore he has, for the most part unconsciously, developed late-maturing strains. This fact doubtless contributed to the gravity of the seed-corn situation caused by the early freezes and subsequent unfavorable curing weather in the fall of 1917, making the condition of the seed supply for the 1918 crop very serious. The new crop was badly damaged by frost, and the carry-over of old corn was very small. In situations of this kind, the efforts of every seed-saving agency are necessary to provide the required supply. At the time of writing the effect on the 1918 acreage of the serious seed-corn situation can not be fully estimated.

FORAGE-CROP SEEDS.

In the very nature of things, hay, fodder, and pasture crops, broadly speaking, are not seed crops. With very few exceptions they are utilized before they are mature, and in the cases where they are harvested after the maturity of their seed they are usually fed in their entirety to live stock. Seed of forage crops, therefore, is not locally produced to anything like the extent of that of cereals. In a very large measure seed of forage crops could be grown on the farms where needed, and in some cases very profitably, but in the case of certain important crops seed can be produced only in restricted areas and under suitable climatic and soil conditions. Alfalfa is a good example of this. The crop is now grown quite abundantly east of the hundredth meridian, but only in very limited areas in the humid region does seed set in quantity sufficient to make its harvesting a commercial possibility. The saving of seed of forage crops must be, for the most part, a definite and not an incidental feature of farm work, which is also a reason why the seed trade is called upon to handle much of the nation's supply.

GRASS SEEDS.

Tame hay and pasture grasses are grown practically on every general farm where soil and climate permit. Grass crops are considered almost indispensable to a permanent system of agriculture, and on most of the farms which grow them some seed is sown each year. With few exceptions these grasses are good seed producers, setting seed abundantly under a wide range of conditions, but notwithstanding this, the commercial production of their seed, to a considerable degree, has been localized. Soil and climate have been important factors, but custom, regardless of economic conditions, likewise has been instrumental in determining the localities.

TIMOTHY.

No recent statistics are available on the acreage of timothy, America's greatest cultivated hay grass, but those of 1909 indicate that there were at that time nearly 15,000,000 acres of this grass grown alone and nearly 20,000,000 acres of it grown in mixtures with clovers. It is therefore reasonable to assume that over 200,000,000 pounds of timothy seed are sown annually by our farmers. In almost all parts of the region generally outlined as east of the ninety-sixth meridian and north of Tennessee, it seeds abundantly in average seasons, but as the map (fig. 13) indicates, the commercial production of seed in the main is fairly well localized. More timothy seed is grown in this country than is needed for our own seedings. Our exports for the fiscal year 1916 were approximately 13,500,000 pounds, and the quantity of seed harvested annually is limited only by economic factors.

The production of timothy seed bears such a peculiar relation to the price of timothy hay that the supply does not adjust itself quickly to the demands. This is responsible many times for the wide fluctuations in the price of seed. When the price of hay is high, there is a strong tendency to harvest more of the crop for hay and less for seed. This, coupled with the tendency to increase the acreage in the succeeding season materially advances the price of seed. Timothy seed is harvested and thrashed by ordinary farm machinery. In some sections, notably in Iowa, where commercial seed production is well developed, special methods of harvesting are practiced, as, for example, heading, which has many advantages. This method permits the harvesting of a fair crop of hay after the seed crop has been removed (Pl. LXXIV, fig. 1). No varieties of timothy have as yet been commercialized, although there are very good prospects that some will be in the near future. While of great importance to American agriculture, there is no cause for fear regarding the adequacy of our supply of timothy seed.

REDTOP.

Although it does not compare with timothy in importance, redtop is, nevertheless, a very valuable hay and pasture grass. It is especially valuable on wet and so-called sour soils. The redtop and alsike-clover mixture is a popular one, and the redtop-clover-timothy mixture is also extensively used, especially in the Northeast. Redtop is a common constituent of lawn and turf grass mixtures, and the quantity sown for all purposes in this country is very large. Probably 95 per cent of commercial redtop seed is produced in Wayne, Edward, Richland, Marion, and Jefferson Counties in south-central Illinois. In these counties it is a staple money crop which requires no special farm machinery to harvest or special skill to produce. Some years ago seed in the chaff was sold by the seed trade, but of late years the market demand is for fancy or recleaned seed. Redtop has been used extensively as an adulterant of the seed of the fine bent-grasses, to which it is closely related, but with perfected methods of identification this practice must soon come to an end. The country's supply of redtop seed may be said to be sufficient.

KENTUCKY AND CANADA BLUEGRASSES.

The commercial production of Kentucky bluegrass seed is confined principally to a few counties in Kentucky, Missouri, and Iowa, the most important section being in Kentucky surrounding Winchester, Paris, and Lexington. Limestone soils are largely responsible for defining these sections, as it is only upon such soil that this grass yields a profitable crop of seed. There are several places in the East where Kentucky bluegrass produces seed abundantly, but where it is not harvested commercially. The peculiar nature of the seed makes necessary its harvesting, curing, and thrashing by special methods and equipment. This and custom have had much to do with limiting and localizing commercial seed production. When the seed is mature, it is harvested by horse-drawn seed strippers and piled in long windrows for curing (Pl. LXXIV, fig. 2). When thoroughly dry, it is thrashed by a specially constructed machine having a cylinder which revolves in a close-fitting sleeve. Improper curing is responsible for the low vitality of much of the seed that is on the market. If stored as it should be, seed that is a year old will germinate better than new seed. We export considerable quantities of seed annually.

In the past, seed of Canada bluegrass was used extensively to adulterate Kentucky bluegrass seed, but this practice has largely been discontinued. A considerable quantity of seed of Canada bluegrass is used in this country every year, and practically all of it comes from southern Ontario. The character which makes special machinery necessary for the harvesting of Kentucky bluegrass seed is absent in the case of Canada bluegrass; therefore the ordinary mower, rake, and thrasher are used satisfactorily. The demand for the seed of this grass falls short of the possible supply.

ORCHARD GRASS.

Kentucky, Indiana, Ohio, Virginia, West Virginia, and Tennessee supply the greater part of the orchard-grass seed used in the United States. Jefferson, Oldham, and Shelby Counties in Kentucky and Clark and adjoining counties in Indiana are the most important commercial seed sections No difficulties attend the harvesting of orchard-grass seed, and no particular experience is required to handle it on the farm. In past years, rather large quantities of seed were imported from New Zealand, but the strain of orchard grass grown in that country is inferior to our own, and imported seed is discriminated against on our markets.

OTHER GRASSES.

At one time the commercial production of meadow-fescue seed was quite an important industry in eastern Kansas and western Missouri, but in recent years it has declined perceptibly, owing largely to the falling off of home demands. Considerable quantities are still grown, but mostly for export to Europe, where it is used as a constituent of pasture and meadow mixtures. Meadow fescue can scarcely be said to be a very important grass in this country.

Almost all the seed of Italian and perennial rye-grass used by us is imported from Europe. At present, however, seed of a variety of Italian rye-grass is imported in liberal quantities from Argentina. Our normal requirements of both species aggregate about 2,500,000 pounds of seed. These grasses are used in meadow and pasture mixtures and also in turf-grass mixtures. While valuable grasses, no concern is occasioned by the fact that we do not produce our own seed supply.

In mixtures which include orchard grass, tall meadow oat-grass is used principally in the Piedmont sections of the Southern States. Seed of it is grown mostly in Virginia, West Virginia, North Carolina, and Tennessee, but as a commercial commodity it is relatively unimportant.

A few years ago, brome-grass (*Bromus inermis*) promised to be a valuable hay and pasture grass in the Northern States, especially in the Great Plains region and the Pacific Northwest. It has fallen so far short of expectations that at the present time it is only of very minor importance. Some seed is produced in the Dakotas and Minnesota, but most of our supply is imported now, principally from Canada, since European seed is not readily available.

In proportion to the importance of Bermuda grass, there is little seed used in this country. The grass propagates itself so readily by stolons and rootstocks that vegetative propagation in most cases is more economical than seeding. In the Southern States, where it is so abundant, Bermuda-grass seed is not produced commercially. Prior to a very few years ago, our seed supply was secured from Australia, but now it is produced at home, chiefly in southwestern Arizona. In the Southwest, Bermuda grass sets seed abundantly, and the quality is superior to that of the commercial Australian-grown seed. By developing our own source of supply we not only obtain better seed, but also cheaper seed.

Rhodes grass, another southern grass, is increasing slowly in importance. It is limited in its area by its inability to withstand low temperatures. This confines it as a perennial principally to Florida and the immediate Gulf coast region. There is a fair demand for seed of this species, but none is produced commercially here. Our supply comes almost exclusively from Australia.

Natal grass is a warm-climate hay grass which as yet is of limited importance here. It has proved promising in Florida, and the commercial seed supply is practically all produced there.

SORGHUMS.

It has often been said that the sorghums are the backbone of the dry-land agriculture in the southern half of the Great Plains region. This is especially true of the grain sorghums, although the sweet sorghums and Sudan grass contribute no small amount to the cultivated forage supply in that region.

Kafir, feterita, and milo are the most important grain sorghums, and the leading States in their production are Kansas, Oklahoma, and Texas. On account of the relatively long season required for their maturity, the grain-sorghum area does not extend much north of southern Nebraska, although the kaoliangs, a less important group, are attracting considerable attention in South Dakota. Generally speaking, milo is the popular variety of grain sorghum in northwestern Kansas, western Oklahoma, and the Panhandle of Texas, because it matures more quickly than kafir and can be grown at higher altitudes. The Dwarf variety is the one most commonly used. The kafirs are largely grown in central Kansas and Oklahoma. Of the three common varieties, Blackhull, Red, and Pink, the first mentioned is the most popular, and the dwarf strain of it is rapidly coming into use. Feterita is a relatively short-seasoned grain sorghum, and will produce a crop with less moisture than kafir or milo, but is not as productive in normal seasons.

Only about 3 pounds of good seed of the grain sorghums are required to plant an acre, but since much of the seed used is of low vitality the optimum rate is more nearly 5 pounds. On this basis approximately 25,000,000 pounds, or 450,000 bushels, of seed are necessary to plant our annual acreage. The seed is easily harvested (Pl. LXXV, fig. 1), but seedsmen and grain dealers are called upon to supply a fairly large part of the seed needed, as much of the crop is fed, without thrashing, to live stock on the farm. Ordinarily the supply of seed is adequate for the country's needs, the only problem being to get it free from mixtures and to store it in such a way that it will not heat.

In the spring of 1917 the demand for the seed of grain sorghums for feed and for the making of alcohol and yeast threatened to curtail the supply for planting purposes, but a little attention to the conservation and distribution of the available seed resulted in supplying enough for planting a very large acreage. In the summer of 1917 serious droughts covered a large area in Texas and also affected parts of Oklahoma and Kansas. These, together with early frosts, greatly reduced the total yield of good seed. As a result, care to prevent too much of it from being fed and precaution in storing that needed for planting in 1918 were necessary.

Sweet sorghums are grown principally in the Southwestern States, in the central and southern Great Plains, and to a limited extent in the upper Mississippi Valley. The acreage of the crop can not be definitely stated, but in the aggregate it is very large. Since the seed of sweet sorghums is not used to any extent for feed or for industrial purposes, rarely more than enough for planting is harvested. This is particularly true of some of the better sirup varieties. The demand for sugar substitutes suggests that efforts should be made to conserve the seed supply, which it is believed will be enough, if properly distributed, for planting a considerably increased acreage.

The rapidity with which Sudan grass attained a place among the staple forage crops of this country is little less than phenomenal. This grass is now grown extensively in the South and the southern half of the Great Plains. On account of its close resemblance to Johnson grass, a near relative, it was feared that prejudice would militate against its use. To overcome the danger of disseminating Johnson-grass seed by means of Sudan-grass seed, the growing of the latter north of the Johnson-grass territory was recommended, but the trouble was soon overcome; in reality, it failed to materialize to anything like the extent anticipated, ley in southeastern Colorado. Speculation in Sudan-grass seed in the North has never been extensively practiced. The bulk of commercial Sudan-grass seed comes from northern Texas, Oklahoma, southern Kansas, and the Arkansas Valley in southeastern Colorado. Speculation in Sudan-grass seed, coupled with the fact that the crop is still a very new one, has prevented the seed supply from attaining a proper equilibrium. Just now, it does not seem to be quite sufficient for the demand. About the time that Sudan grass was introduced, the demand for Johnson-grass seed was increasing quite rapidly, but when the former got well established, the demand for the latter diminished rather than developed.

MILLETS.

The foxtail millets are the only important ones in the United States. They are widely grown, but can scarcely be said to be popular crops. The area devoted to millets in 1909 was approximately 1,200,000 acres, and there has been very little increase since that time. Our annual seed requirements are probably not more than 25,000,000 pounds, all of which is home grown. Large quantities of seed are imported from the Orient, but they are mostly used in poultry and other feeds. Kansas, Missouri, Texas, Nebraska, North Dakota, Tennessee, and Oklahoma produce most of our seed of the common, German, and Hungarian varieties. Seed of the Siberian variety and the Kursk, an improved strain selected from it, are grown in the northern part of the Great Plains region. At this time the supply of seed of the common, Siberian, and Kursk millets is not abundant.

LEGUME SEED SUPPLY HIGHLY IMPORTANT.

Nearly every system of permanent agriculture has one or more leguminous crops in its foundation. Not all include legumes to the extent that red clover is included in the cropping systems of our Northern States, but some legumes find their way, sooner or later, to a majority of our American farms. Legume seeds, as a class, are the highest priced forage-crop seeds, since many of them are in demand as feeds, while those that are not are relatively costly to produce.

A rather large part of the value of some legumes is derived incidentally from their effect on subsequent crops. Clovers might be cited as good examples of this, and we are now obtaining a measure of what the farmer thinks such legumes are worth for their soil-improving qualities under the present scale of values by the constant increase in the price of seed. For example, as the price of crimson-clover seed approached 18 cents per pound in the summer of 1917, farmers began to drop out of the market. When it reached 20 cents per pound, sales fell off materially, and at 22 cents per pound only a relatively small quantity of seed was sold. Red clover is now being put to the same test. Some of the most important legume seeds can be produced commercially only in restricted areas. In the main, it may be said that a large part of the supply is handled by some branch of the seed trade.

RED CLOVER.

An immense quantity of red-clover seed, including the Mammoth variety, is sown annually in this country, probably at least 120,000,000 pounds, not all of which is produced at home. From July 1, 1915, to June 30, 1916, 32,508,537 pounds of red-clover seed were imported, but for the corresponding period a year later, only 5,343,600 pounds came from foreign sources. We export, as well as import, red-clover seed. In the summer of 1917 England contracted heavily for seed here, because the crop prospects there were not good. France, which normally supplies us some seed, likewise placed contracts in this country. This extra demand on our own none too heavy crop, coming at a time when the Russian supply was not available to us, produced a wholesale price of $19.80 per bushel for red-clover seed in January, 1918. The important foreign supplies of seed that are available in normal times are those of Chile, Russia, Italy, and France. Seed from Chile usually contains seed of a noxious species of dodder and is therefore undesirable. The Italian-grown seed produces plants that lack hardiness in our red-clover area. Russian and French red-clover seed are both desirable.

Ohio, Indiana, Michigan, Wisconsin, and Idaho produce the bulk of our red-clover seed, and Toledo is considered the center of our red-clover seed market. It is practically the only city in the United States where futures in this commodity are dealt in.

The only special machinery needed in the producing of red-clover seed is a huller, which, in fact, is a thrasher with a modified cylinder and concaves. Some apprehension is felt as to our supply of seed for the 1918 seeding and also regarding the effect of the high price of seed on the acreage sown, and this apprehension would seem to be well founded.

ALSIKE CLOVER.

In many places where red clover can not be grown successfully, alsike clover has been found to succeed admirably. Particularly is this true on wet and sour soils. Its seed, therefore, is usually in good demand. In 1909 over 6,500,000 pounds of alsike-clover seed were required in this country for seeding purposes, and the crop has increased materially in its area since then. From July 1, 1915, to June 30, 1916, 1,113,464 pounds of seed were imported, chiefly from Canada. This was increased to 4,329,000 pounds a year later, but from July 1 to November 30, 1917, only 811,200 pounds were permitted entry. That is practically one-half the quantity entered for the corresponding period of the previous year. Most of our home-grown alsike-clover seed comes from Indiana, Michigan, New York, Wisconsin, and Idaho. It is handled in much the same way as red-clover seed (Pl. LXXV, fig. 2), and the price keeps rather a close second with it, the price of alsike-clover seed in December, 1917, being $15 per bushel. While alsike clover can be substituted for red clover in many places, the supply of seed for 1918 is not large enough to afford much relief in connection with the red-clover seed shortage.

OTHER CLOVERS.

As a winter-growing annual soil-improving crop, crimson clover holds high rank along the Atlantic coast from New York to Florida. Its area, however, does not extend far back from the coast. In 1909 it was estimated that there were sown in this country annually nearly 11,000,000 pounds of seed of this species. Since that time, and even prior to the present war, our seed requirements have increased greatly.

A considerable quantity of crimson-clover seed is grown in Delaware, Maryland, Virginia, North Carolina, and South Carolina, but it has been found necessary to import from Europe a relatively large percentage of what is needed. For the fiscal year 1916 our imports were 4,505,893 pounds, and for the fiscal year 1917 they were 5,776,300 pounds. France furnished us with most of our imported seed. The crop of 1917 in that country was scarcely more than enough for home demands, so recent imports from France have fallen off heavily. The high price of seed in Europe and the cost of laying it down in this country have caused very high prices here; so high, in fact, that farmers are seeking other means of maintaining their soil fertility.

Crimson-clover seed is best harvested with a stripper, similar to the type used for harvesting Kentucky-bluegrass seed. Most of the home-grown seed that finds its way into the trade is thrashed with a huller, but much of that gathered by farmers for their own use and for the use of their neighbors is not thrashed, but sown in the chaff.

In every bluegrass pasture white clover is a more or less important grazing plant. It is also found abundantly in bluegrass lawns and turf areas, but compared with its extensive use little seed is required annually. It is probable that not more than 1,000,000 pounds of white-clover seed are sown each year, and of this quantity approximately 150,000 pounds are imported from Canada. The States that produce most of our white-clover seed are Wisconsin, Idaho, and Louisiana. Louisiana is an important, but relatively recent, source of supply. Seed coming from the Northern States is obtained largely as a by-product from the harvesting of other seeds.

The bur clovers are used principally as cover crops. The areas where they are grown in this country are California and the Southern States. The common species used in the South is known as southern bur clover (*Medicago arabica*). For the cotton belt it is superior to the common California bur clover (*Medicago denticulata*). It is estimated that 2,500,000 pounds of bur clover, both hulled and in the bur, were sown in this country in 1909, but appreciably more seed is now required. North Carolina, South Carolina, Georgia, Alabama, and Mississippi produce most of the bur-clover seed for the South, and a large percentage is sown without hulling. It is harvested mostly in a crude manner by raking or sweeping the fields after the plants are fully matured. By this method much trash is collected with the burs. California-grown bur-clover seed is put on the market hulled. Practically no seed of bur clover is now imported.

Louisiana and Mississippi furnish most of our commercial lespedeza, or Japan clover, seed. Baton Rouge is the center of production in Louisiana, and the Delta region of Mississippi is the principal seed-producing section of that State. Other sections of the South could produce this seed, as the plants set seed abundantly in the region to which lespedeza is adapted. This crop has increased much in popularity since the census of 1910, at which time it was estimated that only 4,000,000 pounds of seed were sown annually. Harvesting seed can best be done by means of a mowing machine fitted with a pan to catch the seed as it shatters from the plant.

MELILOTUS, OR SWEET CLOVER.

There are two species of Melilotus, or sweet clover, that are becoming important as cultivated crops in this country, namely, the white species and the biennial yellow species. The former is the more popular and valuable, except possibly at high altitudes in the North and in the extreme South. The rapid increase in the use of white sweet clover as a hay and pasture plant has created a strong demand for the seed. Most of the commercial seed of this species comes from Nebraska, Montana, Wyoming, and Illinois. This plant has a very wide range of adaptation and produces seed abundantly wherever it is found. The same may be said of the biennial yellow species. No data are available on the quantity of seed harvested and sown annually in this country, but it is now quite large. The harvesting of sweet-clover seed is best done by means of a grain binder having a pan attachment to catch the seed that shatters when the crop is cut. Other methods are used, but they involve considerable waste. The ordinary grain thrasher, slightly modified and properly adjusted, is more commonly and successfully used than the clover huller for thrashing the seed. By the proper use of this machine, a very large percentage of the seed can be hulled when thrashed. Both hulled and unhulled seed appear on the market. The possibilities of the production in this country of seed of both the white and the biennial yellow sweet clover are very great.

ALFALFA.

In alfalfa we have a high-yielding hay crop and a low-yielding seed crop, affecting favorably on one hand the demand for seed and unfavorably, on the other, the supply of it. It is very difficult to estimate the annual seed requirement, yet it doubtless exceeds 25,000,000 pounds. Alfalfa-seed production is very uncertain in this country and is commercially localized in fairly definite sections west of the one hundredth meridian. Utah, Idaho, Kansas, Nebraska, California, and Arizona produce the bulk of our domestic-grown seed. The seed of the Grimm variety and other hardy strains comes mostly from the Dakotas, Montana, and Idaho. Arizona and California supply seed of the Peruvian variety, while common alfalfa seed is grown in all of the seed-producing sections. Harvesting is done without the aid of special machinery, but the yield of seed is so unreliable that relatively few farmers engage in its production. For the fiscal years 1916 and 1917 the importations of alfalfa averaged more than 3,000,000 pounds. Most of this seed came from Turkestan, by way of Vladivostok. Prior to the war, Turkestan alfalfa seed came in through Germany, where it was assembled largely in the markets of Hamburg and Darmstadt. Commercial seed of Turkestan alfalfa is very inferior to domestic-grown seed, from the standpoint of the crop it produces, and it is unfortunate that our seedsmen will persist in handling this strain. Vigorous campaigns have been waged against it, which have resulted in cutting our imports nearly in half, and it is hoped that they will be even more reduced in the future. Our 1917 seed crop was about normal, and it is believed that the 1918 seed requirement will be fairly well met.

VETCH.

Unfortunately the difficulty of growing hairy-vetch seed in this country and the high price at which it reaches the farmer have seriously handicapped the extension of this crop. Most of our seed comes from Russia, although some is produced in Michigan, Ohio, and other Northern and Eastern States. In the fiscal year 1917, 295,600 pounds of seed were imported, but the retail price, which was approximately 25 cents per pound, was so high that farmers were reluctant to buy and sow it. Unless the price lowers, the supply will exceed the demand.

The Willamette Valley, in Oregon, produces most of our supply of spring-vetch seed. Very little is imported, not more than 50,000 pounds annually. This species is not as valuable as hairy vetch in the eastern part of the United States, and while the price of seed is much lower, the demand for it is not great.

Narrow-leaved vetch (*Vicia angustifolia*) has been recognized as a valuable plant in the South, but the seed has not been commercially available until very recently. This year considerable quantities have been placed on the market at less than half the price of hairy-vetch seed, having been produced in Minnesota as a by-product of wheat cleaning. It is believed that this species will fill an important place among the green-manure and forage crops of the eastern United States.

CANADA FIELD PEAS.

Only four States, Michigan, Wisconsin, Idaho, and Washington, are important in the commercial production of field-pea seed, and the total area devoted to peas for grain is not more than 250,000 acres. Some seed peas are imported annually from Canada, and at present some peas suitable for seed are being exported to Europe. The estimated requirements for seeding purposes are now 22,500,000 pounds, and, while a scarcity of seed of garden varieties exists, there is enough seed of the field varieties to meet all planting needs if it is properly conserved. The only danger of shortage lies in the fact that there is a demand abroad for all kinds of dried peas for food, which might result in exporting peas beyond the point of our own needs. Some dried peas are now being imported from the Orient, Mexico, and South America, and some are available in Australia, but the commercial foreign stocks are not desirable for seeding purposes.

COWPEAS.

Twenty-two States, mostly in the South, devote an estimated aggregate area of over 5,700,000 acres to cowpeas. Approximately 435,000,000 pounds of seed are required to plant this area. Although producing fair seed yields, cowpeas have never been popular as a grain crop, largely because of the difficulties of harvesting. No thoroughly satisfactory seed harvesters have been developed; therefore the bulk of the seed that is now on the market is hand picked. Thrashing requires care, but can be done by a slight modification of the ordinary grain thrasher. Our commercial cowpea seed comes from very well distributed sections in the Southern States. As there is no demand for the seed for feeding or for industrial purposes, little fear is entertained regarding the adequacy of our supply. With the growing popularity of the soy bean and the rapid strides of the velvet bean, cowpeas are somewhat eclipsed, and the extension of their acreage appears to be unlikely.

SOY BEANS.

There are no statistics upon which to estimate the rate of increase in soy-bean acreage in this country. Those for 1917 are the only figures available and indicate an aggregate of 460,000 acres, located in 17 States, which is probably double that of 1916. The present crop of soy beans is large, but, nevertheless, the seed supply needs careful guarding, first, because the oil mills are ready to crush the beans if the price does not exceed $2 per bushel, and, second, because the canneries, provided they are able to get the cans, will take soy beans, as they did in the spring of 1917, if navy and other varieties of baking beans reach the price they commanded at that time. This is especially true of the yellow-seeded varieties, which comprise the greater part of the crop. The seed of early-maturing varieties was injured by early frosts in the fall of 1917; therefore good available stocks should be conserved at all costs.

Millions of tons of soy beans are waiting in Manchuria for export to this country, and our own seed supplies may be influenced indirectly by them. These oriental beans represent mixed and inferior varieties and are entirely unsuited for seed. They are also inferior to domestic-grown soy beans for food, but if they should come to this country in large quantities they would find a market at the oil mills, and this would tend to conserve our own beans for seed. If they are imported to the extent of breaking the market, a slackening in the demand for seed might result. It appears that we will need approximately 14,000,000 pounds of soybean seed to plant an acreage equal to that of last year.

Early frosts and freezes in the fall of 1917 greatly reduced the seed supply of the early-maturing varieties in the Northern States. Every possible effort should be made to conserve the seed that is now available and to encourage its planting in the spring of 1918.

VELVET BEANS.

The advent of early-maturing varieties of velvet beans has resulted in an almost phenomenal increase in the acreage of this crop in the southern United States. For the year 1917 it was estimated that there were more than 6,000,000 acres of velvet beans, mostly grown along with corn, in seven States in the cotton belt. It is safe to say that this is five times as great as the acreage of 1916. Alabama, Florida, and Georgia have five-sixths of the velvet-bean acreage of the

South and harvest as dried beans over 60 per cent of their crop. The velvet-bean meal industry has developed rapidly, and this furnishes a ready market for the beans, but there will be plenty saved for planting even a very much larger acreage than was planted in 1917, which required at least 93,000,000 pounds of seed.

PEANUTS.

An examination of all the available statistics indicates that the acreage of peanuts in 1917 was more than double that of 1916, the total area being more than 2,900,000 acres. A much larger percentage of the planted area was harvested for market this year than heretofore. There is a constantly increasing demand for peanuts as a food, and much of the harvested crop soon finds its way to the large shelled-peanut dealers. These dealers are very potent factors in the distribution of peanuts for seed, since they handle more seed than seedsmen. In the spring of 1917 large concerns agreed to set aside portions of their stocks of Spanish peanuts until after the close of the planting season, in order to insure enough seed for the large acreage that was planted. Such an arrangement could doubtless be made whenever there is any necessity for doing so. Upwards of 1,500,000 bushels of shelled peanuts were required for planting the 1917 acreage, and much more will be required for seed in 1918.

SEEDS OF FIBER CROPS.

There are but two important cultivated fiber crops, one major and one minor, grown here, and we produce our own seed supply of both. The seed of cotton, the major fiber crop, is a staple in more than one respect, while the seed of hemp, the minor crop, is harvested and used in this country only for planting purposes.

COTTON.

In some respects cotton seed is in a class with the cereal seeds, inasmuch as a relatively small percentage of it is used for planting. By far the greater part goes to the crushers, where the oil is extracted, and the residue is converted into feed and fertilizer. The total production of cotton seed in

1916 was estimated at 5,237,000 tons. Of this quantity, approximately 826,000 tons were required for planting purposes.

The difficulty of maintaining improved varieties of cotton in a pure condition, owing to the fact that they cross readily among themselves and the seed becomes mixed in the process of ginning, results in a large demand for good planting stocks. Such stocks almost invariably command a relatively high price. Individual farmers have done much in the way of producing and selling cotton seed suitable for planting. Seedsmen and ginners likewise are important factors in this connection. Rarely is there a serious situation in the supply of seed for planting. Select stocks are not always abundant, but seed of some kind can invariably be had. The drought in the summer of 1917 damaged the cotton crop so badly in parts of Texas that steps were necessary to provide seed from outside sources for a large acreage, but no great difficulty was experienced in doing this, as the supply of seed of suitable varieties was reasonably abundant elsewhere.

The present enormous demand for long-staple cotton for the manufacture of automobile tires and other commodities requiring fabric of high tensile strength has created a problem in connection with the supply of seed of long-staple varieties. Every effort should be put forth to produce and conserve good seed of these varieties, since the demand for long-staple cotton will doubtless increase.

HEMP.

Although we have still only a small acreage devoted to hemp in the United States, the acreage has doubled each year for the last three years. The area planted in 1917 was estimated at 42,000 acres. Kentucky supplies practically all of the hemp seed sown in this country. It is grown in seed plats along the Kentucky River. China and Japan furnish us large quantities of hemp seed for poultry feed, but it is practically valueless for seeding purposes. This seed can not be distinguished from our own domestic seed, and since it is much cheaper, fraud is often perpetrated on the unsuspecting farmer. The sale of Kentucky-grown hemp seed is controlled by such a small number of dealers that a tendency frequently develops toward the charging of exorbitant prices. Hemp must be specially planted for seed production, and in view of the increasing importance of the crop, seed production should be strongly encouraged. Chile offers possibilities in this connection, but for the present our efforts should be exerted at home. Our planting requirements, based on the acreage of 1917, are about 2,100,000 pounds of seed.

MISCELLANEOUS FIELD-CROP SEEDS.

Certain of our crops to which small acreages are devoted fill very important places among our industrial and dietary needs. It is quite essential that their acreages be maintained, if not materially increased, as time goes on. Some of these crops at times present real seed problems, and just now the country is confronted with solving one of these problems or suffering a reduction in the output of a very necessary food product.

SUGAR BEETS.

The effect of the war on the sugar-beet seed supply is now being seriously felt, although it has been very much in evidence since the outset. We have been dependent upon Europe almost exclusively for our sugar-beet seed since the beginning of our beet-sugar industry, and although we have engaged more or less seriously in beet-seed production investigations for many years, the war found us in the position of producing but a very small proportion of the seed needed to keep our factories in operation. It was generally thought that Germany and Russia could grow beet seed much more cheaply than it could be produced in this country. Therefore it was considered economy for our sugar companies to get seed from abroad. With Germany at war with us and Russia in an unsettled condition, we have been compelled to take definite steps to grow as large a part of our seed supply as possible. The history of our efforts to get sugar-beet seed out of Europe from 1914 until the present time is very interesting. Suffice it to say that we are still getting seed out of Russia by way of Vladivostok, but it is becoming increasingly difficult. Our seed requirements for 1918 are estimated at upwards of 220,000 bags, or 22,500,000 pounds. This will be used for planting approximately 800,000 acres and replanting a portion of this area.

The prospects for sugar-beet seed production in this country are now quite bright, and even the relatively small quantity of domestic-grown seed has been sufficient to relieve the situation materially. It is estimated that in 1917 we produced 50,000 bags of seed, mostly in Utah and Colorado. In 1918 we should produce very much more than this. We now have about 100 sugar factories, with 15 or more additional factories under construction. It takes at least 2,000 bags of seed to produce enough beets with which to operate a factory profitably, so that the seed requirements for 1918 will be much larger than for 1917. While Russia is now the only foreign source of supply and it has been a difficult task to get seed from that country, it is thought that few, if any, of our sugar factories will be compelled to close for lack of seed in 1918. Sugar-beet seed is handled mostly through importing jobbers. and it is the policy of factories to accumulate a supply for two or more years in advance of their needs.

FLAX.

In the United States flax is primarily a seed crop. Between 28,000,000 and 30,000,000 bushels of flax seed are required annually by our linseed-oil industries, which constitute the greatest demand. This is about 100 per cent more than our average production for the last three years. We sow annually nearly 2,000,000 acres of flax, which require approximately 900,000 bushels of seed. Our flax area is confined principally to North Dakota, South Dakota, Montana, and Minnesota, where much of the crop is grown upon new land. Exclusive of the United States, the important flaxseed-producing countries of the world are Argentina, Russia, India, and Canada.

The drought in the summer of 1917 badly damaged the flax crop in western North Dakota and Montana and thereby greatly reduced the country's total yield. The high price of flax seed at harvest time and the doubt on the part of the farmers as to the stability of high prices when seed from Argentina should appear upon our markets, together

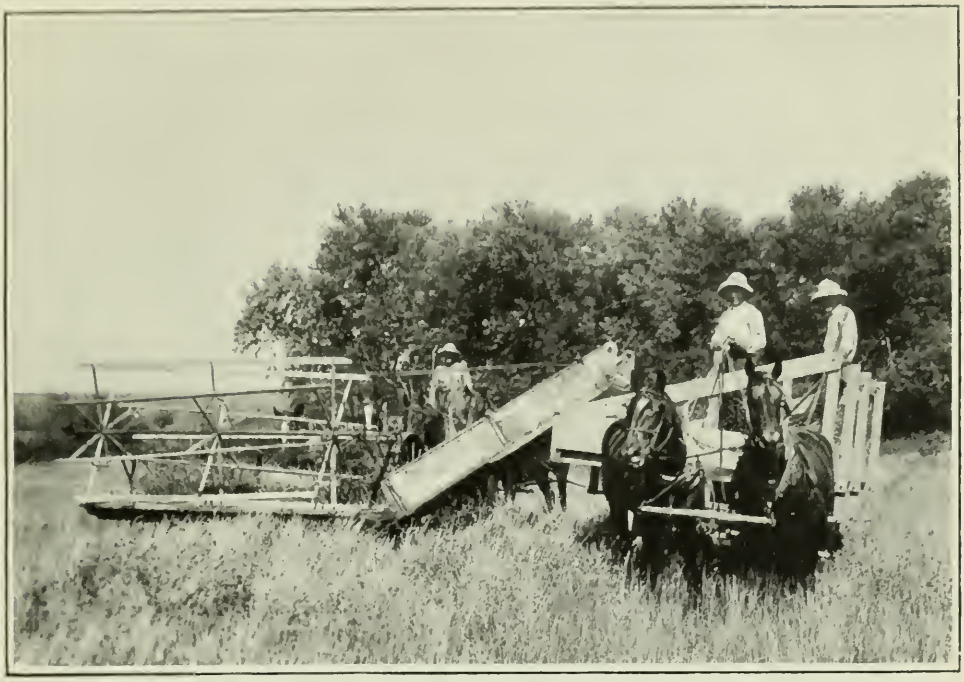


FIG. 1.—HEADING TIMOTHY PERMITS THE HARVESTING OF A FAIR CROP OF HAY AFTER THE SEED CROP HAS BEEN REMOVED.

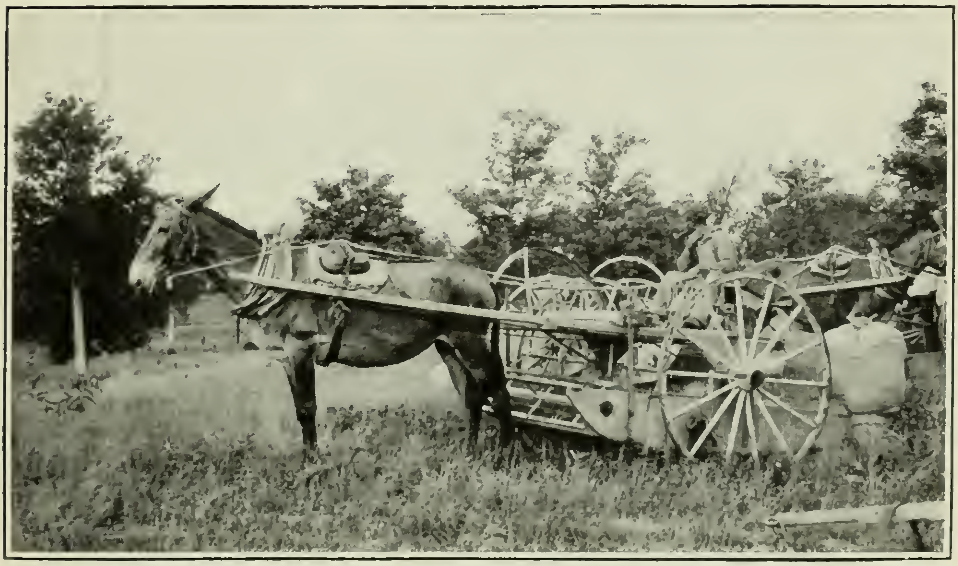


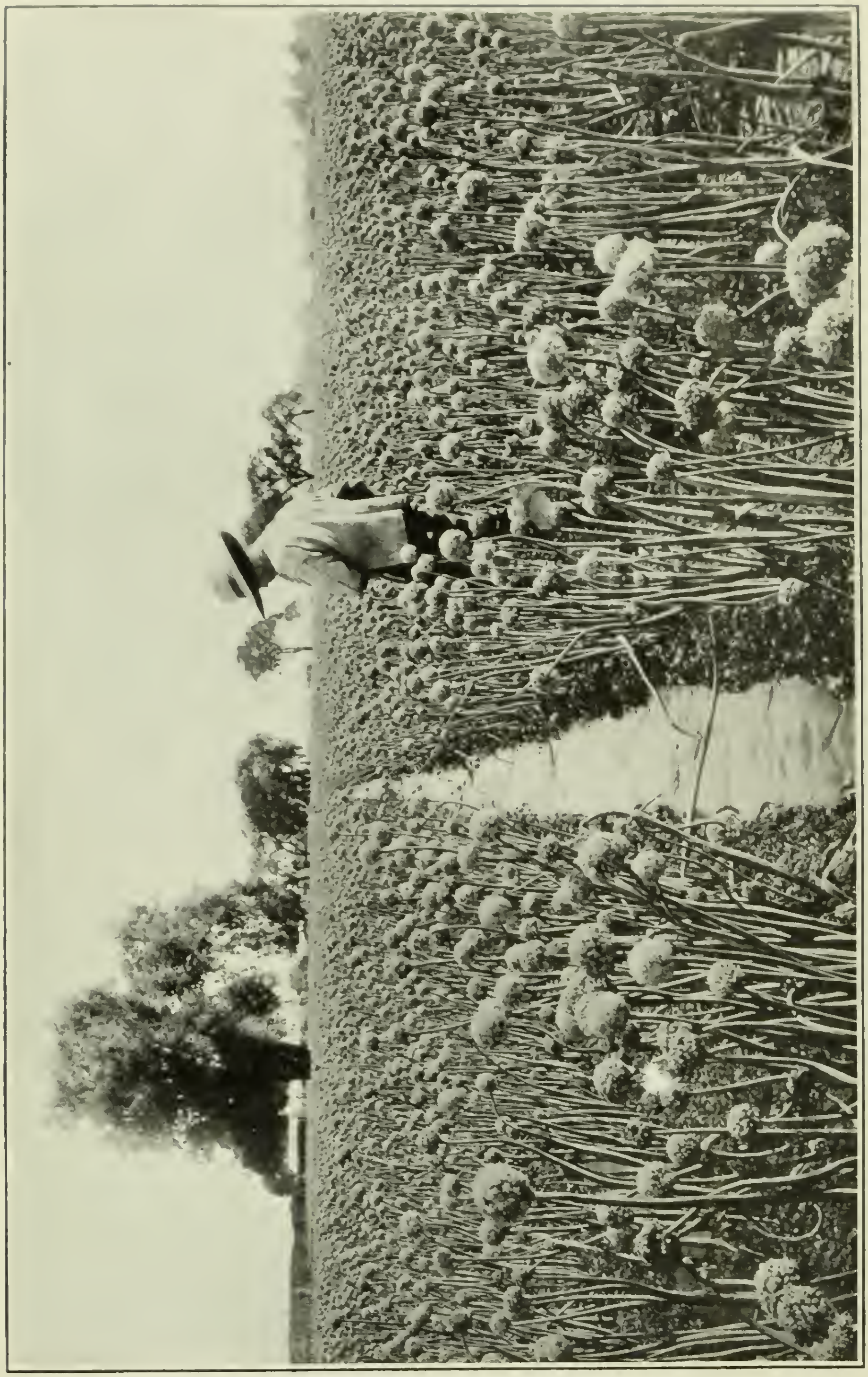
FIG. 2.—KENTUCKY BLUEGRASS SEED IS HARVESTED BY HORSE-DRAWN SEED STRIPPERS AND PILED IN LONG WINDROWS FOR CURING.

FIG. 1.—SEED OF GRAIN SORGHUMS IS EASILY HARVESTED BY ORDINARY FARM MACHINERY.

FIG. 2.—SEED OF ALSIKE CLOVER IS HARVESTED IN MUCH THE SAME WAY AS THAT OF RED CLOVER.

FIG. 1.—THE ACREAGE DEVOTED TO RADISH SEED IN THE UNITED STATES HAS BEEN INCREASED SUBSTANTIALLY SINCE 1914.

FIG. 2.—MOST OF OUR DOMESTIC SUPPLY OF TURNIP SEED IS PRODUCED IN THE PACIFIC NORTHWEST.



ONION SEED IS PRODUCED EXTENSIVELY IN THE UNITED STATES, AND ITS PRODUCTION CAN BE GREATLY INCREASED AS OUR NEEDS WARRANT.

with their need for cash, resulted in the sending of large quantities of seed to our primary markets. This movement so seriously threatened the seed supply, especially of North Dakota and Montana, that definite action was necessary to conserve seed to meet the demands for sowing the 1918 acreage. The new crop of flax seed from Argentina appears on our markets in February and March, but this seed is not suitable for sowing in the United States.

BROOM CORN.

As a piece of household equipment, the broom is indispensable, and the broom-corn broom is by far the most popular type in this country. In the aggregate, we devote about 300,000 acres annually to the production of broom corn. Most of the acreage is in Oklahoma, Illinois, Kansas, Colorado, and Texas. Nearly 1,000,000 pounds of seed are required to sow this acreage. The sections in which the crop is grown for the most part produce their own seed supply. Seed from humid sections is not suitable for the drier sections. Broom-corn seed should be specially grown, since that obtained from the brush harvested for broom making is mostly immature and of low vitality.

VEGETABLE SEEDS.

It was not until the vigorous campaign for increased food production in this country was well under way that general interest was manifested in the vegetable-seed situation. The fact is that the supply of seed was affected immediately war was declared in Europe, but the reserve stocks prevented the effect of the war on the supply from at once becoming evident. Prior to the war it was our custom to import large quantities of seed of certain vegetables from various European countries. The war did not stop our importations immediately, not even from Germany, but it produced a condition which eventually not only shut off our supply, but made it practically necessary for us to export to Europe certain kinds of seed that we formerly imported from that continent. The successful production of vegetable seed requires special experience and training, as well as suitable climate, soil, and equipment, and therefore our industry, while it expanded greatly, could not meet the demands made upon it without showing evidence of strain. As the surplus stocks became absorbed and the seedsmen, large and small, were compelled more and more to depend upon growing-crop contracts for their annual supplies, the wholesale prices of most vegetable seeds increased rapidly, until at present they are unusually high. Since the retail prices normally bear no direct relation to the wholesale prices and in the past have not fluctuated with the latter, the price of seed in packets in 1918 will be watched with much interest.

California is our main dependence for the production of seed of the common vegetables, other than peas, beans, and sweet corn. It is true that other States produce vegetable seeds, but in none has the industry developed to the same extent as in California. In that State the climate and soil are generally favorable, and up to the present time relatively cheap Chinese, Japanese, and Hindoo labor has been available. The map (fig. 14) indicates in a general way the States in which the several vegetable seeds are grown.

Peas, beans, and corn are bulky seeds, and these have always been grown at home. New pea-producing areas are continually opening up in the Northwest, especially in irrigated districts. These new areas supersede old ones to a considerable degree, owing to the fact that they are less infested with the pea weevil. Garden and canning varieties of seed peas were contracted for heavily in 1917, both for home use and for export, but the crop was light and the supply of seed for 1918 is none too abundant. Estimates are not available on the acreage of garden peas, but it is probably somewhat less than the acreage of Canada field peas.

In 1917 this country put out the largest acreage of edible beans that it has ever planted, over 2,100,000 acres. Field beans and not strictly garden varieties made up most of the acreage. The high price of dried beans for food resulted in increasing the acreages in old bean-growing sections and the planting of beans, especially the small white and pinto varieties, in entirely new sections. Early in 1917 the price of beans was so high that stocks from every available source were imported. Among these was a small Lima bean of the Sieva type from the Orient, which resembles the navy bean so closely that it was fraudulently sold to farmers in new bean-growing sections. It is entirely unsuited for planting in the sections where sold, and is not a desirable food product, as it frequently causes the development of hydrocyanic acid in the digestive tract. This Lima bean is commonly known as the Burma or Rangoon bean.

Michigan, Wisconsin, and New York were at one time the principal white-bean producing States, but now the Western States, principally California, are more dependable, as the crops there are less subject to attacks of anthracnose. This year unfavorable weather damaged the white beans of the Eastern States to such an extent that care was necessary in conserving stocks for planting in 1918, as seed grown in the West is not suitable for the North and East. It is estimated that over 1,000,000 acres were planted in white beans in 1917, requiring over 45,000,000 pounds of seed.

The pinto bean is now next to the white bean in acreage, there having been more than 350,000 acres planted in 1917. This bean is taking well on dry land in the western part of the Great Plains, and its acreage has increased phenomenally in the past two years. The seed requirements now are about 6,000,000 pounds, but the supply of good seed is ample.

The red kidney and tepary beans are grown in the Southwest. Both are used as dried beans. The commercial area grown of the former was about 145,000 acres in 1917, while that of the latter was less than 40,000. These acreages require for their planting about 9,000,000 and 600,000 pounds of seed, respectively. The white tepary bean is sometimes substituted for the navy bean, which it resembles somewhat closely, but it is suited only to the dry Southwest.

California devoted approximately 150,000 acres to the production of Lima beans for drying, and the quantity of seed required for planting this acreage is nearly 12,000,000 pounds. Lima beans are extensively used as a green vegetable, but our seed requirements for this purpose are not known.

It is of the so-called strictly garden varieties of beans that there is difficulty in producing an ample supply of seed. The exact requirements are not definitely known, but they are very large, since almost every garden in the country has a few rows of snap beans of one variety or another. The total area of the varieties planted for seed is probably less than 200,000 acres, scattered throughout the principal bean-growing States.

While sweet corn is grown for seed somewhat generally throughout the entire corn belt, the bulk of our supply comes from Nebraska, Iowa, Minnesota, Illinois, and Ohio. It requires a large quantity of seed for planting the acreage for the canneries, as well as for home gardens, but data are not available as to the total number of bushels needed. Early frosts in the fall of 1917 and subsequent unfavorable weather injured the vitality of the seed and reduced the supply to a point so low as to cause concern, while only a very small stock was carried over from the crop of 1916; therefore the total supply of seed for 1918 is far from abundant.

Before the present war, Europe supplied us with much seed of the cruciferous vegetables, including principally radish, turnip, cabbage, and kale. Most of our foreign radish seed, and we imported heavily, came from Germany, France, and England. Now we are even exporting small quantities to the last two countries. Most of our radish seed is grown in California, and the seed growers there have expanded their acreages of this crop very substantially. (Pl. LXXVI, fig. 1.)

It was estimated that prior to 1914 we imported more than 75 per cent of the turnip seed we required. This came chiefly from Denmark, Sweden, Holland, Germany, France, and England. Most of our domestic supply is produced in the Pacific Northwest. (Pl. LXXVI, fig. 2.) On account of the large surplus stocks in the hands of the seed growers, seedsmen, and jobbers when the war began and the slowness with which the European supply became unavailable, we did not at first realize what it would mean to be dependent upon our own growers for turnip seed. The realization came early in 1917, and the advance in the wholesale price of seed was quicker and more pronounced than that of any other vegetable. The poor seed crop of the Pacific Northwest in 1917 still further increased the price, and from present indications it will be necessary for us to conserve very rigidly our stocks of turnip seed, both of the English and Swede types, until our growers can gain some headway on our home and export demands.

Denmark and Holland have grown most of our cabbage seed in the past, but now domestic production is being extended, especially in the Puget Sound country and on Long Island. The possibilities of cabbage-seed production in the former section are very great. This might also be said of cauliflower, kale, and rape.

Kale seed is grown in considerable quantities in our Southern States. Rape, which is more of a forage crop than a human food, is grown extensively in Japan, as well as in Europe, and just now most of the seed which we are importing comes from that country. The Japanese varieties of winter rape appear to be very much the same as the European varieties. For the fiscal year 1917, 2,285,700 pounds of rape seed were imported.

Much spinach seed is required for home gardens, market gardens and canneries. Formerly it has been secured without difficulty from Holland, Italy, and Greece. On account of embargoes and transportation difficulties, it recently has not been possible to get seed from Europe as freely as desired. In 1917 the spinach-seed acreage in California was greatly increased over previous plantings; likewise that in the Pacific Northwest; but the California crop was short, and the increased acreage failed to produce enough seed to relieve the situation caused by the difficulties surrounding importations from Europe. The canners and market gardeners are taking active interest in the possibilities of the very much increased production of spinach seed along the Atlantic coast and in the Puget Sound country, as well as in California, with a view of making this country independent of foreign countries for its seed. An abundance of prickly-spinach seed can be had from Japan, but this variety is not in favor here.

The growing of Bermuda onions in southern Texas and the Southwest is now quite an important industry. The seed for this crop comes mostly from the Canary Islands, and nearly 75,000 pounds are now required annually for planting. In the spring of 1917 some apprehension was felt by the growers regarding the arrival of seed from Teneriffe in time for planting, but it arrived without undue delay. Investigations have shown that Bermuda-onion seed of high quality can be produced in Arizona and New Mexico. This seed gives highly satisfactory results in the United States and also in the Bermuda Islands. The seed of other varieties of onion is produced abundantly, and its production can be as greatly increased as needs warrant. (Pl. LXXVII.)

Vine seeds, so called, are domestic grown, and their production is fairly well scattered over the United States. The important vine seeds are those of muskmelon, cucumber, watermelon, squash, and pumpkin. Most of the muskmelon seed comes from the Arkansas Valley in southeastern Colorado. Cucumber seed likewise comes from this section and from the Northeastern States. Watermelon seed comes from Kansas, Oklahoma, Texas, Georgia, Alabama, and Florida. Squash and pumpkin seed come from Nebraska, Wisconsin, Michigan, and other Northern and Eastern States. With the exception of squash, vine seeds are secondary products, since the crops producing them are grown for other purposes. The supply of seed is sufficient for our needs, as is normally the case.

Until recently much carrot, beet, and parsnip seed was imported, but now our needs are fairly well supplied from our own crops, which for the most part are grown in California. Some seed of these vegetables, especially of carrots, is exported, but the exportable surplus is very small. Because of their relatively high food value, and the fact that two years' growth is required by them to produce seed, the seed supply of these vegetables has been watched with considerable interest. The shortening of the time required for seed production by transferring stecklings to Cuba and Porto Rico for winter planting has been considered, but this course is not deemed practicable as yet.

Much commercial tomato seed is obtained as a by-product from the canning of tomatoes and the making of catsup and other tomato products. In some cases the reverse is true, and the seed is the main product, while the tomato pulp is sold to food manufacturers. The wholesale price of tomato seed has advanced greatly in the past year, but the cost of labor, more than the size of the tomato crop, determines the price and the quantity of seed.

California produces lettuce seed, and the supply is rarely in doubt. Lettuce has little real food value, but, like radishes, it is found in all gardens and is on the market throughout the year. The seed requirements, therefore, are very large.

A great many other vegetables, such as celery, parsley, okra, and collards, are grown, but we are able to produce enough seed of these to meet our own needs without special difficulty.

The high prices that obtain for vegetable seed doubtless will stimulate the planting of a much larger acreage for seed in the future than even that of 1917, and this should not be discouraged. On the other hand, these prices will tempt inexperienced growers to engage in the industry, with a financial loss to themselves and without profit to the country. This would be a real economic waste and should be avoided.

Other countries, notably Japan, are encouraging the production of vegetable seed, but as yet they have not materially affected the market here.

While it is believed that the present supplies of vegetable seed will meet all needs for 1918, full consideration should be given this subject before launching campaigns for backyard gardens. The supplies are not so great that rigid economy in their use will not be necessary, and this fact should be clearly in the mind of everyone, from the backyard amateur to the experienced market gardener.

SUMMARY AND OUTLOOK.

Never before in the history of our country has the question of seed supply been so vitally important, and never has it been so necessary that all legitimate agencies engaged directly or indirectly in the production or dissemination of seed be utilized efficiently for the national good. It is not the time to break down any feature of the great seed-industry organization, since there are no means at hand effectively to replace the tested and proved parts of the machinery. Individual interests must expect to suffer, but they must be protected to the extent of obtaining from them the greatest possible measure of efficiency.

The seed supply for 1918 presents some serious difficulties. Just how well its needs will be met can not be foretold at this time, but it is believed that producers are awake to the seed needs of the Nation and that they ultimately will see to it that crop production is not curtailed for lack of seed.

Temporary seed shortages have developed under new economic conditions, and they may continue, but farmers and seedsmen are resourceful, and they may be expected to find ways and means to meet not only the needs of this country, but also those of other countries which may be dependent upon us.

A GRAPHIC SUMMARY OF SEASONAL WORK ON FARM CROPS.

Compiled by O. E. BAKER, *Agriculturist, Office of Farm Management*, C. F. BROOKS, *Assistant in Farm Management*, and R. G. HAINSWORTH, *Head Draftsman, Office of Farm Management.*

FOR THE basic data used in the preparation of the following maps and graphs the compilers are indebted to the Bureau of Crop Estimates and its corps of township reporters, to several instructors and extension workers in certain agricultural colleges and experiment stations, and to a number of their colleagues in the Office of Farm Management and the Bureau of Plant Industry.[1]

[1] The collection of information concerning the dates of planting and harvesting the crops and of performing other farm operations was first undertaken by the Bureau of Crop Estimates (at that time Bureau of Statistics) in 1910, and the work placed under the supervision of J. R. Covert. The results of a schedule forwarded to and returned by the county representatives and other agents of that bureau were edited, tabulated, and discussed by Mr. Covert and published as Bulletin No. 85, Bureau of Statistics, United States Department of Agriculture, in 1912. The demand for this bulletin, entitled "Seedtime and Harvest: Cereals, Flax, Cotton, and Tobacco," was so great that it was soon out of print.

In 1913, upon the inception of the project to prepare and publish an Atlas of American Agriculture, it appeared advisable to have more detailed data than were obtainable from these schedules, so with the cooperation of the Bureau of Crop Estimates and in collaboration with Mr. Covert, the Office of Farm Management prepared separate schedules for wheat, corn, potatoes, oats, cotton, grain sorghums, sugar beets, beans, tobacco, hay crops, rye, and barley, which have been forwarded from time to time by the Bureau of Crop Estimates to its list of township reporters, some 33,000 in number. It is the endeavor of that bureau to maintain one crop reporter in each township in the United States, who is selected, in so far as possible, from among the most successful and intelligent farmers in the township. The fullness and accuracy with which the schedules have been filled out is evidence of the loyalty and carefulness of these men. As evidence of the reliability of their reports it may be mentioned that the Office of Farm Management has collected independently a number of farm records of planting and harvesting crops extending back 20 to 30 years, and the average date derived from these records differed less than four days, and usually less than two days, from the mode of the dates (that is, the most frequent date) given by the township reporters in that locality.

The maps showing the usual date of planting, harvesting, and performing other operations on the crops, figures 11 to 81, inclusive, except those mentioned below, are based primarily on these records received from the township reporters. Figure 13 is based largely on correspondence with the several State Experiment Stations. The small corner maps (figs. 12, 20, 32, 40, 48, 50, 52, 56, 68, 74, 78, and 82) show geographic distribution of the acreage of the several crops in 1909 according to the census of 1910. Figures 16, 24, and 36 are based on reports relating to the progress of seedtime and harvest in 1917 received through the Section Directors of the United States Weather Bureau. Figure 64, acreage of early potatoes, 1916, is based upon published estimates of the Bureau of Crop Estimates. Figures 66 and 70 are derived from United States census statistics of 1910 worked up by date of harvest zones.

The data used in preparing figures 1, 2, 3, 4, and 5 were supplied by C. M. Bennett, Agriculturist, Office of Farm Management, for figure 6 by R. S. Willard, and for figure 7 by E. S. Haskell, both of the same office. Figures 8, 9, and 10 are based upon occupation statistics published in the United States census of 1910. The data used is preparing figures 83 and 85, Dates of picking Elberta peaches and Ben Davis apples, were supplied by H. P. Gould, Pomologist, Bureau of Plant Industry; while those used in preparing figures 87 and 89, Strawberries, picking begins, and Tomatoes, canning season opens, were contributed by F. J. Blair, of the Bureau of Crop Estimates. For data used in various statements in the inscriptions underneath the maps relating to labor requirements on the crops in different localities, the compilers are indebted to Prof. W. F. Handschin, of the University of Illinois, Prof. W. E. Grimes, of the Kansas Agricultural College, Prof. R. E. Karper, of the Texas Agricultural Experiment Station, Prof. F. W. Peck, of the Minnesota Agricultural Experiment Station, Prof. E. L. Currier, of the Montana Agricultural College, Prof. R. L. Adams, of the University of California, and to Jos. H. Arnold, C. M. Bennett, G. A. Billings, M. A. Crosby, E. S. Haskell, Byron Hunter, O. A. Juve, A. D. McNair, L. A. Morehouse, M. B. Oates, F. D. Stevens, T. H. Summers, R. S. Washburn, and R. E. Willard, of the Office of Farm Management. Mr. Morehouse also prepared the inscriptions under figures 71 and 72, 73 and 74, 75 and 76, 77 and 78, and Mr. Arnold the inscriptions under figures 79 and 80, 81 and 82.

In preparing the maps the dates for each operation were entered from the schedules returned by the township reporters on large county outline maps of the States. The altitude reported on each schedule was indicated also. In making the general maps showing dates by isochronal lines, a strict use of the individual reports was not possible. This is because there is for many crop operations a wide range of dates in the reports received from a county. Such differences are due (1) to the physical conditions, such as temperature, slope, drainage, and soils on each farm, (2) to the individual practice of the farmer, and (3) to the difficulty of estimating for some crops and operations the dates in a "normal or usual season" as requested on the schedule. Therefore, where it was reasonable to do so, county averages of the reported dates were used. Such averages sufficed for most of the operations in flat regions, especially for such definite events as the beginning of wheat harvest. Three sets of conditions, however, prevented the use of averages for all maps or for all parts of a map—large differences in elevation; two or more periods of planting; and, for certain operations, an extended period during which the work can be carried on. Where the reports from different altitudes showed a well-marked topographic influence a contour map was used as an aid in drawing the isochronal lines. Where there were two or more well-defined planting periods the dates used were the modes or the averages of the most numerous group. Corn, spring oats, and late potatoes had to be treated in part in this way. Where the operation may be performed during an extended period the modal date was generally used, or the range in dates was shown on the map. In general, the maps show the average of the usual dates when most (not all) farmers perform the crop operation designated.

The most striking feature of the maps is the northward and upward movement of spring operations and events and the southward and downward progress in autumn. This movement progresses at a rate of approximately 1 degree of latitude or 400 feet of altitude in four days. Local climatic influences of the Great Lakes and of the Atlantic Ocean are evident on almost every map. In operations which may be performed during a long period the maps indicate for the most part only the effect of local competition for labor by other crops, although the underlying control of general climatic conditions is not wholly obscured. Local markets may hasten the harvest of certain crops, such as potatoes, near the large cities.

These maps were prepared originally to provide the farm management and agricultural extension workers with information as to when the various crop operations occur in all sections of the country upon which they might base their studies and recommendations relative to rotations and better types of farming. A fundamental problem in farm management is so to apportion the acreage of the different crops on a farm as to equalize the seasonal requirements for labor. It is not possible to manage or operate a farm on the same basis as a manufacturing plant. In a factory the employees are protected from the weather so that work can be carried on during the winter and on rainy days in summer without change in the character of the work and with approximately uniform efficiency. But farming is done outdoors, and the farmer is limited not only by weather conditions but also by the progress of the seasons, which require that practically all the crop operations, such as planting and harvesting, be done at a particular time of year. Moreover, the character of the work is constantly changing, and the labor problem is made still more difficult for the farmer to solve because of the fact that the amount of labor required to perform the different seasonal operations on the crops varies widely. In the South it is the chopping out, or thinning, of cotton and the picking of cotton that require the largest amounts of labor. In the wheat regions it is harvest time when the extra labor is needed, in the fruit regions picking time. The cotton must be picked before a certain time or it will be discolored or lost, the wheat must be harvested or it will shatter or be damaged by weather, the fruit must be picked or it will fall and rot. In other regions the amount of plowing that can be done during a certain period in the spring limits the acreage of crops that can be sown. In some regions such operations as plowing, planting, cultivating, and cutting corn, seeding and harvesting winter wheat, and making hay can be so adjusted by the farmer, through apportioning a certain acreage to each of these three crops, that a comparatively smooth or uniform distribution of work throughout the growing season is secured; but in other regions, particularly those where cotton, wheat, or fruit are the dominant crops, there will inevitably occur certain periods in the season when extra labor must be obtained.

In picking cotton the labor of women and children can be employed, and this is true to a small extent in the picking and packing of fruit, hence the local supply of labor is generally sufficient; but in harvesting wheat, men are needed, some of whom must be more or less skilled or experienced, hence the largest army of transient labor assembled in the United States is to be found each summer in the wheat fields of the Central West. Prior to 1917 the corn farmer of the Middle West, and the cotton grower of the South, as well as the wheat farmer in the grain belt, had no appreciable difficulty in securing the extra labor to carry this peak load of work during these rush seasons. Recently this condition has been changed and securing the supply of man labor for these crops also has become a difficult matter.

During the coming season the maps may, therefore, find immediate use, as some of them were used in manuscript form in 1917, in anticipating this demand for labor and planning for its mobilization, especially in the seeding and harvesting of wheat in the Central West and in the gathering and marketing of some of the perishable crops. For this use due account must be taken of the earliness or lateness of the season relative to the normal, which the map presents.

In using these maps and graphs it should also be borne in mind that although the data as to dates of planting and harvesting the staple crops and as to man and horse labor per acre required for the various operations are exact enough to enable the farmer to calculate, if desired, how many acres of each crop may be grown in a given season, it is a mistake to assume that precise adjustments can be made. It would undoubtedly be unwise for the individual farmer to attempt to draw up on this basis a schedule that would indicate the work to be performed each day throughout the spring and summer. Weather conditions can not be controlled by the farm operator. He might have decided in advance to cultivate corn on the afternoon of June 29, but if heavy rains occur he will be compelled to postpone the operation to a later date. A few interruptions of this character would seriously upset any theoretical schedules which might be made.

This limitation, however, does not vitiate the value of the information presented in the maps as indicative of the seasonal labor requirements of the country at large. A glance at the seeding dates given in the spring wheat maps, for instance, shows that in certain regions this operation begins about the first of April, that seeding becomes general about the middle of April and ends about the first of May. These average dates are based on many reports of actual practice, and although they will vary from year to year, sometimes as much as a week or 10 days, it is useful, from the standpoint of labor mobilization, to know about when wheat seeding will need to be done. The wheat grower living in this region understands that the preliminary preparation of the land must precede planting. He must make allowance for time in which to perform these operations and crowd no large amount of other work into this period. The same suggestion will apply in the production of any other important farm crop.

The dates of the various operations on the crops are in most cases not likely to change materially, but the efforts of the experiment stations and the United States Department of Agriculture may in time alter considerably the dates when certain operations are performed, such, for instance, as the time of seeding winter wheat in the Mississippi Valley, south of the 39th parallel of latitude. (Compare figs. 11 and 13.)

LIST OF MAPS AND GRAPHS.

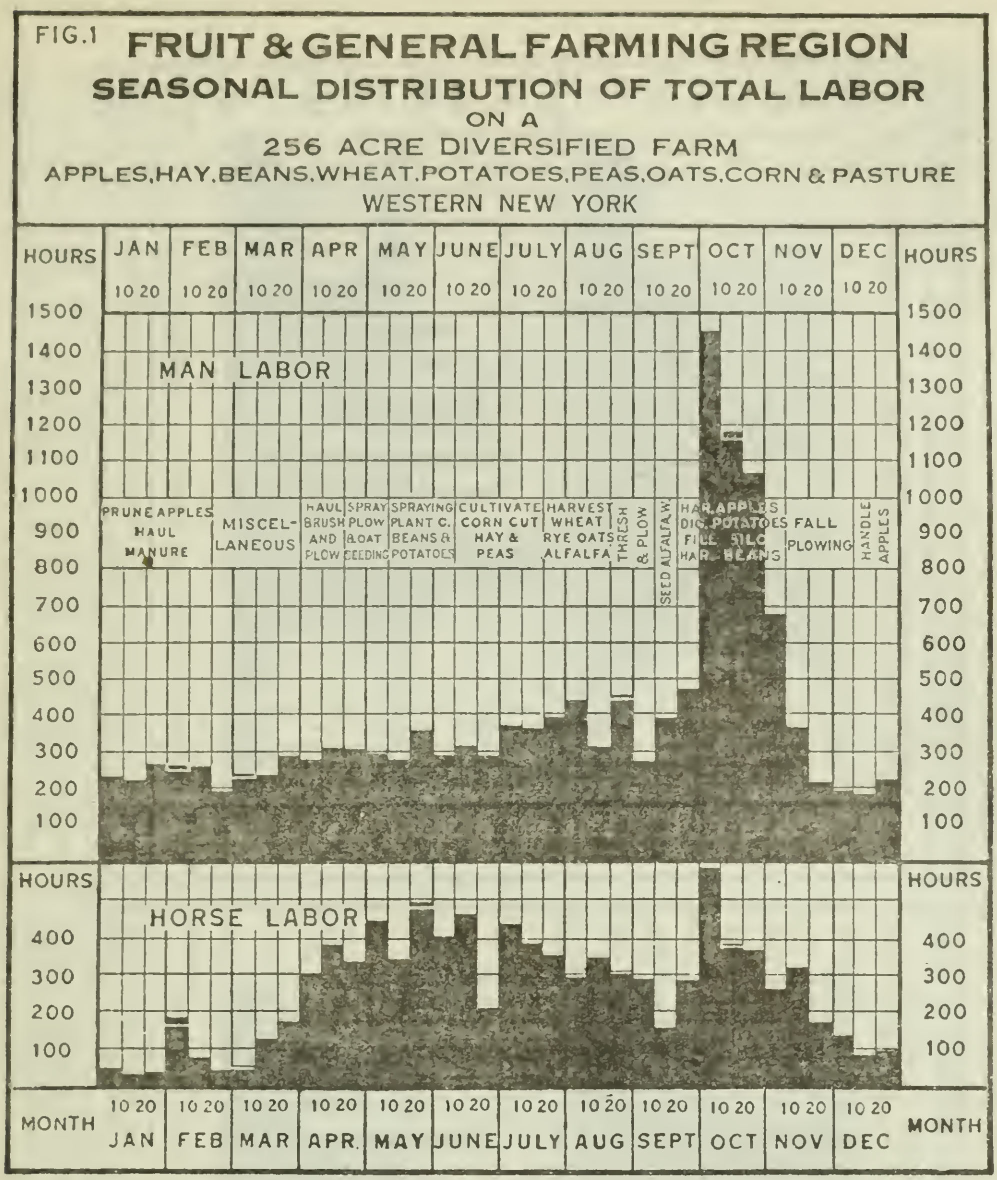


FIG. 1.—Fruit growing and general farming are the more common types of farming in western New York. The intensive fruit farms, which are found mostly within a few miles of the shores of Lake Ontario and Lake Erie and bordering the inland lakes, usually have only a few acres of farm crops. In the general farming area lying back of the fruit belt small to medium-sized apple orchards are found on many farms. The man-labor requirement on these diversified farms is quite uniform throughout the growing season with the exception of the haying and harvesting period in midsummer and again during the period of fall seeding and of bean, potato, and apple harvesting. The farm for which labor distribution is shown in the graph above is in a diversified farming region, and although an apple orchard is a common enterprise in this region, it is unusual to find an orchard so large in proportion to other enterprises. There were on this farm in the year illustrated in the graph above 40 acres of apples in full bearing and 2 of pears, 48 of hay, 26 of wheat, 19 of beans, 19 of oats, 15 of peas, 12 acres of corn for silage, 9 acres of rye, 7 of potatoes, 7 of pasture, and a half acre of cabbage and other vegetables. Two men were hired by the year, another man was employed during July and August, and during the latter half of September 2 to 4 extra men were hired by the day. During October and early November a force varying from 8 to 24 in number was employed in picking and packing the apple crop. The orchard had been well cared for and it was a favorable season. Several thousand transient fruit pickers, it is estimated, are sent out each fall by labor agencies in Buffalo, Rochester, and Syracuse to work in the orchards and on the farms of western New York.

In the graph above and in those on the following pages, whenever a 10-day bar is separated by a white line into two parts the lower part represents the hours of labor on this farm and the portion of the bar above the white line represents the number of hours of labor put in by the farmer and his help on neighbors' farms, either given in exchange for help or, in some cases, paid for in cash by the neighbors. The records do not indicate the time when the neighbors gave labor to this farmer in return, but in this and succeeding graphs undoubtedly some of the higher 10-day bars, especially those during the harvest season, when this practice of exchanging labor is most common, are the result in part of help received from neighbors. (Data supplied by C. M. Bennett, Agriculturist, Office of Farm Management.)

FIG. 2.—*Corn belt: Seasonal distribution of total labor on a 325-acre corn, small grain, timothy seed and hay farm, central Iowa.*

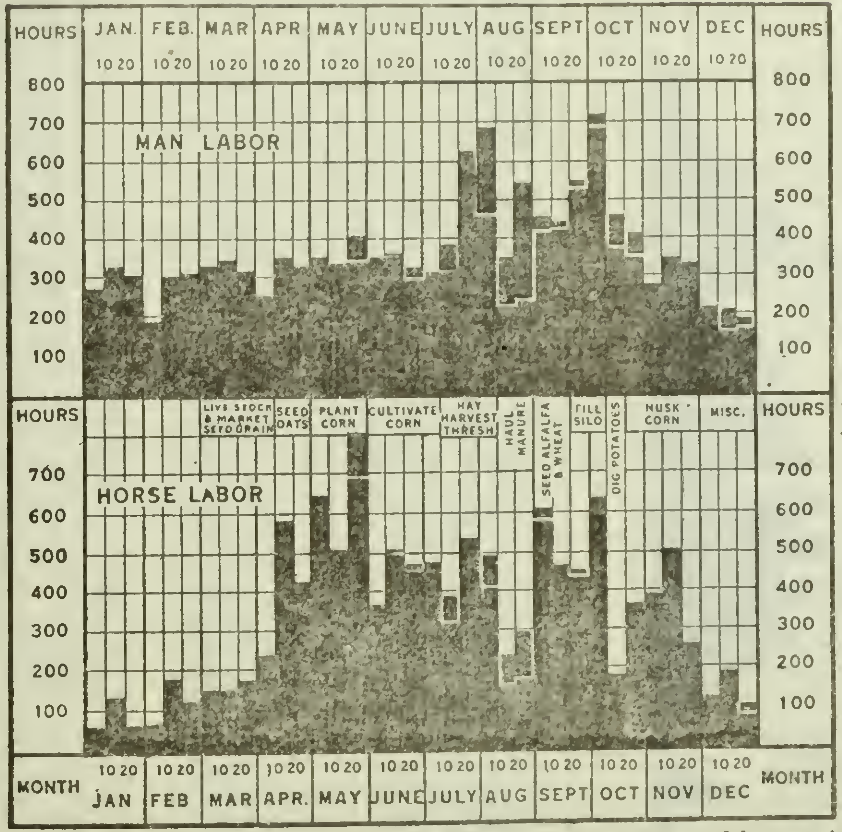
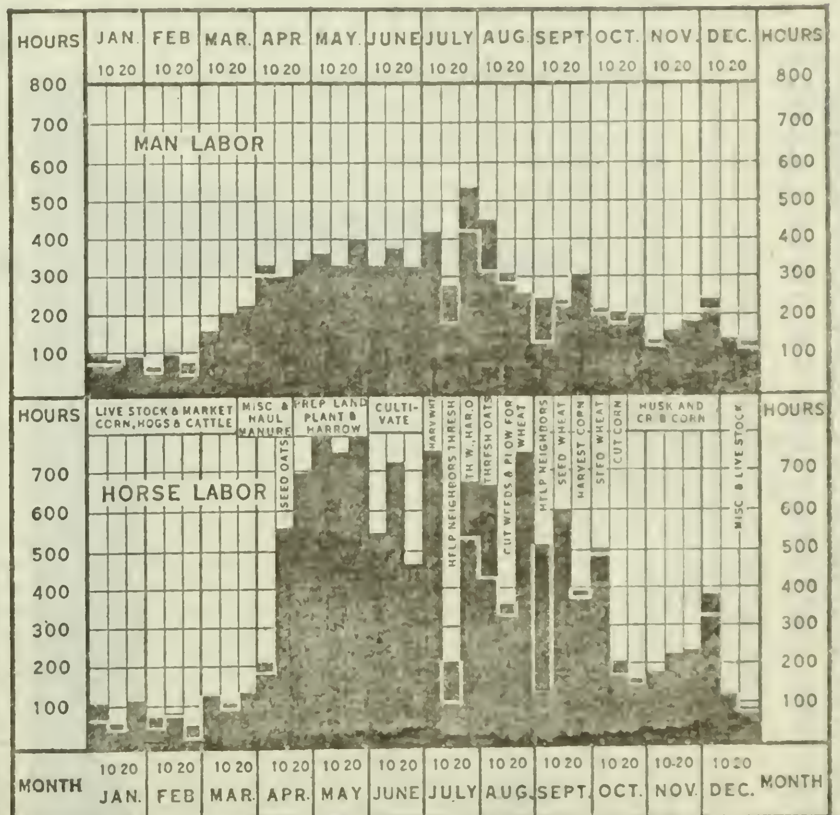


FIG. 3.—*Corn belt: Seasonal distribution of total labor on a 270-acre corn and small grain farm, southwestern Illinois.*



FIGS. 2 and 3.—In the corn belt, especially where small grain and hay are important crops and live stock is fed, the seasonal requirements of man labor are, perhaps, more evenly distributed than in other agricultural areas in the United States, except the dairy belt. The peak load of work is likely to occur the latter part of July and early August, when haying, harvesting and shock thrashing are in progress. On the Iowa farm the extra labor from July 20 to August 10 was mostly the exchange labor of neighbors. The horse labor is less uniform in amount than man labor and reaches its peak load usually in April and May and again in the early fall. Where corn is cut for silage the peak load at this time is intensified. On the Iowa farm, which had 102 acres of corn, of which 26 were cut for silage, 48 acres of oats and a few acres each of barley, winter and spring wheat, together with 63 acres of hay, the farmer hires two men by the year, and when a larger crew is needed, exchanges work with his neighbors. The Illinois farm had 140 acres of corn, 54 of oats, 51 of wheat, and the labor, in addition to that of the farmer himself, consisted of two men hired during the season from March to December. He also exchanges labor with his neighbors. (Data supplied by C. M. Bennett, Office of Farm Management.)

FIG. 4.—*Winter wheat region: Seasonal distribution of total labor on a 800-acre wheat and summer fallow farm, Walla Walla, Wash.*

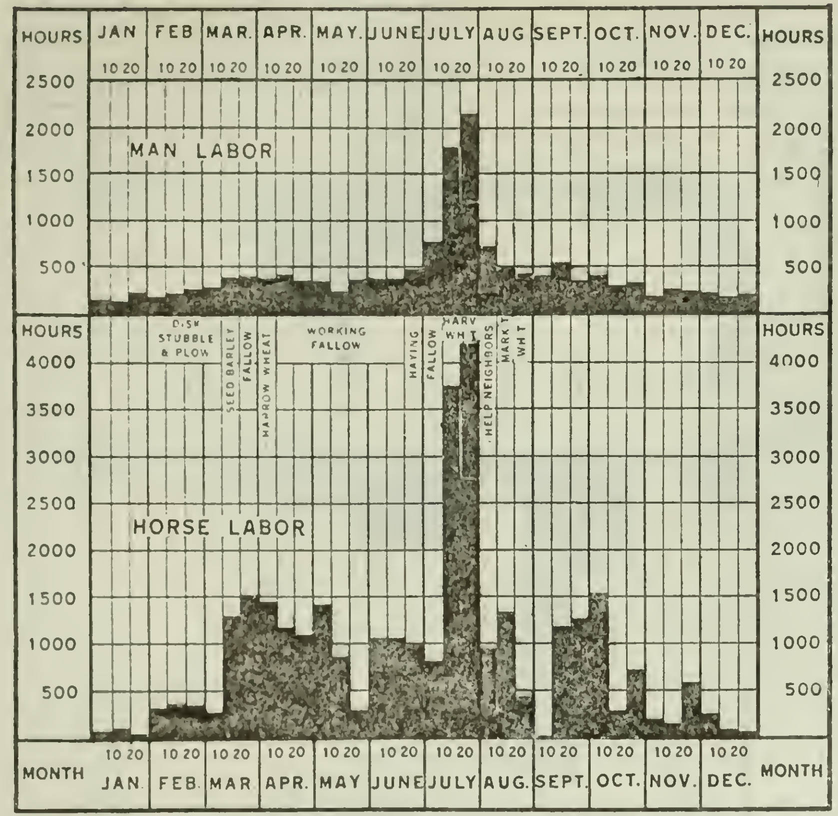
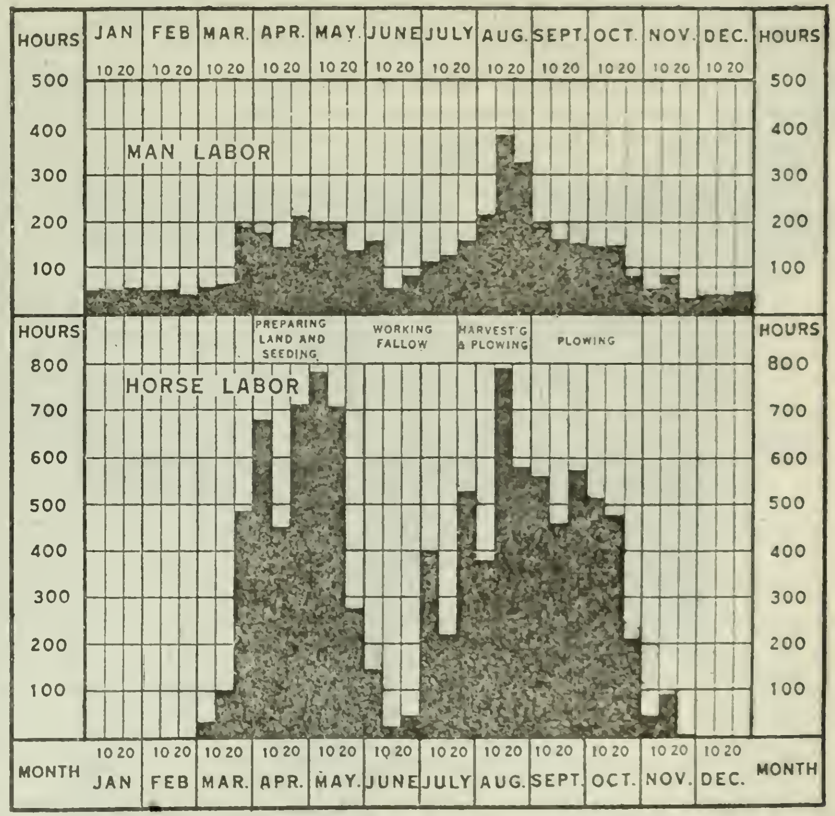


FIG. 5.—*Spring wheat region: Seasonal distribution of total labor on a 600-acre grain farm, North Dakota.*



FIGS. 4 and 5.—In the regions where wheat is the important crop, the heaviest demand for man labor comes at harvest time, which in North Dakota and Washington occurs during the latter half of August. In the spring-wheat region an earlier peak load, less accentuated but of longer duration, occurs during April and early May, when the preparation of the land and the seeding first of wheat and then of oats, barley or flax takes place. In eastern Washington work summer fallow is also required at this time. On the Dakota farm, which had 280 acres of spring wheat, 127 acres of oats, 60 acres barley, 49 acres flax, 20 acres hay, and 52 acres fallow 2 brothers did all the work except during the harvesting and thrashing season, August 1 to September 10, when 1 to 3 day laborers were employed. In this region it is customary to hire the thrashing done, the thrasher furnishing nearly all of the labor required. This labor does not appear on the graph. The eastern Washington farm had in this year 317 acres in wheat, 14 in emmer, 33 in pasture crops, and 374 acres of summer fallow. The labor force, in addition to the farmer himself, consisted of one man hired by the year and two men hired for the greater part of the year. The farmer hired, in addition, 10 to 20 transient laborers during two weeks of harvest time and exchanged labor with a neighbor. In this region it is customary for the farmer to do his own thrashing. (Data supplied by C. M. Bennett.)

FIG. 6.—*Cotton belt: Seasonal distribution of field labor on a 160-acre farm, Black Waxy Prairie of Texas.*

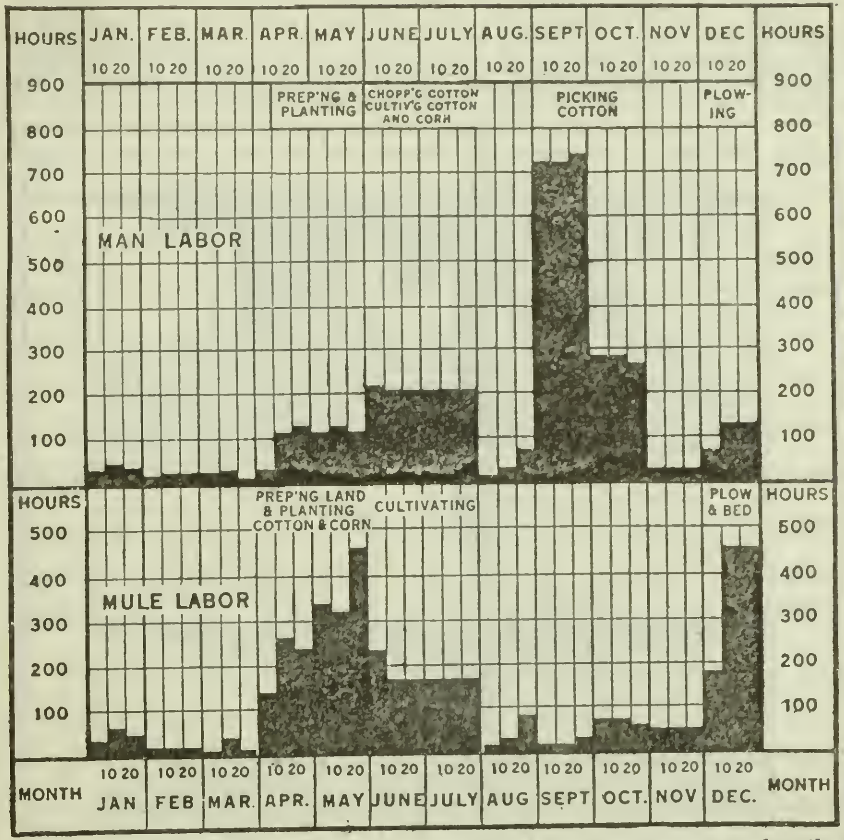
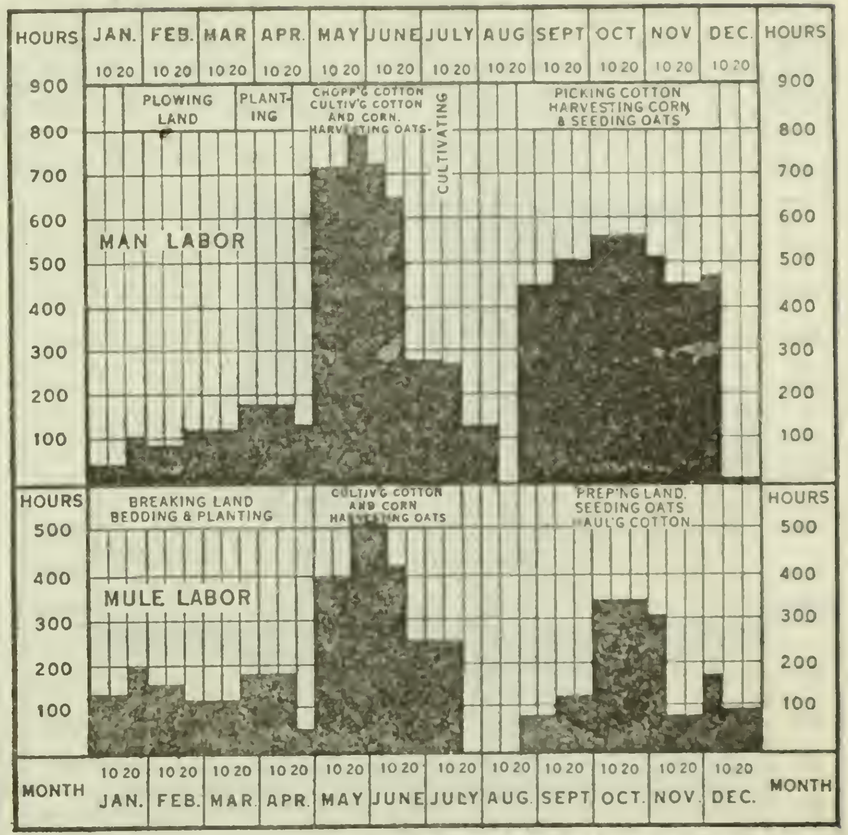


FIG. 7.—*Cotton belt: Seasonal distribution of field labor on a 552-acre cotton, corn, and oats farm, southern Georgia.*



FIGS. 6 and 7.—In the cotton belt the peak load of man labor occurs when the small cotton plants are "chopped out," or thinned, and hoed during May, June, and early July, varying with latitude, and again when the cotton is picked during the fall months. The greatest demand for mule labor occurs during late April to June, when both cotton and corn require cultivation and cowpeas are seeded, and again in the late fall and winter, when cotton is hauled to the gin, oats are seeded, and the land is plowed for next year's cotton and corn crops. In the nothern portion of the cotton belt or on heavy soils farther south, the peak load of mule labor is frequently shifted to early spring. On the Texas farm, which had 117 acres of cotton, 16 of corn, 3 of oats, and 3 of sorghum, the farmer and three sons did all of the work, except picking. During September and early October a colored family of four was hired to help in picking cotton. The Georgia farm is more diversified than is usual in the South. It had 75 acres of cotton, 90 of corn and peanuts, 80 of oats, 3 acres of sweet potatoes, and 1 acre of sugar cane. The peanuts and sweet potatoes were "hogged off." The labor force consisted of five colored croppers, with a small amount of day labor hired to help in harvesting oats. The cotton and corn was all grown by the croppers, the other crops by the farmer. (Data supplied by R. E. Willard and E. S. Haskell, Office of Farm Management.)

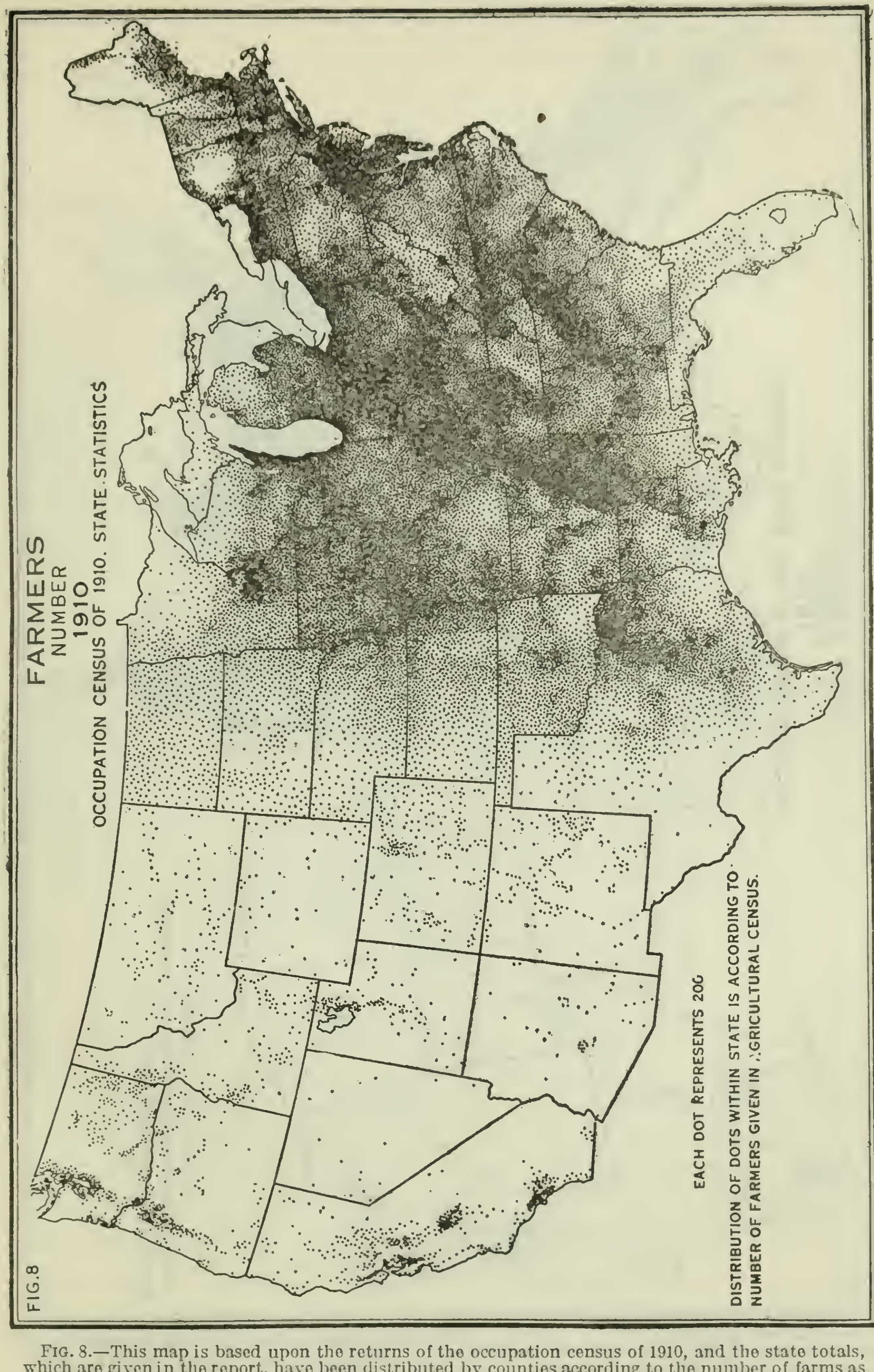


FIG. 8.—This map is based upon the returns of the occupation census of 1910, and the state totals, which are given in the report, have been distributed by counties according to the number of farms as given in the agricultural census of 1910. It is noticeable that, except for the Black Prairie of Texas, the areas of greatest density are located east of the Mississippi and Wabash rivers, particularly alor the east side of the Mississippi River from Vicksburg to Cairo, in the Piedmont of Georgia and So Carolina, in the Ohio River Valley, in southeastern Pennsylvania, and in the lake plains o York, Ohio, and Michigan. The total number of farmers in 1910 is given as 5,926,690. Te with 401,148, while Georgia ranked second with 285,548, Mississippi third with 270,255, an fourth, having in that year 266,384 farmers.

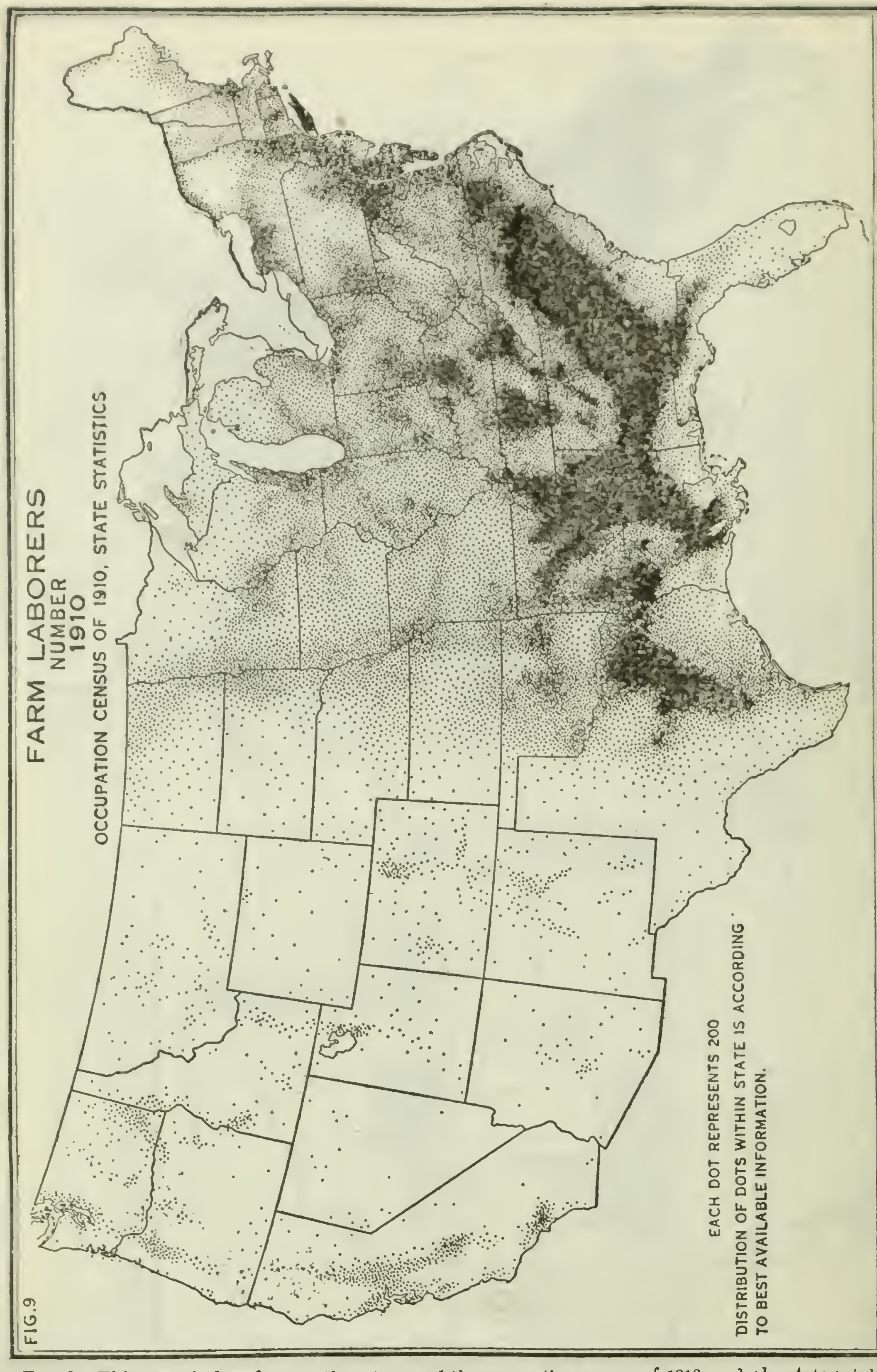


FIG. 9.—This map is based upon the returns of the occupation census of 1910, and the state totals, which are given in the report, have been distributed by counties partly according to the expenditure for labor, as given in the agriculture census of 1910, partly according to rural population, and partly according to information as to local employment of labor. Therefore, the number of dots in a state is correct, according to the census, but the distribution of the dots within a State is only approximate. In the South, where the cotton crop gives employment to a great number of farm laborers, the negro croppers probably have been included as farm laborers in the occupation census. Outside the cotton belt the greatest concentration of farm laborers is found in the tobacco districts of Kentucky, Tennessee, southwestern Ohio, southeastern Pennsylvania, and the Connecticut Valley; in the trucking sections of eastern Maryland and Delaware, of Long Island and of western New York, and in the sugar-cane region of Louisiana.

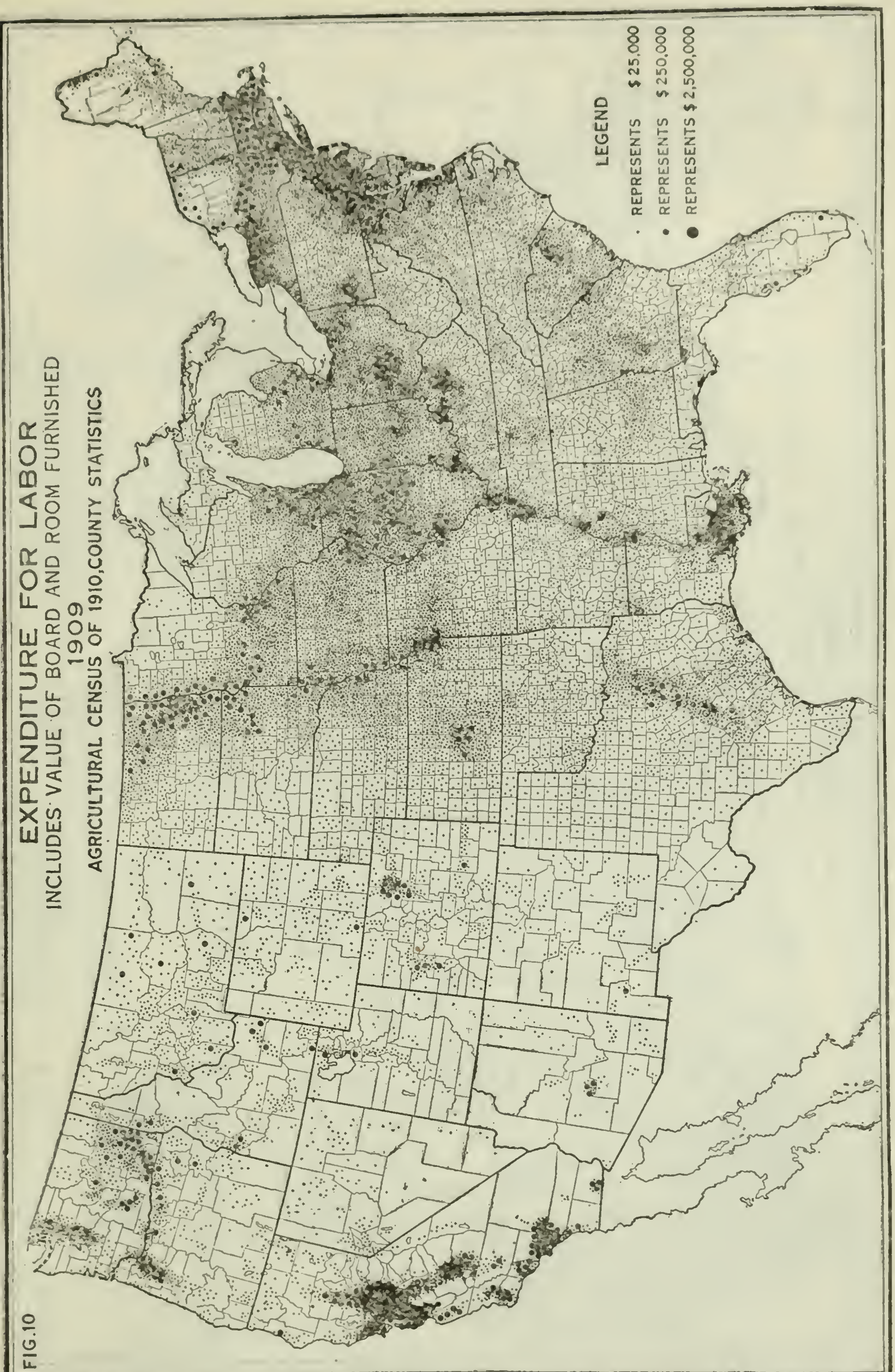
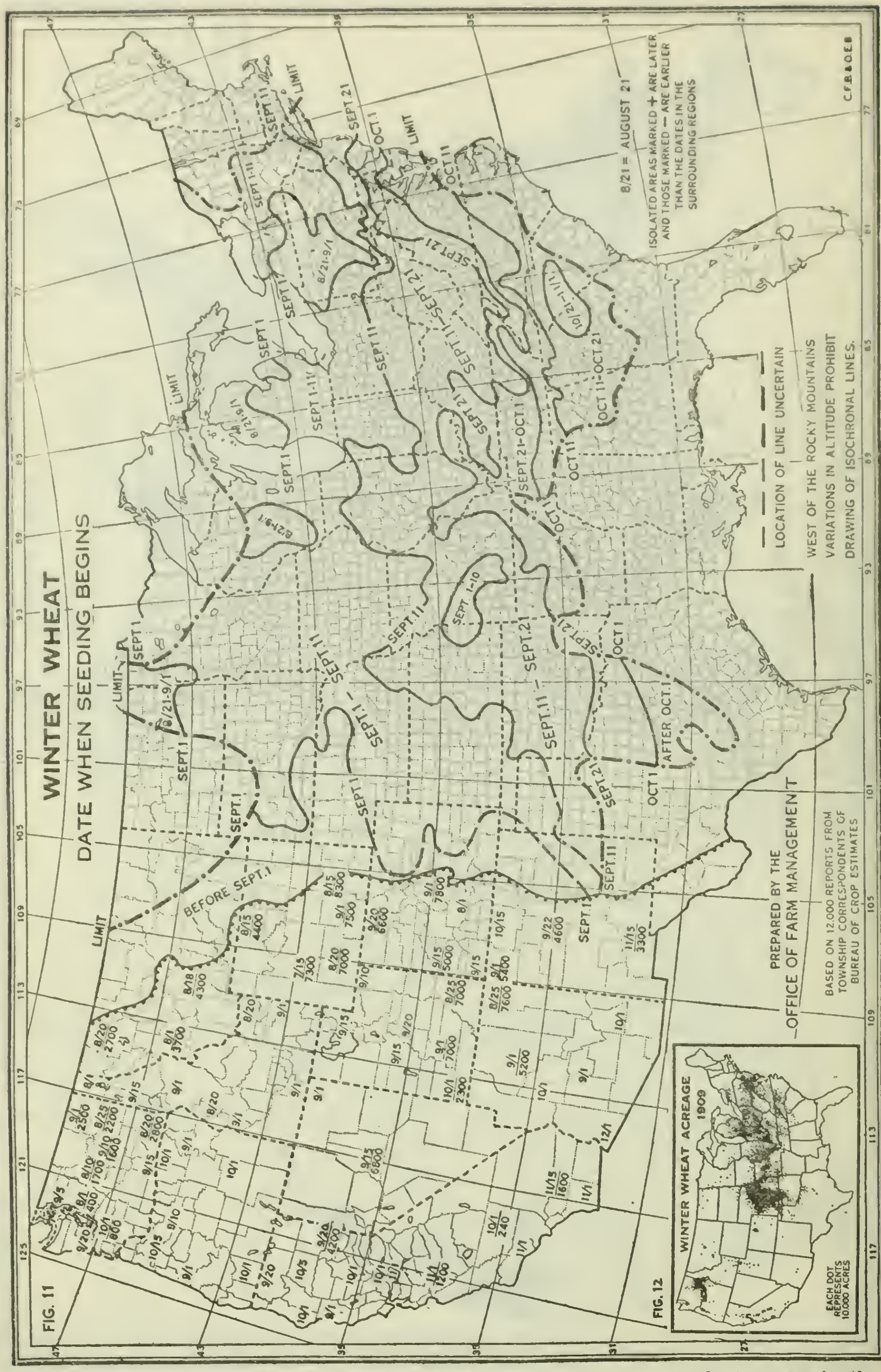
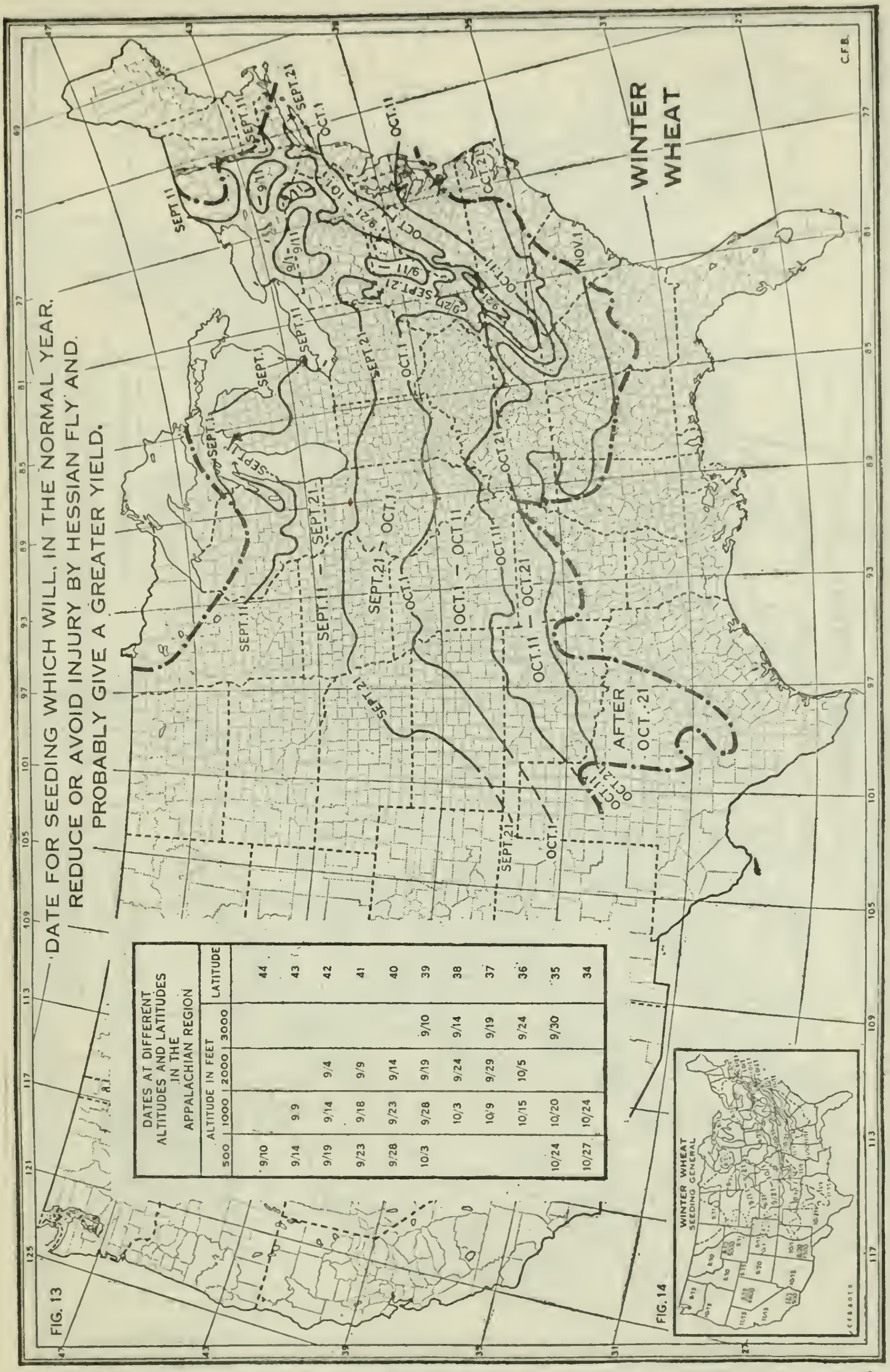


Fig. 10.—The regions of greatest expenditure for labor include the belt of intensive types of farming which extends from Baltimore to Boston, the fruit and truck region of western New York, the market corn region of central Illinois, the Elgin dairy district of northern Illinois and southeastern Wisconsin, the spring-wheat region of the Red River valley, the wheat region of eastern Washington and Oregon, the northern Willamette Valley, and, most prominent of all, the valleys of California, where fruit, alfalfa, small grain, truck, beans, and sugar beets are the important crops, and large amounts of labor are required at different times in the year. In the South the only areas that stand out prominently are the sugar-cane districts of Louisiana and the Black Prairie region of Texas. The labor of the South is paid mostly in kind or by shares of the crop, rather than in cash. The map presents, by counties, the statistics of cash wages plus cost of board, according to the agricultural census of 1910.



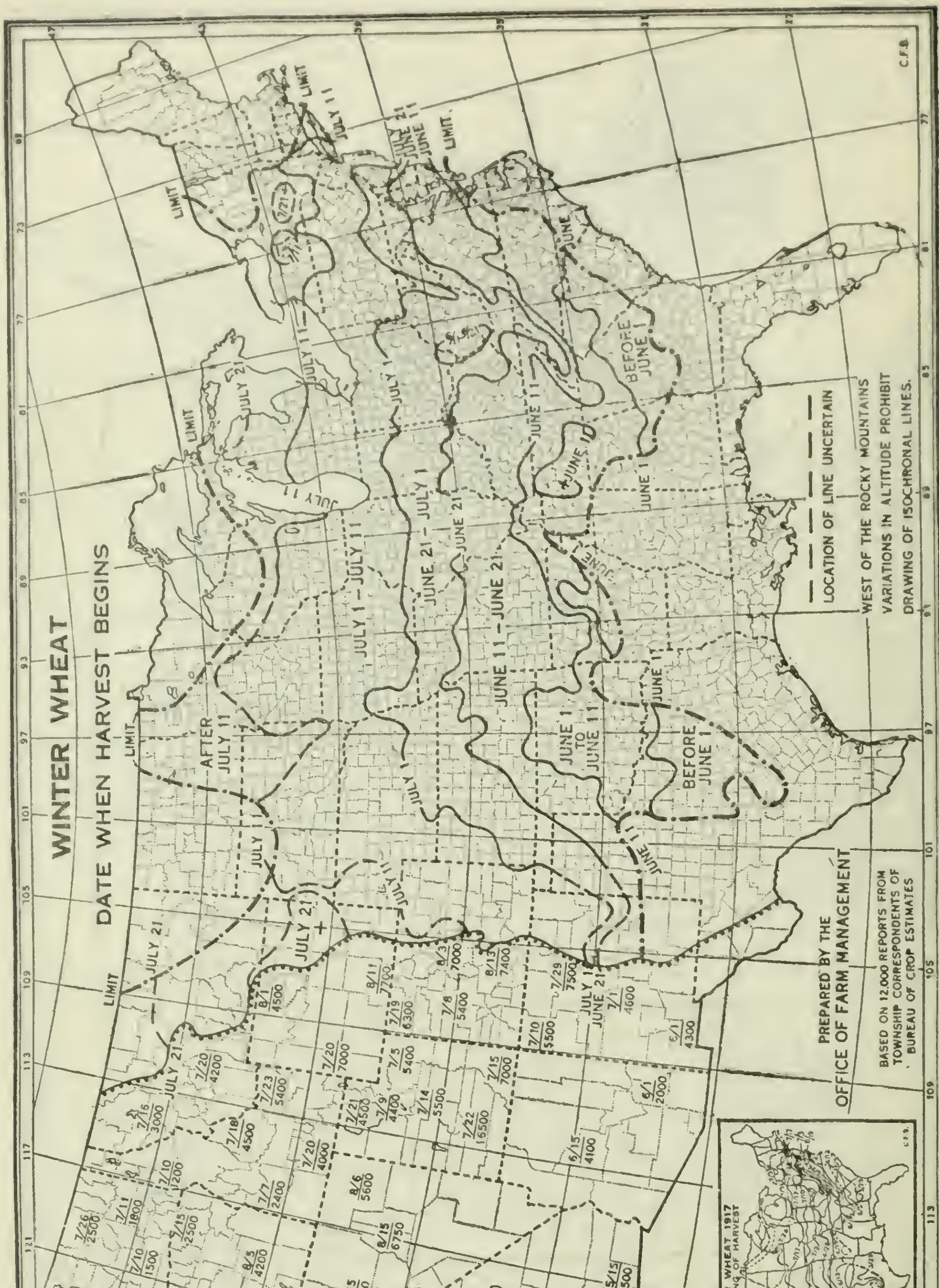
FIGS. 11 and 12.—Kansas and Nebraska have nearly one-third the winter wheat acreage in the United States. Seeding begins in central Nebraska about September 1 and ends in Texas about October 1. In southwestern Illinois, southern Indiana, and northeastern Maryland, other important centers, seeding begins usually about September 21. In eastern Kansas, Missouri, southern Illinois and Indiana, Kentucky, and Tennessee, the seeding dates shown on the map, which represent the practice of most farmers, are so early as to invite injury by the fly in practically every year. It is a serious problem to seed late enough to avoid injury by the Hessian fly and yet early enough to give the wheat a good start before winter sets in. In this and succeeding maps the heavy dot-and-dash line represents the boundary of the crop, beyond which either the acreage is so small as to be of no significance or else the data are insufficient to permit drawing isochronal lines.



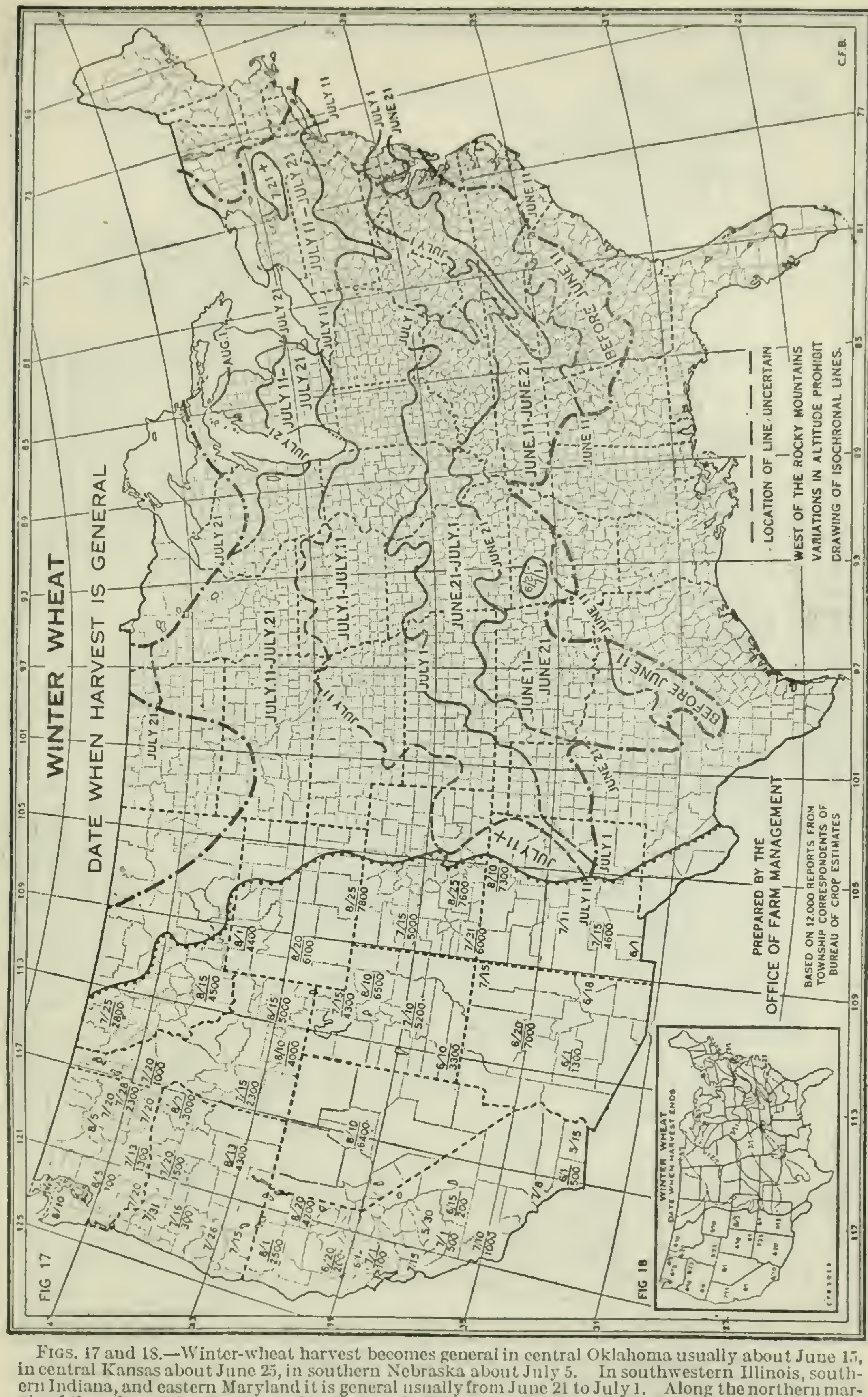
DATES AT DIFFERENT ALTITUDES AND LATITUDES IN THE APPALACHIAN REGION

LATITUDE	ALTITUDE IN FEET 500	1000	2000	3000
44	9/10			
43	9/14	9 9		
42	9/19	9/14	9/4	
41	9/23	9/18	9/9	
40	9/28	9/23	9/14	
39	10/3	9/28	9/19	9/10
38		10/3	9/24	9/14
37		10/9	9/29	9/19
36		10/15	10/5	9/24
35	10/24	10/20		9/30
34	10/27	10/24		

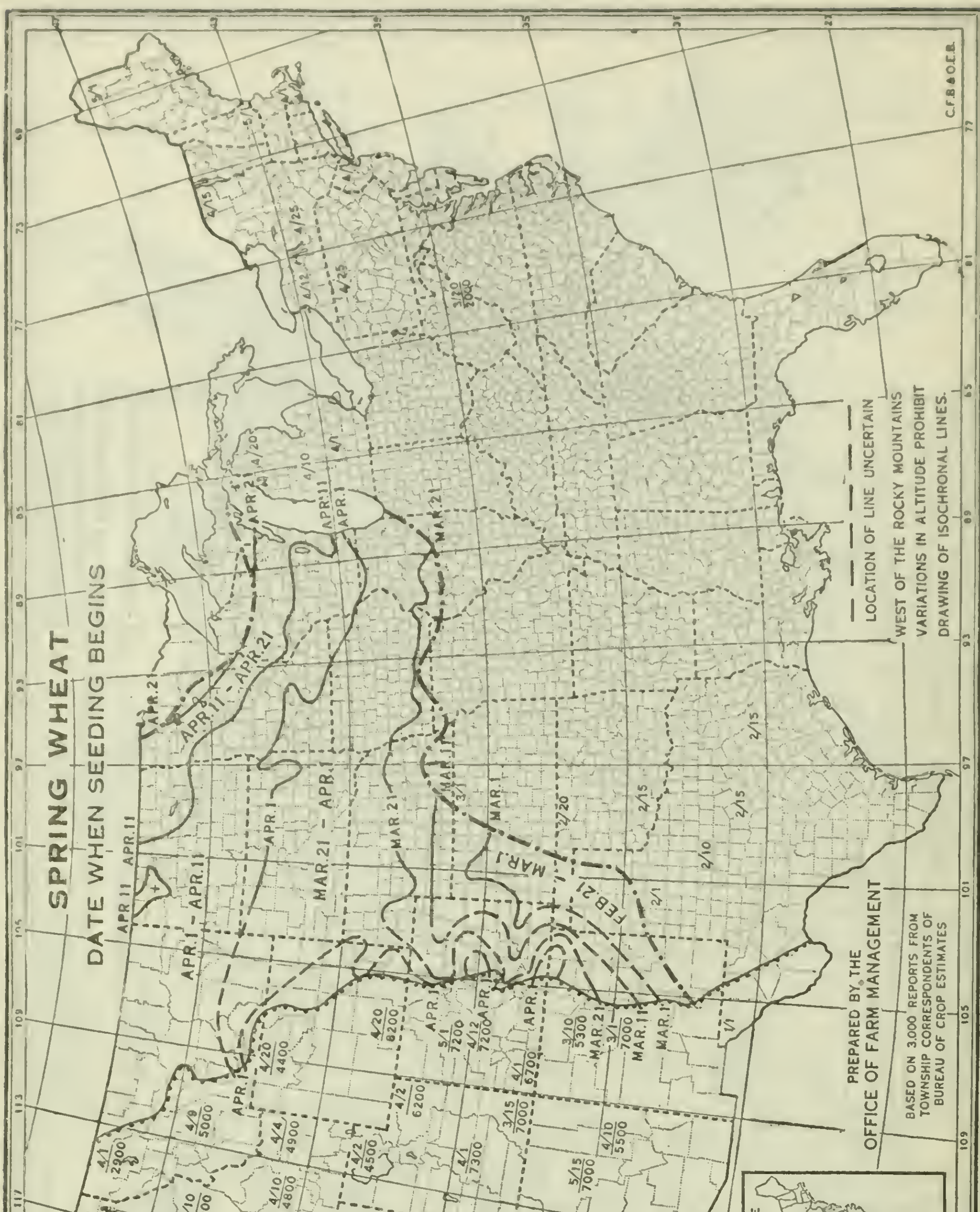
FIGS. 13 and 14.—This map is an attempt to correlate the recommendations of the different experiment stations as to the date of seeding winter wheat. The results of experiments in Kansas, Nebraska, Iowa, Indiana, and Ohio show that when the Hessian fly is prevalent the best yields may be expected when the seeding occurs just after the emergence of the last autumn brood of the fly; and when the fly is not numerous, the best time for seeding generally is about a week earlier. In the years when the fly is prevalent the actual dates to be recommended depend on experiments in the fields at the time, so in such years it is necessary to follow closely the recommendations of the state entomologists. Planting in the north depends largely on the season and the labor situation. South of the thirty-ninth parallel and east of southeastern Kansas the autumn is long enough to allow seeding after the average date of emergence of the fly, with the best chance of still securing the maximum yield.



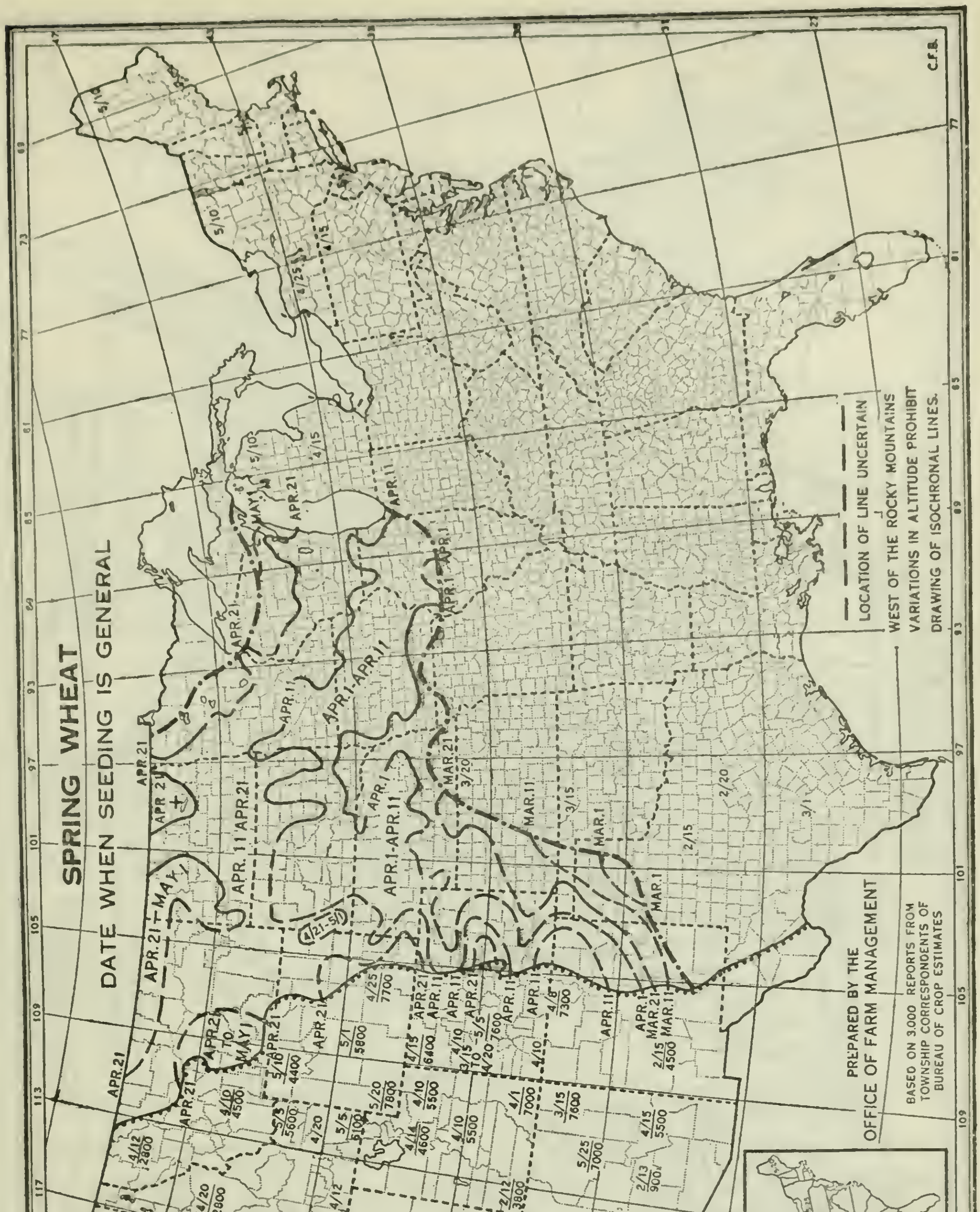
FIGS. 15 and 16.—The harvest of winter wheat begins in central Texas usually about May 25, but is of little importance until central Oklahoma is reached about June 5. In this section the army of transient harvest hands begins to assemble, and reaches its maximum size in central Kansas, where the harvest begins usually about June 15. By June 25, in the normal year, there are 50,000 transient laborers, it is estimated, working in the wheat fields of Kansas. Part of them have come in from the South, upon completion of the harvest there; part of them have been gathered from the cities and other centers of employment in the east, largely by the public and private labor agencies in Kansas City and other points; and in part the army is composed of local labor assembled from adjacent towns and villages. By July 1 harvest has begun in central Nebraska, and the harvest army, constantly disintegrating and being reinforced by fresh recruits, is busy in the wheat fields of that state.



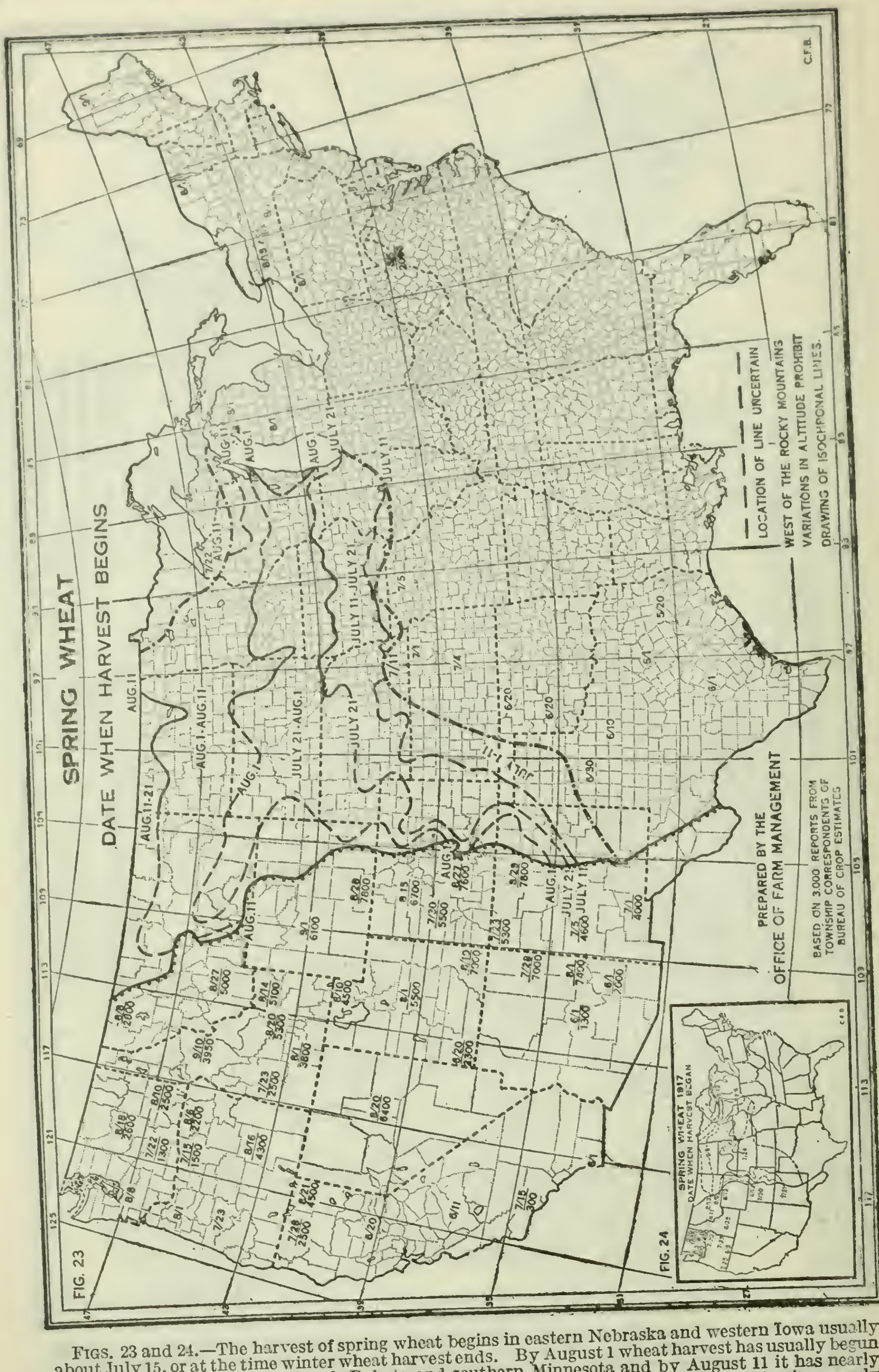
FIGS. 17 and 18.—Winter-wheat harvest becomes general in central Oklahoma usually about June 15, in central Kansas about June 25, in southern Nebraska about July 5. In southwestern Illinois, southern Indiana, and eastern Maryland it is general usually from June 21 to July 1. Along the northern margin of the winter-wheat region in New York and Michigan, and also in eastern Washington and Oregon, harvest is general about July 21. Two weeks after harvest is general it is over in all these regions except in eastern Washington and Oregon, where the harvest may not be finished before August 20 or 25. Records indicate that the average amount of labor required to harvest an acre of wheat in southeastern Pennsylvania, western Illinois, and Kansas is about 3 man and 4 horse hours, and in thrashing about the same amount. In California, with a combine harvester, the figures are 2 man and 10 horse hours per acre; and in eastern Washington, with a combine, 2 man and 8 horse hours, without a combine 1.5 man and 3 horse hours to harvest and 4.5 man and 4.5 horse hours to thrash an acre.



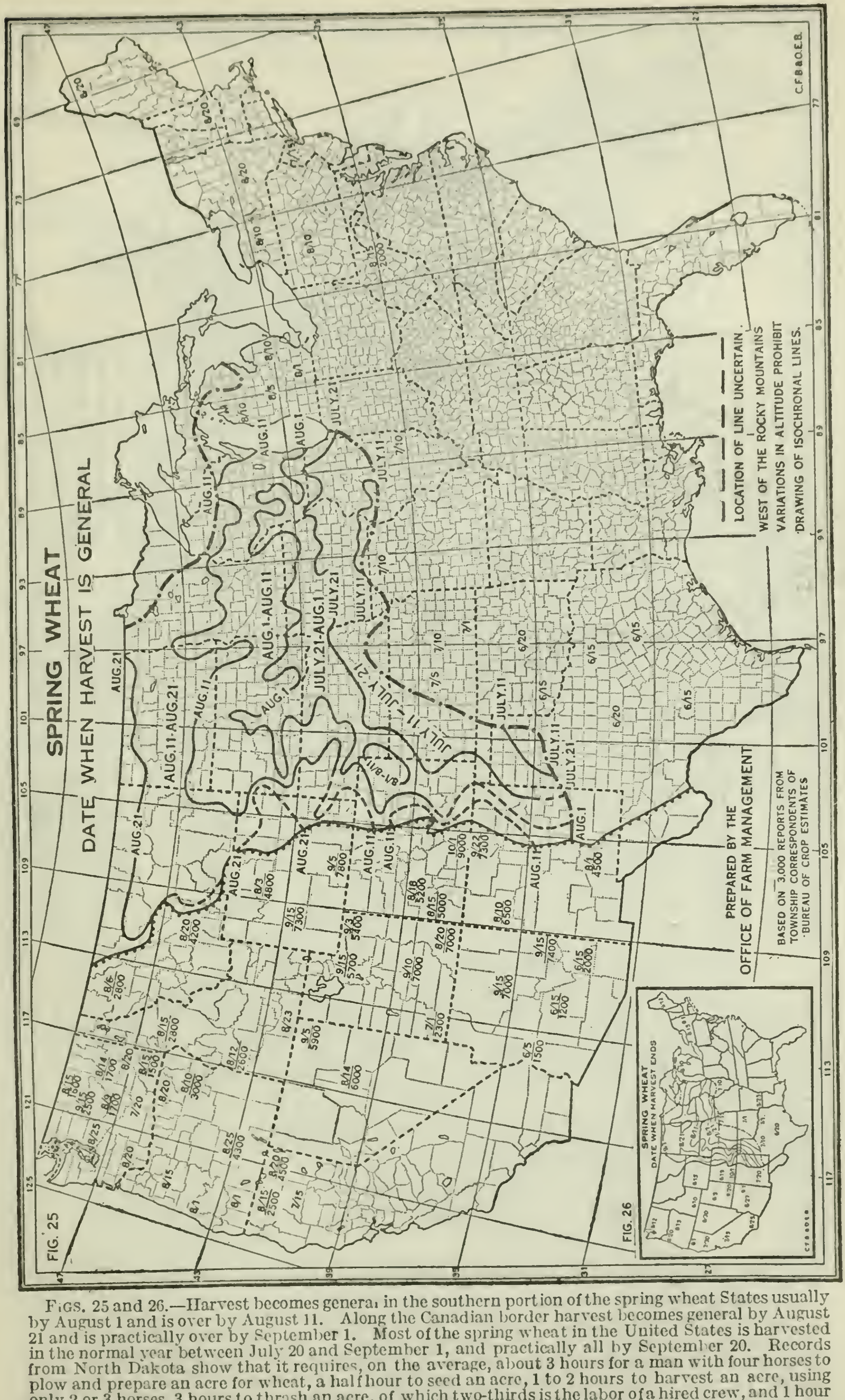
FIGS. 19 and 20.—Minnesota, the Dakotas, and eastern Washington produce over three-fourths of the spring wheat grown in the United States. Lines are drawn on the map only for those areas east of the Rocky Mountains having in general over 100 acres per county in the census year 1909. The seeding of spring wheat begins in northeastern Nebraska and western Iowa usually about March 21, and during the following ten days it begins throughout most of South Dakota and in Minnesota south of the Minnesota river. By April 11 it is beginning in northern North Dakota and north central Minnesota. Along the margin of the spring wheat belt in northern Minnesota and at higher altitudes in the West seeding usually does not begin until April 21 or even later. Seeding throughout the spring wheat region should be done as early as possible to avoid rust and secure the best yields, and for this reason it is necessary to do as much plowing as possible the previous fall.



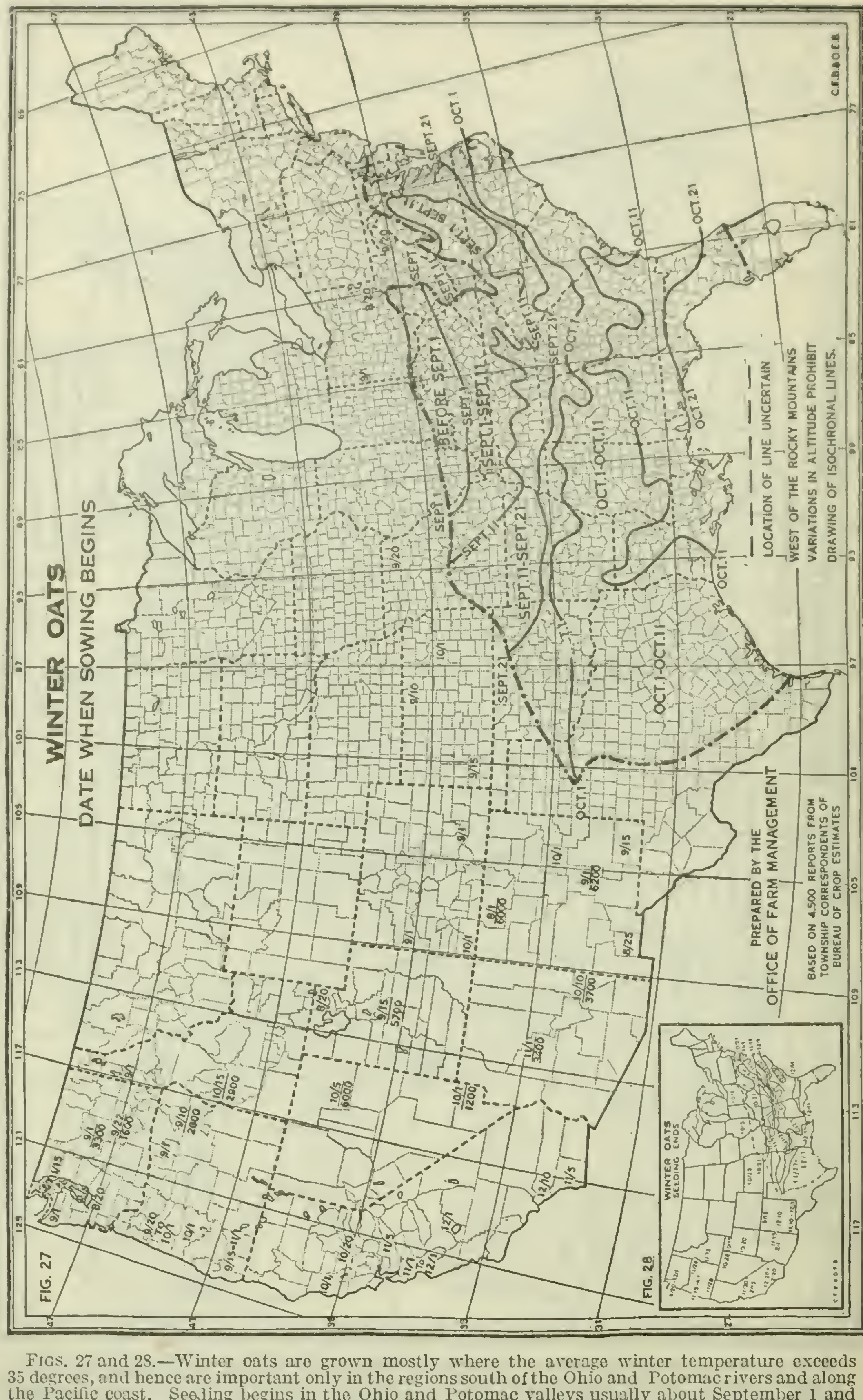
FIGS. 21 and 22.—The seeding of spring wheat becomes general in southern South Dakota usually about April 1 and in northern North Dakota about April 21, or some 10 days after the beginning date. In the Big Bend and Palouse districts of eastern Washington seeding is general during the first half of April. The usual duration of the period from beginning to end of seeding is about 20 days in Nebraska, where the acreage is small, 30 days in northern South Dakota, and 35 days in northern North Dakota. In eastern Washington it is 30 to 40 days. In the Dakotas and Montana seeding wheat requires on the average a half hour of man labor per acre and two hours of horse labor. The amount of land that can be seeded is dependent not only upon the supply of labor and efficient use of machinery in fall plowing, and in the plowing and seeding after the land thaws out in the spring, but also upon weather conditions during both these periods.



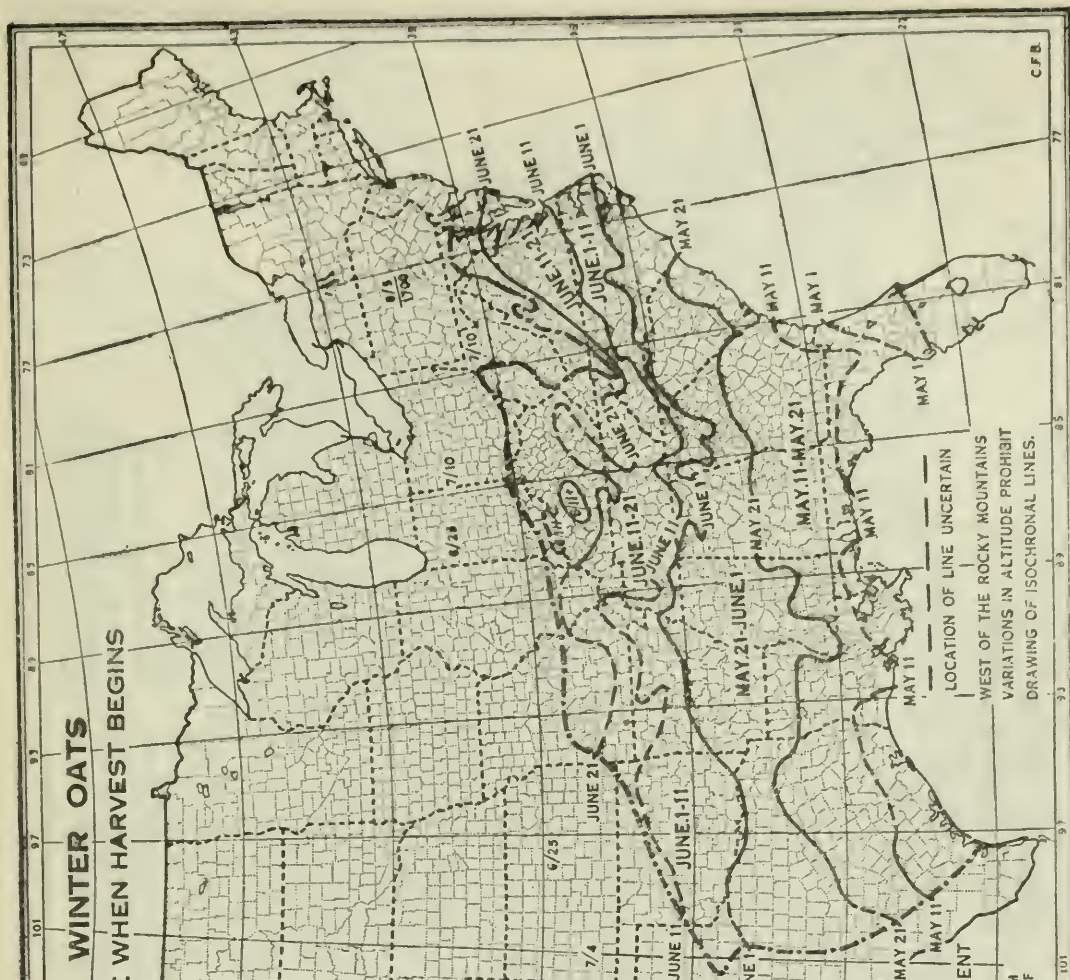
FIGS. 23 and 24.—The harvest of spring wheat begins in eastern Nebraska and western Iowa usually about July 15, or at the time winter wheat harvest ends. By August 1 wheat harvest has usually begun throughout practically all of South Dakota and southern Minnesota and by August 11 it has nearly reached the Canadian line. In eastern Washington and Oregon spring wheat harvest begins usually about July 15 in the warmer river valleys, but not until August 10 on the higher, cool plateaus. The transient labor supply for the harvest in Minnesota and the Dakotas, estimated at 30,000 to 40,000 men, comes mostly from States to the south where it has been employed in harvesting winter wheat, and from the logging camps. In Washington and Oregon the local supply is depended on, supplemented by laborers from the logging camps and mines. The corner insert map, figure 24, shows that the season of 1917 was nearly normal, but that it varied from the normal a few days in many places.



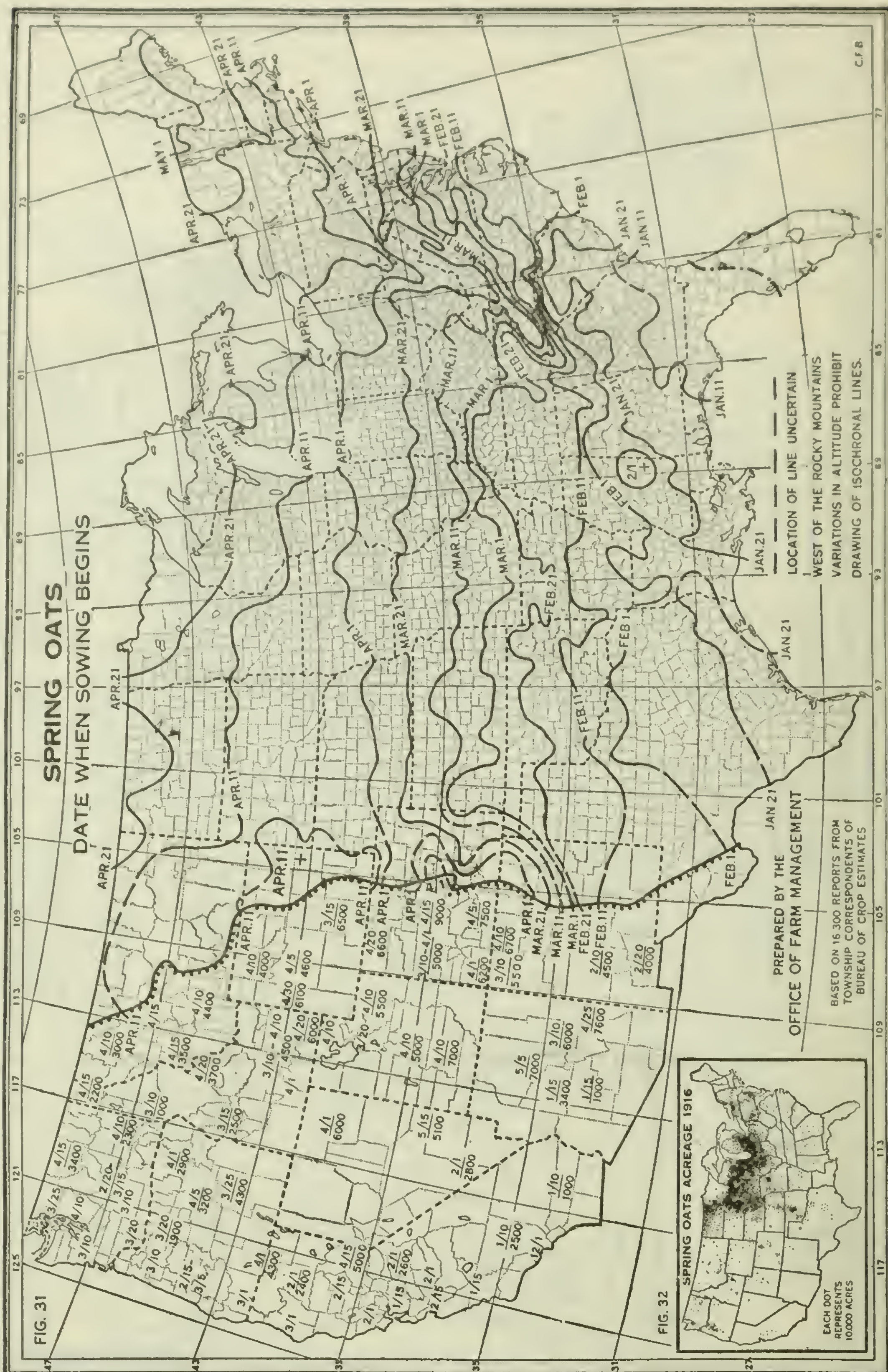
FIGS. 25 and 26.—Harvest becomes general in the southern portion of the spring wheat States usually by August 1 and is over by August 11. Along the Canadian border harvest becomes general by August 21 and is practically over by September 1. Most of the spring wheat in the United States is harvested in the normal year between July 20 and September 1, and practically all by September 20. Records from North Dakota show that it requires, on the average, about 3 hours for a man with four horses to plow and prepare an acre for wheat, a half hour to seed an acre, 1 to 2 hours to harvest an acre, using only 2 or 3 horses, 3 hours to thrash an acre, of which two-thirds is the labor of a hired crew, and 1 hour to market the wheat, a total of about 9 man hours and 21 horse hours of labor per acre. In the eastern Palouse district of Washington the average total amounts are 9 man and 29 horse hours; in the Big Bend region, including labor on summer fallow, 8 hours of man and 45 hours of horse labor.



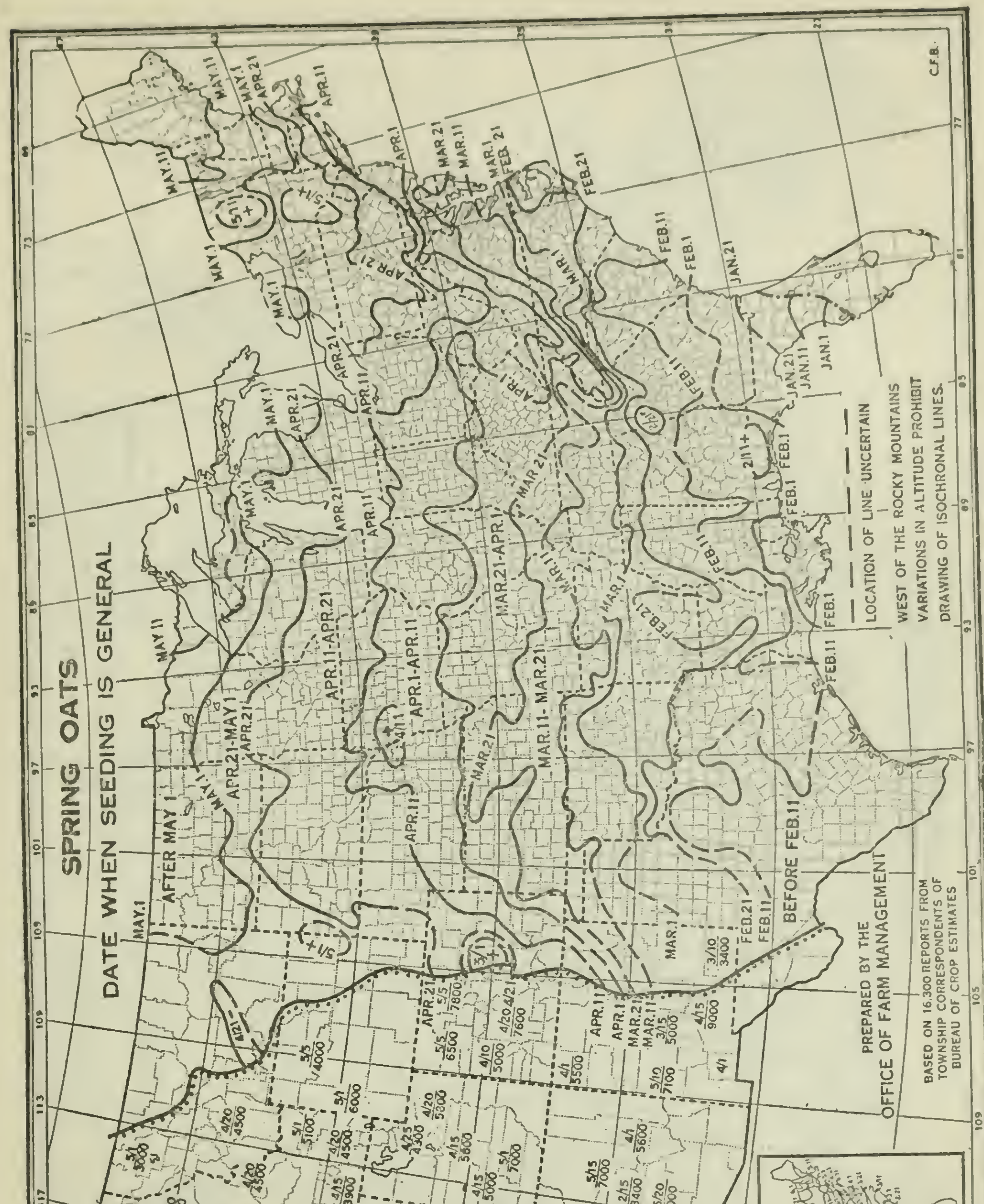
FIGS. 27 and 28.—Winter oats are grown mostly where the average winter temperature exceeds 35 degrees, and hence are important only in the regions south of the Ohio and Potomac rivers and along the Pacific coast. Seeding begins in the Ohio and Potomac valleys usually about September 1 and ends about October 1; along the northern margin of the cotton belt seeding begins about September 21 and may continue 30 to 50 days; and finally in northern Florida it begins about October 21 and is over by December 15. In western Washington seeding takes place usually during September, in Oregon during September and October, and in California mostly during October and November. Winter oats in all these sections are mostly a minor crop and seldom require extra labor. In the South plowing, harrowing, and seeding an acre of oats requires in general 6 to 10 hours of man labor and 13 to 20 hours of horse or mule labor. To produce an acre of winter oats requires from 10 to 20 hours of man labor.



FIGS. 29 and 30.—The harvesting of winter oats begins along the Gulf Coast early in May and progresses northward across the cotton belt at the rate of 10 to 15 miles a day, reaching the northern boundary of the cotton belt about June 11 and the lower Ohio and Potomac valleys usually by June 21. The winter oat harvest ends along the Gulf Coast usually by June 1, and in the Ohio and Potomac valleys before July 11. Along the Pacific Coast the harvest of winter oats begins in western Washington during the latter part of June or early July and may last into August; in western Oregon it begins usually during the first half of July and is over by August 1; and in California the harvest begins from mid-April to July 1, varying with locality and farm practice, and ends usually 4 to 8 weeks later. In the South it requires in general about 8 hours of man labor and 6 hours of mule labor to harvest an acre of oats, except in central Texas where only half as much man labor is required.

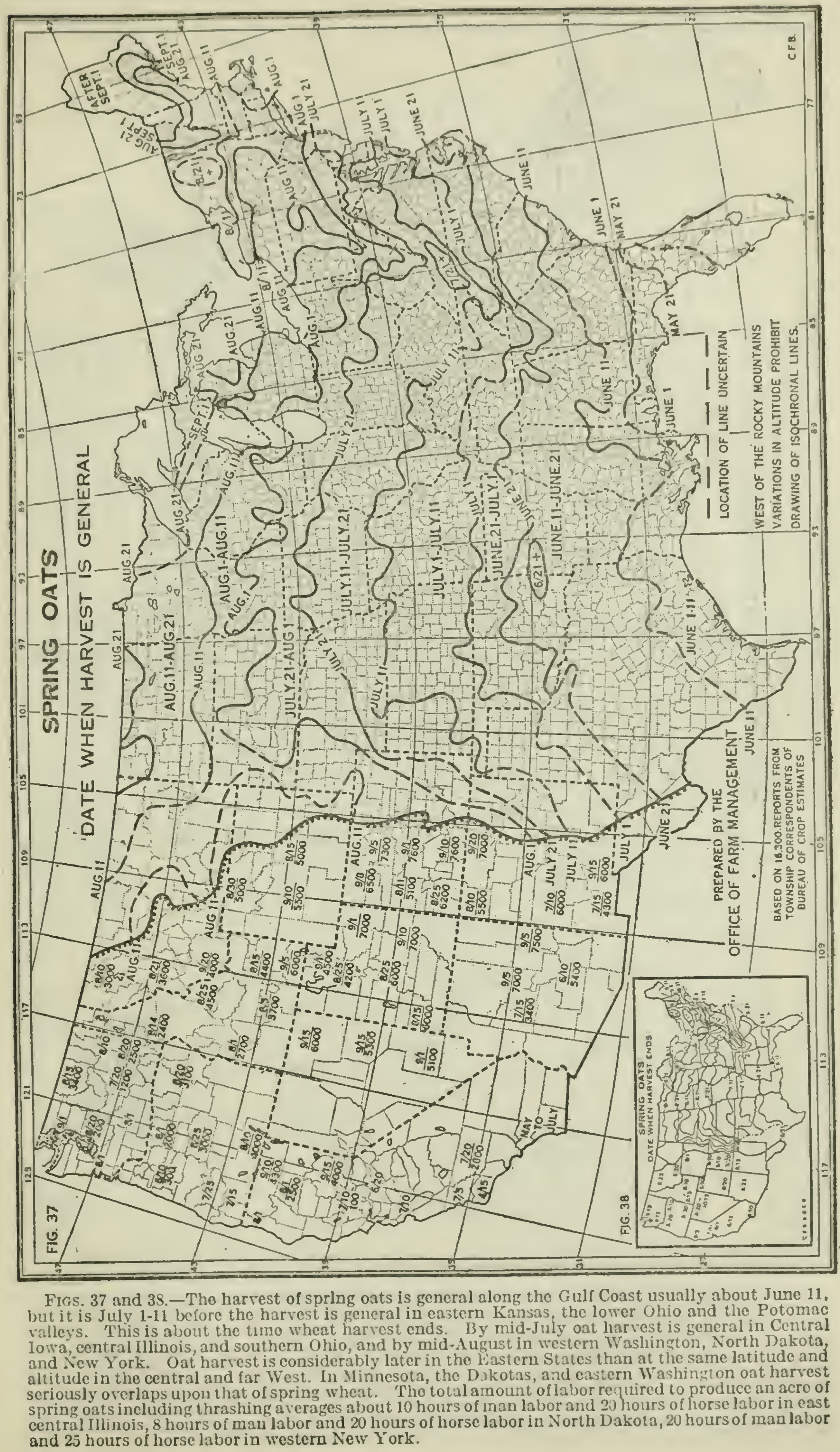


FIGS. 31 and 32.—The spring oat belt consists of a crescent-shaped area extending from New England to North Dakota, bounded on the north by the Great Lakes and on the south and west by a curved line across central Ohio, Illinois, eastern Nebraska and thence northward along the Missouri river. In the corn belt oats are sown in the spring before corn-planting time and harvested in July after the corn is laid by. There is, therefore, very little competition with the more profitable corn crop for labor at critical times of year. In the spring wheat region of the Northwest there is some competition for labor between the seeding of oats and wheat, but as the oats are generally sown 10 days later than the wheat they serve to lengthen and make less strenuous the seeding season. Outside the oat belt described above, spring oats are not a sufficiently important crop to affect seriously the requirements for farm labor.

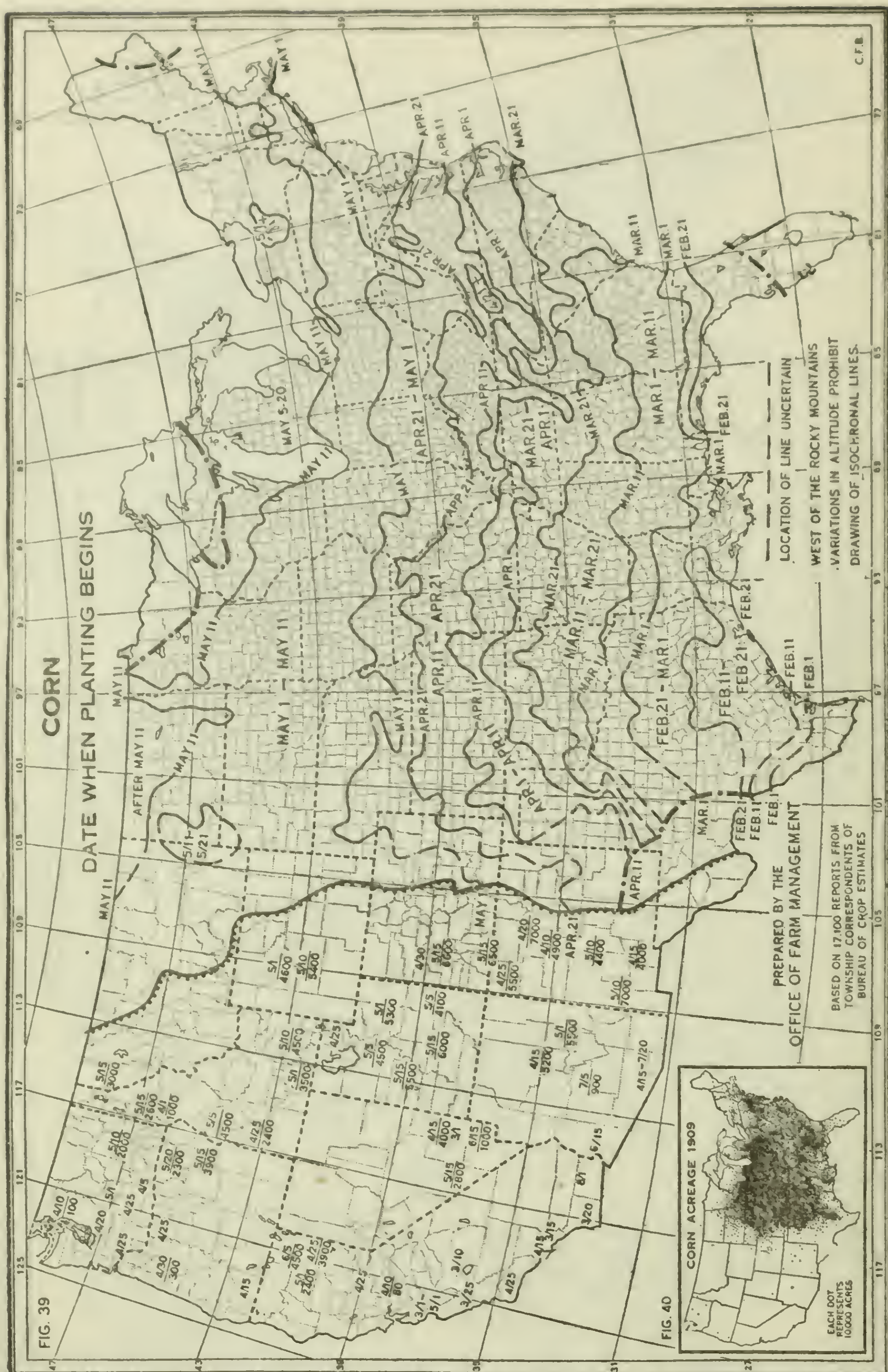


FIGS. 33 and 34.—Seeding of spring oats begins in the lower portion of the Ohio and Potomac river valleys about March 1 to 15 in the normal year, is general March 21 to April 1, and is over by April 11 to 21; in central Illinois seeding begins about March 21, is general usually April 1 to 11, and ends about April 15; in northern Iowa it begins about April 5, is general about April 11, and ends about April 21; and along the Canadian line in North Dakota it begins about April 21, is general about May 5, and is finished by May 21. In western New York seeding begins usually about April 15, is general by May 1, and is over by May 15. The preparation of land for oats in east central Illinois requires about two hours of man labor per acre and eight hours of horse labor, while for drilling about a half hour of man labor and an hour of horse labor are required. In other parts of the country the labor required for this operation appears to be 50 to 100 or more per cent greater.

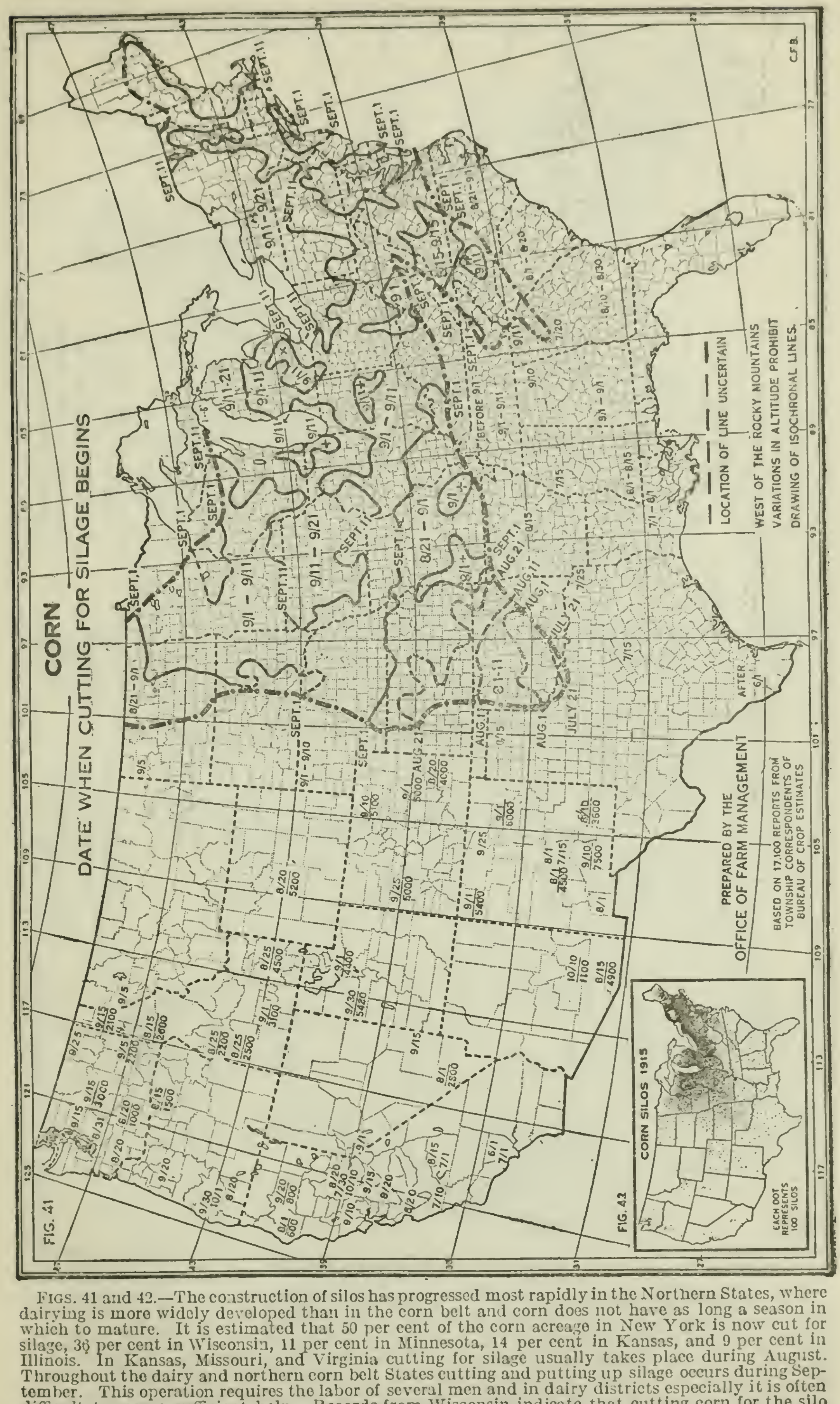
FIGS. 35 and 36.—The harvest of spring oats begins along the Gulf coast usually about May 21 and progresses northward up the Mississippi valley at the average rate of 14 miles a day until about August 11 it crosses the boundary into Canada. Along the Atlantic and Pacific coasts the rate is somewhat less rapid. In central Illinois, central Iowa, and eastern Nebraska, in which states nearly one-third of the total oat acreage of the United States is found, the harvest usually begins about July 11. The small map in the corner shows the beginning of oat harvest in 1917. In this year the season in some districts was two weeks later than usual. In east central Illinois about 2. 5 hours man labor and 3 to 4 hours of horse labor are required to cut and shock an acre of oats. In North Dakota the labor required for harvesting averages 2 hours of man labor and 4 hours of horse labor per acre, while in western New York the corresponding figures are 3. 5 hours of man labor and 3. 5 hours of horse labor per acre.



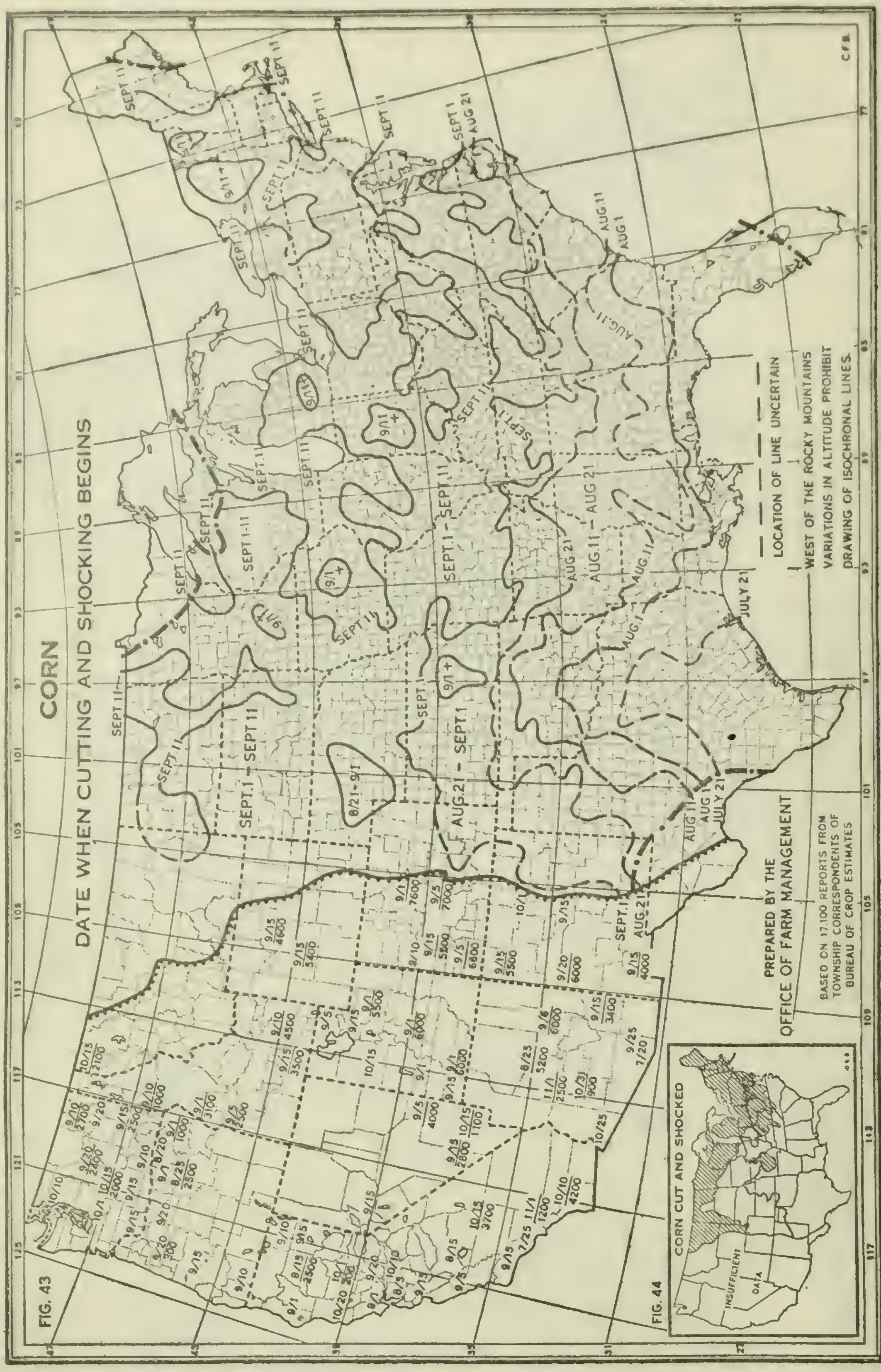
FIGS. 37 and 38.—The harvest of spring oats is general along the Gulf Coast usually about June 11, but it is July 1-11 before the harvest is general in eastern Kansas, the lower Ohio and the Potomac valleys. This is about the time wheat harvest ends. By mid-July oat harvest is general in Central Iowa, central Illinois, and southern Ohio, and by mid-August in western Washington, North Dakota, and New York. Oat harvest is considerably later in the Eastern States than at the same latitude and altitude in the central and far West. In Minnesota, the Dakotas, and eastern Washington oat harvest seriously overlaps upon that of spring wheat. The total amount of labor required to produce an acre of spring oats including thrashing averages about 10 hours of man labor and 20 hours of horse labor in east central Illinois, 8 hours of man labor and 20 hours of horse labor in North Dakota, 20 hours of man labor and 25 hours of horse labor in western New York.



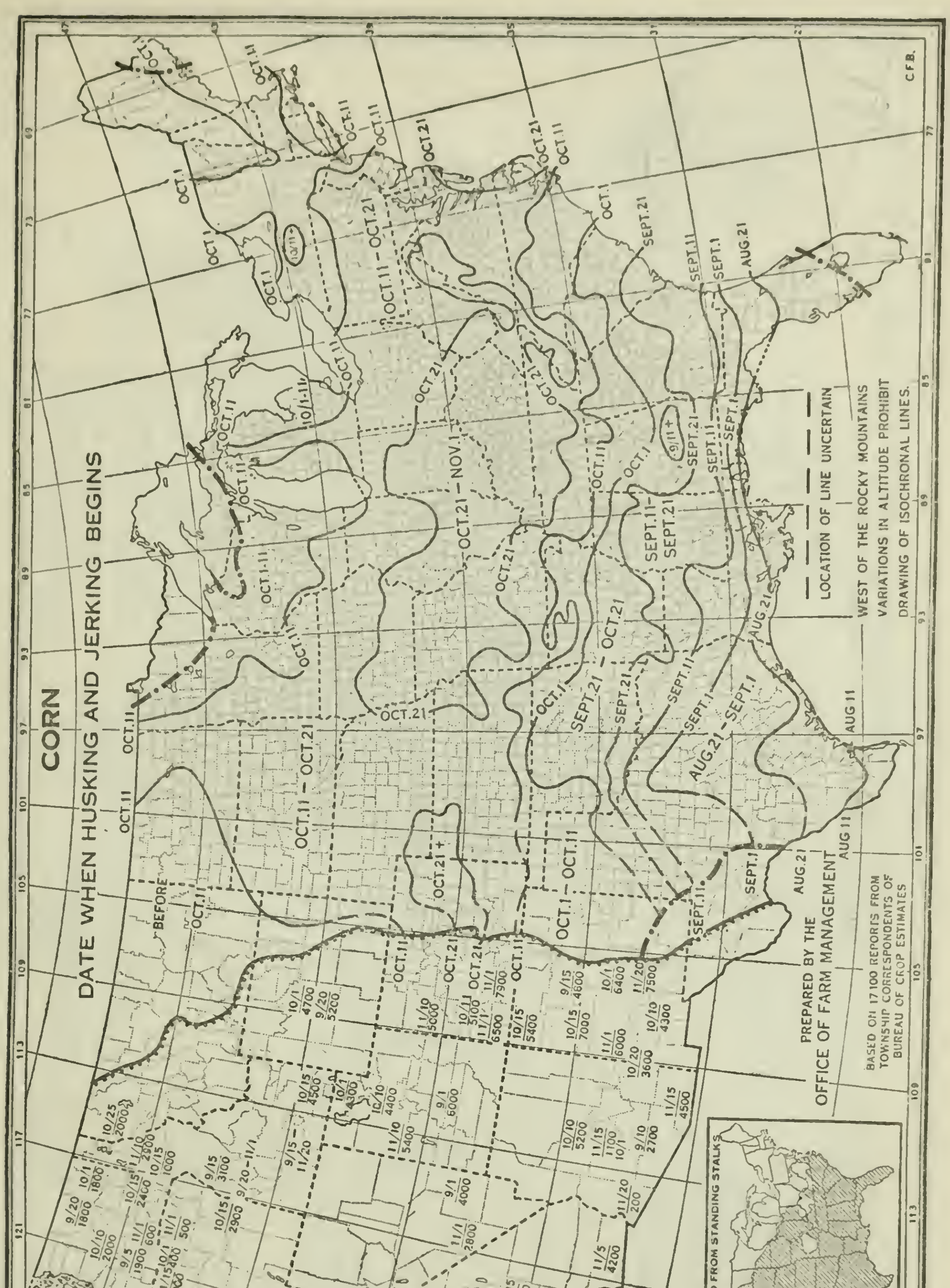
FIGS. 39 and 40.—Planting corn begins usually in extreme southern Texas before February 1 and progresses northward at an average rate of 13 miles a day until by May 1 it has begun generally in central Nebraska, north central Illinois, and central Ohio. During the next 10 days corn planting begins in practically all regions where it is grown northward to the Canadian line. Throughout the great corn States of Ohio, Indiana, Illinois, and Iowa, and in southern Wisconsin, Minnesota, and South Dakota corn planting is general about May 15. In New York and northern and eastern Wisconsin it is general the last week in May. Planting is completed throughout the corn belt usually by June 1. In the South there are often two important planting periods during the season, an early planting before cotton planting and a late planting usually in June, after the planting and chopping out of cotton is completed.



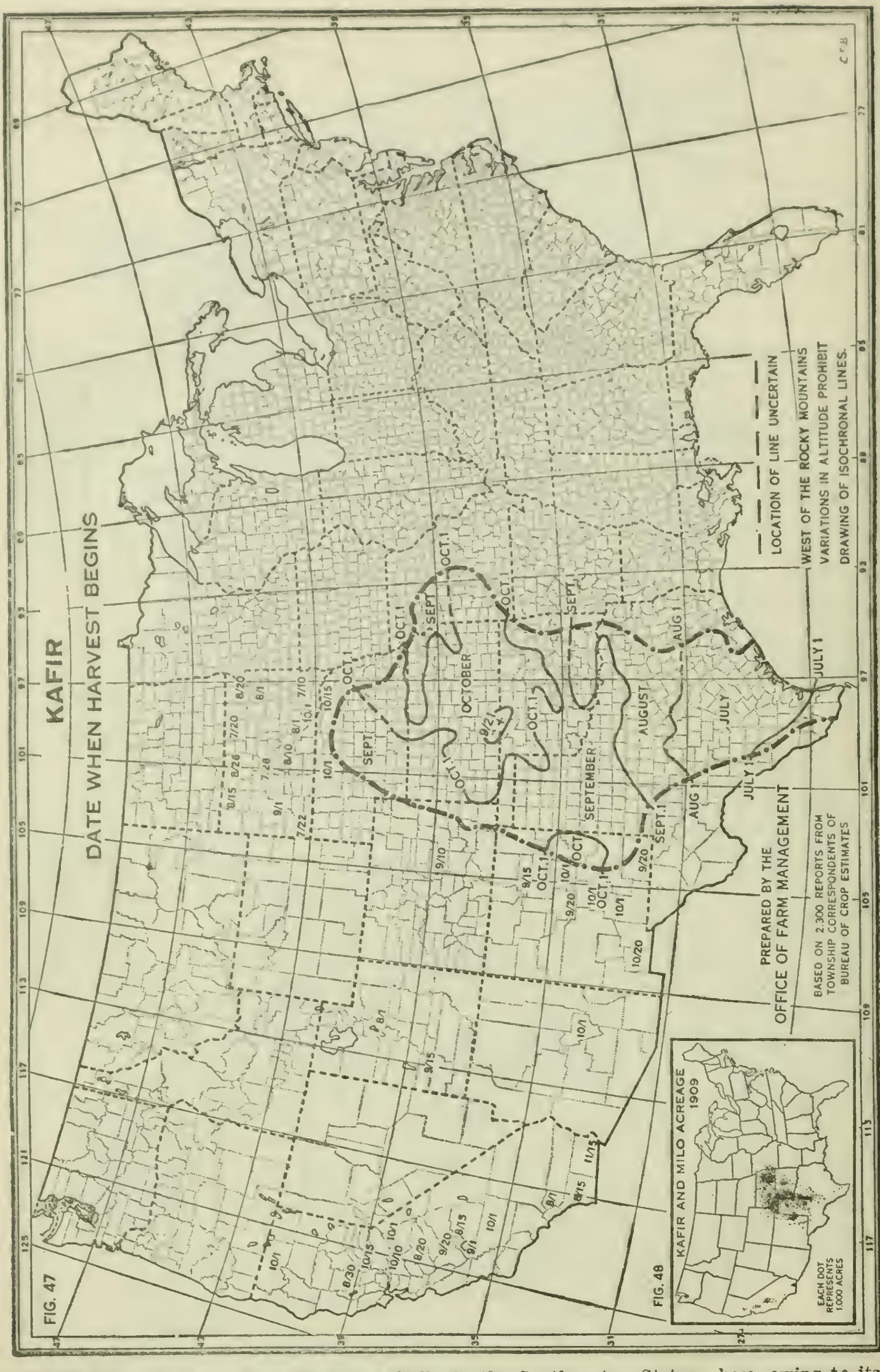
FIGS. 41 and 42.—The construction of silos has progressed most rapidly in the Northern States, where dairying is more widely developed than in the corn belt and corn does not have as long a season in which to mature. It is estimated that 50 per cent of the corn acreage in New York is now cut for silage, 36 per cent in Wisconsin, 11 per cent in Minnesota, 14 per cent in Kansas, and 9 per cent in Illinois. In Kansas, Missouri, and Virginia cutting for silage usually takes place during August. Throughout the dairy and northern corn belt States cutting and putting up silage occurs during September. This operation requires the labor of several men and in dairy districts especially it is often difficult to secure sufficient help. Records from Wisconsin indicate that cutting corn for the silo requires on the average about 4 hours of man labor and 4 hours of horse labor per acre, while filling the silo requires about 18 hours of man labor and 12 hours of horse labor per acre of corn.



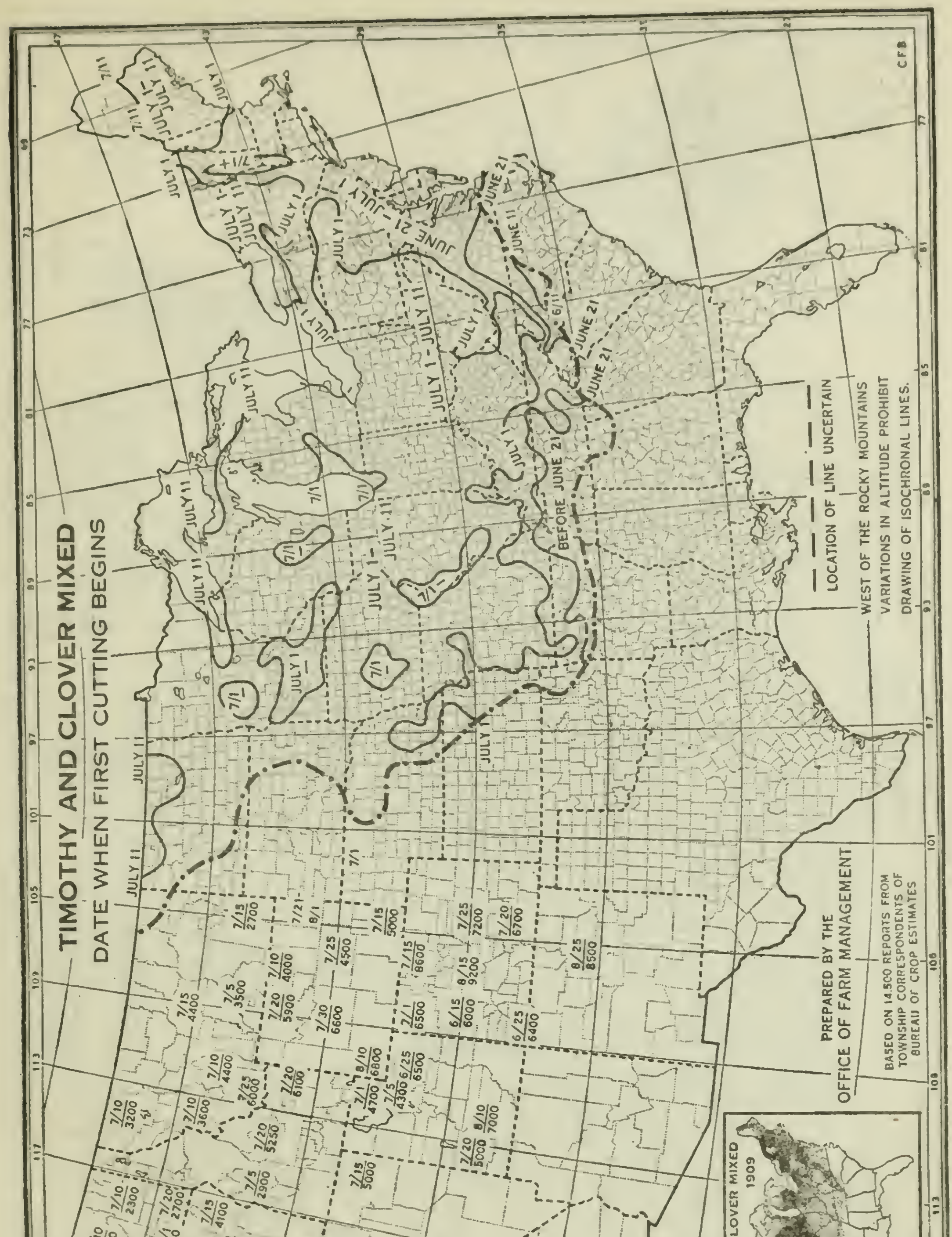
FIGS. 43 and 44.—The cutting and shocking of corn is the common practice in the dairy States of the North and in Ohio, northeastern Kentucky, West Vigrinia and most of Virginia and Maryland, also in the eastern Ozark region of Missouri. Cutting begins throughout this entire area between September 1 and 21, and is general from Iowa eastward to New York, Tennessee, and Virginia during the last 10 days of September. In the hill lands of New England and New York, in northern Wisconsin and from Iowa northward, westward and southward it is general between September 10 and 20. The dotted line on the small corner map shows where the beginning of cutting and shocking of corn occurs, on the average, at the same time as the beginning of seeding of winter wheat. Cost accounting records and reports from six States show that the amount of labor required to cut, husk, and haul an acre of corn averages about 25 hours of man and half as many hours of horse labor per acre.



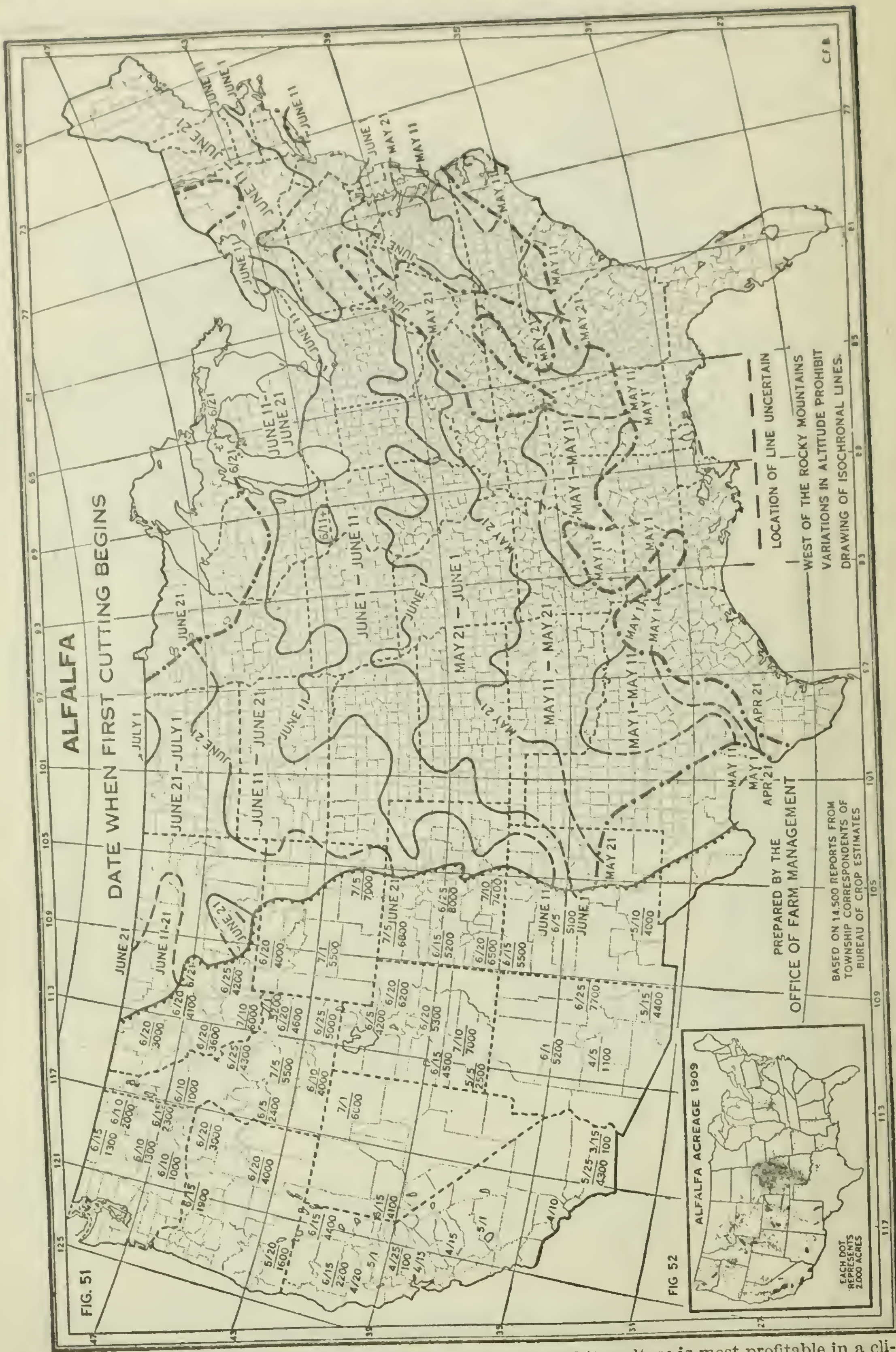
FIGS. 45 and 46.—Husking or jerking from the standing stalk is the common method of harvesting corn in the Southern States and south and west of a line from Fort Wayne, Ind., to Bismarck, N. Dak. This operation begins in the Southern States during September (in central Texas and Florida during August) and becomes general during October. Along the northern margin of the corn belt and in the dairy States, it occurs during the first 10 days of October. In the heart of the corn belt, where there is a large acreage to handle, it begins during the latter part of October and continues into December. The amount of labor required for this operation, as shown by records from several States, ranges in general from 4 to 8 hours of man labor and 4 to 12 hours of horse labor per acre. The average is about 6 hours of man and 8 hours of horse labor per acre. The stalks are plowed under later in the fall or in the spring. Little transient seasonal labor is employed in the culture of corn.



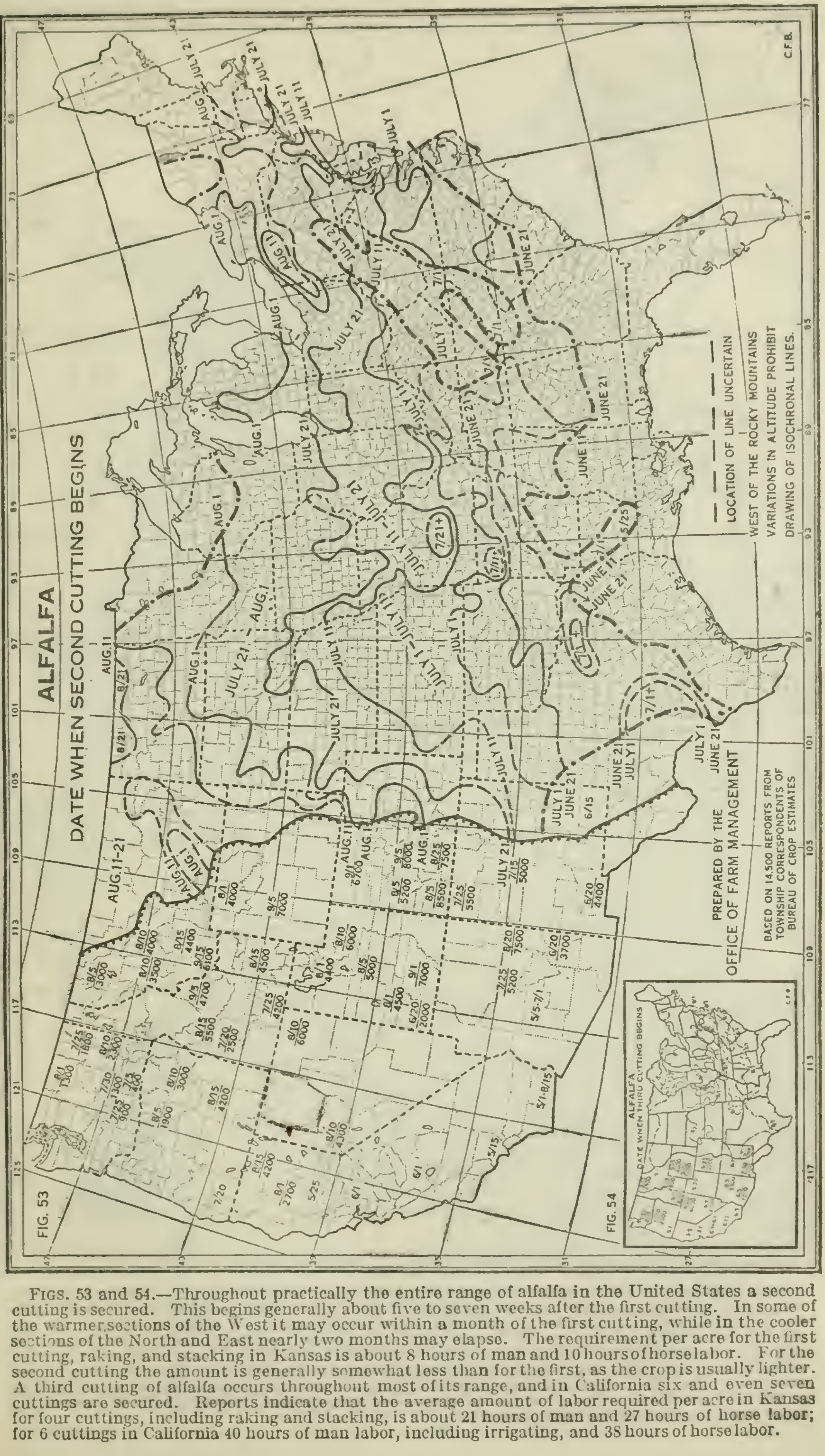
FIGS. 47 and 48.—Kafir is confined practically to the Southwestern States where, owing to its drought resistant character, it has become an important crop. It is both harvested for seed and cut for forage. As kafir is a comparatively new crop, farm practice in its culture is not as well established as with other staple crops, while the long growing season and vicissitudes of rainfall over much of its range not only permit but enforce wide latitude in dates of planting and harvest; hence, it has been possible to draw lines on the map only by 30-day rather than by 10-day periods. Very little transient labor from outside is used in harvesting kafir corn. In the Staked Plains of Texas records show an average labor requirement for harvesting and thrashing of 4.4 man hours and 8.8 horse hours per acre. The total labor required to produce an acre was 14 man hours and 37 horse hours. These figures, however, will vary greatly with the size of the crop and other conditions.



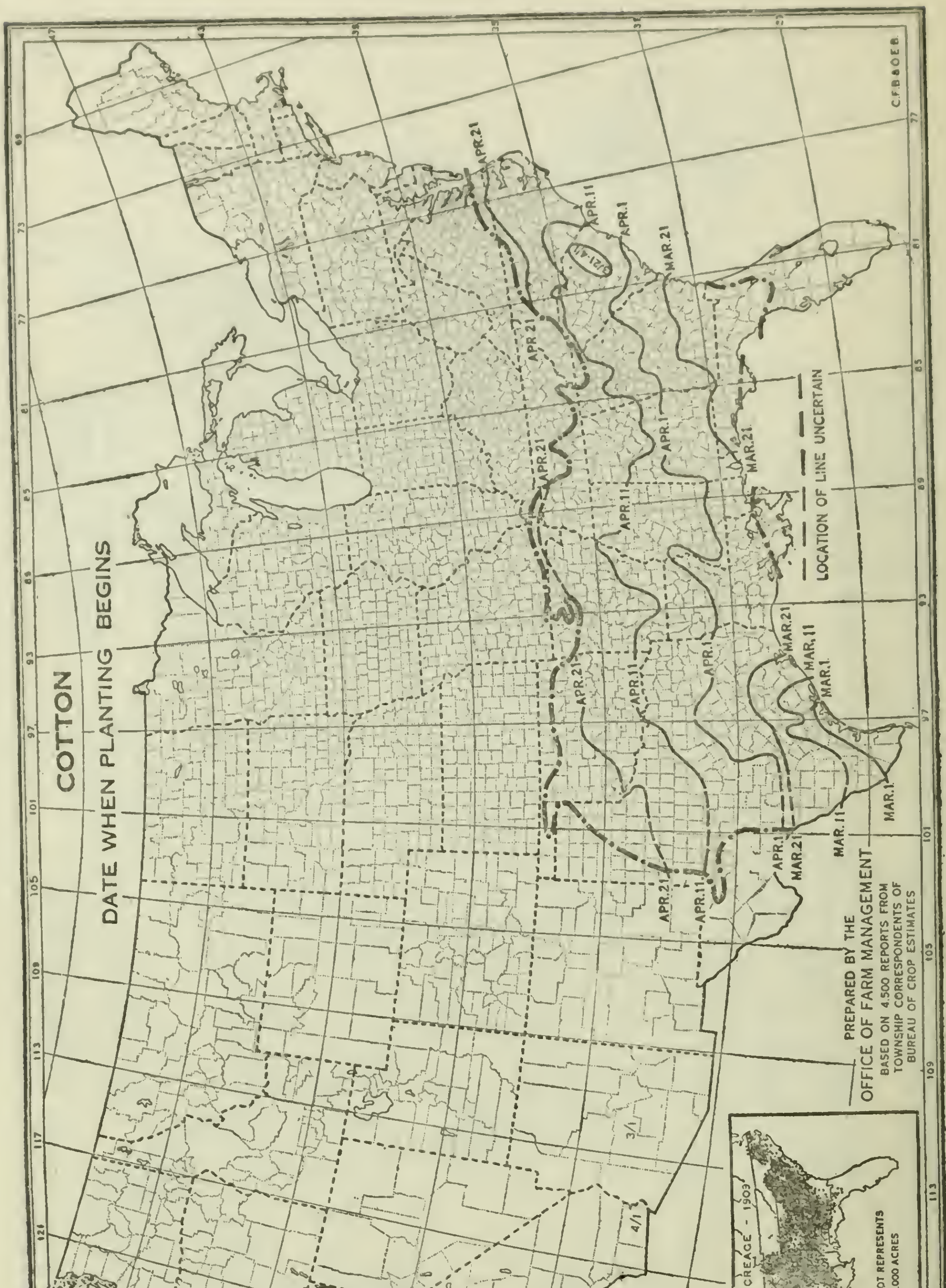
FIGS. 49 and 50.—Timothy, sown separately or mixed with clover, is the principal hay crop in the corn belt and in the eastern, northern, and Pacific northwestern dairying regions of the United States. In the hill lands of New York and in northern Wisconsin it constitutes over one-half of the acreage of all crops, and hay-making time becomes the busiest period of the year. In the corn belt the cutting of clover hay frequently occurs at the same time as the last cultivation of corn and as a result there is a heavy demand for labor at this time of year. Little transient labor is used, however, in cutting and curing hay. Throughout the region of greatest production the first cutting of timothy and mixed hay begins usually about July 1. Along the southern margin of the belt it may begin one to two weeks earlier and along the Canadian border one to two weeks later. In general, the average amount of labor required to cut, rake, and haul to the barn is about 8 man and 8 horse hours per acre.



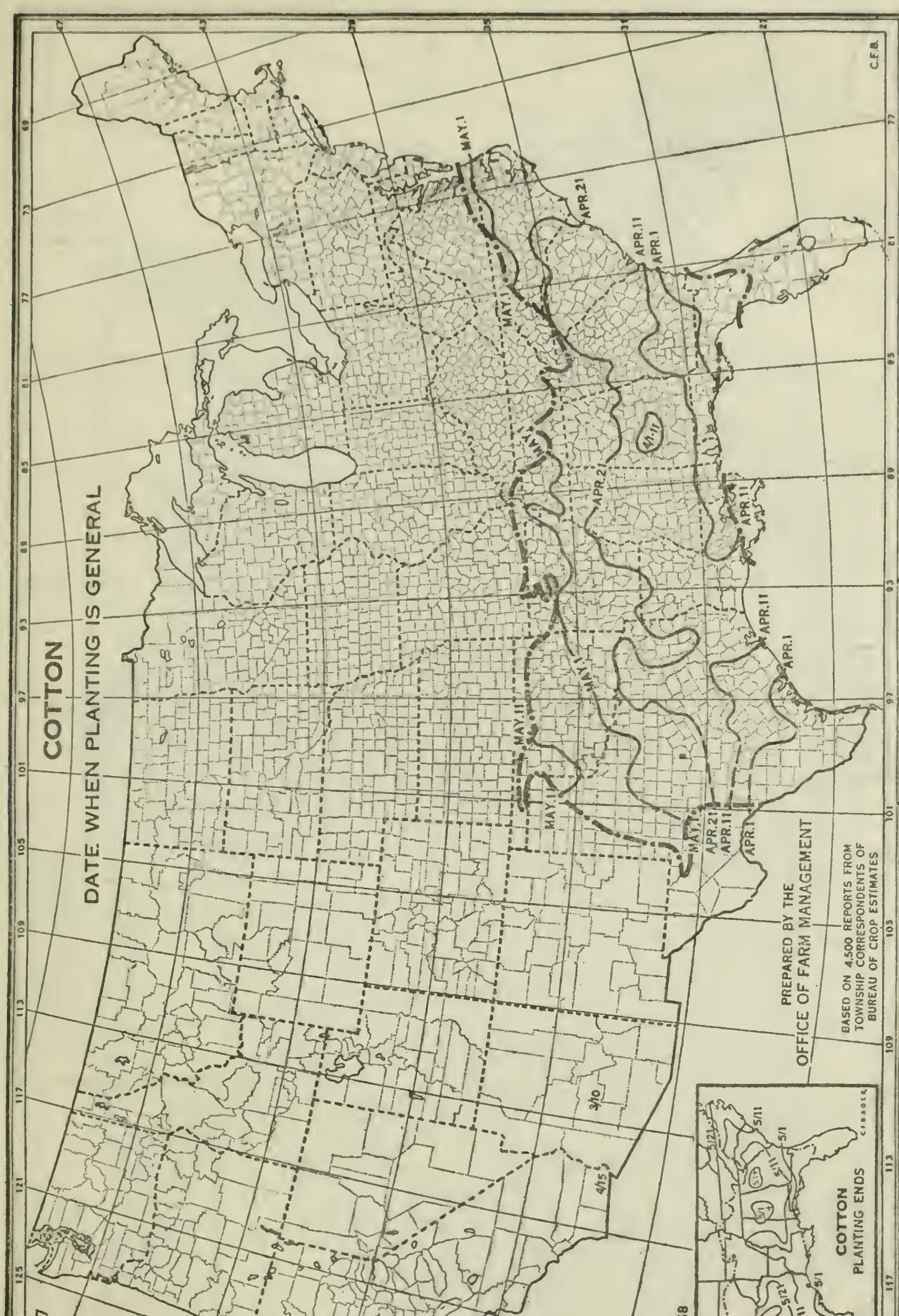
FIGS. 51 and 52.—Alfalfa requires soils that are not acid, and its culture is most profitable in a climate that is not rainy during the summer, when the crop is being made. Consequently alfalfa thrives best in the Western States, and fairly well in the limestone regions in the East, where its culture is increasing rapidly. This increase is retarded by the fact that the first cutting of alfalfa commonly conflicts with corn cultivation. About one-half of the alfalfa of the United States is grown under irrigation, and less than 6 per cent of the acreage in 1909 was east of the Missouri River. It is the dominant crop in the eleven Western States. The first cutting begins in the Imperial and Salt River Valleys about April 1; in the Great Valley of California April 15; in the Yakima and lower Snake River Valleys, in the Salt Lake region, and in northeastern Colorado about June 10; in the Arkansas Valley of Colorado and in north-central Kansas about June 1. This period of cutting lasts only a few days.



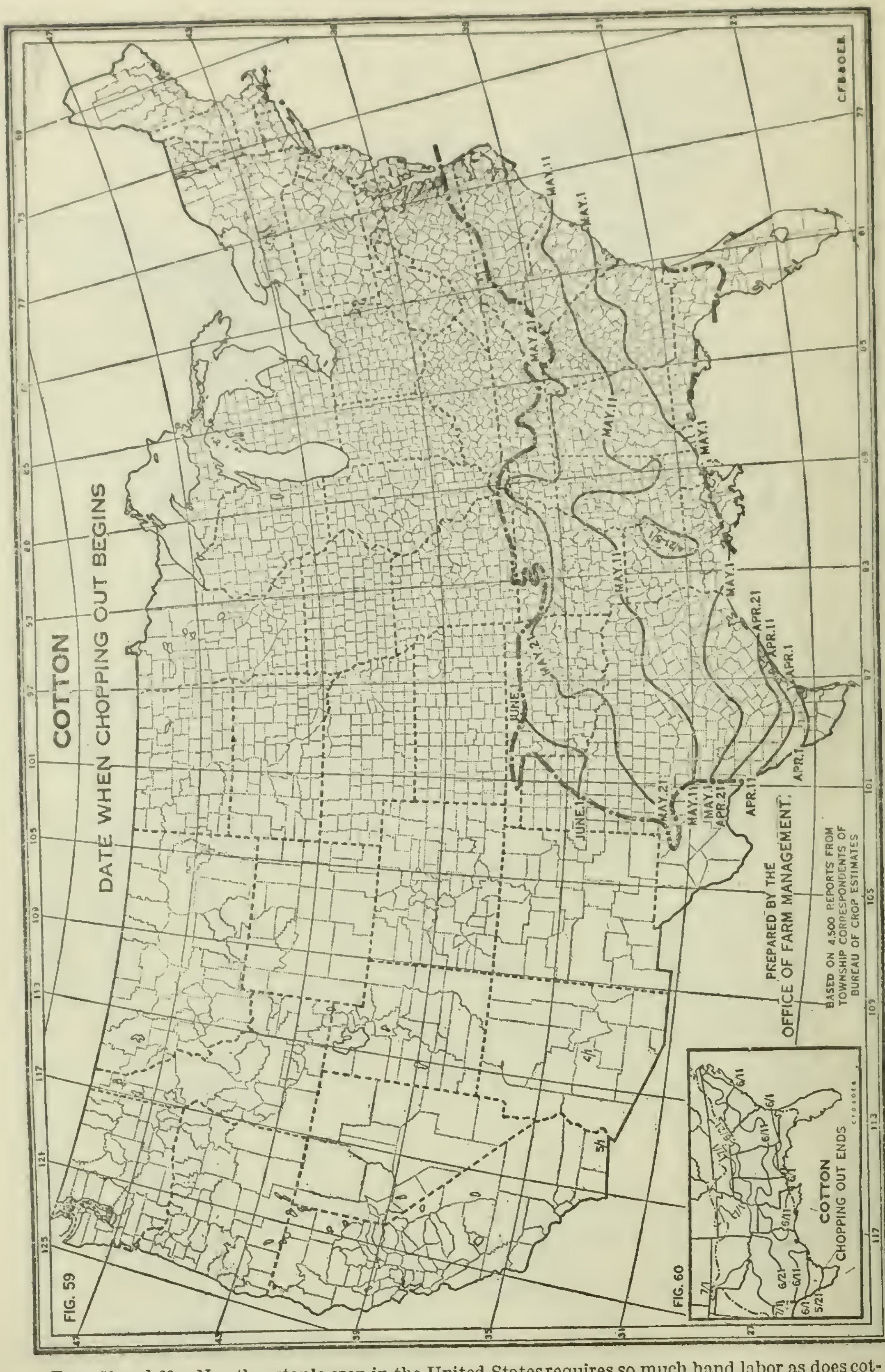
FIGS. 53 and 54.—Throughout practically the entire range of alfalfa in the United States a second cutting is secured. This begins generally about five to seven weeks after the first cutting. In some of the warmer sections of the West it may occur within a month of the first cutting, while in the cooler sections of the North and East nearly two months may elapse. The requirement per acre for the first cutting, raking, and stacking in Kansas is about 8 hours of man and 10 hours of horse labor. For the second cutting the amount is generally somewhat less than for the first, as the crop is usually lighter. A third cutting of alfalfa occurs throughout most of its range, and in California six and even seven cuttings are secured. Reports indicate that the average amount of labor required per acre in Kansas for four cuttings, including raking and stacking, is about 21 hours of man and 27 hours of horse labor; for 6 cuttings in California 40 hours of man labor, including irrigating, and 38 hours of horse labor.



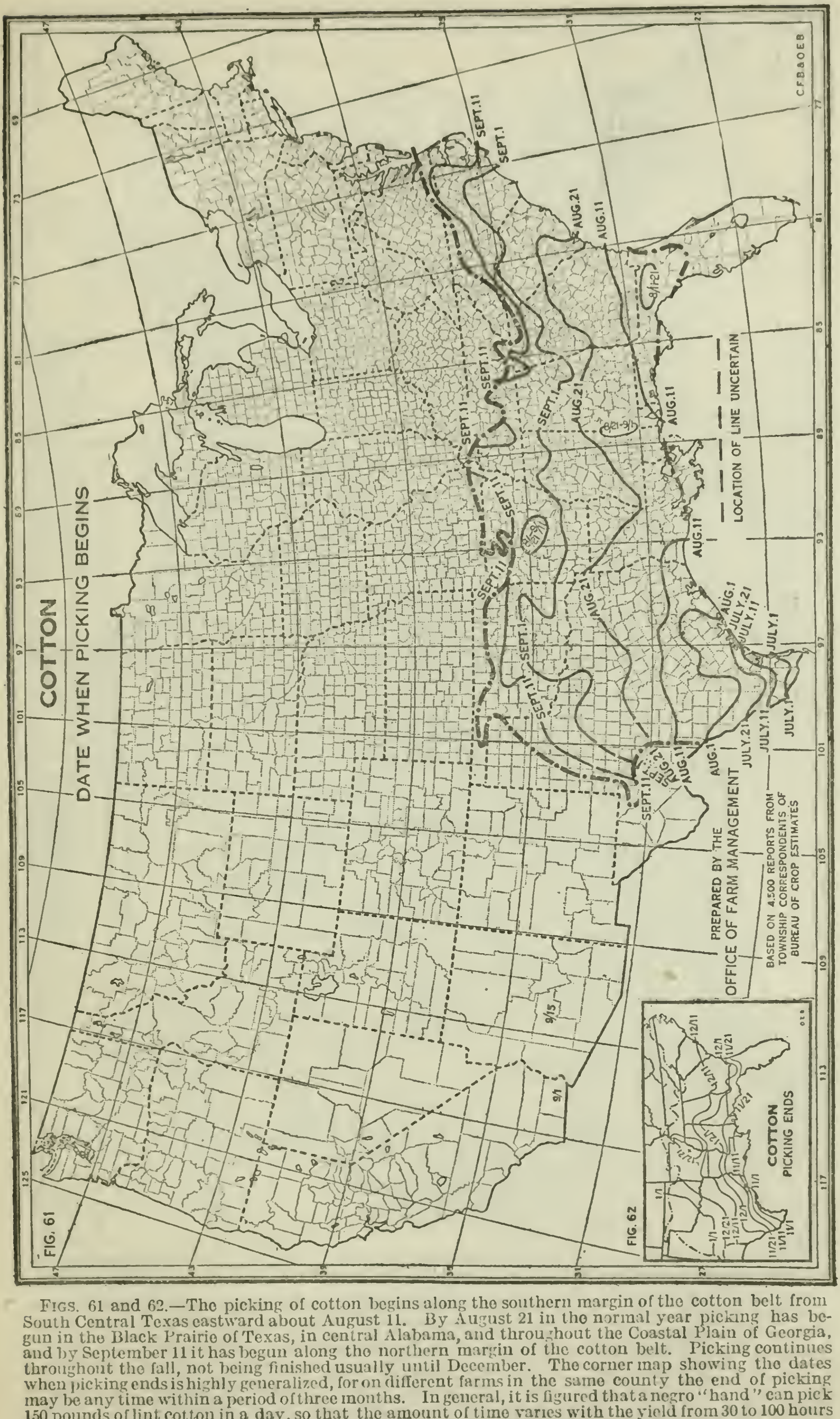
FIGS. 55 and 56.—Cotton planting begins usually about the middle of March in extreme southern Texas and in northern Florida; about April 1 in the Black Waxy Prairie of Texas, in central Louisiana, central Alabama, and central Georgia; and about April 21 along the northern margin of the cotton belt. Records from the Black Prairie of Texas show that cutting stalks, plowing or bedding, and harrowing requires, on the average, about 4 hours of man and 12 hours of horse or mule labor per acre, planting requires about 1 hour of man and 3 hours of horse labor, chopping out 11 hours of man labor, cultivating 7 hours of man and 14 hours of horse labor, picking about 32 hours of man labor, and hauling to the gin 2 hours of man and 3 hours of horse labor per acre, a total of approximately 57 hours of man labor and 32 hours of horse labor per acre.



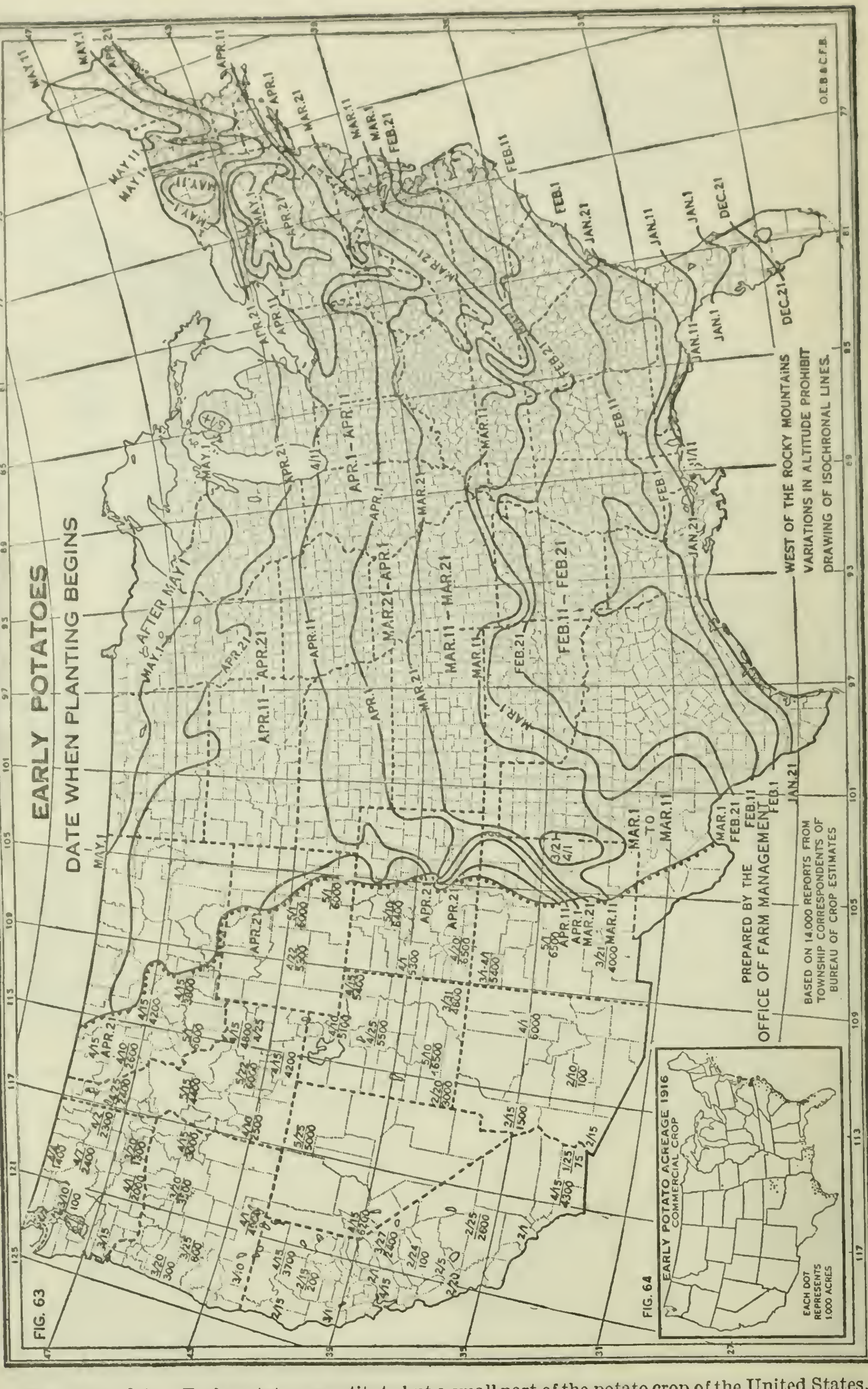
FIGS. 57 and 58.—Cotton planting is general during the month of April. It ends usually by May 21. Records from nine localities in Georgia, Alabama, Mississippi, Louisiana, and Arkansas show a requirement of 12 to 16 hours of man labor and 13 to 26 (average 20) hours of mule labor to prepare an acre of land for cotton, 2 hours man labor and also of horse labor to plant an acre, 15 to 22 (average 17) hours labor both man and horse to harrow and cultivate, 13 to 30 (average 18) hours man labor only to chop and hoe, and from 45 to 90 hours of man labor per acre to pick the crop. In addition, an average of 4 hours of man labor and 8 hours of mule labor per acre are required to haul the crop to the gin and market. The amount of labor required varies with the character of the soil, intensity of culture, and other factors, but in general the production of cotton east of Texas and Oklahoma requires from 90 to 150 hours of man labor and from 40 to 50 hours of mule labor per acre.



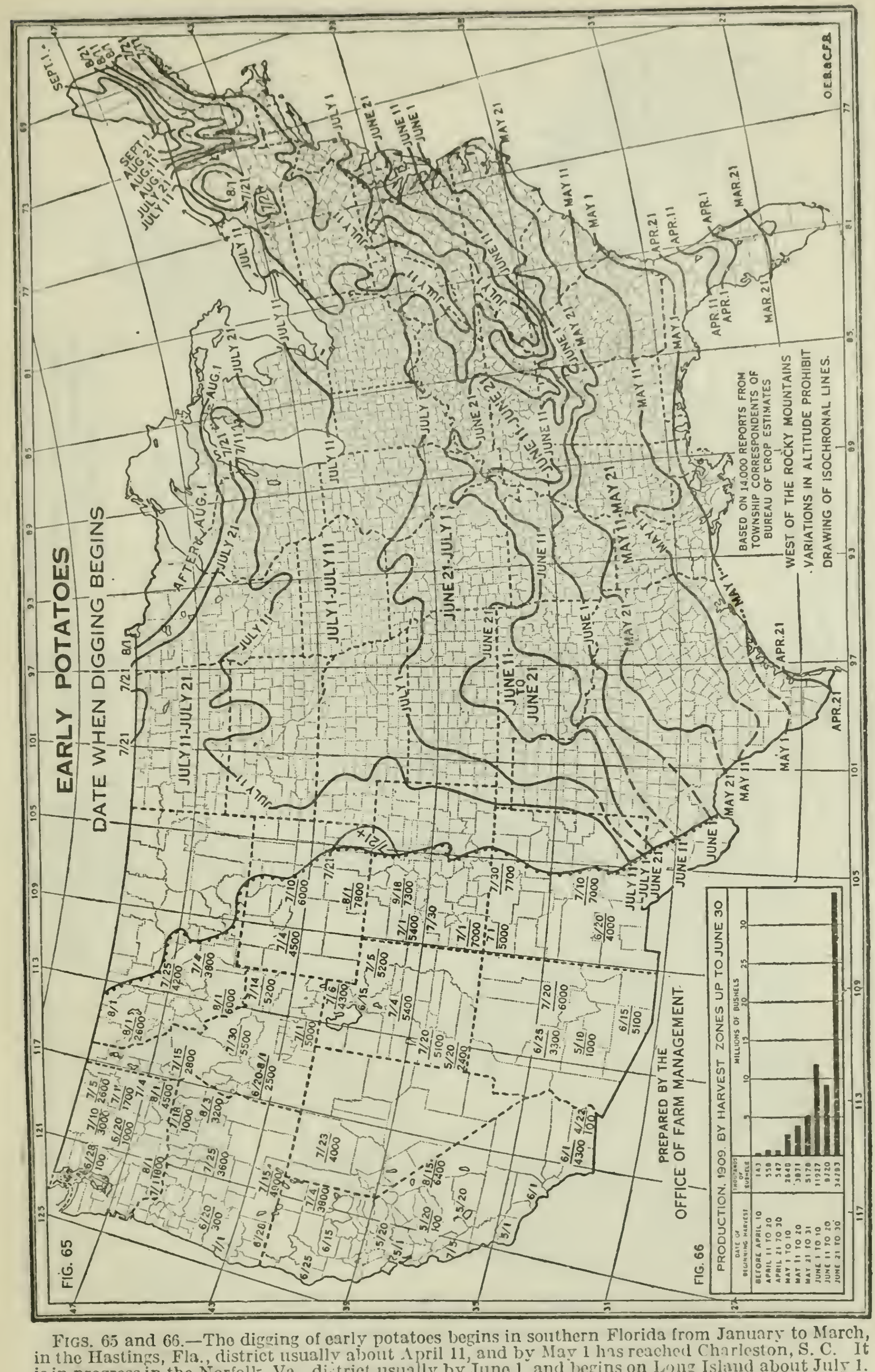
FIGS. 59 and 60.—No other staple crop in the United States requires so much hand labor as does cotton. Next to picking, chopping out—that is, thinning the plants to a certain distance apart in the row—is the most laborious process in the production of cotton. This operation begins usually about a month after planting, or about May 1 in the southern portion of the cotton belt and May 21 along the northern margin, and ends four or five weeks later. Chopping out is done entirely by hand and requires in general from 13 to 25 hours of labor per acre in the eastern portion of the cotton belt, 18 hours being, perhaps, a fair average. In the Texas Black Waxy Prairie the reports indicate that only about 11 hours are required, on the average, for chopping out an acre of cotton.



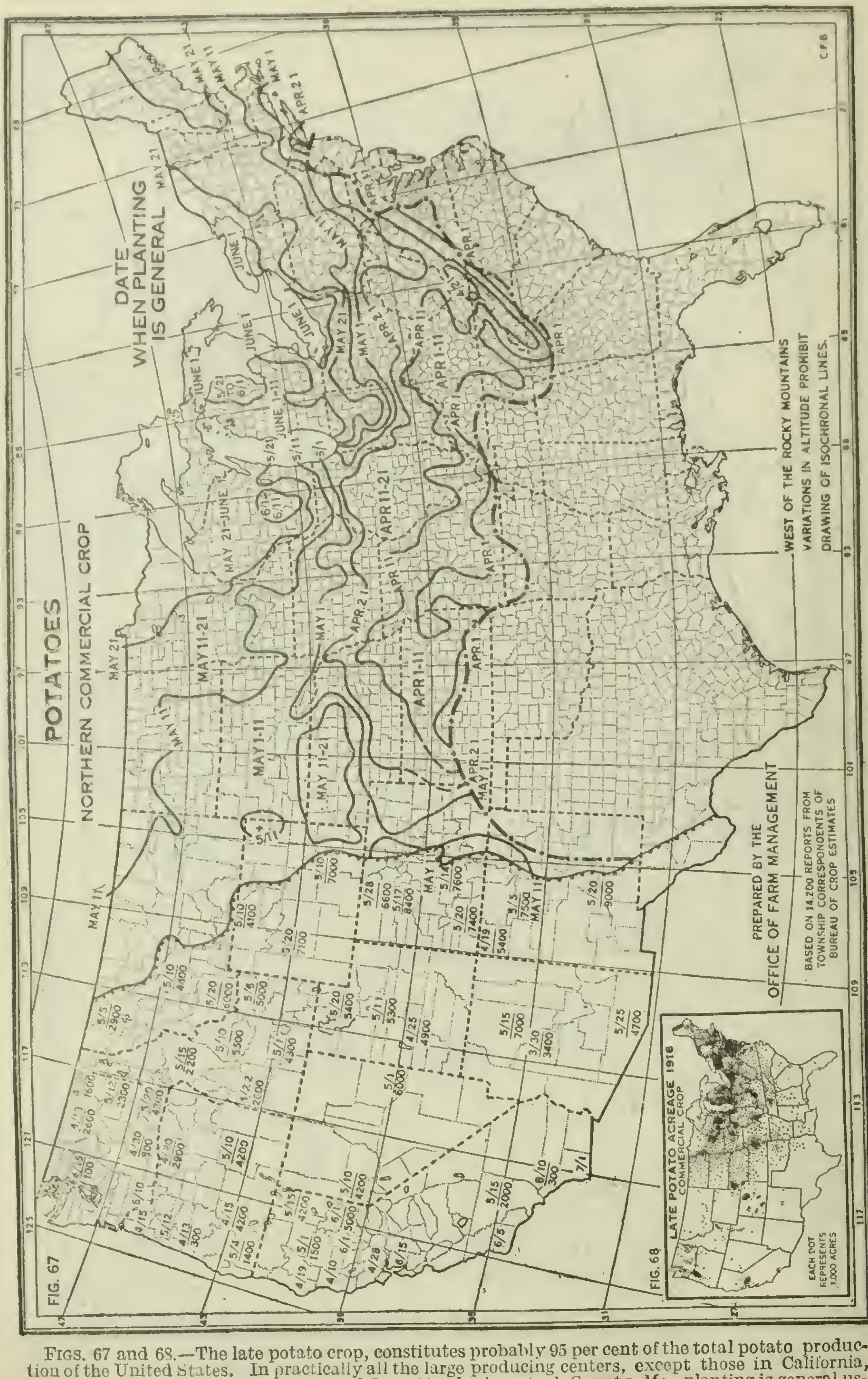
FIGS. 61 and 62.—The picking of cotton begins along the southern margin of the cotton belt from South Central Texas eastward about August 11. By August 21 in the normal year picking has begun in the Black Prairie of Texas, in central Alabama, and throughout the Coastal Plain of Georgia, and by September 11 it has begun along the northern margin of the cotton belt. Picking continues throughout the fall, not being finished usually until December. The corner map showing the dates when picking ends is highly generalized, for on different farms in the same county the end of picking may be any time within a period of three months. In general, it is figured that a negro "hand" can pick 150 pounds of lint cotton in a day, so that the amount of time varies with the yield from 30 to 100 hours per acre. The average time required to pick an acre of cotton east of Texas is 50 hours, a greater amount of man labor than is required to produce 3 acres of corn in Illinois or 4 acres of wheat in Kansas.



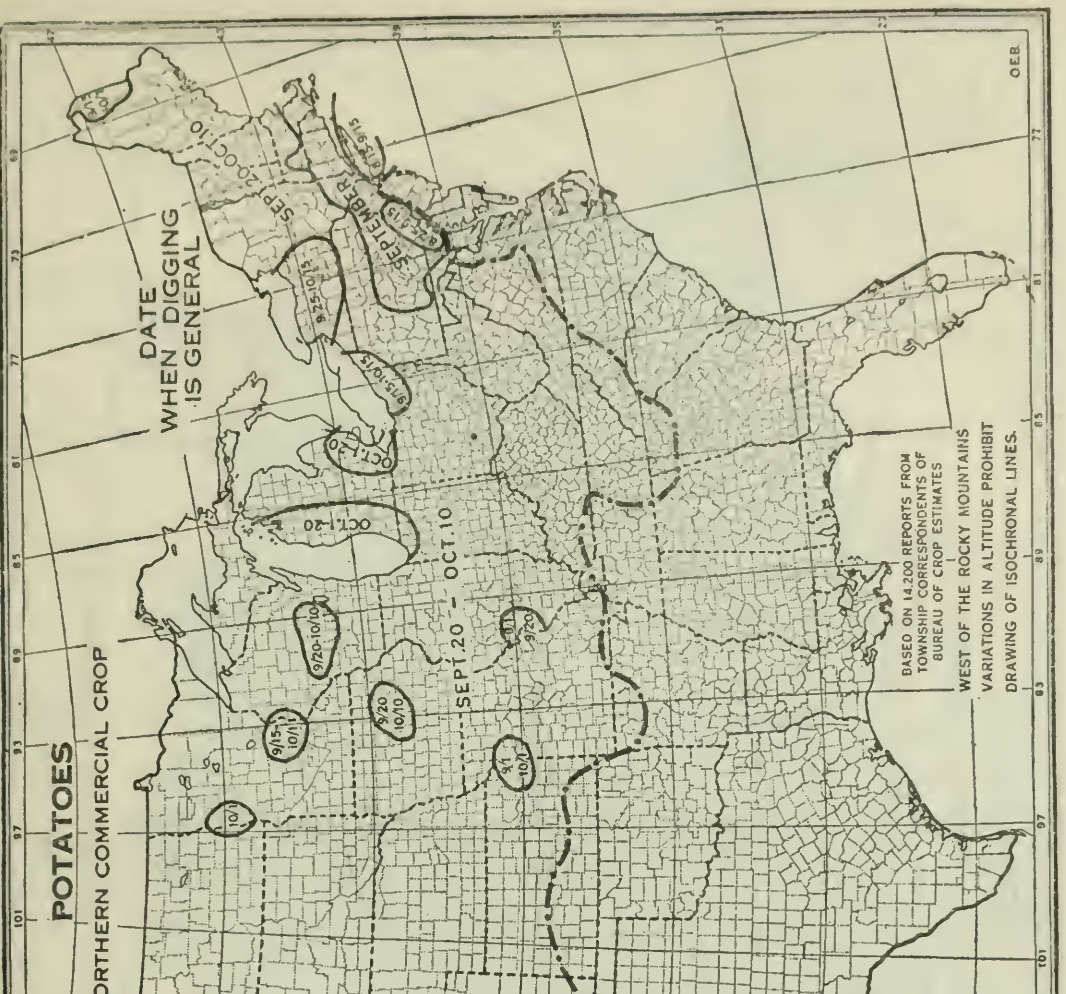
FIGS. 63 and 64.—Early potatoes constitute but a small part of the potato crop of the United States, and their commercial production is developed principally in the South Atlantic and Gulf States, whence they are shipped, both by rail and boat, to the northern cities. The planting of early potatoes begins in southern Florida in November or December and lasts for two months or more, in central Florida planting begins about February 20, around Charleston February 1, in the Norfolk district March 1, and in the district around New York City about April 1. Early potatoes are not a commercial crop north of New York City, but a few are planted for home use. In northern Maine and northern Minnesota this planting begins about May 11, and practically coincides with the planting of the late potato crop, which is the commercial crop in the Northern States. This map also shows perhaps better than a temperature map, the progress of the season northward in the United States.



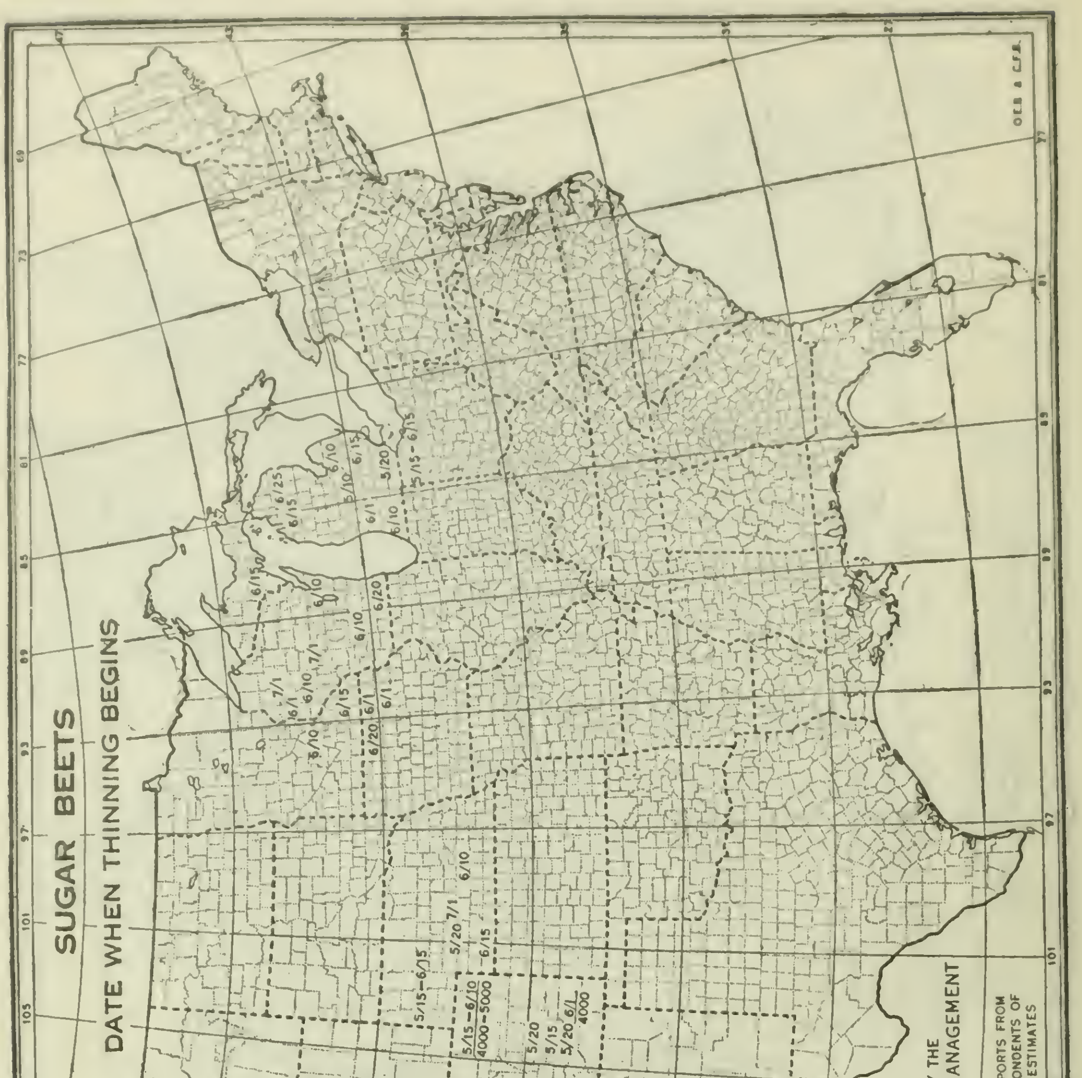
FIGS. 65 and 66.—The digging of early potatoes begins in southern Florida from January to March, in the Hastings, Fla., district usually about April 11, and by May 1 has reached Charleston, S. C. It is in progress in the Norfolk, Va., district usually by June 1, and begins on Long Island about July 1. Since Charleston is located nearer the northern markets and has cheaper transportation rates than Hastings, when shipments begin from Charleston those from Hastings dwindle rapidly, and likewise when the Norfolk shipments begin the Charleston season soon ends. On Long Island, if prices are high, the crop is dug during July and sold as early potatoes, but if prices are low the potatoes are not dug until fall. The average amount of labor required to produce an acre of early potatoes in the Hastings, Fla., district is about 115 hours of man labor and 66 hours of horse labor. Of this amount 79 hours of man labor and 12 hours of horse labor per acre, according to the records, were required in digging.



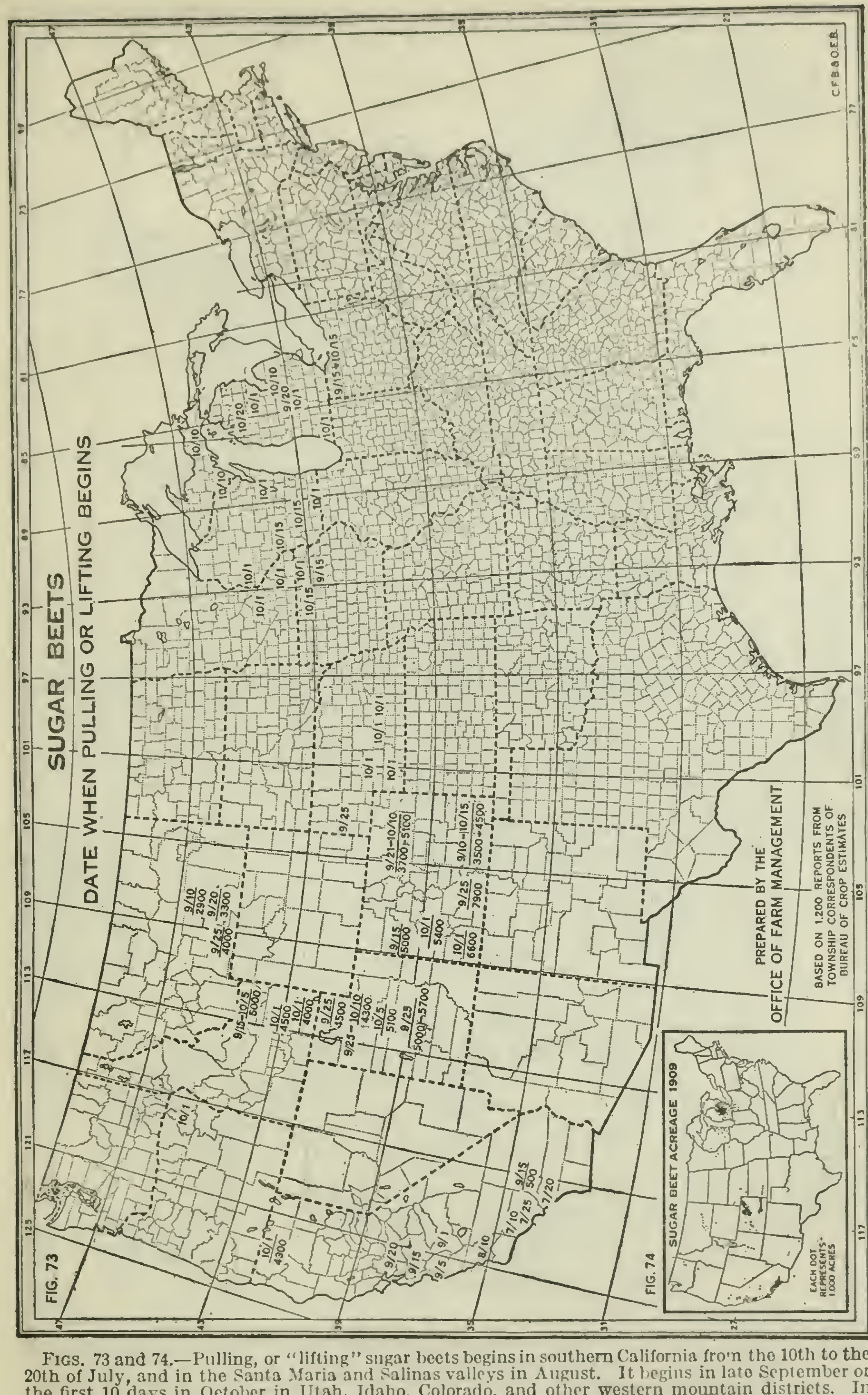
FIGS. 67 and 68.—The late potato crop, constitutes probably 95 per cent of the total potato production of the United States. In practically all the large producing centers, except those in California, this crop is planted between April 1 and June 11. In Aroostook County, Me., planting is general usually about May 15, in western New York May 21 to June 1, in Michigan and central Wisconsin June 1 to 11, in the Minnesota and Colorado districts about May 15, but in the Stockton, Cal., district planting extends from March until July 1, while digging takes place from June 1 until February 15. In this region there is little seasonal change in temperature and the dates of planting and digging depend more on the market price than upon weather conditions. In the Maine, New York, Michigan, Wisconsin, and Minnesota districts, on the other hand, the necessity of digging the crop before the ground freezes limits to a period of a few weeks not only the digging but also the planting of potatoes.



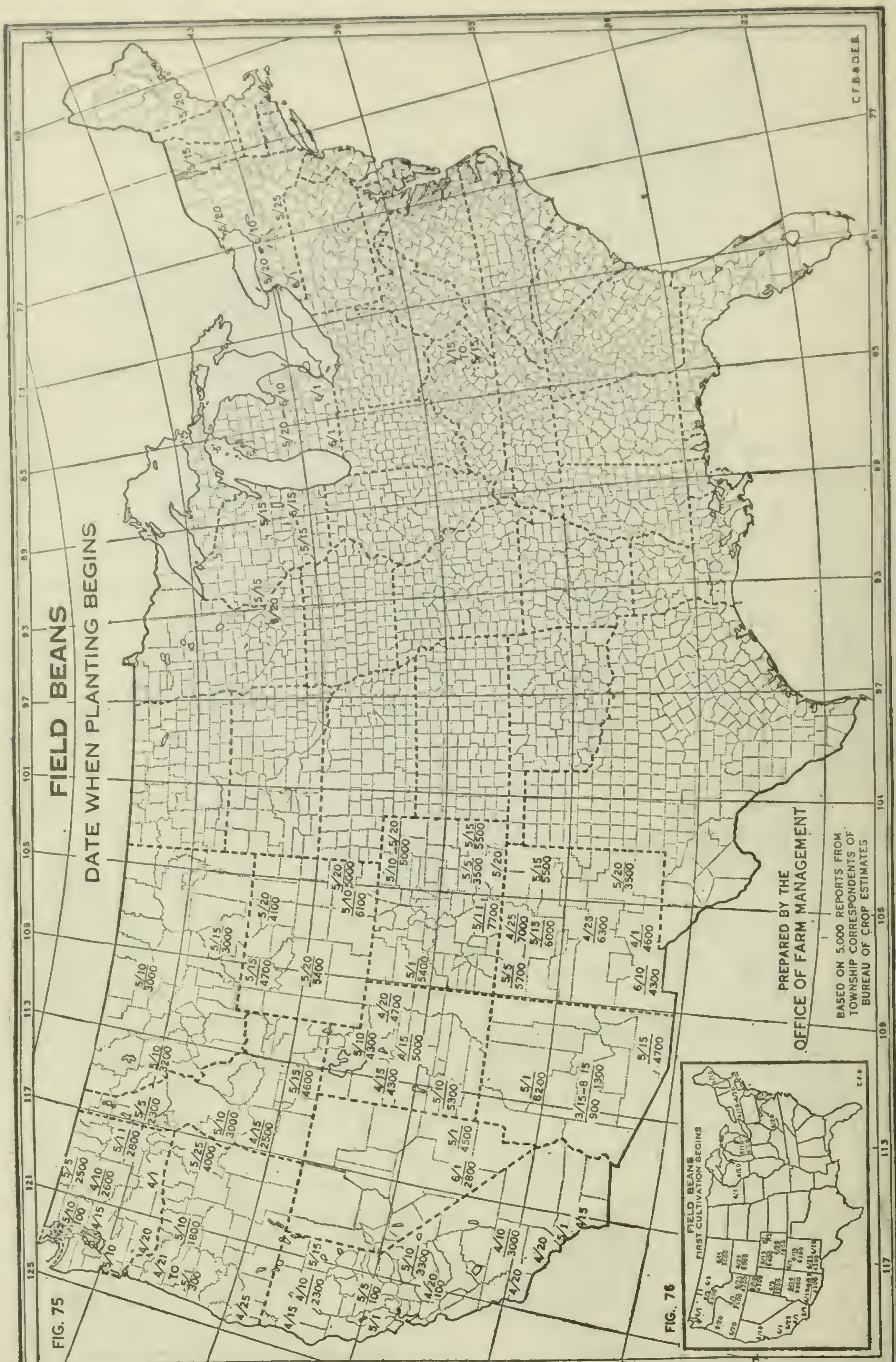
FIGS. 69 and 70.—The digging of late potatoes in all the large producing districts, except those in California, occurs usually between September 15 and October 11. The earliest digging generally occurs around the large cities. Owing to the moderate autumn temperatures along the Lake shores in Michigan and New York digging may be delayed as late as the latter half of October. In the Wisconsin district several records indicate that plowing and preparing the ground for potatoes requires about 9 hours of man labor and 20 hours of horse labor, planting 8 hours of man and 2 hours of horse labor, cultivating, spraying, and hoeing 17 man and 11 horse hours, harvesting 35 man and 13 horse hours, while there were spent in marketing and miscellaneous work on the crop an average of 19 man and 34 horse hours—a total of 88 hours of man and 80 of horse labor per acre. Practically all this work in the Northern States is done by the farmers with the help during digging time of labor secured from near-by villages.



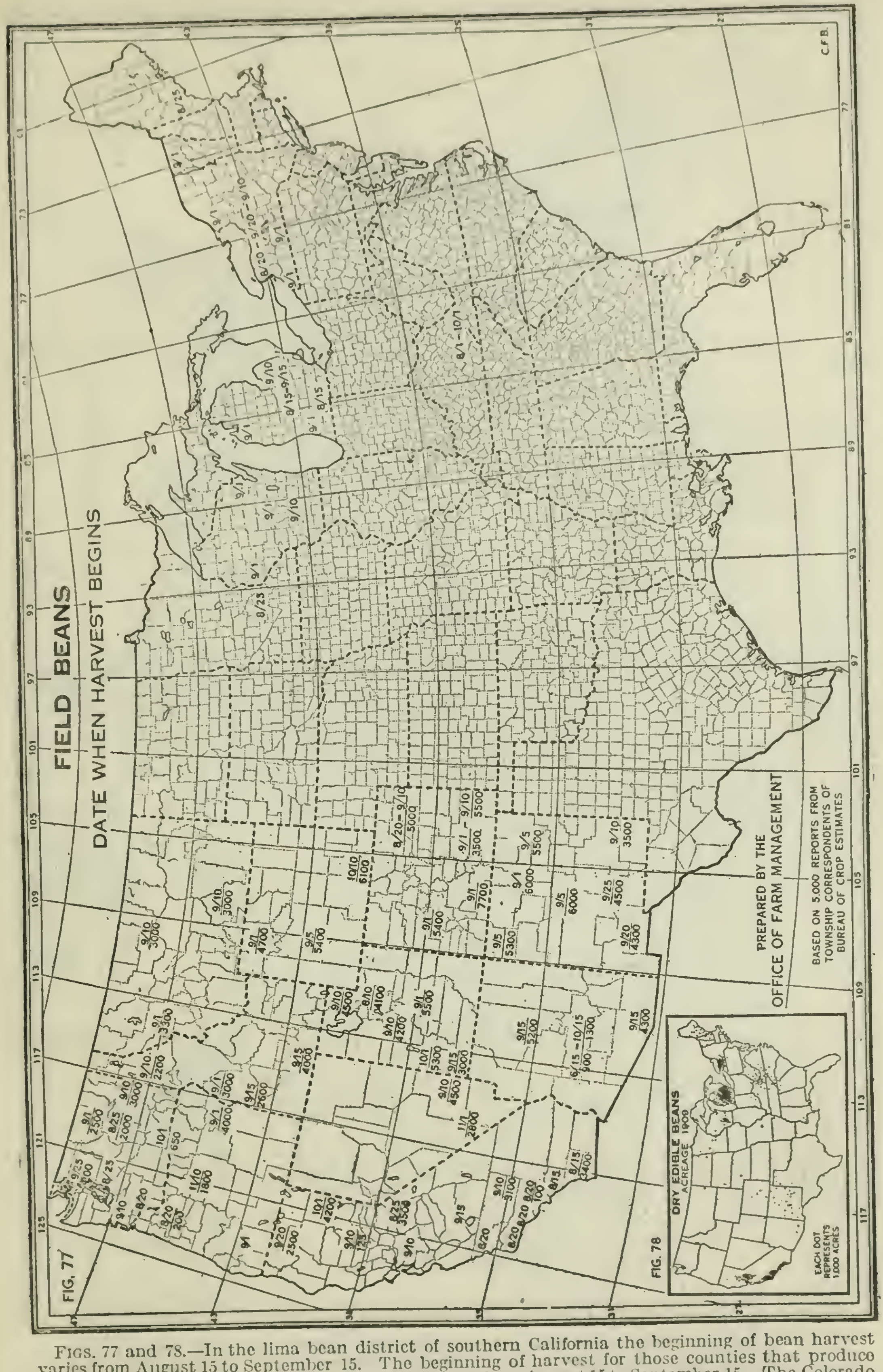
FIGS. 71 and 72.—The chief sugar-beet districts of the United States are found in California, Colorado, Utah, Idaho, Michigan, and Wisconsin. In the Michigan and Wisconsin districts, and in adjacent States, sugar beets are cultivated under humid conditions, while in Colorado, Utah, Idaho, and other Western States this crop is produced under irrigation. In California sugar beets are grown both with and without irrigation. There is a wide range in the dates when the operations on sugar beets are performed. Planting may begin in California as early as October and may continue as late as the following May. In the irrigated districts of Colorado, Utah, and Idaho planting varies from the first of April till the middle of June. The bulk of the planting is done in this section from April 25 to May 20. This is true also of Michigan and Wisconsin. Thinning begins from three to four weeks after planting. The usual dates for blocking and thinning are given in the accompanying map.



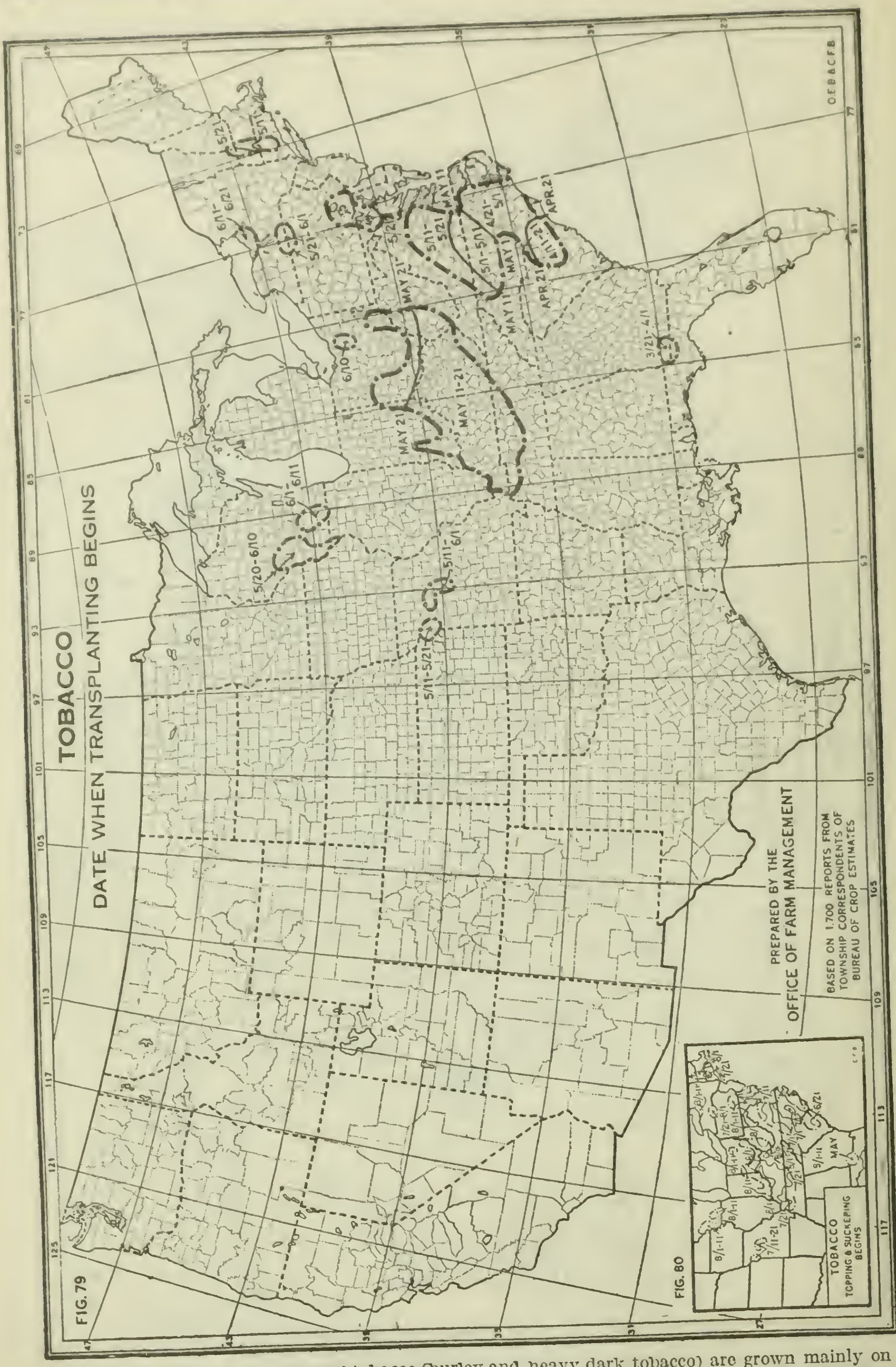
FIGS. 73 and 74.—Pulling, or "lifting" sugar beets begins in southern California from the 10th to the 20th of July, and in the Santa Maria and Salinas valleys in August. It begins in late September or the first 10 days in October in Utah, Idaho, Colorado, and other western mountain districts. In Michigan and Ohio the dates are approximately the same. The labor engaged to do the blocking and thinning also performs usually this final hand operation of pulling and topping. Both operations require a large amount of hand labor. It is frequently designated "contract labor." The sugar companies usually make the necessary arrangements for bringing this labor into the district where it is needed. In the Middle West laborers for the thinning are obtained from large cities. A fair proportion of the hand work in southern Colorado and also in southern California is done by Mexican labor. Farther north in California, also in northern Utah and southern Idaho, much of the hand work is done by Japanese.



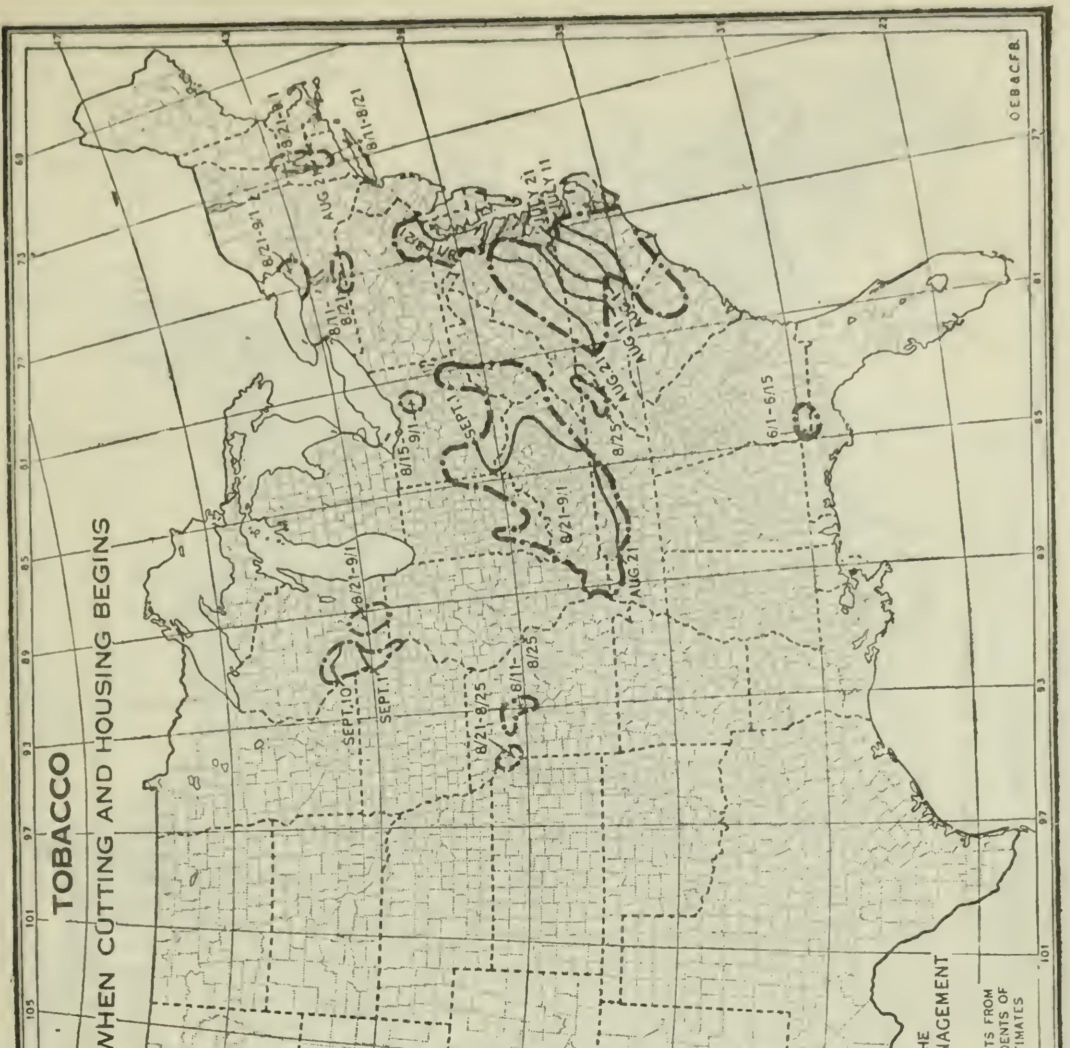
FIGS. 75 and 76.—The chief centers of production of dry edible beans are New York, Michigan, and California. The acreage devoted to beans also has been expanding in New Mexico, Colorado, Washington and Idaho during the past two years. The Michigan and New York growers have confined their attention largely to the production of navy beans and kidney beans. In Colorado and New Mexico the Pinto or Mexican bean is grown to the exclusion of practically all other varieties. There are two distinct districts in California; one, located along the southern coast, produces lima beans exclusively; while in the other area, which includes the valleys and coast of central California, Pinks, Lady Washington, and navy beans are grown. The planting or seeding period in the lima bean district varies from April 15 to May 1. In the other district the planting begins between the 20th of April and the 1st of May. In New York, Michigan, and Wisconsin bean planting begins from May 15 to June 10, usually after corn planting.



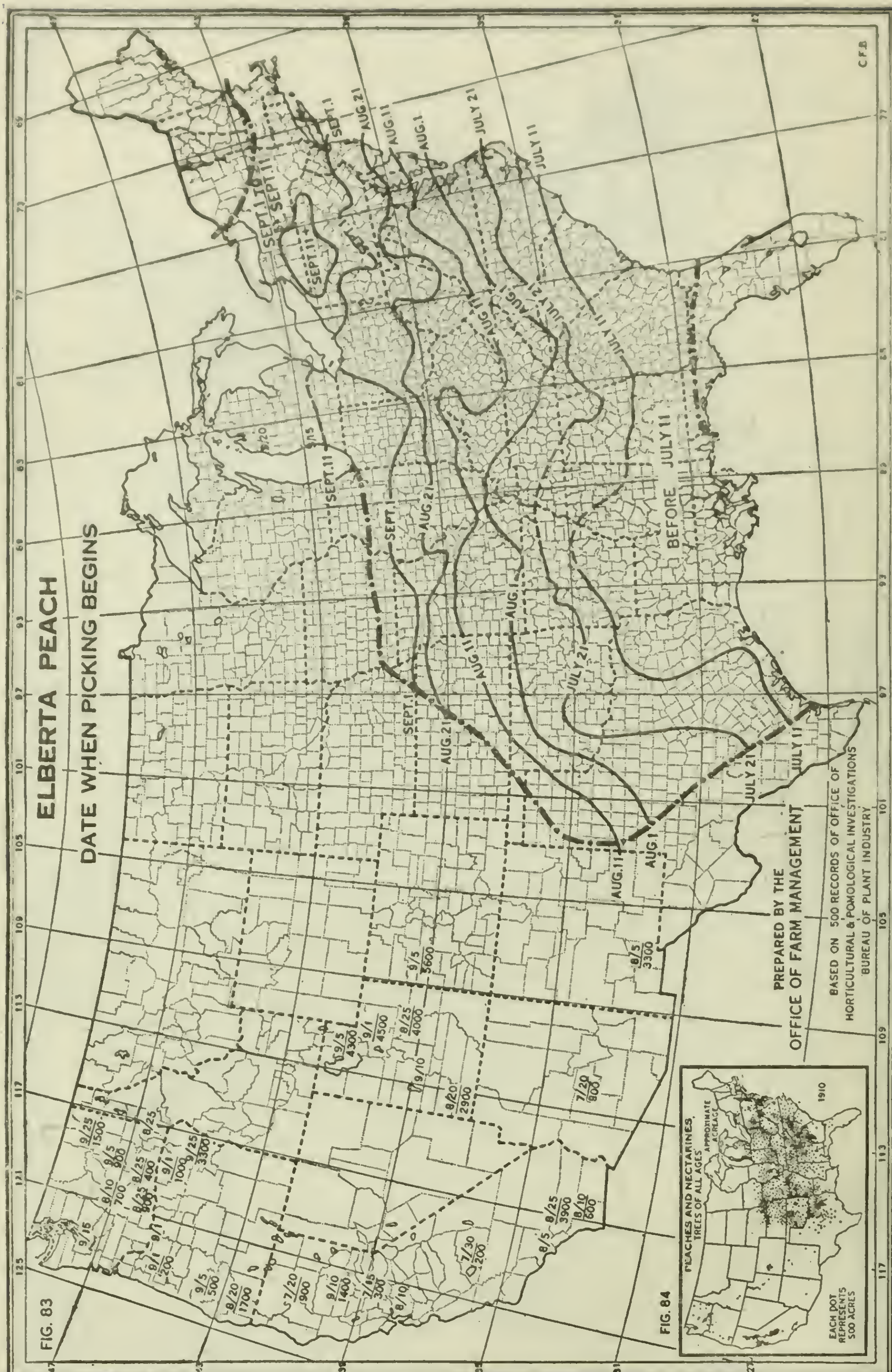
FIGS. 77 and 78.—In the lima bean district of southern California the beginning of bean harvest varies from August 15 to September 15. The beginning of harvest for those counties that produce Pinks, Lady Washington, and navy beans also varies from August 15 to September 15. The Colorado bean harvest begins the latter part of August or early in September. In the Plains area this work does not conflict appreciably with other farm operations, but in the irrigated districts the completion of the bean harvest may interfere to some extent with potato digging or in some cases with beet lifting. Michigan and New York bean growers begin harvesting from August 20 to September 20, the most common date being September 1. In the bean-growing counties of Michigan the crop is usually out of the way by the beginning of sugar-beet harvest. Beans and potatoes compete for labor at this season of the year in some New York districts. Corn harvest or silo filling may also demand attention at this time.



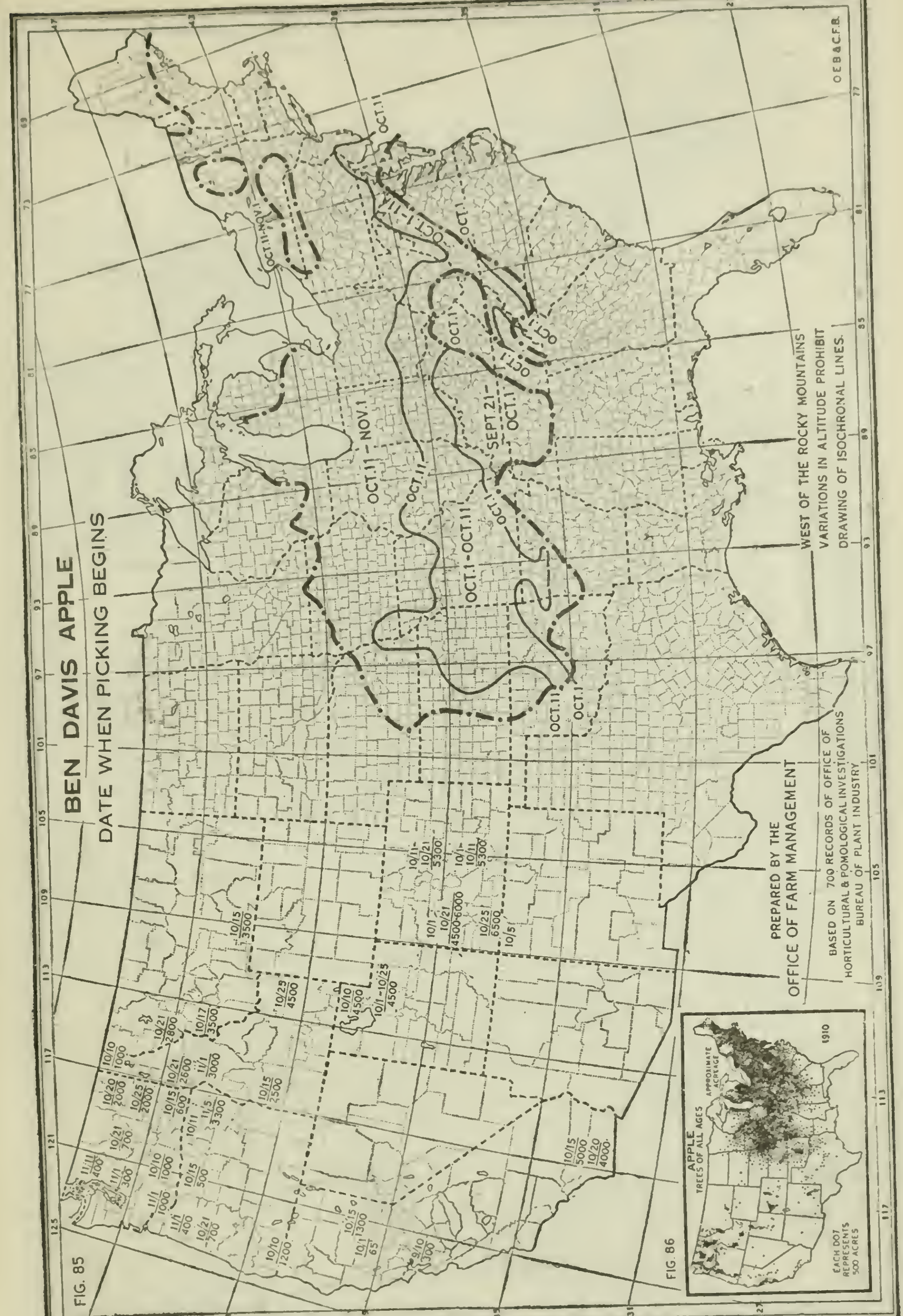
FIGS. 79 and 80.—Plug and export tobacco (burley and heavy dark tobacco) are grown mainly on the heavy clay soils of the Ohio River valley. Tobacco for cigar wrappers, binders, and fillers is grown in scattered localities from western Florida to New England and Wisconsin, mainly, however, in the Connecticut valley of New England. Smoking and chewing tobacco is extensively grown in the Piedmont and coast regions of Virginia and the Carolinas, mostly on sandy loam soils. Tobacco is sown in beds early in the spring and later transplanted. In the more southern districts these beds are prepared from about February 1 to March 15, and in the more northern districts from about March 15 to April 1. Transplanting in Florida begins about the 21st of March and in the most northern localities in New York and Wisconsin it begins as late as June 10. In the central districts, where the bulk of the tobacco is grown, the transplanting begins about May 10 and continues up to about June 1.



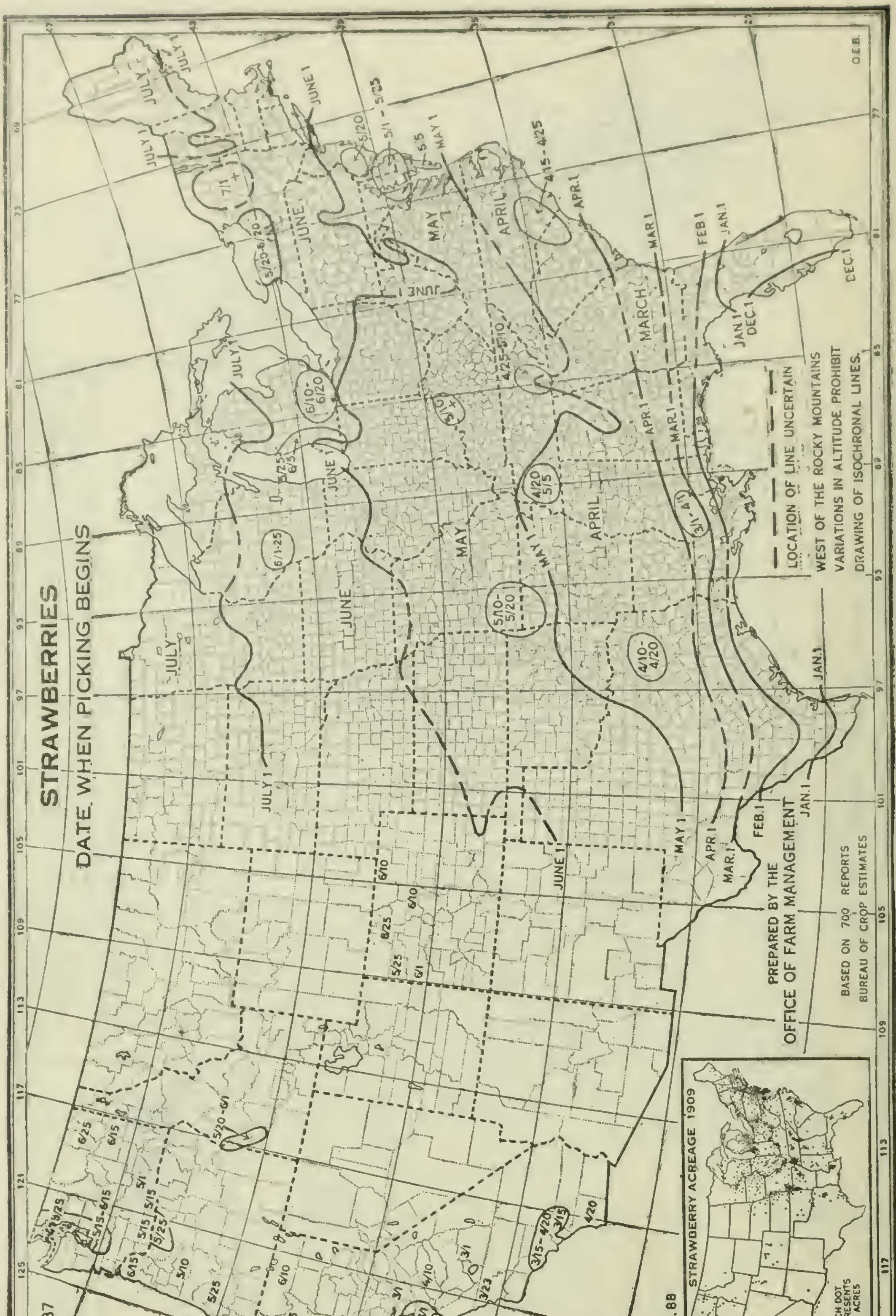
FIGS. 81 and 82.—Tobacco is generally ready to cut and house about three months after it is transplanted. In the Sumner district in western Florida it is cut early in June, and along the coastal plain of the Carolinas as early as July 11. In all the other sections cutting and housing takes place from about August 20 to September 10. In the Ohio River valley, where about half of the tobacco of the United States is grown, summer drouths are frequent. However, if tobacco gets a good start after transplanting, it will stand practically dormant until rains come when it will speed up its growth and usually mature before frost. While it usually takes more labor to cut and house tobacco than the farmer and his family can supply, there is usually a sufficient amount of labor in the community for this work. Much of the tobacco in the United States is grown by small tenant farmers who rent 5 to 10 acres on shares for a season, practically all the work being done by the tenant and his family.



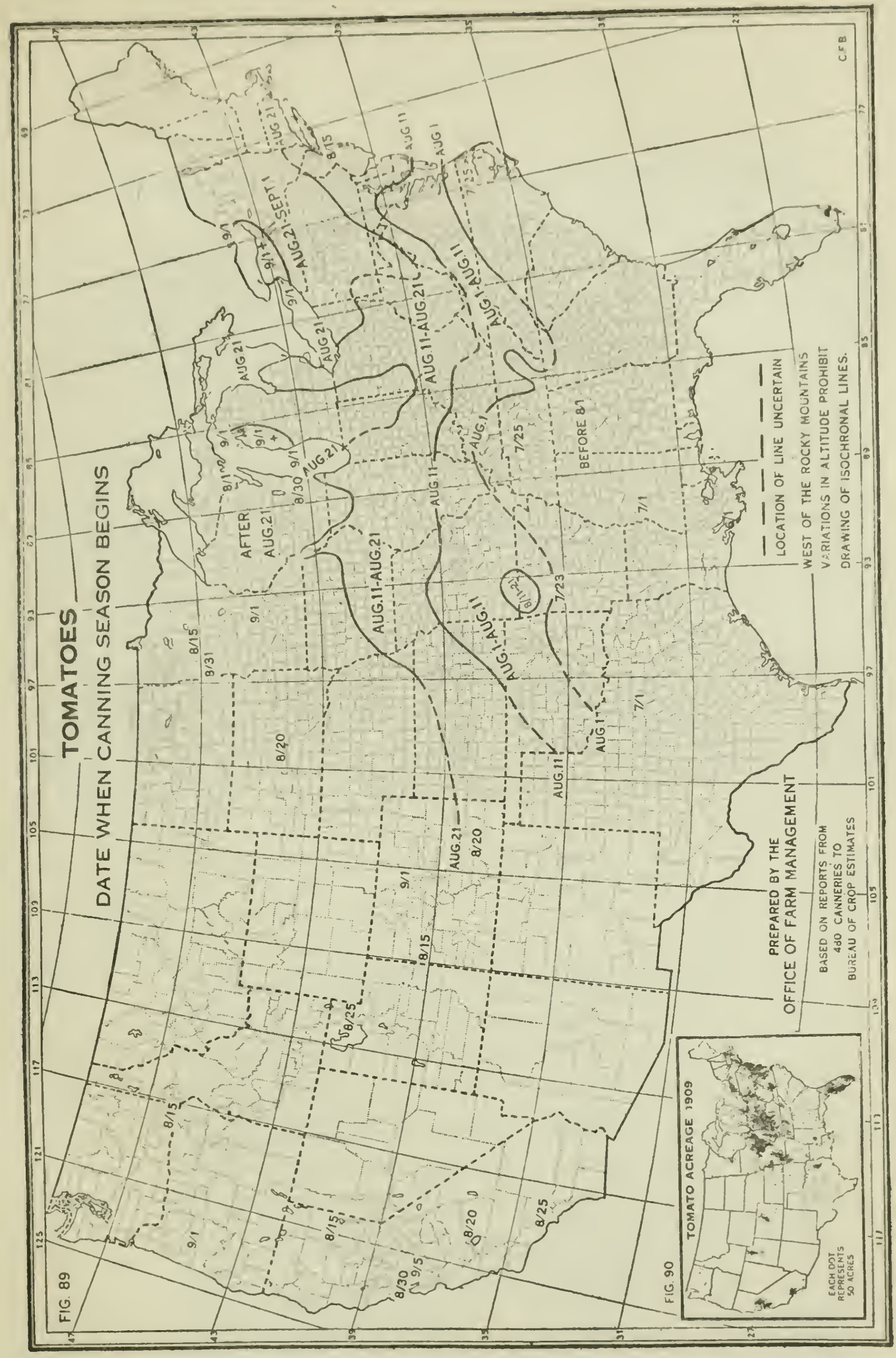
FIGS. 83 and 84.—Picking the commercial crop of peaches begins in the important centers of central Georgia and northeastern Texas usually about July 10 and is over by the 20th, in the Ozarks picking begins between July 25 and August 15, in Delaware by mid-August, and in Michigan and New York from September 1 to 20. The picking season in these regions is usually about 10 to 15 days long. In California picking begins some years as early as July 15, but usually during August. Picking peaches commonly requires a considerable supply of transient labor. An average crop in central Georgia, 125 bushel crates per acre, requires about 50 hours of man labor; and a crop of 135 crates (or 270 baskets) in West Virginia requires about 45 hours of labor per acre. The map is based on about 500 records from commercial growers received during the 10 years 1902–1911 by H. P. Gould, of the Office of Horticultural and Pomological Investigations, Bureau of Plant Industry.



FIGS. 85 and 86.—The Ben Davis apple is one of the most important commercial varieties and has a wide range. The date of its picking may, therefore, be considered representative of the date when extra labor is needed in handling the winter apple crop. Picking begins about September 21 along the southern margin of the apple belt and progresses northward until about a month later it is beginning in Michigan and New York. In large centers of apple production, especially in Missouri, Michigan, and New York, a considerable amount of transient labor is required to assist in this operation. In general for an 80-barrel crop in New York about 50 hours of labor are required for picking and 50 for sorting, packing, and hauling; and in Hood River, Oreg., 50 hours for picking, and 100 for sorting, packing, and hauling a crop of 200 packed boxes per acre. The map is based on about 700 records from commercial growers received during the 10 years 1902–1911 by H. P. Gould, of the Office of Horticultural and Pomological Investigations, Bureau of Plant Industry.



FIGS. 87 and 88.—The principal centers of commercial strawberry production are shown on the map surrounded by circular lines, and dates are given inside each circle showing when picking usually begins in that district. The irregular lines extending from the Atlantic coast to the Great Plains mark off the zones when picking begins according to reports from scattered growers outside the important strawberry centers. Lines are drawn only for the first of each month as the dates are too variable to justify drawing lines for 10-day periods. Throughout most of Florida and along the Texas coast picking occurs during January and February. In southern Georgia and Mississippi picking begins about March 1, in the Carolina district about April 1, in the eastern Maryland and Delaware and Ozark districts early in May, and in western Michigan and New York about June 1. The map is based upon data collected from commercial growers by F. J. Blair, of the Bureau of Crop Estimates, and loaned to the Office of Farm Management.



FIGS. 89 and 90.—Tomato-canning factories are confined practically to the central portion of the United States. The canning season begins about August 1 in southern Virginia, Tennessee, and northwestern Arkansas, and about a month later in the lake plains of New York, in western Michigan and Iowa. The canning season generally lasts from 6 to 10 weeks. Large quantities of tomatoes are grown in southern Florida and Texas and shipped fresh to the northern markets from December to June. Large quantities are also grown for consumption in the fresh state throughout the Northern States. The picking of tomatoes for domestic use or for shipment usually begins two to four weeks earlier than the beginning of the canning season. In Maryland and other Atlantic coast districts women and children from nearby cities are employed in picking tomatoes. The map is based upon data collected from 477 canning factories by F. J. Blair, of the Bureau of Crop Estimates.

APPENDIX.

AGRICULTURAL COLLEGES IN THE UNITED STATES.[1]

College instruction in agriculture is given in the colleges and universities receiving the benefits of the acts of Congress of July 2, 1862, August, 30, 1890, and March 4, 1907, which are now in operation in all the States and Territories except Alaska. The total number of these institutions is 69, of which 67 maintain courses of instruction in agriculture. In 23 States and Porto Rico the agricultural colleges are departments of the State universities. In 17 States separate institutions having courses in agriculture are maintained for the colored race. All of the agricultural colleges for white persons and several of those for negroes offer four-year courses in agriculture and its related sciences leading to bachelor's degrees, and many provide for graduate study. About 60 of these institutions also provide special, short, or correspondence courses in the different branches of agriculture, including agronomy, horticulture, animal husbandry, poultry raising, cheese making, dairying, sugar making, rural engineering, farm mechanics, and other technical subjects. The agricultural experiment stations, with very few exceptions, are departments of the agricultural colleges. The total number of persons engaged in the work of education and research in the land-grant colleges and the experiment stations in 1917 was 8,861, the number of students (white) in interior courses in the colleges of agriculture and mechanic arts, 61,972, the total number of students (white) in the whole institutions, 122,053;[2] the number of students (white) in the four-year college courses in agriculture, 16,939; the total number of students in the institutions for negroes, 11,352, of whom 2,054 were enrolled in agricultural courses. With a few exceptions, each of these colleges offers free tuition to residents of the State in which it is located. In the excepted cases scholarships are open to promising and energetic students, and in all opportunities are found for some to earn part of their expenses by their own labor. The expenses are from $125 to $300 for the school year.

Agricultural colleges in the United States.

State or Territory.	Name of institution.	Location.	President.
Alabama	Alabama Polytechnic Institute	Auburn	C. C. Thach.
	Agricultural School of the Tuskegee Normal and Industrial Institute.	Tuskegee Institute	R. R. Moton.[3]
	Agricultural and Mechanical College for Negroes.	Normal	W. S. Buchanan.
Arizona	College of Agriculture of the University of Arizona.	Tucson	——— ———[4]
Arkansas	College of Agriculture of the University of Arkansas.	Fayetteville	Martin Nelson.[4]
	Branch Normal College	Pine Bluff	J. G. Ish, jr.
California	College of Agriculture of the University of California.	Berkeley	T. F. Hunt.[4]
Colorado	The State Agricultural College of Colorado.	Fort Collins	C. A. Lory.
Connecticut	Connecticut Agricultural College	Storrs	C. L. Beach.
Delaware	Delaware College	Newark	S. C. Mitchell.
	State College for Colored Students	Dover	W. C. Jason.
Florida	College of Agriculture of the University of Florida.	Gainesville	P. H. Rolfs.[4]
	Florida Agricultural and Mechanical College for Negroes.	Tallahassee	N. B. Young.
Georgia	Georgia State College of Agriculture	Athens	A. M. Soule.
	Georgia State Industrial College	Savannah	R. R. Wright.
Hawaii	College of Hawaii	Honolulu	A. L. Dean.
Idaho	College of Agriculture of the University of Idaho.	Moscow	E. J. Iddings.[4]

[1] Including only institutions established under the land-grant act of July 2, 1862.
[2] Not including students in correspondence courses and extension schools.
[3] Principal.
[4] Dean.

Agricultural colleges in the United States—Continued.

State or Territory.	Name of institution.	Location.	President.
Illinois	College of Agriculture of the University of Illinois.	Urbana	E. Davenport.[1]
Indiana	School of Agriculture of Purdue University.	La Fayette	J. H. Skinner.[1]
Iowa	Iowa State College of Agriculture and Mechanic Arts.	Ames	R. A. Pearson.
Kansas	Kansas State Agricultural College	Manhattan	W. M. Jardine.
Kentucky	The College of Agriculture of the University of Kentucky	Lexington	T. P. Cooper.[1]
	The Kentucky Normal and Industrial Institute for Colored Persons.	Frankfort	G. P. Russell.
Louisiana	Louisiana State University and Agricultural and Mechanical College.	Baton Rouge	T. D. Boyd.
	Southern University and Agricultural and Mechanical College of the State of Louisiana.	Scotland Heights, Baton Rouge.	J. S. Clark.
Maine	College of Agriculture of the University of Maine.	Orono	L. S. Merrill.[1]
Maryland	Maryland State College of Agriculture	College Park	A. F. Woods.
	Princess Anne Academy, Eastern Branch of the Maryland State College of Agriculture.	Princess Anne	T. H. Kiah.[2]
Massachusetts	Massachusetts Agricultural College[3]	Amherst	K. L. Butterfield.
	Massachusetts Institute of Technology [3].	Boston	R. C. Maclaurin.
Michigan	Michigan Agricultural College	East Lansing	F. S. Kedzie.
Minnesota	College of Agriculture of the University of Minnesota.	University Farm, St. Paul.	R. W. Thatcher.[1]
Mississippi	Mississippi Agricultural and Mechanical College.	Agricultural College.	W. H. Smith.
	Alcorn Agricultural and Mechanical College.	Alcorn	L. J. Rowan.
Missouri	College of Agriculture of the University of Missouri.	Columbia	F. B. Mumford.[1]
	School of Mines and Metallurgy of the University of Missouri.[3]	Rolla	———
	Lincoln Institute	Jefferson City	B. F. Allen.
Montana	Montana State College of Agriculture and Mechanic Arts.	Bozeman	Jas. M. Hamilton.
Nebraska	College of Agriculture of the University of Nebraska.	Lincoln	E. A. Burnett.[1]
Nevada	College of Agriculture of the University of Nevada.	Reno	C. S. Knight.[1]
New Hampshire	New Hampshire College of Agriculture and the Mechanic Arts.	Durham	R. D. Hetzel.
New Jersey	Rutgers College (the New Jersey State College for the Benefit of Agriculture and the Mechanic Arts).	New Brunswick	W. H. S. Demarest.
New Mexico	New Mexico College of Agriculture and Mechanic Arts.	State College	A. D. Crile.
New York	New York State College of Agriculture	Ithaca	A. R. Mann.[1]
North Carolina	The North Carolina State College of Agriculture and Engineering.	West Raleigh	W. C. Riddick.
	Negro Agricultural and Technical College	Greensboro	J. B. Dudley.
North Dakota	North Dakota Agricultural College	Agricultural College.	E. F. Ladd.
Ohio	College of Agriculture of Ohio State University.	Columbus	Alfred Vivian.[1]
Oklahoma	Oklahoma Agricultural and Mechanical College.	Stillwater	J. W. Cantwell.
	Agricultural and Normal University	Langston	I. E. Page.
Oregon	Oregon State Agricultural College	Corvallis	W. J. Kerr.
Pennsylvania	The School of Agriculture of the Pennsylvania State College.	State College	R. L. Watts.[1]
Porto Rico	College of Agriculture and Mechanic Arts of the University of Porto Rico.	Mayaguez	R. S. Garwood.[1]
Rhode Island	Rhode Island State College	Kingston	Howard Edwards.
South Carolina	The Clemson Agricultural College of South Carolina.	Clemson College	W. M. Riggs.
	State Agricultural and Mechanical College of South Carolina.	Orangeburg	R. S. Wilkinson.
South Dakota	South Dakota State College of Agriculture and Mechanic Arts.	Brookings	E. C. Perisho.
Tennessee	College of Agriculture, University of Tennessee.	Knoxville	H. A. Morgan.[1]
	Tennessee Agricultural and Industrial State Normal School.	Nashville	W. J. Hale.
Texas	Agricultural and Mechanical College of Texas.	College Station	W. B. Bizzell.
	Prairie View State Normal and Industrial College.	Prairie View	I. M. Terrell.[2]

[1] Dean. [2] Principal. [3] Does not maintain courses in agriculture.

Agricultural colleges in the United States—Continued.

State or Territory.	Name of institution.	Location.	President.
Utah	The Agricultural College of Utah	Logan	E. G. Peterson.
Vermont	College of Agriculture of the University of Vermont.	Burlington	J. L. Hills.[1]
Virginia	The Virginia Agricultural and Mechanical College and Polytechnic Institute.	Blacksburg	J. D. Eggleston.
	The Hampton Normal and Agricultural Institute.	Hampton	J. E. Gregg.[2]
Washington	State College of Washington	Pullman	E. O. Holland.
West Virginia	College of Agriculture of West Virginia University.	Morgantown	J. L. Coulter.[1]
	The West Virginia Collegiate Institute	Institute	Byrd Prillerman.
Wisconsin	College of Agriculture of the University of Wisconsin.	Madison	H. L. Russell.[1]
Wyoming	College of Agriculture, University of Wyoming.	Laramie	A. D. Faville.[1]

[1] Dean. [2] Principal.

AGRICULTURAL EXPERIMENT STATIONS.

Alabama (College), Auburn: J. F. Duggar.
Alabama (Canebrake), Uniontown: J. M. Burgess.
Alabama (Tuskegee), Tuskegee Institute: G. W. Carver.
Alaska, Sitka (Rampart, Kodiak, Fairbanks, and Matanuska): C. C. Georgeson.[1]
Arizona, Tucson: ———.
Arkansas, Fayetteville: Martin Nelson.
California, Berkeley: T. F. Hunt.
Colorado, Fort Collins: C. P. Gillette.
Connecticut (State), New Haven; Connecticut (Storrs), Storrs: E. H. Jenkins.
Delaware, Newark: Harry Hayward.
Florida, Gainesville: P. H. Rolfs.
Georgia, Experiment: J. D. Price.
Guam:[2] C. W. Edwards.[3]
Hawaii (Federal), Honolulu: J. M. Westgate.[1]
Hawaii (Sugar Planters'), Honolulu: H. P. Agee.
Idaho, Moscow: J. S. Jones.
Illinois, Urbana: E. Davenport.
Indiana, La Fayette: C. G. Woodbury.
Iowa, Ames: C. F. Curtiss.
Kansas, Manhattan: W. M. Jardine.
Kentucky, Lexington: T. P. Cooper.
Louisiana (State), Baton Rouge; Louisiana (Sugar), New Orleans; Louisiana (North), Calhoun; Louisiana (Rice), Crowley: W. R. Dodson.
Maine, Orono: C. D. Woods.
Maryland, College Park: H. J. Patterson.
Massachusetts, Amherst: W. P. Brooks.
Michigan, East Lansing: R. S. Shaw.
Minnesota, University Farm, St. Paul: R. W. Thatcher.
Mississippi, Agricultural College: E. R. Lloyd.
Missouri (College), Columbia: F. B. Mumford.
Missouri (Fruit), Mountain Grove: Paul Evans.
Montana, Bozeman: F. B. Linfield.
Nebraska, Lincoln: E. A. Burnett.
Nevada, Reno: S. B. Doten.
New Hampshire, Durham: J. C. Kendall.
New Jersey (College), New Brunswick; New Jersey (State), New Brunswick: J. G. Lipman.
New Mexico, State College: Fabian Garcia.
New York (State), Geneva: W. H. Jordan.
New York (Cornell), Ithaca: A. R. Mann.
North Carolina, Raleigh and West Raleigh: B. W. Kilgore.
North Dakota, Agricultural College: L. Van Es.[4]
North Dakota, Agricultural College: ————
Ohio, Wooster: C. E. Thorne.
Oklahoma, Stillwater: H. G. Knight.
Oregon, Corvallis: A. B. Cordley.
Pennsylvania, State College: R. L. Watts.
Pennsylvania (Institute of Animal Nutrition), State College: H. P. Armsby.
Porto Rico (Federal), Mayaguez: D. W. May.[1]
Porto Rico (Insular), Rio Pedras: E. Colón.
Rhode Island, Kingston: B. L. Hartwell.
South Carolina, Clemson College: H. W. Barre.
South Dakota, Brookings: J. W. Wilson.
Tennessee, Knoxville: H. A. Morgan.
Texas, College Station: B. Youngblood.
Utah, Logan: F. S. Harris.
Vermont, Burlington: J. L. Hills.
Virginia (College), Blacksburg: A. W. Drinkard, jr.
Virginia (Truck), Norfolk: T. C. Johnson.
Washington, Pullman: George Severance.[4]
West Virginia, Morgantown: J. L. Coulter.
Wisconsin, Madison: H. L. Russell.
Wyoming, Laramie: A. D. Faville.

STATE OFFICIALS IN CHARGE OF AGRICULTURE.

Alabama: Commissioner of Agriculture, Montgomery.
Alaska: Agronomist in charge of Experiment Station, Sitka.
Arizona: Secretary of State, Phoenix.
Arkansas: Commissioner of Bureau of Mines, Manufactures, and Agriculture, Little Rock.
California: Secretary of the California State Agricultural Society, Sacramento.
Colorado: Secretary of the State Board of Agriculture, Fort Collins.
Connecticut: Secretary of State Board of Agriculture, Hartford.
Delaware: Secretary of State Board of Agriculture, Dover.

[1] Agronomist in charge.
[2] Address: Island of Guam, via San Francisco.
[3] Animal husbandman in charge.
[4] Acting director.

Florida: Commissioner of Agriculture, Tallahassee.
Georgia: Commissioner of Agriculture, Atlanta.
Guam: Agronomist in charge of Experiment Station, Guam.
Hawaii: Secretary of Territorial Board of Agriculture, Honolulu.
Idaho: Superintendent of Department of Farm Markets, Boise.
Illinois: Director of Department of Agriculture, Springfield.
Indiana: Secretary of State Board of Agriculture, Indianapolis.
Iowa: Secretary of Department of Agriculture, Des Moines.
Kansas: Secretary of State Board of Agriculture, Topeka.
Kentucky: Commissioner of Agriculture, Frankfort.
Louisiana: Commissioner of Agriculture and Immigration, Baton Rouge.
Maine: Commissioner of Agriculture, Augusta.
Maryland: Secretary of State Board of Agriculture, Kensington.
Massachusetts: Secretary of State Board of Agriculture, Boston.
Michigan: Secretary of State Board of Agriculture, East Lansing.
Minnesota: Secretary of State, St. Paul.
Mississippi: Commissioner of Agriculture and Commerce, Jackson.
Missouri: Secretary of State Board of Agriculture, Jefferson City.
Montana: Commissioner of Agriculture and Publicity, Helena.
Nebraska: Secretary of State Board of Agriculture, Lincoln.
Nevada: Secretary of State, Carson City.
New Hampshire: Commissioner of Agriculture, Concord.
New Jersey: Secretary of Department of Agriculture, Trenton.
New Mexico: State Land Commissioner, Santa Fe.
New York: Commissioner of Agriculture, Albany.
North Carolina: Commissioner of Agriculture, Raleigh.
North Dakota: Commissioner of Agriculture and Labor, Bismarck.
Ohio: Secretary of State Board of Agriculture, Columbus.
Oklahoma: Commissioner of Agriculture, Oklahoma.
Oregon: Secretary of State Board of Agriculture, Salem.
Pennsylvania: Secretary of Department of Agriculture, Harrisburg.
Philippine Islands: Director of Agriculture, Manila.
Porto Rico: Commissioner of Agriculture and Labor, San Juan.
Rhode Island: Secretary of State Board of Agriculture, Providence.
South Carolina: Commissioner of Agriculture, Commerce, and Industries, Columbia.
South Dakota: Commissioner of Immigration, Pierre.
Tennessee: Commissioner of Agriculture, Nashville.
Texas: Commissioner of Agriculture, Austin.
Utah: Secretary of State, Salt Lake City.
Vermont: Commissioner of Agriculture, St. Albans.
Virginia: Commissioner of Agriculture and Immigration, Richmond.
Washington: Commissioner of Agriculture, Olympia.
West Virginia: Commissioner of Agriculture, Charleston.
Wisconsin: Commissioner of Agriculture, Madison.
Wyoming: Secretary of State, Cheyenne.

STATE OFFICERS IN CHARGE OF COOPERATIVE AGRICULTURAL EXTENSION WORK.

Alabama: J. F. Duggar, Alabama Polytechnic Institute, Auburn.
Arizona: E. P. Taylor, College of Agriculture, University of Arizona, Tucson.
Arkansas: W. C. Lassetter, College of Agriculture, University of Arkansas, Fayetteville.
California: W. T. Clarke, College of Agriculture, University of California, Berkeley.
Colorado: H. T. French, State Agricultural College of Colorado, Fort Collins.
Connecticut: H. J. Baker, Connecticut Agricultural College, Storrs.
Delaware: H. Hayward, Delaware College, Newark.
Florida: P. H. Rolfs, College of Agriculture, University of Florida, Gainesville.
Georgia: J. Phil Campbell, Georgia State College of Agriculture, Athens.
Idaho: L. W. Fluharty, The Statehouse, Boise.
Illinois: W. F. Handschin, College of Agriculture, University of Illinois, Urbana.
Indiana: G. I. Christie, Purdue University, La Fayette.
Iowa: R. K. Bliss, Iowa State College of Agriculture and Mechanic Arts, Ames.
Kansas: E. C. Johnson, Kansas State Agricultural College, Manhattan.
Kentucky: Fred Mutchler, College of Agriculture of the University of Kentucky, Lexington.
Louisiana: W. R. Perkins, Louisiana State University and Agricultural and Mechanical College, Baton Rouge.
Maine: L. S. Merrill, College of Agriculture, University of Maine, Orono.
Maryland: T. B. Symons, Maryland State College of Agriculture, College Park.
Massachusetts: W. D. Hurd, Massachusetts Agricultural College, Amherst.
Michigan: R. J. Baldwin, Michigan Agricultural College, East Lansing.
Minnesota: A. D. Wilson, College of Agriculture, University of Minnesota, University Farm, St. Paul.
Mississippi: E. R. Lloyd, Mississippi Agricultural and Mechanical College, Agricultural College.
Missouri: A. J. Meyer, College of Agriculture, University of Missouri, Columbia.
Montana: F. S. Cooley, Montana State College of Agriculture and Mechanic Arts, Bozeman.
Nebraska: C. W. Pugsley, College of Agriculture, University of Nebraska, Lincoln.
Nevada: C. A. Norcross, College of Agriculture, University of Nevada, Reno.
New Hampshire: J. C. Kendall, New Hampshire College of Agriculture and Mechanic Arts, Durham.
New Jersey: Alva Agee, Rutgers College, New Brunswick.
New Mexico: A. C. Cooley, New Mexico College of Agriculture and Mechanic Arts, State College.
New York: A. R. Mann, New York State College of Agriculture, Ithaca.
North Carolina: B. W. Kilgore, North Carolina State College of Agriculture and Engineering, West Raleigh.
North Dakota: G. W. Randlett, North Dakota Agricultural College, Agricultural College.
Ohio: C. S. Wheeler, College of Agriculture, Ohio State University, Columbus.
Oklahoma: J. A. Wilson, Oklahoma Agricultural and Mechanical College, Stillwater.

Oregon: O. D. Center, Oregon State Agricultural College, Corvallis.
Pennsylvania: M. S. McDowell, Pennsylvania State College, State College.
Rhode Island: A. E. Stene, Rhode Island State College, Kingston.
South Carolina: W. W. Long, Clemson Agricultural College of South Carolina, Clemson College.
South Dakota: C. Larsen, South Dakota State College, Brookings.
Tennessee: C. A. Keffer, College of Agriculture, University of Tennessee, Knoxville.
Texas: Clarence Ousley, Agricultural and Mechanical College of Texas, College Station.
Utah: J. T. Caine, 3d, Agricultural College of Utah, Logan.
Vermont: Thos. Bradlee, University of Vermont and State Agricultural College, Burlington.
Virginia: J. M. Jones, Virginia Polytechnic Institute, Blacksburg.
Washington: W. S. Thornber, State College of Washington, Pullman.
West Virginia: C. R. Titlow, College of Agriculture, West Virginia University, Morgantown.
Wisconsin: K. L. Hatch, College of Agriculture, University of Wisconsin, Madison.
Wyoming: A. E. Bowman, College of Agriculture, University of Wyoming, Laramie.

NATIONAL AND STATE LIVE-STOCK ASSOCIATIONS AND ALLIED ORGANIZATIONS.

During the past few years numerous requests from many sources have been received by the Bureau of Animal Industry for a list of the various national and State live-stock and live-stock breeders' associations. Owing to the frequency of these petitions the Animal Husbandry Division of the bureau sent letters of inquiry to State agricultural colleges, experiment stations, live-stock associations and individuals with the object of securing a list of this kind. Many replies were received to these inquiries, but it is regrettable that a considerable number of the letters either met with no response, were returned unclaimed or, as was the case in a number of instances, those receiving the communication were unable to furnish definite information as to such organizations in their State, or to state where the desired information could be obtained. Therefore, it is not claimed that this list is complete, but that it is sufficiently large to be considered fairly representative of these classes of organizations.

No effort was made to secure a list of county or community organizations, as to have included all such would make a record of too great length to be shown in a pamphlet of respectable size. Information regarding county associations can, no doubt, be secured in most cases from the several State associations.

It is believed this list represents the only record of its kind that can be considered up-to-date so far, at least, as it covers the organizations named.

The value and necessity for such a record should be apparent. The close linking of the live-stock industry with our national prosperity places an added value on such a record, particularly at this time. The conditions confronting the country to-day and the immense value and great importance of the live-stock industry in all its phases, together with the urgent necessity for improved and increased production are of such moment that it has been considered advisable to place this list, however incomplete it may be, before the public with the hope that its circulation will not only aid in the formation of similar associations in States where they do not now exist, but that it will be used as the means to further the efforts now being made to increase the quality and quantity of the Nation's resources along every line here represented.

In view of the fact that there are undoubtedly some State associations of which definite information was not received, the Bureau of Animal Industry will appreciate receiving notice of any that do not appear here. It will also be pleased to receive information of the organization of new State associations of the classes represented.

Owing to the fact that the annual meetings of these organizations are held at different times during the year it is very probable that the names and addresses of some of the officials given will be found incorrect at the time of the distribution of this pamphlet. It will be appreciated, therefore, if any changes in the names and addresses of the officials are reported to the bureau in order that its record may be kept up-to-date.

The plan adopted in listing these associations is as follows: the associations of a national character have been given at the head of the list and these are followed by the State organizations. The States are given in alphabetical order and under each State there is given first, the general State association, if such exists, which is followed by organizations of horse breeders, dairy associations, cattle breeders, sheep breeders, and swine breeders, in the order named.

NATIONAL ASSOCIATIONS.

Name of association.	President.	Address.	Secretary.	Address.
American National Live Stock Association	I. T. Pryor	San Antonio, Tex	T. W. Tomlinson	515 Cooper Building, Denver, Colo.
National Dairy Union	N. P. Hull	Lansing, Mich	W. T. Creasy	Catawissa, Pa.
Southern Cattlemen's Association	F. H. Jones	Livingston, Ala	R. M. Gow	Little Rock, Ark.
National Swine Growers' Association	Wm. McFadden	Union Stock Yards, Chicago, Ill.	J. J. Doty	Shenandoah, Iowa.
American Poultry Association	E. E. Richards	Cedar Rapids, Iowa	E. B. Campbell	Mansfield, Ohio.
National Wool Growers' Association	F. J. Hagenbarth	Salt Lake City, Utah	S. W. McClure	Salt Lake City, Utah.
National Mohair Growers' Association	U. S. Grant	Dallas, Oreg	F. O. Landrum	Laguna, Tex.

NATIONAL POULTRY ASSOCIATIONS.

Name of association.	President.	Address.	Secretary.	Address.
American Buttercup Club	Waldron Harrington	Oxford, N. Y	Phillip C. Gori	Ulster, Pa.
American Guinea Club	Geo. L. Rockwell	Ridgefield, Conn	Edw. R. Flint	Flintdell Farm, Tunbridge, Vt.
American Buff Plymouth Rock Club	W. S. Robson	Fayette, Mo	Thomas B. Elliot	R. R. 29, St. Louis, Mo.
The American Columbian Plymouth Rock Club	J. Fred Walthers	508 Transverse Avenue, Mount Oliver Station, Pittsburgh, Pa.	T. J. Enslin	Hackettstown, N. J.
American Java Association	A. E. Huber	Newpoint, Ind	Seth W. Morton	Box 124, Albany, N. Y.
American Blue Orpington Club	Mrs. H. Hooker	South Hadley, Mass	Miss Nickerson	Leominster, Mass.
American Buff Wyandotte Club	Andrew Riddell	Greenwich, N. Y	Andrew C. De Hass	Middletown, N. Y.
The Blue Andalusian Club of America	E. D. Bird	Greenwich, Conn	Walter J. Coates	East Calais, Vt.
The Buff Minorca Club of America	S. O. Lindgreen	Kingsburg, Cal	W. P. Williams	1102 West Fifty-second Street, Los Angeles, Cal.
Hamburg Fanciers Club	John Lowell	38 Equitable Building, Boston, Mass.	Robert C. Morse	19 Congress Street, Boston, Mass.
International S. C. Black Minorca Club	Dr. E. D. Greeger	Canton, Ill	Junnus Johnson	6001 Harrison Road, Kansas City, Mo.
National Bantam Association	Geo. L. Young	411 East Seventh Street, Brooklyn, N. Y.	J. Hart Welch	Douglaston, L. I., N. Y.
National American Dominique Club	A. Q. Carter	Jefferson, Me	C. W. Besse	Jefferson, Me.
National Game Club	R. H. Roberts	Sheboygan, Wis	E. J. W. Dietz	736 Cornelia Avenue, Chicago, Ill.
National Rose Comb Orpington Club	H. C. Faulkner	Marshall, Mich	E. M. Mengell	Auburn, Pa.
National Rose Comb White Orpington Club	C. M. Streby	Belleville, Ohio	A. H. White	Syracuse, N. Y.
National Columbian Wyandotte Club	Richard G. Harwood	Littleton, Mass	Chas. H. Moreaux	Luverne, Minn.
National Bronze Turkey Club	James Miles	Petersburg, Ill	Chas. E. Bird	Meyersdale, Pa.
United Ancona Club	W. D. Farrand	Central City, Nebr	R. W. Van Hoesen	Franklinville, N. Y

STATE ASSOCIATIONS.

Alabama Live Stock Association	Dr. C. A. Cary	Auburn, Ala	Geo. S. Templeton	Mobile, Ala.
Central Alabama Dairy Association	B. F. Miller	Montgomery, Ala	L. L. Gilbert	Montgomery, Ala.
Alabama Hereford Cattle Breeders' Association	N. J. Bell	Montgomery, Ala	R. J. Goode, jr	Gastonburg, Ala.
Alabama Shorthorn Breeders' Association	John J. King	Consul, Ala	J. M. McKinzie	Greenville, Ala.
Southern Shorthorn Breeders' Association	J. A. Pettis	Dawson, Ga	T. J. Wood	Troy, Ala.
Arizona Dairymen's Association	Frank R. Sanders	Chandler, Ariz	G. W. Barnes	University of Arizona, Tucson, Ariz.
Arizona Cattle Growers' Association	L. L. Harmon	Phoenix, Ariz	Sam B. Bradner	Phoenix, Ariz.
Arizona Holstein Breeders' Association			F. R. Sanders	Mesa, Ariz.
Arizona Wool Growers' Association	E. A. Sawyer	Winslow, Ariz	L. F. Verkamp	Flagstaff, Ariz.
Arkansas Angus Breeders' Association	W. L. Banks	Smithdale, Ark	R. L. Block	Wynn, Ark.
Northwest Arkansas Shorthorn Breeders' Association	Culver Crowder	Bentonville, Ark	Art T. Lewis	Fayetteville, Ark.
California Draft Horse Breeders' Association	E. W. Westgate	Rio Vista, Cal	R. P. Royce	Davis, Cal.
Pacific Coast Trotting Horse Breeders' Association	E. P. Heald	Van Ness Avenue and Post Street, San Francisco, Cal.	F. W. Kelley	366 Pacific Building, San Francisco, Cal.
North California Guernsey Cattle Club	B. E. Nixon	Napa, Cal	A. J. Welsh	Redwood City, Cal.
California Holstein Friesian Association	F. W. Kiesel	Sacramento, Cal	Chas. L. Hughes	Sacramento, Cal.
California Jersey Breeders' Association	J. W. Cappeni	Ferndale, Cal	J. E. Thorp	Lockeford, Cal.
California Swine Breeders' Association	C. B. Cunningham	Mills, Cal	J. I. Thompson	Davis, Cal.
Colorado State Dairymen's Association	C. W. Hall	Denver, Colo	Roud McCann	Fort Collins, Colo.
Western Hereford Breeders' Association	Dr. T. F. DeWitt	Parshall, Colo	John E. Painter	Roggen, Colo.
Colorado Jersey Breeders' Association	A. M. McClenahan	Greeley, Colo	Prof. Geo. E. Morton	Fort Collins, Colo.
Western Shorthorn Breeders' Association	D. B. Nowels	Lamar, Colo	W. L. Warnock	Loveland, Colo.
Colorado Swine Breeders' Association	C. W. Henry	Greeley, Colo	R. B. Broad	Fort Collins, Colo.
Colorado Duroc-Jersey Association	R. E. Hogsett	Brush, Colo	W. L. Stone	Box 718, Pueblo, Colo.
Connecticut State Ayrshire Breeders' Club	Wilson H. Lee	Orange, Conn	L. H. Healey	Capitol, Hartford, Conn.
Connecticut Dairymen's Association	C. B. Pomeroy	Willimantic, Conn	J. G. Schwink, jr	Meriden, Conn.
New England Devon Breeders' Association	J. E. Gifford	Rockville, Conn	Leslie Geer	16 State Street, Hartford, Conn.
Connecticut Guernsey Breeders' Association	Joseph Alsop	Avon, Conn	Robert Scoville	Taconic, Conn.
Connecticut Holstein Friesian Breeders' Club	H. P. Loverin	South Willington, Conn	E. H. Lake	West Hartford, Conn.
Connecticut Sheep Breeders' Association	Charles L. Gold	West Cornwall, Conn	H. L. Garrigus	Storrs, Conn.
Connecticut Berkshire Association	R. L. Faux	Niantic, Conn	Geo. G. Grant	Taftville, Conn.
Delaware Holstein Friesian Breeders' Association	D. O. Hastings	Wilmington, Del	W. W. Blake Arkcoll	Wilmington, Del.
Florida State Live Stock Association	W. F. Blackman	Winter Park, Fla	P. L. Sutherland	Jacksonville, Fla.
Stock Growers' Association of Southeast Florida,	Dr. J. G. Du Puis	Lemon City, Fla	M. A. Milam	Miami, Fla.
Georgia Dairy and Live Stock Association	A. S. Chamblee	Bartow, Ga	Milton P. Jarnagin	Athens, Ga.
Georgia Hereford Cattle Breeders' Association	Jas. T. Anderson	Marietta, Ga	H. P. Redwine	Fayetteville, Ga.
Georgia Shorthorn Breeders' Association	E. J. Willingham	Macon, Ga	T. G. Chastain	Atlanta, Ga.
Georgia Berkshire Association	C. J. Hardman	Commerce, Ga	Ruohs Pyron	Cartersville, Ga.
Georgia Duroc Association	J. W. Hodge	Elko, Ga	J. P. Peacock	Cochran, Ga.
Northwest Live Stock Association	Thos. F. Wren	Fenn, Idaho	Paul Clagstone	Lewiston, Idaho.
Idaho Live Stock Association	E. J. Iddings	Moscow, Idaho	E. J. Fjeldstead	Boise, Idaho.
Idaho Cattle & Horse Growers' Association	Clay Vance	Chilly, Idaho	L. E. Dillingham	Mackay, Idaho.
Idaho State Dairymen's Association	Gustave Kunze	Buhl, Idaho	O. P. Hendershott	Boise, Idaho.
Idaho State Poland China Association	U. L. Wilson	Greenleaf, Idaho	A. J. Miller	Caldwell, Idaho.

STATE ASSOCIATIONS—Continued.

Name of association.	President.	Address.	Secretary.	Address.
State Live Stock Association of Illinois	J. G. Imboden	Decatur, Ill	Jay R. Brown	Union Stock Yards, Chicago, Ill.
Illinois Live Stock Breeders' Association	J. E. Meharry	Toulon, Ill	A. T. Peters	Peoria, Ill.
Illinois Horse Breeders' Association	P. S. Haner	Taylorville, Ill	F. S. Prichard	Ottawa, Ill.
Illinois Jack, Jennet, and Mule Breeders' Association	Ira Sharp	Sharpsburg, Ill	A. F. Hughes	Williamsville, Ill.
Illinois State Dairymen's Association	J. P. Mason	Elgin, Ill	Lewis N. Wiggins	Springfield, Ill.
Illinois Cattle Breeders' Association	W. W. Wright	Toulon, Ill	John R. Jones	Williamsville, Ill.
Illinois Cattle Feeders' Association	J. W. Kirkton	Gridley, Ill	H. P. Rusk	Urbana, Ill.
Illinois State Hereford Breeders' Association	A. N. Abbott	Morrison, Ill	B. M. Davison	Springfield, Ill.
Illinois Jersey Cattle Club	W. S. O'Hair	Paris, Ill	Sidney B. Smith	Do.
Illinois Shorthorn Breeders' Association	C. J. McMaster	Altona, Ill	Rank C. Forbes	Henry, Ill.
Illinois Sheep Breeders' Association	R. J. Stone	Stonington, Ill	W. C. Coffey	Urbana, Ill.
Illinois Swine Breeders' Association	Simon Albrecht	Tiskilwa, Ill	Oscar Hensel	Edelstein, Ill.
Illinois Chester Breeders' Association	F. E. Sherer	Joy, Ill	Henry Andrews	Sheffield, Ill.
Indiana Live Stock Breeders' Association	J. C. Andrew	West Point, Ind	C. G. Starr	La Fayette, Ind.
Indiana Draft Horse Breeders' Association	J. V. Painter	Middletown, Ind	J. H. Skinner	Do.
Indiana State Dairy Association	W. H. Seymour	Brookville, Ind	C. R. George	Do.
Indiana Cattle Feeders' Association	C. L. Meharry	Attica, Ind	C. G. Starr	Do.
Indiana Aberdeen-Angus Breeders' Association	B. F. Wilson	Anderson, Ind	W. W. Smith	West La Fayette, Ind.
Indiana Guernsey Breeders' Association	A. E. Adams	Plymouth, Ind	W. M. Schlosser	Frankfort, Ind.
Indiana Hereford Breeders' Association	R. M. Hamer	La Fayette, Ind	H. E. Allen	La Fayette, Ind.
Indiana Holstein Friesian Association	C. R. Sowder	Indianspolis, Ind	C. A. Kurtze	1931 Broadway, Indianapolis, Ind.
Indiana Jersey Cattle Club	J. A. Driscoll	Liberty, Ind	Milford Evans	Sheridan, Ind.
Indiana Shorthorn Breeders' Association	H. E. Harlan	Alexandria, Ind	F. C. Beall	La Fayette, Ind.
Indiana Sheep Breeders and Feeders Association	J. C. Andrew	West Point, Ind	H. E. Allen	1931 Broadway, Indianapolis, Ind
Indiana Swine Breeders' Association	E. J. Barker	Thorntown, Ind	J. R. Moore	Rochester, Ind.
Indiana Berkshire Association	E. J. Barker	Thorntown, Ind	C. A. Kurtze	1931 Broadway, Indianapolis, Ind
Indiana Duroc Swine Breeders' Association	T. W. Logan	Lafontaine, Ind	E. K. Morris	939 Illinois Street, Indianapolis, Ind.
Indiana Hampshire Swine Breeders' Association	John R. Lewis	Rensselaer, Ind	M. S. Gardiner	Idaville, Ind.
Indiana State Poland China Breeders' Association	S. R. Claycomb	Portland, Ind	Perry Johnson	Atlanta, Ind.
Iowa Draft Horse Breeders' Association	Wm. Crownover	Hudson, Iowa	G. E. O'Brien	Des Moines, Iowa.
Iowa State Dairy Association	W. B. Quarton	Algona, Iowa	F. W. Stephenson	Oelwein, Iowa.
Iowa Beef Producers' Association	Geo. H. Burge	Mount Vernon, Iowa	E. B. Thomas	Audubon, Iowa.
Iowa Guernsey Breeders' Association	H. J. Schmidt	Cedar Falls, Iowa	F. L. Kerr	Manilla, Iowa.
Iowa Hereford Cattle Breeders' Association	R. W. Cassidy	Whiting, Iowa	F. E. Brazie	Harlan, Iowa.
Iowa Polled Hereford Breeders' Association	P. M. Schooley	West Liberty, Iowa	J. E. Kirstein	Clarion, Iowa.
Iowa Holstein-Friesian Breeders' Association	J. F. Cass	Waterloo, Iowa	F. C. Barney	Chapin, Iowa.
Iowa Shorthorn Breeders' Association	Frank Toyne	Lanesboro, Iowa	D. A. Jay	Blakesburg, Iowa.
Interstate Shorthorn Breeders' Association	J. B. McMillan	Rock Rapids, Iowa	J. E. Halsey	West Hotel, Sioux City, Iowa.
Iowa Sheep Breeders' and Wool Growers' Association	Will Michael	Selma, Iowa	V. G. Warner	Bloomfield, Iowa.
Iowa Shropshire Association	Carlos Fawcett	Springdale, Iowa	M. G. Thornburg	Ames, Iowa.
Iowa Swine Breeders' Association	F. H. Sixsmith	Orient, Iowa	M. P. Hancher	Rolfe, Iowa.
Iowa Chester Breeders' Association	C. C. Evans—	North English, Iowa	James R. Moore	Rochester, Ia.

Kansas Live Stock Association	W. R. Stubbs	Lawrence, Kans	J. H. Mercer	State House, Topeka, Kans.
Kansas Improved Live Stock Breeders' Associaiton	James Tomson	Carbondale, Kans	Geo. W. Berry	Topeka, Kans.
Kansas Horse Breeders' Association	Geo. B. Rose	Sterling, Kans	C. W. McCampbell	Manhattan, Kans.
Kansas State Dairy Association	W. M. Newlin	Hutchinson, Kans	J. B. Fitch	Do.
Aberdeen Angus Association of Kansas	E. L. Barrier	Eureka, Kans	W. A. Cochel	Do.
Kansas Ayrshire Breeders' Association	L. E. Johnston	Waldron, Kans	Jas. W. Linn	Do.
Kansas Hereford Breeders' Association	Arthur T. Crocker	Bazaar, Kans	W. A. Howard	Comiskey, Kans.
Holstein-Friesian Association of Kansas	Ben Schneider	Nortonville, Kans	W. H. Mott	Herington, Kans.
Kansas Sheep Breeders' Association	A. T. Stockwell	Larned, Kans	A. M. Paterson	Manhattan, Kans.
Kansas Swine Breeders' Association	Fred Luptad	Lawrence, Kans	Carl P. Thompson	Do.
Kansas Poland China Breeders' Association	F. B. Caldwell	Howard, Kans	Paul Oliver	Danville, Kans.
Kansas Hampshire Swine Breeders' Association	F. M. Watkins	Cherryvale, Kans	Geo. W. Eia	Valley Falls, Kans.
Kentucky Pure Bred Live Stock Association	C. E. Marvin	Paynes Depot, Ky	L. B. Shropshire	Louisville, Ky.
Kentucky Horse, Jack, and Mule Breeders' Association	M. S. Cohen	Frankfort, Ky	W. S. Anderson	Lexington, Ky.
Kentucky Trotting Horse Breeders' Association	E. A. Tipton	Lexington, Ky	J. W. Williams	Do.
Kentucky Dairy Cattle Club	J. M. Howie	Anchorage, Ky	J. J. Hooper	Do.
Kentucky Beef Cattle Association	T. L. Hornsby	Eminence, Ky	E. S. Good	Do.
Holstein Breeders' Club of Kentucky	J. B. Bowles	Bardstown, Ky	J. S. Lindsay	Winchester, Ky.
Kentucky Shorthorn Breeders' Association	C. H. Bower	Lexington, Ky	R. T. Judy	Sharpsburg, Ky.
Kentucky Sheep Breeders' Association	R. H. Stevenson	do	E. S. Good	Lexington, Ky.
Kentucky Swine Breeders' Association	W. W. Johnson	Danville, Ky	Hubert Vreeland	Farmers' Home Journal, Louisville, Ky.
Louisiana Live Stock and Breeders' Association	E. J. McCall	Ponchartrainr Grove, La	R. B. Bentley (acting)	University Station, Baton Rouge, La.
Louisiana Dairymen's Association	N. H. Richardson	Bains, La	J. M. Cadwallader	Louisiana State University, Baton Rouge, La.
Louisiana Beef Breeders' Association	R. K. Boney	Ducksport La	R. H. Benton, jr	University Station, Baton Rouge, La.
Louisiana Jersey Breeders' Association	C. M. Roberts	Minden, La	O. G. Hankins	Ruston, La.
Louisiana Swine Breeders' Association	O. P. Geren	New Orleans, La	E. L. Jordan	Baton Rouge, La.
Maine Live Stock Breeders' Association	H. M. Moulton	Cumberland Center, Me	E. W. Morton	Orono, Me.
Maine Dairymen's Association	H. M. Tucker	Augusta, Me	Brooks Brown	Augusta, Me.
Maine Ayrshire Breeders' Association	L. G. Bunker	Waterville Me	John A. Ness	Auburn, Me.
New England Hereford Breeders' Association	Harvey D. Eaton	do	Stephen J. Adams	Cornish, Me.
Maine Holstein-Friesian Breeders' Association	L. E. McIntire	East Waterford, Me	H. J. Shaw	Topsham, Me.
Maine Shorthorn Breeders' Association	C. E. Cobb	Denmark, Me	C. R. Leland	Mechanic Falls, Me.
Maryland State Dairymen's Association	D. G. Harry	Pylesville, Md	R. H. Ruffner	College Park, Md.
Holstein-Friesian Breeders' Club of Maryland	John B. Diamond, jr	Gaithersburg, Md	G. H. Hibberd	Lutherville, Md.
Massachusetts Dairymens' Association	Burton W. Potter	Worcester, Mass	W. P. B. Lockwood	Amherst, Mass.
New England Ayrshire Club	A. H. Sagendorph	Spencer, Mass	R. M. Handy	Barre, Mass.
Michigan Improved Live Stock Breeders' and Feeders' Association.	I. R. Waterbury	Detroit, Mich	G. A. Brown	East Lansing, Mich.
Michigan Horse Breeders' Association	Jacob De Gens	Alicia, Mich	R. S. Hudson	Do.
Michigan Dairymens' Association	Geo. H. Brownell	Detroit, Mich	R. T. Frary	Lapeer, Mich.
Michigan Aberdeen Angus Breeders' Association	A. Minty	Ionia, Mich	Ward Hathaway	Ovid, Mich.
Michigan Guernsey Cattle Club	Harry Ballard	Niles, Mich	C. G. Parnall	Jackson, Mich.
Michigan Hereford Breeders' Association	Louis Norton	Quimby, Mich	Earl C. McCarty	Bad Axe, Mich.
Michigan Holstein-Friesian Breeders' Association	H. W. Norton, jr	Howell, Mich	Charles Daniels	Okemo, Mich.
Central Michigan Holstein Breeders' Association	John B. Strange	Grand Ledge, Mich	Fred R. McDonel	R. F. D. No. 4, Lansing, Mich.
Michigan Jersey Cattle Club	Alvin Balden	Capac, Mich	Mrs. P. H. Walker	R. F. D. No. 8, Kalamazoo, Mich.
Michigan Red Polled Cattle Breeders' Association	N C. Herbison	Birmingham, Mich	E. J. Peabody	Grand Ledge, Mich.

STATE ASSOCIATIONS—Continued.

Name of association.	President.	Address.	Secretary.	Address.
Michigan Shorthorn Breeders' Association	Jay Smith	Ann Arbor, Mich	W. W. Knapp	Howell, Mich.
Central Michigan Shorthorn Breeders' Association	Oscar Skinner	Gowen, Mich	C. W. Crum	McBride, Mich.
Michigan Sheep Breeders' & Feeders' Association	H. H. Hinds	Stanton, Mich	W. H. Schantz	Hastings, Mich.
Michigan Hampshire Sheep Breeders Association	John Hull	Dimondale, Mich	C. A. Tyler	Coldwater, Mich.
Michigan Merino Sheep Breeders' Association	H. L. Mayo	Nashville, Mich	E. N. Ball	Hamburg, Mich.
Michigan State Oxford Down Sheep Breeders' Association.	I. R. Waterbury	Detroit, Mich	B. F. Miller	Flint, Mich.
Michigan Shropshire Association	H. E. Powell	Ionia, Mich	W. H. Schantz	Hastings, Mich.
Michigan Swine Breeders' Association	George Mansfield	Homer, Mich	O. F. Foster	Ann Arbor, Mich.
Michigan Berkshire Breeders' Association	J. L. Miller	Caledonia, Mich	B. B. Perry	Leslie, Mich.
Michigan Duroc-Jersey Swine Breeders' Association	C. U. Edmonds	Hastings, Mich	M. T. Story	Lowell, Mich.
Michigan Hampshire Swine Breeders' Association	H. H. Halladay	Clinton, Mich	Geo. Starr	Grass Lake, Mich.
Michigan O. I. C. and Chester White Breeders' Association.	Harry T. Crandell	Cass City, Mich	J. C. Jewett	Mason, Mich.
Michigan Poland China Swine Breeders' Association	J. C. Butler	Portland, Mich	W. J. Clark	Do.
Minnesota Live Stock Breeders' Association	W. S. Moscrip	Lake Elmo, Minn	W. A. McKerrow	University Farm, St. Paul, Minn.
Minnesota Horse Breeders' Association	C. B. Crandall	Randolph, Minn	J. F. Kuehn	Do.
Minnesota Cattle Breeders' Association	J. S. Anderson	Atwater, Minn	F. E. Millard	Canby, Minn.
Minnesota Aberdeen Angus Breeders' Association	L. A. Campbell	Utica, Minn	Walter M. Falkenhagen	Montevideo, Minn
Minnesota Ayrshire Breeders' Association	R. E. Lynch	Zimmerman, Minn	Geo. Chambers	Owatonna, Minn.
Minnesota Guernsey Breeders' Association	Geo. C. Stone	Duluth, Minn	B. Bieri	Mound, Minn.
Minnesota Hereford Breeders' Association	L. E. Potter	Springfield, Minn	J. S. Montgomery	University Farm, St. Paul, Minn.
Minnesota Holstein Breeders' Association	E. T. Winship	Owatonna, Minn	H. R. Searles	Do.
Minnesota Jersey Cattle Club	C. R. Brackett	Long Lake, Minn	H. L. Elliott	Minneapolis, Minn.
Minnesota Red Polled Cattle Breeders' Association	Geo. P. Grout	Duluth, Minn	F. W. Foote	Red Wing, Minn.
Minnesota Shorthorn Breeders' Association	Leslie Smith	St. Cloud, Minn	T. G. Patterson	University Farm, St. Paul, Minn.
Minnesota Sheep Breeders' Association	J. H. Bobendrier	Rogers, Minn	Phil. Anderson	Do.
Minnesota Swine Breeders' Association	O. S. Lasby	Mankato, Minn	R. C. Ashby	Do.
Minnesota State Poland China Breeders' Association	J. M. Glasier	St. James, Minn	P. W. Young	Prosper, Minn.
Live Stock & Dairy Association	Cary Cocke	Columbus, Miss	A. Smith	Robinsonville, Miss.
Mississippi Angus Association	W. T. Burnett	Vicksburg, Miss	M. T. Aldrich	Michigan City, Miss.
Mississippi Hereford Breeders' Association	E. K. Middleton	Pocahontas, Miss	A. F. Wortman	Jackson, Miss.
Mississippi Shorthorn Breeders' Association	A. B. Patterson	Meridian, Miss	H. K. Gayle	A. & M. College, Agricultural College, Miss.
Mississippi Swine Breeders' Association	E. K. Middleton	Pocahontas, Miss	E. M. Ranck	Agricultural College, Miss.
Missouri Live Stock Producers' Association	C. E. Yancey	Liberty, Mo	S. T. Simpson	Columbia, Mo
Missouri Draft Horse Breeders' Association	J. F. Roelofson	Maryville, Mo	E. A. Trowbridge	Do.
Missouri Saddle Horse Breeders' Association	James Houchin	Jefferson City, Mo	E. A. Trowbridge	Do.
Missouri State Dairy Association	E. G. Bennett	Carthage, Mo	A. C. Ragsdale	Do.
Missouri Aberdeen-Angus Association	Ernest Bacon	Popular Bluff, Mo	J. D. Blackwell	Fayette, Mo.
Northwest Missouri Hereford Breeders' Association	John Rankin, sr	Tarkio, Mo	Howard E. French	Kellerton, Iowa.
Missouri Holstein Breeders' Association	C. M. Jones	Chillicothe, Mo	C. E. Driver	Eureka, Mo.
Southwest Jersey Cattle Breeders' Association	E. E. Knoche	Martin City, Mo	J. M. Axley	Kansas City, Mo.
Central Shorthorn Breeders' Association	H. M. Hill	Lafontaine, Kans	J. A. Forsythe	Pleasant Hill, Mo.
Southwest Missouri Shorthorn Breeders' Association	J. W. McCanse	Mt. Vernon, Mo	Clinton Marbut	Verona, Mo.
Missouri Sheep Breeders' & Feeders' Association	E. B. Wilson	Stanberry, Mo	H. Hackedorn	Columbia, Mo.
Missouri Duroc-Jersey Swine Breeders' Association	A. White, jr	Palmyra, Mo	R. L. Hill	Do.

Missouri Hampshire Swine Association	W. J. Brinigar	Blythedale, Mo.	Thomas E. Deem	Cameron, Mo.
Missouri O. I. C. & Chester White Swine Breeders' Association.	R. H. Scott	Nelson, Mo	Sidney D. Frost	Kingston, Mo.
Missouri Poland China Swine Breeders' Association	J. P. Bennett	Lees Summit, Mo	C. H. Walker	600 Graphic Arts Building, Kansas City, Mo.
Montana Stock Growers' Association	R. P. Heren	Miles City, Mont	D. W. Raymond	Helena, Mont.
Montana Horse Breeders' Association	H. L. Summers	Bozeman, Mont	E. H. Riley	Bozeman, Mont.
Montana State Dairymen's Association	J. A. Woll	Whitehall, Mont	G. L. Martin	Do.
Montana Shorthorn Breeders' Association	P. H. Griffin	Drummond, Mont	H. L. Summers	Do.
Montana Pure Bred Hog Breeders' Association	P. J. Moloy	Townsend, Mont	Albert R. Whitney	Belgrade, Mont.
Nebraska Improved Live Stock Breeders' Association	Charles Graff	Bancroft, Nebr	H. J. Gramlich	University Farm, Lincoln, Nebr.
Nebraska Live Stock Feeders' Association	Z. F. Leftwich	St. Paul, Nebr	K. F. Warner	Lincoln, Nebr.
Nebraska Horse Breeders' Association	W. J. Thompson	Dorchester, Nebr	H. J. Gramlich	Do.
Nebraska State Dairymens' Association	O. L. Severe		R. W. McGinnis	
Nebraska Dairy Cattle Breeders' Association	D. D. Maxfield	R. F. D. No. 2, Lincoln, Nebr.		
Aberdeen Angus Association of Nebraska	J. A. Amsbery	Mason City, Nebr	D. K. Robertson	Madison, Wis.
Nebraska Hereford Breeders' Association	O. E. Green	Genoa, Nebr	C. B. Benger	Callaway, Nebr.
Nebraska Red Polled Cattle Association	Luke Wiles	Plattsmouth, Nebr	Elliott R. Davis	Lincoln, Nebr.
Nebraska Shorthorn Breeders' Association	Frank Hess	Surprise, Nebr	C. McCarthy	York, Nebr.
Nebraska State Sheep Breeders' and Wool Growers' Association.	James Houg	Shelton, Nebr	H. B. Pier	Omaha, Nebr.
Nebraska State Swine Breeders' Association	Sam McKelvie	Fairfield, Nebr	Elmer J. Lamb	Lincoln, Nebr.
Chester Breeders' Association of Nebraska	H. L. Bode	Friend, Nebr	C. H. Murray	Friend, Nebr.
State Live Stock Association	W. H. Moffat	Reno, Nev	David Staunton	Reno, Nev.
Granite State Dairymen's Association	C. J. Bell	Hollis, N. H	W. P. Davis	Durham, N. H.
New Hampshire Ayrshire Cattle Breeders' Club	Hollis F. Towne	Hookset, N. H	Geo. H. Yeaton	Dover, N. H.
New Hampshire Holstein-Friesian Club	J. W. Prentiss	Alstead, N. H	P. A. Campbell	Dixville Notch, N. H.
New Hampshire Jersey Cattle Club	Geo. M. Putnam	Contoocook, N. H	F. E. Garvin	Dunbarton, N. H.
New Hampshire Sheep Breeders' Association	Henry W. Nims	Keene, N. H	E. G. Ritzman	Durham, N. H.
New England Berkshire Club	Geo. L. Flanders	Warner, N. H	S. R. Morrison	Oxford, N. H.
New Jersey Guernsey Breeders' Association	Joseph Laroque	Bedminster, N. J	C. D. Cleveland	Eatontown, N. J.
New Jersey Holstein-Friesian Breeders' Association	Louis H. Schenck	Somerville, N. J	Jacob Todd, jr	Somerville, N. J.
Jersey Cattle Association of New Jersey	George Batten	Montclair, N. J	Fred Huyler	Gladstone, N. J.
New Jersey Berkshire Breeders' Association	A. S. Knight	No. 1 Madison Avenue, New York, N. Y.	L. E. Ortiz	Bernardsville, N. J.
New Mexico Horse & Cattle Growers' Association	J. M. Morley	Datil, N. Mex	J. W. Miller	Albuquerque, N. Mex.
Rio Grande Valley Dairy Association	Lee Harlan	Telles, N. Mex	Edmondson B. Link	Las Cruces, N. Mex.
New Mexico Wool Growers' Association	G. M. Otero	Los Lunas, N. Mex	Walter M. Connell	Commercial Club Building, Albuquerque, N. Mex.
Eastern New Mexico Swine Growers' Association	O. M. Trotter	Artesia, N. Mex	W. C. Reed	Sante Fe, N. Mex.
New York State Breeders' Association	H. B. Harpending	Dundee, N. Y	Albert E. Brown	428 South Salina Street, Syracuse, N. Y.
New York State Draft Horse Breeders' Club	E. S. Akin	604 Walnut Ave., Syracuse, N. Y.	E. E. Horton	Johnson City, N. Y.
New York State Dairymen's Association	George Hogue	Arcade, N. Y	S. C. Shaver	Department of Agriculture, Albany, N. Y.
Empire State Ayrshire Club	W. P. Schanck	Avon, N. Y	Milton W. Davison	Canisteo, N. Y.
New York State Guernsey Breeders' Association	F. M. Smith	Springfield Center, N. Y	James H. Seaman	Glens Falls, N. Y.
The Holstein-Friesian Breeders' Club of New York State	Edward A. Powell	Syracuse, N. Y	Wing R. Smith	Syracuse, N. Y.
New York State Jersey Cattle Club	J. L. Craig	Ogdensburg, N. Y	C. O. Gould	East Hampton, N. Y.
New York State Sheep Breeders' Association	J. C. Duncan	Lewiston, N. Y	J. S. Pratt	Knowlesville, N. Y.
New York State Berkshire Association	W. S. Hinchey	Rochester, N. Y	W. W. Stewart	Linwood, N. Y.
North Carolina Beef Breeders and Feeders' Association	J. E. Latham	Greensboro, N. C	R. S. Curtis	West Raleigh, N. C.

STATE ASSOCIATIONS—Continued.

Name of association.	President.	Address.	Secretary.	Address.
North Carolina Dairy Association	H. P. Lutz	Newton, N. C	W. H. Eaton	West Raleigh, N. C
North Carolina Swine Breeders' Association	G. A. Holderness	Tarboro, N. C	Dan T. Gray	Do.
North Carolina Poultry Breeders' Association	J. P. Kerr	Haw River, N. C	B. F. Kaupp	Do.
North Dakota Live Stock Association	J. A. Power	Leonard, N. Dak	W. H. Peters	Agricultural College, Fargo, N. Dak.
United Live Stock Breeders' Association	W. P. Hetler	Esmond, N. Dak	Matthew Duffy	Esmond, N. Dak.
North Dakota Jersey Cattle Breeders' Association	C. E. Batchellee	Fingal, N. Dak	S. F. Crabbe	Fargo, N. Dak.
North Dakota Yorkshire Club	L. A. Knoke	Willow City, N. Dak	Harry J. Devine	Mapleton, N. Dak.
Ohio Live Stock Association	Ralph Postle	Camp Chase, Ohio	B. E. Carmichael	Wooster, Ohio.
Ohio Percheron Breeders' Association	O. H. Pollock	Delaware, Ohio	D. J. Kays	Ohio State University, Columbus, Ohio.
Ohio State Dairymen's Association	L. P. Bailey	Tacoma, Ohio	Oscar Erf	Columbus, Ohio.
Ohio Ayrshire Breeders' Association	A. B. McConnell	Wellington, Ohio	D. M. Henderson	Hudson, Ohio.
Ohio Galloway Breeders' Association	James Frantz	R. F. D. No. 4, Bluffton, Ohio	Geo. D. Simmons	Hicksville, Ohio.
Ohio Guernsey Breeders' Association	E. H. Campbell	Salem, Ohio	H. C. McCamon	Lisbon, Ohio.
Ohio Hereford Cattle Breeders' Association	J. A. Hill	Roundhead, Ohio	J. B. Fernow	Leesburg, Ohio.
Ohio Holstein-Friesian Breeders' Association	Peter Small	Chesterland, Ohio	O. P. Zehring	Germantown, Ohio.
Ohio Jersey Cattle Club	I. R. Blackburn	Dayton, Ohio	P. J. Cummings	Fredericktown, Ohio.
Ohio Red Poll Cattle Breeders' Association	H. C. Price	Newark, Ohio	Frank Nelson	London, Ohio.
Ohio Shorthorn Breeders' Association	P. G. Ross	Mansfield, Ohio	W. C. Rosenberger	Tiffin, Ohio.
Ohio Association for Promotion of Pure Bred Sheep	S. M. Cleaver	Delaware, Ohio	C. S. Plumb	Columbus, Ohio.
Ohio Rambouillet Sheep Breeders' Association	L. W. Shaw	Pottersburg, Ohio	L. C. Orth	McGuffey, Ohio.
Ohio Shropshire Breeders' Association	L. B. Palmer	Pataskala, Ohio	Ralph A. Postle	Camp Chase, Ohio.
Ohio State Chester White Breeders' Association	I. C. Cummins	Xenia, Ohio	F. Schweiterman	Montezuma, Ohio.
Oklahoma Improved Stock Breeders	W. H. Taggart	Waukomis, Okla	C. M. Johnston	Waukomis, Okla.
Oklahoma Dairy Association	L. C. Goodell	Tulsa, Okla	C. A. Burns	Stillwater, Okla.
Oklahoma State Aberdeen-Angus Breeders' Association	L. R. Kersha	Muskogee, Okla	Wm. Alson	Edmond, Okla.
Oklahoma Hereford Breeders' Association	F. M. Gault	Oklahoma, Okla	Keith Sellars	Okarche, Okla.
Oklahoma Jersey Cattle Breeders' Association	R. L. Publey	do	A. L. Churchill	Vinita, Okla.
Oklahoma Shorthorn Breeders' Association	H. C. Lookabaugh	Watonga, Okla	F. K. Taggart	Bison, Okla.
Oklahoma Swine Breeders' Association	W. A. Williams	Marlow, Okla	S. B. Jackson	El Reno, Okla.
Oregon Pure Bred Live Stock Association	C. L. Hawley	McCoy, Oreg	N. C. Maris	35 East Ninth Street North, Portland, Oreg.
Oregon Horse Breeders' Association	D. M. Dryden	Woodburn, Oreg	D. E. Richards	Corvallis, Oreg.
Oregon Dairymen's Association	W. H. Taylor	Corvallis, Oreg	E. G. Woodward	Do.
Oregon Guernsey Cattle Club	Albion L. Gile	Chinook, Wash	R. G. Fowler	Carlton, Oreg.
Oregon Jersey Cattle Club	Frank Loughary	Monmouth, Oreg	S. A. Richa	Silverton, Oreg.
Northwest Shorthorn Association	A. D. Dunn	Wapato, Wash	E. L. Potter	Corvallis, Oreg.
Oregon Swine Breeders' Association	Thos. Brunk	Salem, Oreg	G. O. Swales	Johnson, Wash.
Pennsylvania Breeders' and Dairymen's Association	E. S. Bayard	Pittsburgh, Pa	E. K. Hibshman	State College, Pa.
Pennsylvania Holstein-Friesian Association	E. B. Bennett	Easton, Pa	W. M. Benninger	Benningers, Pa.
Pennsylvania Jersey Breeders' Association	Horace G. Twaddell	Media, Pa	Charles Leonard	Troy, Pa.
Pennsylvania Sheep Breeders' Association	R. L. Munce	Cannonsburg, Pa	J. B. Henderson	Hickory, Pa.
Pennsylvania Berkshire Breeders' Association	E. S. Deubler	Narberth, Pa	E. S. Deubler (acting)	Narberth, Pa.
South Carolina Live Stock Association	G. Y. Hunter	Prosperity, S. C	Walter Sorrell	Camden, S. C.
South Carolina Guernsey Breeders' Association	A. McDonald	Blackstock, S. C	R. M. Cooper, jr	Wisacky, S. C.

South Dakota Improved Live Stock and Poultry Breeders' Association.	John M. Erion	Mitchell, S. Dak	James W. Wilson	Brookings, S. Dak.
South Dakota Dairymen's and Buttermakers' Association.	Enos Albertson	Flandreau, S. Dak	A. P. Ryger	Do.
South Dakota Holstein-Friesian Association	P. A. Zollman	Mitchell, S. Dak	P. R. Crothers	Badger, S. Dak.
South Dakota Shorthorn Breeders' Association	J. E. Ziebach	Gann Valley, S. Dak	F. D. Peckham	Alexandria, S. Dak.
South Dakota Pure Bred Swine Breeders' Association	Fred Meyers	Redfield, S. Dak	J. F. White	Hurley, S. Dak.
Middle Tennessee Beef Breeders' Association	Clarence Campbell	Lynnville, Tenn	J. E. Hite	Nashville, Tenn.
Tennessee Jersey Breeders' Association	Geo. Campbell	Spring Hill, Tenn	Joe Morris	Edenwold, Tenn.
Texas Jack and Mule Breeders' Association	Tom W. Hines	Venus, Tex	W. C. Grant	Denton, Tex.
Cattle Raisers' Association of Texas	James Callan	Menard, Tex	E. B. Spiller	Fort Worth, Tex.
Texas Dairymen's Association	H. A. Clapp	Collegeport, Tex	R. L. Pou	College Station, Tex.
Texas Aberdeen-Angus Breeders' Association	E. H. Small	Shamrock, Tex	Ross Barry	Meridian, Tex.
Texas Hereford Association	B. C. Rhome, jr	Fort Worth, Tex	J. P. Lee	San Angelo, Tex.
Texas Jersey Cattle Club	Dupont B. Lyon	Sherman, Tex	C. M. Evans	College Station, Tex.
Texas Shorthorn Breeders' Association	G. E. King	Taylor, Tex	L. B. Brown	Smithfield, Tex.
Sheep and Goat Raisers' Association of Texas	B. M. Halbert	Sonora, Tex	W. M. Holland	Sonora, Tex.
Texas Swine Breeders' Association	G. P. Lillard	Seguin, Tex	L. B. Burk	College Station, Tex.
Utah Live Stock Breeders' Association	A. W. Ivins	Salt Lake City, Utah	W. E. Carroll	Logan, Utah.
Utah State Dairymen's Association	W. C. Winder	...do	G. B. Caine	Do.
Vermont Ayrshire Club	C. M. Winslow	Brandon, Vt	Clyde N. Smith	Brandon, Vt.
Vermont Guernsey Breeders' Association	Elbert C. Tenney	Brattleboro, Vt	M. H. Moody	Waterbury, Vt.
Vermont Holstein-Friesian Club	G. F. Gregory	Dummerston, Vt	G. G. Waite	Windsor, Vt.
Vermont Jersey Cattle Club	G. L. Nichols	Enosbury Falls, Vt	W. H. Harrington	West Hartford, Vt.
New England Shorthorn Breeders' Association	G. E. Taylor, jr	Shelburne, Mass	W. A. Simpson	Lyndonville, Vt.
Virginia State Dairymen's Association	J. S. Haldeman	Winchester, Va	A. F. Howard	Farmville, Va.
Virginia State Guernsey Breeders' Association	J. S. Agnew	Burkeville, Va	J. C. Courter	Jetersville, Va.
Atlantic Hereford Cattle Breeders' Association	Walter Sonell	Camden, S. C	L. W. Hill	Locust Dale, Va.
Virginia Holstein Friesian Club	F. S. Walker	Woodberry Forest, Va	R. V. Martindale	Sweetbriar, Va.
Virginia Jersey Cattle Club	W. B. Gates	Rice, Va	J. W. Chapman	Culpeper, Va.
Washington Pure Bred Live Stock Association	E. R. Brady	Satsop, Wash	E. E. Faville	Spokane, Wash.
Western Washington Holstein Breeders' Association	Wm. Bishop	Chimacum, Wash	A. B. Winter	Everett, Wash.
West Virginia Live Stock Association	H. M. Gore	Clarksburg, W. Va	E. W. Sheets	Morgantown, W. Va.
West Virginia Ayrshire Breeders' Association	P. O. Reymann	Wheeling, W. Va	W. A. Rhea	Do.
Tri-State Sheep Breeders' and Wool Growers' Association	R. L. Munce	Cannonsburg, Pa	...do	Do.
Wisconsin Live Stock Breeders' Association	Arthur Broughton	Albany, Wis	Andrew Hopkins	Madison, Wis.
Wisconsin Horse Breeders' Association	W. K. Caldwell	Morrisonville, Wis	J. G. Fuller	Do.
Wisconsin Dairymen's Association	M. Michels	Peebles, Wis	P. C. Burchard	Fort Atkinson, Wis.
Wisconsin Aberdeen Angus Breeders' Association	P. Gelbach	Lancaster, Wis	J. G. Fuller	Madison, Wis.
Wisconsin Ayrshire Breeders' Association	James Van Etta	Lina Center, Wis	A. J. McNab	Black River Falls, Wis.
Wisconsin Brown Swiss Cattle Breeders' Association	Ira Inman	Beloit, Wis	H. C. Taylor	Madison, Wis.
Western Guernsey Breeders' Association	J. R. Brent	Oglesby, Ill	Chas. L. Hill	Rosendale, Wis.
Wisconsin Hereford Cattle Breeders' Association	Irving Jewell	Mineral Point, Wis	C. W. Thompson	Lake Geneva, Wis.
Holstein-Friesian Breeders' Association of Wisconsin	R. J. Schaefer	Appleton, Wis	C. J. Schroeder	Racine, Wis.
Wisconsin Jersey Breeders' Association	W. H. Clark	Rice Lake, Wis	E. E. Wyatt	Tomah, Wis.
Wisconsin Red Polled Breeders' Association	J. B. Ahlers	West Bend, Wis	L. C. Underwood	Avoca, Wis.
Wisconsin Shorthorn Breeders' Association	E. E. Jones	Rockland, Wis	J. L. Tormey	Madison, Wis.
The Wisconsin Sheep Breeders' Association	A. Broughton	Albany, Wis	W. F. Renk	Sun Prairie, Wis.
Wisconsin Berkshire Breeders' Association	H. C. Taylor	Beloit, Wis	W. A. Freehoff	Waukesha, Wis.
Wisconsin Chester White Breeders' Association	James Fisher	Eastman, Wis	A. H. Kuhlman	Madison, Wis.
Wisconsin Duroc Jersey Swine Breeders' Association	M. H. O'Keefe	Waunakee, Wis	J. D. Grant	Delavan, Wis.
Wisconsin Hampshire Breeders' Association	H. A. Bush	Fond du Lac, Wis	W. W. Meacham	Downing, Wis.
Wisconsin Poland China Breeders' Association	R. F. Smiley	Albany, Wis	Burlie Dabson	Lancaster, Wis.

STATISTICS OF GRAIN CROPS, 1917.

CORN.

TABLE 1.—*Corn: Area and production in undermentioned countries, 1915–1917.*

Country.	Area.			Production.		
	1915	1916	1917	1915	1916	1917
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	106,197,000	105,296,000	119,755,000	2,994,793,000	2,566,927,000	3,159,494,000
Canada:						
Ontario	237,000	160,000		13,860,000	5,960,000	
Quebec	16,000	13,000		508,000	322,000	
Total Ontario and Quebec	253,000	173,000		14,368,000	6,282,000	
Mexico	(1)	(1)	(1)	60,000,000	(1)	(1)
Total				3,069,161,000		
SOUTH AMERICA.						
Argentina	10,386,000	9,928,000	8,969,000	338,235,000	161,133,000	58,839,000
Chile	80,000	66,000		1,842,000	1,570,000	
Uruguay	787,000	697,000	(1)	11,382,000	4,604,000	(1)
Total				351,459,000		
EUROPE.						
Austria-Hungary:						
Austria	[2] 362,000	(1)	(1)	[2] 8,050,000	(1)	(1)
Hungary proper	6,194,000	(1)	(1)	180,550,000	(1)	(1)
Croatia-Slavonia	(1)	(1)	(1)	25,000,000	(1)	(1)
Bosnia-Herzegovina	(1)	(1)	(1)	7,000,000	(1)	(1)
Total, Austria-Hungary				220,600,000		
Bulgaria	[3] 1,571,000	(1)		35,000,000	(1)	(1)
France	935,000	812,000	738,000	17,104,000	(1)	(1)
Italy	3,887,000	3,918,000	3,627,000	121,824,000	81,547,000	87,000,000
Portugal	(1)	(1)		9,275,000	(1)	
Roumania	5,207,000	5,056,000		86,412,000	(1)	
Russia:						
Russia proper	2,717,000	2,865,000		44,663,000	62,207,000	
Northern Caucasia	917,000	(1)		18,520,000	(1)	
Total, Russia	3,634,000			63,183,000		
Serbia	(1)	(1)	(1)	12,000,000	(1)	(1)
Spain	1,152,000	1,154,000	1,102,000	29,096,000	28,642,000	27,557,000
Total				594,494,000		
ASIA.						
British India	6,073,000	6,735,000		82,200,000	(1)	
Japan	143,000	157,000	142,000	4,022,000	4,102,000	3,705,000
Philippine Islands	1,095,000	1,069,000		14,753,000	14,083,000	
Total				100,975,000		
AFRICA.						
Algeria	(1)	(1)	20,000	350,000	(1)	302,000
Egypt	1,907,000	1,850,000	1,735,000	39,803,000	68,362,000	
Union of South Africa	2,562,000	2,740,000	2,608,000	36,607,000	25,000,000	34,999,000
Total				76,760,000		

[1] No official statistics. [2] Galicia and Bukowina not included. [3] Figures for 1914.

CORN—Continued.

TABLE 1.—*Corn: Area and production in undermentioned countries, 1915–1917*—Contd.

Country.	Area.			Production.		
	1915	1916	1917	1915	1916	1917
AUSTRALASIA.						
Australia:	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
Queensland	176,000	146,000	....	4,261,000	2,003,000	....
New South Wales	144,000	154,000	....	3,175,000	3,773,000	....
Victoria	19,000	22,000	....	1,018,000	1,000,000	....
Western Australia	(1)	(1)	....	(2)	(2)	....
South Australia	(1)	1,000	....	1,000	16,000	....
Total, Australia	340,000	324,000	319,000	8,456,000	6,794,000	8,500,000
New Zealand	5,000	8,000	6,000	284,000	351,000	283,000
Total, Australasia	345,000	332,000	325,000	8,740,000	7,145,000	8,783,000
Grand total	....	....	....	4,201,589,000	....	....

[1] Less than 500 acres.   [2] Less than 500 bushels.

TABLE 2.—*Corn: Total production of countries named in Table 1, 1895–1915.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1895	2,834,750,000	1901	2,366,883,000	1906	3,963,645,000	1911	3,481,007,000
1896	2,964,435,000	1902	3,187,311,000	1907	3,420,321,000	1912	4,371,888,000
1897	2,587,206,000	1903	3,066,506,000	1908	3,606,931,000	1913	3,587,429,000
1898	2,682,619,000	1904	3,109,252,000	1909	3,563,226,000	1914	3,777,913,000
1899	2,724,100,000	1905	3,461,181,000	1910	4,031,630,000	1915	4,201,589,000
1900	2,792,561,000						

TABLE 3.—*Corn: Acreage, production, value, exports, etc., in the United States, 1849–1917.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, contract.[1]				Domestic exports, including corn meal, fiscal year beginning July 1.	Per cent of crop exported.
						December.		Following May.			
						Low.	High.	Low.	High.		
	Acres.	*Bush.*	*Bushels.*	*Cents.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*	*P.ct.*
1849	....	......	*592,071,000*	......	....	....	....	....	....	7,632,860	1.3
1859	....	......	*838,793,000*	......	....	....	....	....	....	4,248,991	.5
1866	34,307,000	25.3	867,946,000	47.4	411,451,000	53	62	64	79	16,026,947	1.8
1867	32,520,000	23.6	768,320,000	57.0	437,770,000	61	65	61	71	12,493,522	1.6
1868	34,887,000	26.0	906,527,000	46.8	424,057,000	38	58	44	51	8,286,665	.9
1869	37,103,000	23.6	874,320,000	59.8	522,551,000	56	67	73	85	2,140,487	.2
1869	....	......	*760,945,000*	......	....	....	....	....	....	....	....
1870	38,647,000	28.3	1,094,255,000	49.4	540,520,000	41	59	46	52	10,673,553	1.0
1871	34,091,000	29.1	991,898,000	43.4	430,356,000	36	39	38	43	35,727,010	3.6
1872	35,527,000	30.8	1,092,719,000	35.3	385,736,000	27	28	34	39	40,154,374	3.7
1873	39,197,000	23.8	932,274,000	44.2	411,961,000	40	49	49	59	35,985,834	3.9
1874	41,037,000	20.7	850,148,000	58.4	496,271,000	64	76	53	67	30,025,036	3.5
1875	44,841,000	29.5	1,321,069,000	36.7	484,675,000	40	47	41	45	50,910,532	3.9
1876	49,033,000	26.2	1,283,828,000	34.0	436,109,000	40	43	43	56	72,652,611	5.7
1877	50,369,000	26.7	1,342,558,000	34.8	467,635,000	41	49	35	41	87,192,110	6.5
1878	51,585,000	26.9	1,388,219,000	31.7	440,281,000	30	32	33	36	87,884,892	6.3
1879	53,085,000	29.2	1,547,902,000	37.5	580,486,000	39	$43\frac{1}{4}$	$32\frac{3}{8}$	$36\frac{1}{8}$	99,572,329	6.4
1879	*62,369,000*	*28.1*	*1,754,592,000*	......	....	....	....	....	....	....	....

[1] No. 2 to 1908.

CORN—Continued.

Table 3.—*Corn: Acreage, production, value, exports, etc., in the United States, 1849–1917*—Continued.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, contract.[1] December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, including corn meal, fiscal year beginning July 1.	Per cent of crop exported.
	Acres.	*Bush.*	*Bushels.*	*Cents.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*	*P. ct.*
1880...	62,318,000	27.6	1,717,435,000	39.6	679,714,000	35⅝	42	41½	45	93,648,147	5.5
1881...	64,262,000	18.6	1,194,916,000	63.6	759,482,000	58½	63½	60	76⅞	44,340,683	3.7
1882...	65,660,000	24.6	1,617,025,000	48.5	783,867,000	49¼	61	53¼	56¾	41,655,653	2.6
1883...	68,302,000	22.7	1,551,067,000	42.4	658,051,000	54⅛	63⅛	52½	57	46,258,606	3.0
1884...	69,684,000	25.8	1,795,528,000	35.7	640,736,000	34½	40¼	44¾	49	52,876,456	2.9
1885...	73,130,000	26.5	1,936,176,000	32.8	635,675,000	36	42¾	34¼	36¾	64,829,617	3.3
1886...	75,694,000	22.0	1,665,441,000	36.6	610,311,000	35¾	38	36⅞	39⅜	41,368,584	2.5
1887...	72,393,000	20.1	1,456,161,000	44.4	646,107,000	47	51⅛	54	60	25,360,869	1.7
1888...	75,673,000	26.3	1,987,790,000	34.1	677,562,000	33½	35⅞	33⅛	35⅜	70,841,673	3.6
1889...	78,320,000	27.0	2,112,892,000	28.3	597,919,000	29¼	35	32¾	35	103,418,709	4.9
1889...	*72,088,000*	*29.4*	*2,122,328,000*	......	....	.....	.....	.....	.....	....	....
1890...	71,971,000	20.7	1,489,970,000	50.6	754,433,000	47¾	53	55	69½	32,041,529	2.2
1891...	76,205,000	27.0	2,060,154,000	40.6	836,439,000	39⅜	59	40¾	[2]100	76,602,285	3.7
1892...	70,627,000	23.1	1,628,464,000	39.4	642,147,000	40	42⅞	39½	44½	47,121,894	2.9
1893...	72,036,000	22.5	1,619,496,000	36.5	591,626,000	34¼	36½	36¾	38½	66,489,529	4.1
1894...	62,582,000	19.4	1,212,770,000	45.7	554,719,000	44¾	47½	47¾	55½	28,585,405	2.4
1895...	82,076,000	26.2	2,151,139,000	25.3	544,986,000	25	26¾	27½	29½	101,100,375	4.7
1896...	81,027,000	28.2	2,283,875,000	21.5	491,007,000	22½	23¾	23	25½	178,817,417	7.8
1897...	80,095,000	23.8	1,902,968,000	26.3	501,073,000	25	27½	32⅜	37	212,055,543	11.1
1898...	77,722,000	24.8	1,924,185,000	28.7	552,023,000	33⅛	38	32½	34⅜	177,255,046	9.2
1899...	82,109,000	25.3	2,078,144,000	30.3	629,210,000	30	31½	36	40½	213,123,412	10.3
1899...	*94,914,000*	*28.1*	*2,666,324,000*	......	....	.....	.....	.....	.....	....	....
1900...	83,321,000	25.3	2,105,103,000	35.7	751,220,000	35¼	40½	42⅝	58½	181,405,473	8.6
1901...	91,350,000	16.7	1,522,520,000	60.5	921,556,000	62½	67½	59⅛	64¾	28,028,688	1.8
1902...	94,044,000	26.8	2,523,648,000	40.3	1,017,017,000	43¾	57¼	44	46	76,639,261	3.0
1903...	88,092,000	25.5	2,244,177,000	42.5	952,869,000	41	43¾	47¼	50	58,222,061	2.6
1904...	92,232,000	26.8	2,467,481,000	44.1	1,087,461,000	43½	49	48	64½	90,293,483	3.7
1905...	94,011,000	28.8	2,707,994,000	41.2	1,116,697,000	42	50¼	47½	50	119,893,833	4.4
1906...	96,738,000	30.3	2,927,416,000	39.9	1,166,626,000	40	46	49½	56	86,368,228	3.0
1907...	99,931,000	25.9	2,592,320,000	51.6	1,336,901,000	57½	61½	67¾	82	55,063,860	2.1
1908...	101,788,000	26.2	2,668,651,000	60.6	1,616,145,000	56¾	62¼	72¼	76	37,665,040	1.4
1909...	108,771,000	25.5	2,772,376,000	......	....	.....	.....	.....	.....	....	....
1909...	*98,383,000*	*25.9*	*2,552,190,000*	57.9	1,477,222,000	62½	66	56	63	38,128,498	1.5
1910[3]..	104,035,000	27.7	2,886,260,000	48.0	1,384,817,000	45½	50	52¼	55¼	65,614,522	2.3
1911...	105,825,000	23.9	2,531,488,000	61.8	1,565,258,000	68	70	76¼	82½	41,797,291	1.7
1912...	107,083,000	29.2	3,124,746,000	48.7	1,520,454,000	47½	54	55¼	60	50,780,143	1.6
1913...	105,820,000	23.1	2,446,988,000	69.1	1,692,092,000	64	73½	67	72½	10,725,819	.4
1914...	103,435,000	25.8	2,672,804,000	64.4	1,722,070,000	62¼	68¼	50½	56	50,668,303	1.9
1915...	106,197,000	28.2	2,994,793,000	57.5	1,722,680,000	69½	75	69	78½	39,896,928	1.3
1916...	105,296,000	24.4	2,566,927,000	88.9	2,280,729,000	88	96	152	174	66,753,194	2.6
1917...	119,755,000	26.4	3,159,494,000	128.3	4,053,672,000	160	190	.....	.....	....	....

[1] No. 2 to 1908. [2] Coincident with "corner." [3] Figures adjusted to census basis.

Table 4.—*Corn: Acreage, production, and total farm value, by States, 1916 and 1917.*

State.	Thousands of acres. 1917	Thousands of acres. 1916	Production (thousands of bushels). 1917	Production (thousands of bushels). 1916	Total value, basis Dec. 1 price (thousands of dollars). 1917	Total value, basis Dec. 1 price (thousands of dollars). 1916
Maine	20	15	780	645	1,778	768
New Hampshire	26	19	1,092	874	2,370	1,005
Vermont	54	45	2,538	1,935	5,406	2,128
Massachusetts	61	42	2,806	1,764	6,033	2,117
Rhode Island	13	11	546	341	1,289	471
Connecticut	95	70	4,845	3,010	10,417	3,612
New York	840	700	26,040	21,000	51,559	23,100
New Jersey	297	270	12,771	10,800	21,711	10,800
Pennsylvania	1,575	1,450	62,212	56,550	95,184	54.854
Delaware	230	205	7,820	6,970	10,948	6,203
Maryland	720	675	28,080	26,325	39,312	23,429
Virginia	2,450	2,100	72,275	58,800	110,581	54,684
West Virginia	834	740	25,020	22,570	42,534	22,796
North Carolina	3,000	2,600	60,000	48,100	102,000	52,910
South Carolina	2,313	2,065	43,947	32,008	84,378	36,169

CORN—Continued.

TABLE 4.—*Corn: Acreage, production, and total farm value, by States, 1916 and 1917*—Continued.

State.	Thousands of acres.		Production (thousands of bushels).		Total value, basis Dec. 1 price (thousands of dollars).	
	1917	1916	1917	1916	1917	1916
Georgia	4,500	4,000	72,000	62,000	115,200	62,000
Florida	925	820	13,875	12,300	19,425	11,070
Ohio	3,950	3,600	150,100	113,400	204,136	102,060
Indiana	5,651	5,137	203,436	174,658	254,295	146,713
Illinois	11,000	10,200	418,000	300,900	459,800	252,756
Michigan	1,750	1,650	37,625	45,375	68,478	43,106
Wisconsin	1,918	1,690	42,196	60,840	68,779	55,973
Minnesota	3,000	2,600	90,000	87,100	99,000	69,680
Iowa	11,100	10,050	410,700	366,825	443,556	293,460
Missouri	7,200	6,775	252,000	132,112	287,280	118,901
North Dakota	590	510	5,310	13,515	8,018	11,353
South Dakota	3,350	2,950	97,150	84,075	116,580	64,738
Nebraska	9,240	7,400	249,480	192,400	299,376	150,072
Kansas	9,156	6,950	128,184	69,500	160,230	62,550
Kentucky	3,900	3,400	122,850	95,200	148,648	82,824
Tennessee	3,900	3,000	111,150	78,000	133,380	73,320
Alabama	4,825	3,825	77,200	47,812	96,500	48,768
Mississippi	4,100	3,400	84,050	47,600	115,989	46,648
Louisiana	2,347	2,134	42,246	44,814	61,679	42,125
Texas	7,075	6,800	77,825	129,200	129,968	134,368
Oklahoma	3,900	3,950	33,150	53,325	48,730	49,592
Arkansas	2,800	2,550	67,200	45,135	94,080	44,232
Montana	81	74	1,012	1,850	1,771	1,720
Wyoming	33	25	660	550	1,155	495
Colorado	532	475	10,640	7,362	13,300	6,626
New Mexico	170	125	3,400	2,625	6,392	2,966
Arizona	32	22	864	770	1,642	1,078
Utah	20	13	500	429	850	493
Nevada	2	1	60	34	90	42
Idaho	22	21	682	735	1,057	735
Washington	41	38	1,517	1,406	2,458	1,406
Oregon	42	40	1,260	1,340	1,890	1,273
California	75	64	2,400	2,048	4,440	2,540
United States	119,755	105,296	3,159,494	2,566,927	4,053,672	2,280,729

TABLE 5.—*Corn: Production and distribution in the United States, 1897–1917.*

[000 omitted.]

Year.	Old stock on farms Nov. 1.	Crop.	Total supplies.	Stock on farms Mar. 1 following.	Shipped out of county where grown.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1897	290,934	1,902,968	2,193,902	782,871	411,617
1898	137,894	1,924,185	2,062,079	800,533	396,005
1899	113.644	2,078,144	2,191,788	773,730	348,098
1900	92,328	2,105,103	2,197,431	776,166	478,417
1901	95,825	1,522,520	1,618,345	441,132	153,213
1902	29,267	2,523,648	2,552,915	1,050,653	557,296
1903	131,210	2,244,177	2,375,387	839,053	419,877
1904	80,246	2,467,481	2,547,727	954,268	551,635
1905	82,285	2,707,994	2,790,279	1,108,364	681,539
1906	119,633	2,927,416	3,047,049	1,297,979	679,544
1907	130,995	2,592,320	2,723,315	962,429	467,675
1908	71,124	2,668,651	2,739,775	1,047,763	568,129
1909	79,779	2,552,190	2,631,969	977,561	635,248
1910	115,696	2,886,260	3,001,956	1,165,378	661,777
1911	123,824	2,531,488	2,655,312	884,069	517,704
1912	64,764	3,124,746	3,189,510	1,289,655	680,796
1913	137,972	2,446,988	2,584,960	866,392	422,091
1914	80,046	2,672,804	2,752,850	910,894	498,285
1915	96,009	2,994,793	3,090,802	1,116,559	560,824
1916	87,908	2,566,927	2,654,835	782,303	450,589
1917	34,448	3,159,494	3,193,942	....	....

CORN—Continued.

TABLE 6.—*Corn: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average, 1908–1917.	1913	1914	1915	1916	1917	5-year average, 1912–1916.	1917
Mo.	41.6	40.5	38.0	46.0	44.0	40.0	38.0	46.0	41.0	43.0	39.0	101	87	88	85	119	228	37.91	88.92
N. H.	42.7	39.0	35.1	46.0	45.0	46.0	37.0	46.0	45.0	46.0	42.0	95	81	82	76	115	217	37.86	91.14
Vt.	42.1	40.3	37.0	43.0	41.0	40.0	37.0	47.0	46.0	43.0	47.0	94	81	81	84	110	213	36.56	100.11
Mass.	43.5	40.4	38.0	45.5	44.0	45.0	40.5	47.0	47.0	42.0	46.0	98	85	85	80	120	215	39.40	98.90
R. I.	39.7	42.8	33.2	40.0	45.0	41.5	36.5	42.0	43.0	31.0	42.0	112	99	98	100	138	236	39.92	99.12
Conn.	46.2	41.3	41.0	53.2	48.5	50.0	38.5	46.0	50.0	43.0	51.0	98	85	89	85	120	215	41.25	109.65
N. Y.	36.1	38.8	36.0	38.3	38.5	38.6	28.5	41.0	40.0	30.0	31.0	91	81	83	78	110	198	29.67	61.38
N. J.	38.0	38.0	32.7	36.0	36.8	38.0	39.5	38.5	38.0	40.0	43.0	84	75	76	75	100	170	30.64	73.10
Pa.	39.8	39.5	32.0	41.0	44.5	42.5	39.0	42.5	38.5	39.0	39.5	80	72	73	70	97	153	30.13	60.44
Del.	33.0	32.0	31.0	31.8	34.0	34.0	31.5	36.0	31.5	34.0	34.0	69	59	62	62	89	140	21.61	47.60
Md.	35.8	36.6	31.4	33.5	36.5	36.5	33.0	37.0	35.0	39.0	39.0	73	65	68	61	89	140	24.55	54.60
Va.	25.5	26.0	23.2	25.5	24.0	24.0	26.0	20.5	28.5	28.0	29.5	83	76	81	71	93	153	19.94	45.14
W. Va.	30.2	31.2	31.4	26.0	25.7	33.8	31.0	31.0	31.5	30.5	30.0	87	80	83	74	101	170	25.32	51.00
N. C.	18.9	18.0	16.8	18.6	18.4	18.2	19.5	20.3	21.0	18.5	20.0	94	88	86	77	110	170	17.25	34.00
S. C.	17.4	14.1	16.7	18.5	18.2	17.9	19.5	18.5	16.5	15.5	19.0	102	97	92	87	113	192	16.61	36.48
Ga.	14.7	12.5	13.9	14.5	16.0	13.8	15.5	14.0	15.0	15.5	16.0	93	91	85	78	100	160	12.99	25.60
Fla.	14.0	10.5	12.6	13.0	14.6	13.0	15.0	16.0	15.0	15.0	15.0	87	82	80	73	90	140	11.96	21.00
Ohio	38.4	38.5	39.5	36.5	38.6	42.8	37.5	39.1	41.5	31.5	38.0	67	63	61	56	90	136	23.66	51.68
Ind.	36.3	30.3	40.0	39.3	36.0	40.3	36.0	33.0	38.0	34.0	36.0	62	60	58	51	84	125	21.12	45.00
Ill.	33.9	31.6	35.9	39.1	33.0	40.0	27.0	29.0	36.0	29.5	38.0	62	63	61	54	84	110	19.06	41.80
Mich.	31.7	31.8	35.4	32.4	33.0	34.0	33.5	36.0	32.0	27.5	21.5	78	67	67	68	95	182	22.76	39.13
Wis.	33.3	33.7	33.0	32.5	36.3	35.7	40.5	40.5	23.0	36.0	22.0	73	60	65	68	92	163	23.52	35.86
Minn.	32.6	29.0	34.8	32.7	33.7	34.5	40.0	35.0	23.0	33.5	30.0	60	53	52	62	80	110	18.64	33.00
Iowa	34.9	31.7	31.5	36.3	31.0	43.0	34.0	38.0	30.0	36.5	37.0	58	60	55	51	80	108	20.17	39.96
Mo.	26.8	27.0	26.4	33.0	26.0	32.0	17.5	22.0	29.5	19.5	35.0	67	74	68	57	90	114	15.40	39.90
N. Dak.	22.7	23.8	31.0	14.0	25.0	26.7	28.8	28.0	14.0	26.5	9.0	69	52	58	67	84	151	14.87	13.59
S. Dak.	27.7	29.7	31.7	25.0	22.0	30.6	25.5	26.0	29.0	28.5	29.0	58	56	50	49	77	120	14.95	34.80
Nebr.	24.5	27.0	24.8	25.8	21.0	24.0	15.0	24.5	30.0	26.0	27.0	59	65	53	47	78	120	13.20	32.40
Kans.	17.5	22.0	19.9	19.0	14.5	23.0	3.2	18.5	31.0	10.0	14.0	66	78	63	51	90	125	9.63	17.50
Ky.	27.5	25.2	29.0	29.0	26.0	30.4	20.5	25.0	30.0	28.0	31.5	70	76	64	56	87	121	17.89	38.12
Tenn.	25.2	24.8	22.0	25.9	26.8	26.5	20.5	24.0	27.0	26.0	28.5	73	77	68	58	94	120	17.67	34.20
Ala.	16.1	14.7	13.5	18.0	18.0	17.2	17.3	17.0	17.0	12.5	16.0	86	89	80	69	102	125	13.41	20 00
Miss.	18.2	17.3	14.5	20.5	19.0	18.3	20.0	18.5	19.0	14.0	20.5	82	77	73	65	98	138	13.59	28.29
La.	20.4	19.8	23.0	23.6	18.5	18.0	22.0	19.3	20.5	21.0	18.0	79	77	75	64	94	146	15.30	26.28
Tex.	18.9	25.7	15.0	20.6	9.5	21.0	24.0	19.5	23.5	19.0	11.0	83	82	74	58	104	167	16.19	18.37
Okla.	15.8	24.8	17.0	16.0	6.5	18.7	11.0	12.5	29.5	13.5	8.5	69	72	64	46	93	147	9.94	12.50
Ark.	20.5	20.2	18.0	24.0	20.8	20.4	19.0	17.5	23.0	17.7	24.0	80	78	80	64	98	140	14.91	33.60
Mont.	25.8	23.4	35.0	23.0	26.5	25.5	31.5	28.0	28.0	25.0	12.5	91	77	76	69	93	175	21.19	21.88
Wyo.	22.5	28.0	28.0	10.0	15.0	23.0	29.0	25.0	25.0	22.0	20.0	84	80	70	67	90	175	18.39	35.00
Colo.	19.7	20.2	24.2	19.9	14.0	20.8	15.0	23.0	24.0	15.5	20.0	73	73	60	55	90	125	12.46	25.00
N. Mex.	24.2	27.0	31.3	23.0	24.7	22.4	18.5	28.0	26.0	21.0	20.0	95	75	80	73	113	188	19.16	37.60
Ariz.	31.6	33.2	32.1	32.5	33.0	33.0	28.0	32.0	30.0	35.0	27.0	119	110	120	115	140	190	37.14	51.30
Utah	31.7	29.4	31.4	30.3	35.0	30.0	34.0	35.0	34.0	33.0	25.0	91	70	75	80	115	170	27.54	42.50
Nev.	32.4	....	....	30.0	30.5	30.0	34.0	36.0	35.0	34.0	30.0	108	118	110	93	125	150	36.83	45.00
Idaho	31.8	29.0	30.6	32.0	30.0	32.8	32.0	31.0	35.0	35.0	31.0	83	68	72	65	100	155	24.96	48.05
Wash.	29.3	25.5	27.8	28.0	28.5	27.3	28.0	27.0	27.0	37.0	37.0	88	80	73	77	100	162	24.18	59.94
Oreg.	30.1	27.8	30.7	25.5	28.5	31.5	28.5	30.0	35.0	33.5	30.0	87	70	82	82	95	150	25.74	45.00
Cal.	35.1	32.0	34.8	37.5	36.0	37.0	33.0	36.0	41.0	32.0	32.0	101	88	87	88	124	185	33.51	59.20
U. S.	26.0	26.2	25.5	27.7	23.9	29.2	23.1	25.8	28.2	24.4	26.4	68.7	69.1	64.4	57.5	88.9	128.3	16 94	33.85

[1] Based upon farm price Dec. 1.

CORN—Continued.

TABLE 7.—*Corn: Wholesale price per bushel, 1912–1917.*

Date.	New York.		Baltimore.		Cincinnati.		Chicago.		Detroit.		St. Louis.		San Francisco.	
	No. 2 yellow.		Mixed.		No. 2 mixed.		Contract.		No. 3.		No. 2.		White (per 100 lbs.).	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Jan.–June	67¼	87½	67	85	64	87	63¼	82½	62½	83½	63	85	155	197½
July–Dec	54½	84	52	87	47	84	47½	83	48	81½	45	80½	150	195
1913.														
Jan.–June	57¼	71¼	52⅛	65½	48	65	46½	63	48	62	45	64	145	155
July–Dec	67	87¼	64½	68	63½	81	60	78¼	60¾	78½	61¾	82	151½	187
1914.														
Jan.–June	60	82½	66¼	77	64	75	60	73½	62	74	63	73½	161	178
July–Dec	71¾	93¾	67½	89	63½	88½	62¼	86	63½	88	62⅜	87	167½	193
1915.														
Jan.–June	77½	90¼	72	84¾	70	81	68½	79	70	80	68½	78½	172	190
July–Dec	72⅜	92¾	67½	87	62	84	59¾	82¼	64	84	58¾	81	146	180
1916.														
January	85½	89½	70	82½	70½	77½	72½	79½	72½	78	70	77	170	175
February	83½	88½	74¾	80½	71	78	71½	79½	72	77½	71½	77	172	172
March	80½	86¼	75¾	81	72½	76½	70	77	72	76	71	74½	170	172
April	85¼	91¾	80¼	82¼	76	79	74¾	79	76	79	73½	76	170	180
May	79⅜	92¾	73⅝	82⅜	75½	78	69	78½	71½	79	69½	76½	176	180
June	79⅛	88⅞	75⅝	84⅞	72½	78½	69¼	78¼	72½	79½	70	76½	170	177
Jan.–June	79⅛	92¾	70	84⅞	70½	79	69	79½	71½	79½	69½	77	170	180
July	88⅜	93¾	85¼	90	79	83½	78	84¼	79½	85	75½	82½	175	190
August	92⅞	100⅛	88¼	94	83	89	82	88½	84½	91	80½	87½	188	205
September	96¼	101¾	92	95	86½	88½	84¾	90	88	92	83½	89	196	205
October	98¾	120	92	107	88	103	88¼	111	91	115	86½	111	196	215
November	104	119½	105	105	97	107	90	110	98	117	91	107½	215	245
December	102¼	108⅜	95	104½	85	91	88	96	94½	102	88½	94½	205	245
July–Dec	88⅜	120	85¼	107	79	107	78	111	79½	117	75½	111	175	245
1917.														
January	93½	116¼	105	115½	95	105½	93¼	103	102	106	94½	102	205	220
February	108¾	121¼	106	116¼	103	109	96¾	102¾	102	107	95½	101	215	222
March	118	132¾	114	128	105½	122	102½	122½	107	127	101½	123	220	260
April	134	173½	128½	173½	128½	154½	123	160	133⅓	165	126	161	255	330
May	162½	183	164	180	154	173	152	174	161	175	152½	171	325	350
June	170½	186	161	182	164½	176	158	176	162	176½	155	175½	320	340
Jan.–June	93½	186	105	182	95	176	93¼	176	102	176½	94½	175½	205	350
July	189	239¼	183¾	221	182	223	177½	232	181	235	177	231	335	450
August	181	245	178	230	170	235	169	236	182	240	161	233	365	467
September	205	235	190	215½	197	214	195	224	205	230	190	222	365	370
October	202	220	198	205	194	204	189	215½	198	220	190	210	(1)	(1)
November	154	232	140	175	190	224	185	229	211	231	174	196	(1)	(1)
December	214	214	155	175	160	185	160	190	200	211	162½	179	338	338
July–Dec	154	245	140	230	160	235	160	236	181	240	161	233	335	467

[1] Nominal.

TABLE 8.—*Corn: Condition of crop, United States, on first of months named, 1897–1917*

Year.	July.	Aug.	Sept.	Oct.	Year.	July.	Aug.	Sept.	Oct.	Year.	July.	Aug.	Sept.	Oct.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1897	82.9	84.2	79.3	77.1	1904	86.4	87.3	84.6	83.9	1911	80.1	69.6	70.3	70.4
1898	90.5	87.0	84.1	82.0	1905	87.3	89.0	89.5	89.2	1912	81.5	80.0	82.1	82.2
1899	86.5	89.9	85.2	82.7	1906	87.5	88.0	90.2	90.1	1913	86.9	75.8	65.1	65.3
1900	89.5	87.5	80.6	78.2	1907	80.2	82.8	80.2	78.0	1914	85.8	74.8	71.7	72.9
1901	81.3	54.0	51.7	52.1	1908	82.8	82.5	79.4	77.8	1915	81.2	79.5	78.8	79.7
1902	87.5	86.5	84.3	79.6	1909	89.3	84.4	74.6	73.8	1916	82.0	75.3	71.3	71.5
1903	79.4	78.7	80.1	80.8	1910	85.4	79.3	78.2	80.3	1917	81.1	78.8	76.7	75.9

CORN—Continued.

TABLE 9.—*Corn: Farm price per bushel on first of each month, by geographical divisions, 1916 and 1917.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	90.0	62.1	101.3	76.5	102.3	77.3	87.2	62.2	81.1	56.2	100.2	62.1	103.0	70.2
February	95.8	66.7	106.7	79.5	107.2	81.8	94.3	66.6	88.2	61.1	103.1	66.9	103.7	71.5
March	100.9	68.2	114.8	81.6	114.3	85.4	99.0	66.4	92.3	60.2	108.9	72.4	110.8	78.7
April	113.4	70.3	119.1	82.6	124.6	87.3	110.0	66.9	108.4	63.1	119.5	75.8	118.7	75.9
May	150.6	72.3	157.2	83.0	167.9	89.1	148.1	70.2	141.3	65.3	160.0	76.2	142.7	79.3
June	160.1	74.1	168.1	84.1	185.2	92.1	155.3	70.6	147.4	66.6	173.9	79.9	161.4	77.0
July	164.6	75.4	172.3	84.3	186.3	92.7	160.4	71.6	155.3	68.7	173.0	81.0	182.6	79.3
August	196.6	79.4	195.7	87.4	199.6	95.0	198.7	76.8	197.4	73.3	191.6	83.6	180.8	85.4
September	175.5	83.6	198.1	93.8	198.6	98.4	170.3	81.7	162.7	77.9	188.5	86.4	182.8	88.7
October	175.1	82.3	204.3	94.3	190.9	96.9	181.6	81.5	168.0	76.9	166.2	83.4	171.8	87.2
November	146.0	85.0	170.2	97.2	171.7	95.0	149.6	82.8	137.1	81.6	138.6	86.6	168.1	88.7
December	128.3	88.9	172.3	102.0	162.3	100.1	124.0	86.4	114.7	81.5	134.6	96.4	152.4	101.2
Average	132.7	74.3	153.1	87.0	159.1	91.1	127.0	71.1	120.8	67.4	139.3	80.0	141.1	80.9

TABLE 10.—*Corn (including meal): International trade, calendar years 1909–1916.*

[The item *maicena* or *maizena* is included as "Corn and corn meal."]

GENERAL NOTE.—Substantially the international trade of the world. It should not be expected that the world export and import totals for any year will agree. Among sources of disagreement are these: (1) Different periods of time covered in the "year" of the various countries; (2) imports received in year subsequent to year of export; (3) want of uniformity in classification of goods among countries; (4) different practices and varying degrees of failure in recording countries of origin and ultimate destination; (5) different practices of recording reexported goods; (6) opposite methods of treating free ports; (7) clerical errors, which, it may be assumed, are not infrequent.

The exports given are domestic exports, and the imports given are imports for consumption as far as it is feasible and consistent so to express the facts. While there are some inevitable omissions, on the other hand there are some duplications because of reshipments that do not appear as such in official reports. For the United Kingdom, import figures refer to imports for consumption, when available, otherwise total imports, less exports, of "foreign and colonial merchandise." Figures for the United States include Alaska, Porto Rico, and Hawaii.

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913	1915 (prelim.)	1916 (prelim.)	Country.	Average, 1909–1913	1915 (prelim.)	1916 (prelim.)
FROM—	*Bushels.*	*Bushels.*	*Bushels.*	FROM—continued.	*Bushels.*	*Bushels.*	*Bushels.*
Argentina	115,749	170,490	113,143	Russia	30,034	53	97
Austria-Hungary	268			United States	45,054	50,337	55,252
Belgium	8,130			Uruguay	201	93	
British South Africa	4,075	6,851	6,629	Other countries	10,452	16,679	
Bulgaria	9,307						
Netherlands	8,750	808		Total	270,986	245,311	
Roumania	38,966						

IMPORTS.

Country.	Average, 1909–1913	1915 (prelim.)	1916 (prelim.)	Country.	Average, 1909–1913	1915 (prelim.)	1916 (prelim.)
INTO—				INTO—continued.			
Austria-Hungary	13,877			Netherlands	29,580	43,338	27,514
Belgium	25,801			Norway	1,079	1,925	1,865
British South Africa	237	25	48	Portugal	1,674	471	
Canada	10,629	10,980	8,872	Russia	335	53	322
Cuba	2,746	3,242		Spain	9,775	8,134	4,254
Denmark	11,440	26,019		Sweden	1,476	8,292	
Egypt	471			Switzerland	3,987	4,461	4,767
France	18,708	17,582	28,379	United Kingdom	82,976	92,226	68,759
Germany	32,160			Other countries	4,721	4,797	
Italy	14,895	7,842	2,184				
Mexico	4,404			Total	270,971	229,387	

WHEAT.

TABLE 11.—*Wheat: Area and production of undermentioned countries, 1915-1917.*

Country.	Area.			Production.		
	1915	1916	1917	1915	1916	1917
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	60,469,000	52,316,000	45,941,000	1,025,801,000	636,318,000	650,828,000
Canada:						
New Brunswick	14,000	14,000		267,000	242,000	
Ontario	1,093,000	865,000		30,252,000	17,931,000	
Manitoba	2,754,000	2,726,000		79,434,000	29,667,000	
Saskatchewan	8,524,000	9,032,000		243,481,000	147,559,000	
Alberta	2,156,000	2,605,000		70,476,000	65,088,000	
Other	134,000	128,000		2,837,000	2,294,000	
Total Canada	14,675,000	15,370,000	14,756,000	426,747,000	262,781,000	
Mexico	([1])	([1])	([1])	4,000,000	([1])	([1])
Total				1,456,548,000		
SOUTH AMERICA.						
Argentina	15,471,000	16,420,000	16,089,000	169,166,000	172,620,000	70,224,000
Chile	1,074,000	1,143,000		19,000,000	20,184,000	24,067,000
Uruguay	783,000	950,000	780,000	3,596,000	9,867,000	5,390,000
Total				191,762,000	202,671,000	99,681,000
EUROPE.						
Austria-Hungary:						
Austria	[2] 1,588,000	([1])	([1])	[2] 28,286,000	([1])	([1])
Hungary proper	8,288,000	([1])	([1])	152,934,000	([1])	([1])
Croatia-Slavonia	([1])	([1])	([1])	15,000,000	([1])	([1])
Bosnia-Herzegovina	([1])	([1])	([1])	3,000,000	([1])	([1])
Total Austria-Hungary				199,220,000		
Belgium	[3] 400,000	([1])	([1])	8,000,000	([1])	([1])
Bulgaria	[3] 2,638,000	([1])		46,212,000	38,241,000	
Denmark	164,000	152,000	131,000	7,978,000	6,040,000	4,299,000
Finland	[4] 8,000	([1])	([1])	[3] 196,000	([1])	
France [5]	13,564,000	12,429,000	10,439,000	222,776,000	204,908,000	144,149,000
Germany	4,950,000	([1])	([1])	141,676,000	([1])	([1])
Greece	([1])	([1])	([1])	6,000,000	([1])	([1])
Italy	12,502,000	11,679,000	10,556,000	170,541,000	176,530,000	139,999,000
Montenegro	([1])	([1])	([1])	200,000	([1])	([1])
Netherlands	163,000	136,000	122,000	7,090,000	4,035,000	3,452,000
Norway	14,000	14,000	14,000	285,000	317,000	241,000
Portugal	([1])	([1])	([1])	6,571,000	7,343,000	
Roumania	4,705,000	4,844,000		89,241,000	78,520,000	
Russia:						
Russia proper [5]	46,531,000	42,030,000		525,673,000	440,082,000	
Poland	([1])	([1])	([1])	([1])	([1])	([1])
Northern Caucasia	10,021,000	([1])	([1])	127,631,000	([1])	([1])
Total Russia, European				653,304,000		
Serbia	([1])	([1])	([1])	10,000,000	([1])	([1])
Spain	10,037,000	10,148,000	10,360,000	139,298,000	152,329,000	141,087,000
Sweden	299,000	307,000	329,000	9,170,000	8,979,000	7,496,000
Switzerland	114,000	124,000	139,000	3,957,000	4,053,000	4,556,000
United Kingdom:						
England	2,122,000	1,862,000		68,437,000	53,262,000	
Wales	49,000	50,000		1,421,000	1,466,000	
Scotland	77,000	63,000	61,000	3,053,000	2,264,000	
Ireland	87,000	76,000		3,339,000	2,916,000	
Total United Kingdom	2,335,000	2,051,000		76,250,000	59,908,000	
Total				1,797,965,000		

[1] No official statistics. [2] Galicia and Bukowina not included. [3] Figures for 1914.
[4] Figures for 1910. [5] Excludes territory occupied by the enemy.

WHEAT—Continued.

TABLE 11.—*Wheat: Area and production in undermentioned countries, 1915–1917*—Contd.

Country.	Area.			Production.		
	1915	1916	1917	1915	1916	1917
ASIA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
British India [1]	32,475,000	30,320,000	32,940,000	376,731,000	323,008,000	379,232,000
Cyprus	(2)	(2)	(2)	1,924,000	(2)	(2)
Japanese Empire:						
Japan	1,227,000	1,302,000	1,269,000	26,778,000	30,047,000	26,532,000
Formosa	17,000	(2)	....	161,000	(2)	(2)
Chosen [3]	474,000	(2)	(2)	5,851,000	(2)	(2)
Total	1,718,000	....	....	32,790,000	....	....
Persia	(2)	(2)	....	16,000,000	(2)	....
Russia:						
Central Asia (4 Governments of)	5,421,000	(2)	....	44,132,000	(2)	....
Siberia (4 Governments of)	7,727,000	(2)	....	50,308,000	(2)	....
Transcaucasia (1 Government)	10,000	(2)	....	126,000	(2)	....
Total	13,158,000	....	....	94,566,000	....	....
Turkey (Asia Minor only)	(2)	(2)	(2)	35,000,000	(2)	(2)
Total	....	....	....	557,011,000	....	....
AFRICA.						
Algeria	3,209,000	3,272,000	3,222,000	34,654,000	29,151,000	28,979,000
Egypt	1,592,000	1,447,000	1,116,000	39,144,000	36,543,000	29,834,000
Tunis	1,112,000	1,482,000	1,310,000	11,023,000	7,165,000	6,963,000
Union of South Africa	725,000	785,000	755,000	7,047,000	6,477,000	4,790,000
Total	....	....	....	91,868,000	....	....
AUSTRALASIA.						
Australia:						
Queensland	127,000	94,000	228,000	1,635,000	427,000	2,463,000
New South Wales	2,758,000	4,189,000	3,521,000	13,235,000	68,869,000	36,744,000
Victoria	2,864,000	3,680,000	3,126,000	4,065,000	60,366,000	51,162,000
South Australia	2,502,000	2,739,000	2,765,000	3,639,000	35,210,000	43,831,000
Western Australia	1,376,000	1,734,000	1,567,000	2,707,000	18,811,000	16,108,000
Tasmania	24,000	49,000	23,000	396,000	1,025,000	492,000
Total Australia	9,651,000	12,485,000	11,229,000	25,677,000	184,709,000	150,800,000
New Zealand	230,000	329,000	219,000	6,854,000	7,332,000	5,055,000
Total Australasia	9,881,000	12,814,000	11,448,000	32,531,000	192,041,000	155,855,000
Grand total	....	....	....	4,127,685,000	....	....

[1] Including native States. [2] No official statistics. [3] Data for 1914.

TABLE 12.—*Wheat: Total production of countries named in Table 11, 1891–1915.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1891	2,432,322,000	1898	2,948,305,000	1905	3,327,084,000	1912	3,791,951,000
1892	2,481,805,000	1899	2,783,885,000	1906	3,434,354,000	1913	4,127,437,000
1893	2,559,174,000	1900	2,610,751,000	1907	3,133,965,000	1914	3,585,916,000
1894	2,660,557,000	1901	2,955,975,000	1908	3,182,105,000	1915	4,127,685,000
1895	2,593,312,000	1902	3,090,116,000	1909	3,581,519,000		
1896	2,506,320,000	1903	3,189,813,000	1910	3,575,055,000		
1897	2,236,268,000	1904	3,163,542,000	1911	3,551,795,000		

WHEAT—Continued.

TABLE 13.—*Wheat: Average yield per acre in undermentioned countries, 1890–1916.*

Year.	United States.	Russia (European).[1]	Germany.[1]	Austria.[1]	Hungary proper.[1]	France.[2]	United Kingdom.[2]
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Average:							
1890–1899	13.2	8.9	24.5	16.2	....	18.6	31.2
1900–1909	14.1	9.7	28.9	18.0	17.5	20.5	33.1
1910–1914	14.8	10.3	31.7	20.8	18.6	19.1	32.4
1906	15.5	7.7	30.3	20.3	22.5	20.2	34.8
1907	14.0	8.0	29.6	18.0	14.9	23.2	35.1
1908	14.0	8.8	29.7	21.0	17.5	19.6	33.4
1909	15.4	12.5	30.5	19.9	14.1	22.0	35.0
1910	13.9	11.2	29.6	19.2	19.8	15.9	31.4
1911	12.5	7.0	30.6	19.6	20.9	19.8	34.0
1912	15.9	10.3	33.6	22.3	19.8	21.0	30.0
1913	15.2	13.5	35.1	19.9	19.6	19.9	32.7
1914	16.6	9.4	29.6	[3] 22.9	13.1	18.9	33.8
1915	17.0	[4] 11.6	28.6	[3] 17.8	18.4	16.6	32.7
1916	12.1	....	....	....	....	16.6	....
Average (1907–1916)	14.7	....	....	....	....	19.4	32.8

[1] Bushels of 60 pounds.
[2] Winchester bushels.
[3] Galicia and Bukowina not included.
[4] Poland not included.

TABLE 14.—*Wheat: Acreage, production, value, exports, etc., in the United States, 1849–1917.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage harvested.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, No. 1 northern spring. December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, including flour, fiscal year beginning July 1.	Per cent of crop exported.
	Acres.	*Bush.*	*Bushels.*	*Cents.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*	*P. ct.*
1849	....	......	*100,486,000*	......	....	......	......	......	......	7,535,901	7.5
1859	....	......	*173,105,000*	......	....	......	......	......	......	17,213,133	9.9
1866	15,424,000	9.9	152,000,000	152.7	232,110,000	129	145	185	211	12,646,941	8.3
1867	18,322,000	11.6	212,441,000	145.2	308,387,000	126	140	134	161	26,323,014	12.4
1868	18,460,000	12.1	224,037,000	108.5	243,033,000	80	88	87	96	29,717,201	13.3
1869	19,181,000	13.6	260,147,000	76.5	199,025,000	63	76	79	92	53,900,780	20.7
1869	....	......	*287,746,000*	......	....	......	......	......	......	....	....
1870	18,993,000	12.4	235,885,000	94.4	222,767,000	91	98	113	120	52,574,111	22.3
1871	19,944,000	11.6	230,722,000	114.5	264,076,000	107	111	120	143	38,995,755	16.9
1872	20,858,000	12.0	249,997,000	111.4	278,522,000	97	108	112	122	52,014,715	20.8
1873	22,172,000	12.7	281,255,000	106.9	300,670,000	96	106	105	114	91,510,398	32.5
1874	24,967,000	12.3	308,103,000	86.3	265,881,000	78	83	78	94	72,912,817	23.7
1875	26,382,000	11.1	292,136,000	89.5	261,397,000	82	91	89	100	74,750,682	25.6
1876	27,627,000	10.5	289,356,000	97.0	280,743,000	104	117	130	172	57,043,936	19.7
1877	26,278,000	13.9	364,194,000	105.7	385,089,000	103	108	98	113	92,141,626	25.3
1878	32,109,000	13.1	420,122,000	77.6	325,814,000	81	84	91	102	150,502,506	35.8
1879	32,546,000	13.8	448,757,000	110.8	497,030,000	122	133½	112½	119	180,304,181	40.2
1879	*35,430,000*	*13.0*	*459,483,000*	......	....	......	......	......	......	....	....
1880	37,987,000	13.1	498,550,000	95.1	474,202,000	93½	109¾	101	112⅝	186,321,514	37.4
1881	37,709,000	10.2	383,280,000	119.2	456,880,000	124¾	129	123	140	121,892,389	31.8
1882	37,067,000	13.6	504,185,000	88.4	445,602,000	91⅛	94¾	108	113⅜	147,811,316	29.3
1883	36,456,000	11.6	421,086,000	91.1	383,649,000	94⅝	99¼	85	94¾	111,534,182	26.5
1884	39,476,000	13.0	512,765,000	64.5	330,862,000	69½	76⅜	85⅜	90¾	132,570,366	25.9
1885	34,189,000	10.4	357,112,000	77.1	275,320,000	82⅞	89	72⅛	79	94,565,793	26.9
1886	36,806,000	12.4	457,218,000	68.7	314,226,000	75⅛	79½	80¾	88¾	153,804,969	33.6
1887	37,642,000	12.1	456,329,000	68.1	310,613,000	75⅛	79¼	81¼	89⅞	119,625,344	26.2

WHEAT—Continued.

TABLE 14.—*Wheat: Acreage, production, value, exports, etc., in the United States, 1849–1917*—Continued.

Year.	Acreage harvested.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, No. 1 northern spring. December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, including flour, fiscal year beginning July 1.	Per cent of crop exported.
	Acres.	*Bush.*	*Bushels.*	*Cents.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*	*P. ct.*
1888...	37,336,000	11.1	415,868,000	92.6	385,248,000	96⅝	105½	77¼	95½	88,600,743	21.3
1889...	38,124,000	12.9	490,560,000	69.8	342,492,000	76¾	80½	89¾	100	109,430,467	22.3
1889...	*33,580,000*	*13.9*	*468,374,000*	......	....	......	......	......	......	....	....
1890...	36,087,000	11.1	399,262,000	83.8	334,774,000	87½	92¾	98⅞	108¼	106,181,316	26.6
1891...	39,917,000	15.3	611,781,000	83.9	513,473,000	89⅜	93¼	80	85¾	225,665,811	36.9
1892...	38,554,000	13.4	515,947,000	62.4	322,112,000	69½	73	68¼	76¼	191,912,635	37.2
1893...	34,629,000	11.4	396,132,000	53.8	213,171,000	59⅛	64½	52⅛	60½	164,283,129	41.5
1894...	34,882,000	13.2	460,267,000	49.1	225,902,000	52¾	63⅝	60¾	85⅜	144,812,718	31.5
1895...	34,047,000	13.7	467,103,000	50.9	237,939,000	53¾	64¾	57⅛	67⅝	126,443,968	27.1
1896...	34,619,000	12.4	427,684,000	72.6	310,598,000	74⅝	93⅛	68¾	97⅞	145,124,972	33.9
1897...	39,465,000	13.4	530,149,000	80.8	428,547,000	92	109	117	185	217,306,005	41.0
1898...	44,055,000	15.3	675,149,000	58.2	392,770,000	62¾	70	68⅜	79½	222,618,420	33.0
1899...	44,593,000	12.3	547,304,000	58.4	319,545,000	64	69½	63⅝	67½	186,096,762	34.0
1899...	*52,589,000*	*12.5*	*658,534,000*	......	....	......	......	......	......	....	....
1900...	42,495,000	12.3	522,230,000	61.9	323,515,000	69¼	74⅝	70	75⅛	215,990,073	41.4
1901...	49,896,000	15.0	748,460,000	62.4	467,360,000	73	79½	72⅜	76¼	234,772,516	31.4
1902...	46,202,000	14.5	670,063,000	63.0	422,224,000	71⅞	77¾	74¾	80⅝	202,905,598	30.3
1903...	49,465,000	12.9	637,822,000	69.5	443,025,000	77¾	87	87¾	101½	120,727,613	18.9
1904...	44,075,000	12.5	552,400,000	92.4	510,490,000	115	122	89½	113¾	44,112,910	8.0
1905...	47,854,000	14.5	692,979,000	74.8	518,373,000	82½	90	80¼	87¼	97,609,007	14.1
1906...	47,306,000	15.5	735,261,000	66.7	490,333,000	......	......	84	106	146,700,425	20.0
1907...	45,211,000	14.0	634,087,000	87.4	554,437,000	......	......	......	......	163,043,669	25.7
1908...	47,557,000	14.0	664,602,000	92.8	616,826,000	106½	112	126½	137	114,268,468	17.2
1909...	46,723,000	15.8	737,189,000	......	....	......	......	......	......	....	....
1909...	*44,262,000*	*15.4*	*683,379,000*	98.6	668,680,000	106	119¾	100	119¼	87,364,318	12.8
1910 [1]..	45,681,000	13.9	635,121,000	88.3	561,051,000	104	110	98	106	69,311,760	10.9
1911...	49,543,000	12.5	621,338,000	87.4	543,063,000	105	110	115	122	79,689,404	12.8
1912...	45,814,000	15.9	730,267,000	76.0	555,280,000	85	90¾	90½	96	142,879,596	19.6
1913...	50,184,000	15.2	763,380,000	79.9	610,122,000	89½	93	96	100	145,590,349	19.1
1914...	53,541,000	16.6	891,017,000	98.6	878,680,000	115	131	141	164½	332,464,975	37.3
1915...	60,469,000	17.0	1,025,801,000	91.9	942,303,000	106	128½	116	126	243,117,026	23.7
1916...	52,316,000	12.2	636,318,000	160.3	1,019,968,000	155½	190	258	340	203,578,699	32.0
1917...	45,941,000	14.2	650,828,000	200.9	1,307,418,000	220	220	......	......	....	....

[1] Figures adjusted to census basis.

TABLE 15.—*Winter and spring wheat: Acreage, production, and farm value Dec. 1, by States in 1917, and United States totals, 1890–1917.*

State and year.	Winter wheat. Acreage.	Winter wheat. Average yield per acre.	Winter wheat. Production.	Winter wheat. Average farm price Dec. 1.	Winter wheat. Farm value Dec. 1.	Spring wheat. Acreage.	Spring wheat. Average yield per acre.	Spring wheat. Production.	Spring wheat. Average farm price Dec. 1.	Spring wheat. Farm value Dec. 1.
	Acres.	*Bu.*	*Bushels.*	*Cts.*	*Dollars.*	*Acres.*	*Bu.*	*Bushels.*	*Cts.*	*Dollars.*
Me..........	....	.....	....	.....	....	11,000	14.0	154,000	235	362,000
Vt..........	....	.....	....	.....	....	3,000	20.0	60,000	236	142,000
N. Y........	430,000	19.5	8,385,000	210	17,608,000	....	.....	....	.....	....
N. J........	89,000	19.0	1,691,000	213	3,602,000	....	.....	....	.....	....
Pa..........	1,399,000	17.5	24,482,000	205	50,188,000	....	.....	....	.....	....
Del.........	131,000	16.5	2,162,000	208	4,497,000	....	.....	....	.....	....
Md..........	675,000	17.0	11,475,000	207	23,753,000	....	.....	....	.....	....
Va..........	1,280,000	14.0	17,920,000	216	38,707,000	....	.....	....	.....	....
W. Va.......	315,000	14.0	4,410,000	217	9,570,000	....	.....	....	.....	....
N. C........	930,000	10.5	9,765,000	234	22,850,000	....	.....	....	.....	....

WHEAT—Continued.

TABLE 15.—*Winter and spring wheat: Acreage, production, and farm value Dec. 1, by States in 1917, and United States totals, 1890–1917*—Continued.

State and year.	Winter wheat.					Spring wheat.				
	Acreage.	Average yield per acre.	Production.	Average farm price Dec. 1.	Farm value Dec. 1.	Acreage.	Average yield per acre.	Production.	Average farm price Dec. 1.	Farm value Dec. 1.
	Acres.	*Bu.*	*Bushels.*	*Cts.*	*Dollars.*	*Acres.*	*Bu.*	*Bushels.*	*Cts.*	*Dollars.*
S. C.	175,000	10.5	1,838,000	290	5,330,000					
Ga.	244,000	8.5	2,074,000	290	6,015,000					
Ohio	1,870,000	22.0	41,140,000	204	83,926,000					
Ind.	1,805,000	18.5	33,392,000	203	67,786,000					
Ill.	1,600,000	19.0	30,400,000	201	61,104,000					
Mich.	845,000	18.0	15,210,000	204	31,028,000					
Wis.	93,000	24.0	2,232,000	202	4,509,000	146,000	21.2	3,095,000	202	6,252,000
Minn.	80,000	18.0	1,440,000	202	2,909,000	3,230,000	17.5	56,525,000	202	114,180,000
Iowa	170,000	17.5	2,975,000	199	5,920,000	250,000	21.5	5,375,000	199	10,696,000
Mo.	1,800,000	15.3	27,540,000	195	53,703,000					
N. Dak.						7,000,000	8.0	56,000,000	200	112,000,000
S. Dak.	120,000	14.0	1,680,000	196	3,293,000	3,596,000	14.0	50,344,000	196	98,674,000
Nebr.	597,000	12.0	7,164,000	195	13,970,000	400,000	16.5	6,600,000	195	12,870,000
Kans.	3,713,000	12.3	45,670,000	198	90,427,000	44,000	6.0	264,000	198	523,000
Ky.	750,000	12.0	9,000,000	212	19,080,000					
Tenn.	525,000	9.2	4,830,000	222	10,723,000					
Ala.	93,000	10.0	930,000	270	2,511,000					
Miss.	14,000	15.0	210,000	300	630,000					
Tex.	1,350,000	12.0	16,200,000	210	34,020,000					
Okla.	3,100,000	11.5	35,650,000	194	69,161,000					
Ark.	210,000	16.0	3,360,000	201	6,754,000					
Mont.	605,000	13.0	7,865,000	192	15,101,000	1,122,000	9.0	10,098,000	192	19,388,000
Wyo.	75,000	20.0	1,500,000	200	3,000,000	123,000	22.0	2,706,000	200	5,412,000
Colo.	336,000	23.0	7,728,000	193	14,915,000	264,000	22.0	5,808,000	193	11,209,000
N. Mex.	134,000	10.0	1,340,000	215	2,881,000	69,000	18.0	1,242,000	215	2,670,000
Ariz.	33,000	25.0	825,000	210	1,732,000					
Utah	230,000	14.0	3,220,000	178	5,732,000	90,000	27.0	2,430,000	178	4,325,000
Nev.	4,000	26.0	104,000	180	187,000	37,000	28.0	1,036,000	180	1,865,000
Idaho	310,000	18.0	5,580,000	182	10,156,000	375,000	22.0	8,250,000	182	15,015,000
Wash.	505,000	21.5	10,858,000	193	20,956,000	1,350,000	13.6	18,360,000	193	35,435,000
Oreg.	420,000	20.0	8,400,000	182	15,288,000	401,000	11.0	4,411,000	182	8,028,000
Cal.	375,000	19.8	7,425,000	200	14,850,000					
U. S.	27,430,000	15.2	418,070,000	202.9	848,372,000	18,511,000	12.6	232,758,000	197.2	459,046,000
1916	34,709,000	13.8	480,553,000	162.7	781,906,000	17,607,000	8.8	155,765,000	152.8	238,062,000
1915	41,308,000	16.3	673,947,000	94.7	638,149,000	19,161,000	18.4	351,854,000	86.4	304,154,000
1914	36,008,000	19.0	684,990,000	98.6	675,623,000	17,533,000	11.8	206,027,000	98.6	203,057,000
1913	31,699,000	16.5	523,561,000	82.9	433,995,000	18,485,000	13.0	239,819,000	73.4	176,127,000
1912	26,571,000	15.1	399,919,000	80.9	323,572,000	19,243,000	17.2	330,348,000	70.1	231,708,000
1911	29,162,000	14.8	430,656,000	88.0	379,151,000	20,381,000	9.4	190,682,000	86.0	163,912,000
1910	27,329,000	15.9	434,142,000	88.1	382,318,000	18,352,000	11.0	200,979,000	88.9	178,733,000
1909[1]	*27,151,000*	*15.5*	*419,733,000*	102.4	426,184,000	*17,111,000*	*15.4*	*263,646,000*	92.5	242,496,000
1908	30,349,000	14.4	437,908,000	93.7	410,330,000	17,208,000	13.2	226,694,000	91.1	206,496,000
1907	28,132,000	14.6	409,442,000	88.2	361,217,000	17,079,000	13.2	224,645,000	86.0	193,220,000
1906	29,600,000	16.7	492,888,000	68.3	336,435,000	17,706,000	13.7	242,373,000	63.5	153,898,000
1905	29,864,000	14.3	428,463,000	78.2	334,987,000	17,990,000	14.7	264,517,000	69.3	183,386,000
1904	26,866,000	12.4	332,935,000	97.8	325,611,000	17,209,000	12.8	219,464,000	84.2	184,879,000
1903	32,511,000	12.3	399,867,000	71.6	286,243,000	16,954,000	14.0	237,955,000	65.9	156,782,000
1902	28,581,000	14.4	411,789,000	64.8	266,727,000	17,621,000	14.7	258,274,000	60.2	155,497,000
1901	30,240,000	15.2	458,835,000	66.1	303,227,000	19,656,000	14.7	289,626,000	56.7	164,133,000
1900	26,236,000	13.3	350,025,000	63.3	221,668,000	16,259,000	10.6	172,204,000	59.1	101,847,000
1899	25,358,000	11.5	291,706,000	63.0	183,767,000	19,235,000	13.3	255,598,000	53.1	135,778,000
1898	25,745,000	14.9	382,492,000	62.2	237,736,000	18,310,000	16.0	292,657,000	53.0	155,034,000
1897	22,926,000	14.1	323,616,000	85.1	275,323,000	16,539,000	12.5	206,533,000	74.2	153,224,000
1896	22,794,000	11.8	267,934,000	77.0	206,270,000	11,825 000	13.5	159,750,000	65.3	104,328,000
1895	22,609,000	11.6	261,242,000	57.8	150,944,000	11,438,000	18.0	205,861,000	42.3	86,995,000
1894	23,519,000	14.0	329,290,000	49.8	164,022,000	11,364,000	11.5	130,977,000	47.2	61,880,000
1893	23,118,000	12.0	278,469,000	56.3	156,720,000	11,511,000	10.2	117,662,000	48.0	56,451,000
1892	26,209,000	13.7	359,416,000	65.1	234,037,000	12,345,000	12.7	156,531,000	56.3	88,075,000
1891	27,524,000	14.7	405,116,000	88.0	356,415,000	12,393,000	16.7	206,665,000	76.0	157,058,000
1890	23,520,000	10.9	255,374,000	87.5	223,362,000	12,567,000	11.4	143,890,000	77.4	111,411,000

[1] Census acreage and production.

WHEAT—Continued.

TABLE 16.—*Winter and spring wheat: Yield per acre in States producing both, for 10 years.*

WINTER WHEAT.

State.	Yield per acre (bushels).										
	10-year aver., 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917
Wisconsin	20.4	19.5	20.4	20.0	17.5	19.5	20.1	21.5	23.0	19.0	24.0
Minnesota	17.4	....	....	....	....	....	16.2	19.5	19.5	14.0	18.0
Iowa	20.9	21.0	21.6	21.2	19.7	23.0	23.4	21.6	21.5	18.5	17.5
South Dakota	15.2	....	....	....	....	....	9.0	14.0	20.5	18.5	14.0
Nebraska	17.4	17.8	19.4	16.5	13.8	18.0	18.6	19.3	18.5	20.0	12.0
Kansas	13.8	12.8	14.5	14.2	10.8	15.5	13.0	20.5	12.5	12.0	12.3
Montana	24.5	....	32.5	22.0	31.7	24.5	25.6	23.0	27.0	21.5	13.0
Wyoming	25.2	25.0	32.5	25.0	26.0	28.0	25.0	24.0	26.0	21.0	20.0
Colorado	23.4	....	29.7	23.0	18.0	24.5	21.1	25.0	26.0	20.0	23.0
New Mexico	19.6	....	....	20.0	25.0	20.0	18.6	25.0	22.0	16.5	10.0
Utah	21.8	23.0	24.0	20.5	20.0	24.0	23.0	25.0	25.0	20.0	14.0
Nevada	25.2	....	24.0	24.0	23.0	27.5	23.0	29.0	26.0	24.5	26.0
Idaho	26.9	30.0	29.0	23.7	31.5	28.7	27.4	27.5	29.0	24.0	18.0
Washington	25.5	24.5	25.8	20.5	27.3	27.6	27.0	26.5	27.6	26.5	21.5
Oregon	22.7	23.2	21.0	23.7	22.2	26.8	21.4	22.0	24.0	23.0	20.0
United States	15.7	14.4	15.8	15.9	14.8	15.1	16.5	19.0	16.3	13.8	15.2

SPRING WHEAT.

State.	10-year aver., 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917
Wisconsin	18.4	17.5	19.0	18.7	14.5	18.5	18.6	17.0	22.5	16.6	21.2
Minnesota	14.0	12.8	16.8	16.0	10.1	15.5	16.2	10.5	17.0	7.5	17.5
Iowa	16.4	15.5	14.7	20.9	13.8	17.0	17.0	13.5	16.7	13.0	21.5
South Dakota	11.3	12.8	14.1	12.8	4.0	14.2	9.0	9.0	17.0	6.3	14.0
Nebraska	13.4	13.0	14.0	13.9	10.0	14.1	12.0	11.5	16.0	12.5	16.5
Kansas	9.7	5.5	11.5	8.4	4.2	15.0	8.5	15.0	12.0	10.5	6.8
Montana	21.5	24.2	28.8	22.0	25.2	23.5	21.5	17.0	26.0	18.0	9.0
Wyoming	25.1	25.5	27.0	25.0	26.0	29.2	25.0	22.0	27.0	22.0	22.0
Colorado	22.2	21.0	29.4	21.9	19.5	24.0	21.0	22.5	21.0	19.5	22.0
New Mexico	21.6	25.0	24.5	20.0	20.5	22.0	19.0	23.0	22.5	21.5	18.0
Utah	27.0	27.5	28.5	25.3	27.0	29.2	28.0	25.0	28.0	25.0	27.0
Nevada	30.3	30.0	28.7	29.0	32.5	30.2	31.0	30.0	32.0	31.5	28.0
Idaho	25.3	25.4	26.0	20.4	29.0	28.3	28.0	24.0	26.5	23.5	22.0
Washington	18.6	15.0	20.6	14.5	19.5	20.4	19.0	20.0	22.2	21.5	13.6
Oregon	17.7	16.5	18.7	18.0	17.7	19.5	19.5	16.5	17.0	23.0	11.0
United States	13.1	13.2	15.8	11.0	9.4	17.2	13.0	11.8	18.4	8.8	12.6

TABLE 17.—*All wheat: Acreage, production, and total farm value, by States, 1916 and 1917.*

State.	Thousands of acres.		Production (thousands of bushels).		Total value, basis Dec. 1 price (thousands of dollars).	
	1917	1916	1917	1916	1917	1916
Maine	11	5	154	135	362	252
Vermont	3	1	60	25	142	41
New York	430	400	8,385	8,400	17,608	14,112
New Jersey	89	90	1,691	1,800	3,602	2,952
Pennsylvania	1,399	1,375	24,482	26,125	50,188	42,322
Delaware	131	124	2,162	1,860	4,497	3,013
Maryland	675	650	11,475	10,400	23,753	17,784
Virginia	1,280	1,200	17,920	15,240	38,707	25,146
West Virginia	315	305	4,410	4,422	9,570	7,075
North Carolina	930	870	9,765	9,135	22,850	16,078
South Carolina	175	210	1,838	2,226	5,330	4,207
Georgia	244	334	2,074	3,808	6,015	7,083
Ohio	1,870	1,600	41,140	21,600	83,926	36,504
Indiana	1,805	1,620	33,392	19,440	67,786	32,854
Illinois	1,600	1,525	30,400	16,775	61,104	27,679

WHEAT—Continued.

TABLE 17.—*All wheat: Acreage, production, and total farm value, by States, 1916 and 1917*—Continued.

State.	Thousands of acres.		Production (thousands of bushels).		Total value basis Dec. 1 price (thousands of dollars).	
	1917	1916	1917	1916	1917	1916
Michigan	845	800	15,210	13,280	31,028	22,178
Wisconsin	239	188	5,327	3,315	10,761	5,304
Minnesota	3,310	3,465	57,965	26,410	117,089	42,784
Iowa	420	560	8,350	9,150	16,616	14,274
Missouri	1,800	1,950	27,540	16,575	53,703	27,349
North Dakota	7,000	7,150	56,000	39,325	112,000	59,774
South Dakota	3,716	3,650	52,024	24,825	101,967	37,237
Nebraska	997	3,540	13,764	68,550	26,840	109,680
Kansas	3,757	8,170	45,934	97,980	90,950	160,687
Kentucky	750	890	9,000	8,010	19,080	13,297
Tennessee	525	830	4,830	7,885	10,723	13,326
Alabama	93	110	930	1,045	2,511	1,933
Mississippi	14	6	210	90	630	158
Texas	1,350	1,200	16,200	13,200	34,020	22,836
Oklahoma	3,100	3,050	35,650	29,585	69,161	49,407
Arkansas	210	235	3,360	1,880	6,754	3,064
Montana	1,727	1,485	17,963	28,655	34,489	46,134
Wyoming	198	170	4,206	3,670	8,412	5,322
Colorado	600	600	13,536	11,885	26,124	17,828
New Mexico	203	113	2,582	2,104	5,551	3,156
Arizona	33	40	825	1,160	1,732	1,740
Utah	320	326	5,650	6,900	10,057	10,488
Nevada	41	55	1,140	1,592	2,052	2,229
Idaho	685	634	13,830	15,071	25,171	22,004
Washington	1,855	1,590	29,218	37,635	56,391	53,818
Oregon	821	850	12,811	19,550	23,316	28,347
California	375	350	7,425	5,600	14,850	8,512
United States	45,941	52,316	650,828	636,318	1,307,418	1,019,968

TABLE 18.—*Wheat: Production and distribution in the United States, 1897–1917.*

[000 omitted.]

Year.	Old stock on farms July 1.	Crop.	Total supplies.	Stock on farms Mar. 1 following.	Shipped out of county where grown.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1897	23,347	530,149	553,496	121,320	269,126
1898	17,839	675,149	692,988	198,056	398,882
1899	64,061	547,304	611,365	158,746	305,020
1900	50,900	522,230	573,130	128,098	281,372
1901	30,552	748,460	779,012	173,353	372,717
1902	52,437	670,063	722,500	164,047	388,554
1903	42,540	637,822	680,362	132,608	369,582
1904	36,634	552,400	589,034	111,055	302,771
1905	24,257	692,979	717,236	158,403	404,092
1906	46,053	735,261	781,314	206,642	427,253
1907	54,853	634,087	688,940	148,721	367,607
1908	33,797	664,602	698,399	143,692	393,435
1909	15,062	683,379	698,441	159,100	414,165
1910	35,680	635,121	670,801	162,705	352,906
1911	34,071	621,338	655,409	122,025	348,821
1912	23,876	730,267	754,143	156,483	449,906
1913	35,515	763,380	798,895	151,809	411,753
1914	32,236	891,017	923,253	152,903	541,198
1915	28,972	1,025,801	1,054,773	244,448	633,380
1916	74,731	636,318	711,049	100,650	361,088
1917	15,611	650,828	666,439	....	....

WHEAT—Continued.

TABLE 19.—*Wheat: Yield per acre, price per bushel Dec. 1. and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars.)[1]	
	10-year average, 1908-1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average, 1908-1917.	1913	1914	1915	1916	1917	5-year average, 1912-1916.	1917
Me.	24.5	23.5	25.5	29.7	21.0	23.5	25.5	27.0	28.0	27.0	14.0	127	101	109	112	187	235	32.25	32.90
Vt.	25.9	23.0	25.0	29.3	27.8	25.0	24.5	29.0	30.0	25.0	20.0	123	100	100	107	165	236	30.27	47.20
N. Y.	20.6	17.5	21.0	23.7	19.5	16.0	20.0	22.5	25.0	21.0	19.5	118	93	108	101	168	210	23.85	40.95
N. J.	18.4	17.3	17.9	18.5	17.4	18.5	17.6	18.0	20.0	20.0	19.0	119	96	109	106	164	213	21.73	40.47
Pa.	17.5	18.5	17.0	17.8	13.5	18.0	17.0	18.1	18.5	19.0	17.5	115	91	104	104	162	205	20.28	35.88
Del.	16.2	15.0	14.0	17.0	16.7	17.5	14.5	20.5	15.0	15.0	16.5	116	88	109	109	162	208	18.51	34.32
Md.	16.3	16.4	14.5	17.4	15.5	15.0	13.3	21.5	16.1	16.0	17.0	116	89	106	105	171	207	18.63	35.19
Va.	12.8	11.4	11.2	12.8	12.0	11.6	13.6	14.5	13.8	12.7	14.0	120	96	108	108	165	216	15.26	30.24
W. Va.	13.6	13.0	13.0	12.5	11.5	14.5	13.0	15.0	15.0	14.5	14.0	121	100	108	108	160	217	16.65	30.38
N. C.	10.6	10.0	9.5	11.4	10.6	8.9	11.7	12.0	10.9	10.5	10.5	131	106	117	120	176	234	13.58	24.57
S. C.	10.6	9.0	10.0	11.0	11.4	9.2	12.3	11.5	10.8	10.6	10.5	154	130	145	138	189	290	15.71	30.45
Ga.	10.6	9.2	10.0	10.5	12.0	9.3	12.2	12.1	11.0	11.4	8.5	149	120	134	129	186	290	15.52	24.65
Ohio	16.4	16.0	15.9	16.2	16.0	8.0	18.0	18.5	20.3	13.5	22.0	116	90	105	104	169	204	17.48	44.88
Ind.	15.4	16.6	15.3	15.6	14.7	8.0	18.5	17.4	17.2	12.0	18.5	114	88	103	102	169	203	15.89	37.56
Ill.	15.6	13.0	17.4	15.0	16.0	8.3	18.7	18.5	19.0	11.0	19.0	112	86	101	100	165	201	15.84	38.19
Mich.	17.4	18.0	18.8	18.0	18.0	10.0	15.3	19.7	21.3	16.6	18.0	115	89	103	101	167	204	18.55	36.72
Wis.	19.3	18.2	19.5	19.3	15.9	19.0	19.3	19.1	22.7	17.6	22.3	109	82	100	95	160	202	20.08	45.05
Minn.	14.0	12.8	16.8	16.0	10.1	15.5	16.2	10.6	17.0	7.6	17.5	108	76	102	90	162	202	12.41	35.35
Iowa	18.7	17.2	17.0	21.0	16.4	19.8	20.6	18.6	20.0	16.3	19.9	105	76	96	87	156	199	18.20	39.60
Mo.	13.7	10.0	14.7	13.8	15.7	12.5	17.1	17.0	12.3	8.5	15.3	110	84	98	98	165	195	13.67	29.84
N. Dak.	11.0	11.6	13.7	5.0	8.0	18.0	10.5	11.2	18.2	5.5	8.0	104	73	101	87	152	200	11.12	16.00
S. Dak.	11.4	12.8	14.1	12.8	4.0	14.2	9.0	9.1	17.1	6.8	14.0	103	71	94	86	150	196	9.93	27.44
Nebr.	17.1	17.2	18.8	16.2	13.4	17.6	17.9	18.6	18.3	19.4	13.8	101	71	95	84	160	195	17.79	26.91
Kans.	13.8	12.6	14.4	14.1	10.7	15.5	13.0	20.5	12.5	12.0	12.2	106	79	95	89	164	198	14.40	24.16
Ky.	12.1	11.6	11.8	12.8	12.7	10.0	13.6	16.5	11.0	9.0	12.0	118	96	103	105	166	212	13.29	25.44
Tenn.	11.1	10.0	10.4	11.7	11.5	10.5	12.0	15.5	10.5	9.5	9.2	121	98	105	108	169	222	13.19	20.42
Ala.	11.2	11.5	10.5	12.0	11.5	10.6	11.7	13.0	12.0	9.5	10.0	140	115	126	125	185	270	14.88	27.00
Miss.	14.0	14.5	11.0	14.0	12.0	12.0	14.0	13.0	20.0	15.0	15.0	134	95	125	105	175	300	17.69	45.00
Tex.	12.8	11.0	9.1	15.0	9.4	15.0	17.5	13.0	15.5	11.0	12.0	119	94	99	107	173	210	15.78	25.20
Okla.	12.3	11.6	12.8	16.3	8.0	12.8	10.0	19.0	11.6	9.7	11.5	107	82	92	89	167	194	12.36	22.31
Ark.	11.8	10.0	11.4	13.9	10.5	10.0	13.0	13.0	12.5	8.0	16.0	114	90	99	101	163	201	11.93	32.16
Mont.	23.0	24.2	30.8	22.0	28.7	24.1	23.8	20.2	26.5	19.3	10.4	99	66	91	78	161	192	20.25	19.97
Wyo.	25.1	25.4	28.7	25.0	26.0	28.7	25.0	22.9	26.5	21.6	21.2	104	72	89	78	145	200	22.67	42.40
Colo.	22.7	21.0	29.5	22.3	18.9	24.2	21.0	23.8	24.2	19.8	22.6	101	78	87	80	150	193	20.76	43.62
N. Mex.	21.0	25.0	24.5	20.0	22.9	20.9	18.8	24.2	22.2	18.6	12.7	114	97	90	90	150	215	21.34	27.30
Ariz.	27.6	26.7	25.0	22.3	29.6	30.7	32.0	28.0	28.0	29.0	25.0	129	110	125	115	150	210	35.93	52.00
Utah	23.6	26.5	25.9	22.1	22.3	25.7	24.2	25.0	25.7	21.2	17.7	98	73	86	86	152	178	22.55	31.51
Nev.	28.6	30.0	28.7	26.5	28.3	29.2	27.7	29.6	29.6	28.9	27.8	111	82	95	95	140	180	29.72	50.04
Idaho	26.4	28.2	27.8	22.6	30.7	28.6	27.6	26.2	28.0	23.8	20.2	92	63	87	80	146	182	23.24	36.76
Wash.	21.7	18.8	23.2	16.9	22.7	23.5	23.2	23.5	25.7	23.7	15.8	98	73	100	82	143	193	22.28	30.49
Oreg.	21.2	20.8	20.2	22.1	21.0	25.0	21.0	20.8	22.2	23.0	15.6	100	75	102	84	145	182	21.39	28.39
Cal.	16.4	14.6	14.0	18.0	18.0	17.0	14.0	17.0	16.0	16.0	19.8	113	95	104	95	152	200	17.26	39.60
U. S.	14.7	14.0	15.8	13.9	12.5	15.9	15.2	16.6	17.0	12.2	14.2	107.5	79.9	98.6	91.9	160.3	200.9	15.15	28.46

[1] Based upon farm price Dec. 1.

WHEAT—Continued.

TABLE 20.—*Winter and spring wheat: Condition of crop, United States, on first of months named, 1890–1918.*

Year	Winter wheat.					Spring wheat.			
	December of previous year.	April.	May.	June.	When harvested.	June.	July.	August.	When harvested.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1890	95.3	81.0	80.0	78.1	76.2	91.3	94.4	83.2	79.7
1891	98.4	96.9	97.9	96.6	96.2	92.6	94.1	95.5	97.2
1892	85.3	81.2	84.0	88.3	89.6	92.3	90.9	87.3	81.2
1893	87.4	77.4	75.4	75.5	77.7	86.4	74.1	67.0	68.9
1894	91.5	86.7	81.4	83.2	83.9	88.0	68.4	67.1	69.9
1895	89.0	81.4	82.9	71.1	65.8	97.8	102.2	95.9	94.9
1896	81.4	77.1	82.7	77.9	75.6	99.9	93.3	78.9	73.8
1897	99.5	81.4	80.2	78.5	81.2	89.6	91.2	86.7	80.8
1898	....	86.7	86.5	90.8	85.7	100.9	95.0	96.5	91.7
1899	92.6	77.9	76.2	67.3	65.6	91.4	91.7	83.6	77.2
1900	97.1	82.1	88.9	82.7	80.8	87.3	55.2	56.4	56.1
1901	97.1	91.7	94.1	87.8	88.3	92.0	95.6	80.3	78.4
1902	86.7	78.7	76.4	76.1	77.0	95.4	92.4	89.7	87.2
1903	99.7	97.3	92.6	82.2	78.8	95.9	82.5	77.1	78.1
1904	86.6	76.5	76.5	77.7	78.7	93.4	93.7	87.5	66.2
1905	82.9	91.6	92.5	85.5	82.7	93.7	91.0	89.2	87.3
1906	94.1	89.1	90.9	82.7	85.6	93.4	91.4	86.9	83.4
1907	94.1	89.9	82.9	77.4	78.3	88.7	87.2	79.4	77.1
1908	91.1	91.3	89.0	86.0	80.6	95.0	89.4	80.7	77.6
1909	85.3	82.2	83.5	80.7	82.4	95.2	92.7	91.6	88.6
1910	95.8	80.8	82.1	80.0	81.5	92.8	61.6	61.0	63.1
1911	82.5	83.3	86.1	80.4	76.8	94.6	73.8	59.8	56.7
1912	86.6	80.6	79.7	74.3	73.3	95.8	89.3	90.4	90.8
1913	93.2	91.6	91.9	83.5	81.6	93.5	73.8	74.1	75.3
1914	97.2	95.6	95.9	92.7	94.1	95.5	92.1	75.5	68.0
1915	88.3	88.8	92.9	85.8	84.4	94.9	93.3	93.4	94.6
1916	87.7	78.3	82.4	73.2	75.7	88.2	89.0	63.4	48.6
1917	85.7	63.4	73.2	70.9	75.9	91.6	83.6	68.7	71.2
1918	79.3	....	....	....	....	....	....	....	....

TABLE 21.—*Winter wheat: Per cent of area sown which was abandoned (not harvested).*

Year.	Per cent.	Year.	Per cent.	Year.	Per cent.
1902	15.2	1908	4.2	1914	3.1
1903	2.8	1909	7.5	1915	2.7
1904	15.4	1910	13.7	1916	11.4
1905	4.6	1911	10.7	1917	31.0
1906	5.5	1912	20.1		
1907	11.2	1913	4.7		

TABLE 22.—*Wheat: Farm price per bushel on first of each month, by geographical divisions, 1916 and 1917.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	150.3	102.8	152.3	110.0	163.7	119.0	160.4	111.2	150.3	101.9	156.6	106.0	136.6	88.1
February	164.8	113.9	174.3	121.7	176.9	129.0	173.3	121.0	163.7	114.6	175.1	110.6	150.8	99.3
March	164.4	102.9	174.6	113.6	178.1	123.1	174.7	109.6	163.8	99.6	170.7	109.4	149.6	94.3
April	180.0	98.6	190.4	109.7	192.7	117.9	187.5	104.7	182.8	97.0	187.8	103.4	159.2	86.6
May	245.9	102.5	254.6	111.6	264.8	117.7	259.1	109.0	249.9	102.1	259.5	104.9	214.9	88.9
June	248.5	100.0	266.4	105.8	273.5	115.6	257.5	104.9	242.3	99.1	262.1	103.4	236.5	89.0
July	220.1	93.0	236.4	99.5	234.4	109.5	221.3	99.4	217.8	92.0	221.5	92.0	214.0	83.7
August	228.9	107.1	215.9	108.9	227.3	115.0	221.3	114.4	241.9	108.5	246.5	109.4	201.7	91.0
September	209.7	131.2	208.6	131.3	221.1	133.7	201.8	135.8	207.2	132.5	224.4	137.3	208.9	118.4
October	200.6	136.3	205.6	138.4	225.3	140.8	203.8	143.5	199.1	136.0	202.1	142.4	191.0	124.5
November	200.0	158.4	207.7	166.0	226.1	164.5	204.2	166.6	198.0	159.5	203.1	167.1	189.2	138.2
December	200.9	160.3	206.8	163.6	223.0	170.7	202.9	167.3	198.5	159.7	203.6	168.6	190.6	149.1
Average	201.1	126.7	202.5	132.6	217.8	132.4	205.2	128.3	198.5	126.6	220.8	123.3	188.2	119.8

WHEAT—Continued.

TABLE 23.—*Wheat: Wholesale price per bushel, 1912–1917.*

Date.	New York.		Baltimore.		Chicago.		Detroit.		St. Louis.		Minneapolis.		San Francisco.	
	No. 2 red winter.[1]		No. 2 red.		No. 1 northern spring.		No. 2 red.		No. 2 red winter.		No. 1 northern.		White (per 100 lbs.).[2]	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Jan.-June	98¼	127	95¼	116½	107	122	95¾	120	92½	125½	103½	118⅞	150	190
July-Dec.	103½	118¼	94½	106	85	116	101¾	112	94	115½	80½	112¼	140	165
1913.														
Jan.-June	107	114½	105¾	109½	87¼	96	102½	116¼	93	115	82⅛	89⅝	155	182½
July-Dec.	94	107	89¼	96½	85	95¼	87½	102½	83	97¾	80¾	93½	155	172½
1914.														
Jan.-June	87½	111¾	83	103	89	100	86¼	99¼	75¾	99½	84⅝	98¼	151¼	165
July-Dec.	86¼	136½	82¾	127	88½	133	80	127¾	76	127½	85½	129⅛	152	200
1915.														
Jan.-June	126	178	111	168½	123	167	114½	165	110	164	114⅞	165⅝	165	240
July-Dec.	108¼	144½	100¾	127⅞	99	153¾	106	132	106	129	89	155	140	185
1916.														
January	138½	156¼	123	141¼	119¾	139½	122	137	122	143	118⅞	138¾	150	190
February	130¾	154	116	137½	112	138	111½	135½	116	142	108⅛	136¼	160	185
March	130¾	139	112½	119½	109⅜	123	110½	118¼	112	122	108⅞	120⅞	160	175
April	129¾	143	114¾	123	118¾	128	117	124	116	130½	117⅞	126⅛	160	170
May	124½	136	104	119⅛	116	126	108¾	123½	106	125	113¼	128⅜	160	170
June	113¼	132½	100¼	105¾	106½	118	103	113¼	106	114	106½	116¼	160	170
Jan.-June.	113¼	156¼	100¼	141¼	106½	139½	103	137	106	143	106½	138¾	150	190
July	123½	143	102½	126	110	131⅞	104	129½	109	136½	107⅞	132½	160	185
August	144	179	125½	157	126⅛	164¼	130	154¾	129	165	127⅜	165⅞	160	210
September	168½	184⅝	148¼	157	150	171½	144½	156	147	172	152	167⅝	185	225
October	185¾	209½	156¼	192¼	164	202	157½	188	158	195	169⅛	199⅛	185	275
November	198	215	174	193¼	165	200	173	189½	177	196	177	200	240	290
December	183	206	159	183	155½	190	157	183½	168	187	159⅞	188⅝	250	290
July-Dec.	123½	215	102½	193¼	110	202	104	189½	109	196	107⅞	200	160	290
1917.														
January	207	226	184¼	203	178¼	205	178½	196½	183	206	175	199	250	285
February	197	220¼	168½	197½	162½	199	171	194½	171	202	166⅜	193	250	285
March	216	238	194⅜	213⅝	183¾	213	192	210	194	220	184⅞	211	250	360
April	223½	292	215½	306	205½	295¾	213	300	221½	310	203	286	275	450
May	279¾	320	274½	342	258	340	267	340	265	342	247	339	450	500
June	(3)	(3)	220	283	249	310	245	295	222	298	222½	315	(3)	(3)
Jan.-June.	197	320	168½	342	162½	340	171	340	171	342	166⅜	339	250	500
July	(3)	(3)	209	240	217	300	225	255	210	273	228½	295	330	360
August	(3)	(3)	212	238	223	300	215	250	214	257½	215	305	340	390
September	229	231	222	226	220	200	219	220	215	227	215	221	340	365
October	229	229	222	224	220	220	217	219	215	215	215	215	350	350
November	229	229	222	224	220	220	217	219	215	215	215	215	350	350
December	229	229	222	224	220	220	217	219	215	215	215	215	350	350
July-Dec.	229	231	209	240	217	300	215	255	210	273	215	305	330	390

[1] No. 1 northern spring in 1916–17.
[2] Northern club, in 1913. White, subsequent to 1913.
[3] Nominal.

WHEAT—Continued.

TABLE 24.—*Wheat flour: Wholesale price per barrel, 1912-1917.*

Date.	Chicago.				Cincinnati.		New York.		St. Louis.	
	Winter patents.		Spring patents.		Winter family.		Spring patents.		Winter patents.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Jan.-June	3.75	5.45	4.50	5.60	3.40	4.50	4.25	5.50	4.40	5.85
July-Dec	4.50	5.30	4.00	5.30	4.00	4.50	4.50	5.20	4.20	5.60
1913.										
Jan.-June	4.30	5.10	4.10	5.60	3.25	4.15	4.40	5.00	4.30	5.15
July-Dec	3.90	4.35	4.00	5.50	2.90	3.50	4.40	5.00	3.70	4.55
1914.										
Jan.-June	3.50	4.40	4.00	5.50	3.20	3.50	4.50	5.10	3.35	4.35
July-Dec	3.45	5.50	4.00	6.90	3.05	4.90	4.35	7.00	3.35	5.70
1915.										
Jan.-June	5.10	7.80	5.50	6.75	4.75	6.65	5.50	8.25	5.10	7.50
July-Dec	4.50	5.75	4.50	6.90	4.65	5.65	4.90	7.25	4.60	5.90
1916.										
January	5.65	6.80	5.60	6.20	5.15	5.40	6.25	7.25	5.25	6.10
February	5.60	6.60	5.60	6.85	5.40	5.50	5.45	7.25	5.25	6.10
March	5.30	5.75	5.10	5.65	5.15	5.35	5.70	6.40	5.10	5.40
April	5.50	6.25	5.65	6.10	5.15	5.25	6.05	6.60	5.20	5.50
May	5.30	5.80	5.40	5.90	5.10	5.35	5.80	6.50	4.90	5.35
June	5.00	5.60	5.00	5.60	4.50	5.35	5.50	6.15	4.75	5.05
Jan.-June	5.00	6.80	5.00	6.85	4.50	5.50	5.45	7.25	4.75	6.10
July	5.10	5.45	5.20	5.40	4.50	5.00	5.50	6.85	4.75	6.00
August	5.10	7.00	5.35	7.60	4.75	7.00	6.50	8.55	5.85	7.30
September	6.95	7.50	7.25	8.00	6.75	7.00	7.90	8.75	7.10	7.50
October	7.20	8.50	7.80	9.00	6.75	7.75	8.34	9.90	7.25	8.75
November	8.40	8.65	9.20	9.75	7.50	8.75	9.30	10.00	8.25	9.00
December	7.80	8.50	7.50	9.10	7.00	8.25	8.35	9.45	7.85	8.60
July-Dec	5.10	8.65	5.20	9.75	4.50	8.75	5.50	10.00	4.75	9.00
1917.										
January	8.20	9.50	9.10	10.00	7.25	8.75	8.85	10.20	8.15	9.00
February	8.10	8.40	8.20	9.80	7.75	8.50	8.65	9.25	7.90	8.70
March	8.20	9.50	8.50	10.20	8.00	9.00	9.40	10.40	8.40	9.25
April	9.75	12.50	10.00	13.30	8.50	12.50	10.15	13.75	8.60	13.25
May	14.75	17.00	14.25	17.80	12.00	15.25	13.50	16.75	12.50	15.25
June	13.00	14.65	11.25	15.60	11.00	13.75	12.25	14.75	10.50	13.50
Jan.-June	8.10	17.00	8.20	17.80	7.25	15.25	8.65	16.75	7.90	15.25
July	10.50	12.50	11.25	14.00	10.50	11.50	11.75	13.75	9.80	11.75
August	11.75	12.40	12.00	14.00	9.50	11.50	12.00	13.50	10.00	11.75
September	9.85	10.65	10.50	12.00	9.50	10.00	11.25	12.25	10.15	10.50
October	10.00	10.65	10.40	11.40	9.90	10.00	10.85	12.00	9.95	10.50
November	10.00	10.50	10.20	10.85	9.70	9.90	10.65	11.55	10.00	10.40
December	10.30	10.50	10.30	10.70	9.70	9.70	10.45	11.35	10.20	10.50
July-Dec	9.85	12.50	10.20	14.00	9.50	11.50	10.45	13.75	9.80	11.75

WHEAT—Continued.

TABLE 25.—*Wheat and flour: International trade, calendar years 1909–1916*

["Temporary" imports into Italy of wheat, to be used for manufacturing products for export, are included in the total imports as given in the official Italian returns. In the trade returns of Chile the item *trigo mote* (prepared corn) which might easily be confused with *trigo* (wheat) is omitted. See "General note," Table 10.]

EXPORTS.

[000 omitted.]

Country.	Wheat.			Wheat flour.			Wheat and flour.		
	Average 1909–1913	1915 (prelim.)	1916 (prelim.)	Average 1909–1913	1915 (prelim.)	1916 (prelim.)	Average 1909–1913	1915 (prelim.)	1916 (prelim.)
FROM—	*Bushels.*	*Bushels.*	*Bushels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Bushels.*	*Bushels.*	*Bushels.*
Argentina	89,102	92,281	84,321	1,365	1,305	1,623	95,243	98,155	91,625
Australia	41,997	5,617	....	1,719	1,500	....	49,732	12,365	....
Austria-Hungary	36	....	....	193	....	....	906	....	....
Belgium	19,607	....	....	686	....	....	22,694	....	....
British India	48,781	26,505	....	607	600	....	51,510	29,207	....
Bulgaria	8,840	....	....	534	....	....	11,214	....	....
Canada	74,217	151,900	191,218	3,694	5,569	7,921	90,871	176,959	226,862
Chile	2,221	12	....	83	5	....	2,593	34	....
Germany	12,214	....	....	1,986	....	....	21,149	....	....
Netherlands	53,397	1,807	1	222	5	10	54,394	1,830	44
Roumania	49,106	....	....	725	....	....	52,370	....	....
Russia	155,752	7,018	8,656	1,337	1,081	1,440	161,766	11,885	15,134
United States	53,316	205,830	154,050	10,443	15,681	14,379	100,310	276,393	218,755
Other countries	16,210	12,466	....	3,154	2,586	....	30,412	24,102	....
Total	624,827	503,436	....	26,748	28,332	....	745,194	630,930	....

IMPORTS.

Country.	Wheat Average 1909–1913	Wheat 1915 (prelim.)	Wheat 1916 (prelim.)	Wheat flour Average 1909–1913	Wheat flour 1915 (prelim.)	Wheat flour 1916 (prelim.)	Wheat and flour Average 1909–1913	Wheat and flour 1915 (prelim.)	Wheat and flour 1916 (prelim.)
INTO—									
Belgium	73,826	....	....	31	....	....	73,967	....	....
Brazil	12,283	13,622	15,574	1,825	1,449	1,329	20,495	20,142	....
British South Africa	3,425	3,611	3,772	729	384	452	6,708	5,339	5,805
Denmark	4,088	2,334	....	583	421	....	6,711	4,228	....
France	38,172	61,417	82,841	117	3,413	5,246	38,698	76,775	109,393
Germany	88,982	....	....	172	....	....	89,755	....	....
Greece	6,973	6,037	....	13	163	....	7,034	6,771	....
Italy	52,775	82,751	67,260	15	91	1,517	52,866	83,161	74,088
Japan	2,629	817	644	192	21	10	3,495	911	687
Netherlands	66,896	23,782	27,651	2,168	1,108	576	76,653	28,768	30,242
Portugal	3,228	4,827	....	....	....	....	3,228	4,827	....
Spain	4,468	13,647	11,571	1	10	16	4,471	13,692	11,641
Sweden	6,771	8,784	....	82	257	....	7,140	9,940	....
Switzerland	16,558	17,726	21,971	517	....	....	18,885	17,726	21.971
United Kingdom	192,134	165,179	186,425	6,005	5,752	5,646	219,156	191,063	217,476
Other countries	21,790	23,772	....	11,070	5,882	....	71,574	50,243	....
Total	594,998	428,306	....	23,520	18,951	....	700,836	513,586	....

OATS.

TABLE 26.—*Oats: Area and production in undermentioned countries, 1915–1917.*

Country.	Area.			Production.		
	1915	1916	1917	1915	1916	1917
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	40,996,000	41,527,000	43,572,000	1,549,030,000	1,251,837,000	1,587,286,000
Canada:						
New Brunswick	201,000	198,000	....	5,560,000	6,039,000	....
Quebec	1,400,000	1,073,000	....	42,182,000	24,411,000	....
Ontario	3,095,000	1,991,000	....	122,810,000	50,771,000	....
Manitoba	1,327,000	1,444,000	....	63,965,000	48,439,000	....
Saskatchewan	3,201,000	3,792,000	....	171,765,000	163,278,000	....
Alberta	1,822,000	2,124,000	....	102,692,000	102,199,000	....
Other	379,000	374,000	....	14,710,000	15,074,000	....
Total Canada	11,425,000	10,996,000	....	523,684,000	410,211,000	....
Mexico	(1)	(1)	(1)	17,000	17,000	....
Total	....	....	....	2,072,731,000	1,662,065,000	....
SOUTH AMERICA.						
Argentina	2,869,000	2,565,000	2,525,000	49,397,000	75,280,000	31,781,000
Chile	152,000	161,000	(1)	7,104,000	6,350,000	(1)
Uruguay	82,000	105,000	142,000	933,000	2,283,000	1,926,000
Total	....	....	....	57,434,000	83,913,000	....
EUROPE.						
Austria-Hungary:						
Austria	[2] 2,663,000	(1)	(1)	[2] 57,625,000	(1)	(1)
Hungary proper	2,664,000	(1)	(1)	80,925,000	(1)	(1)
Croatia-Slavonia	(1)	(1)	(1)	5,000,000	(1)	(1)
Bosnia-Herzegovina	(1)	(1)	(1)	4,000,000	(1)	(1)
Total Austria-Hungary	....	....	....	147,550,000	....	....
Belgium	[3] 686,000	(1)	(1)	40,000,000	(1)	(1)
Bulgaria	[3] 379,000	(1)	(1)	9,545,000	7,372,000	(1)
Denmark	1,024,000	1,042,000	981,000	42,859,000	42,286,000	37,685,000
Finland	[4] 987,000	(1)	(1)	22,000,000	(1)	(1)
France [5]	8,062,000	7,777,000	7,706,000	238,551,000	277,179,000	237,426,000
Germany	11,404,000	(1)	(1)	412,400,000	(1)	(1)
Italy	1,208,000	1,122,000	1,107,000	31,443,000	28,742,000	33,889,000
Netherlands	358,000	343,000	371,000	20,692,000	22,240,000	18,594,000
Norway	306,000	297,000	307,000	10,318,000	13,502,000	11,806,000
Roumania	1,065,000	1,068,000	(1)	29,054,000	28,935,000	(1)
Russia:						
Russia proper [5]	33,945,000	34,706,000	....	757,308,000	843,249,000	....
Poland	(1)	(1)	(1)	(1)	(1)	(1)
Northern Caucasia	985,000	(1)	(1)	25,267,000	(1)	(1)
Total	34,930,000	....	....	782,575,000	....	....
Serbia	(1)	(1)	(1)	4,000,000	(1)	(1)
Spain	1,403,000	1,398,000	1,425,000	36,949,000	32,163,000	33,048,000
Sweden	1,970,000	1,954,000	1,929,000	91,311,000	93,089,000	70,754,000
United Kingdom:						
England	1,888,000	1,862,000	....	78,409,000	77,676,000	....
Wales	199,000	222,000	....	7,305,000	8,237,000	....
Scotland	983,000	991,000	1,040,000	40,313,000	37,362,000	....
Ireland	1,089,000	1,072,000	....	58,065,000	52,774,000	....
Total United Kingdom	4,159,000	4,147,000	....	184,092,000	176,049,000	....
Total	....	....	....	2,103,339,000	....	....

[1] No official statistics.
[2] Galicia and Bukowina not included.
[3] Data for 1914.
[4] Data for 1910.
[5] Excludes territory occupied by the enemy.

OATS—Continued.

TABLE 26.—*Oats: Area and production in undermentioned countries, 1915–1917*—Contd.

Country.	Area.			Production.		
	1915	1916	1917	1915	1916	1917
ASIA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
Cyprus	(1)	(1)	(1)	405,000	(1)	(1)
Russia:						
Central Asia (4 Governments of)	986,000	(1)	(1)	16,422,000	(1)	(1)
Siberia (4 Governments of)	5,161,000	(1)	(1)	68,381,000	(1)	(1)
Transcaucasia (1 Government of)	2,000	(1)	(1)	36,000	(1)	(1)
Total	6,149,000	....	....	84,839,000	....	....
Total	....	....	....	85,244,000	....	....
AFRICA.						
Algeria	590,000	536,000	682,000	15,082,000	13,140,000	18,601,000
Tunis	148,000	164,000	124,000	3,445,000	2,067,000	3,996,000
Union of South Africa	(1)	(1)	250,000	[2] 9,661,000	(1)	6,928,000
Total	....	....	....	28,188,000	....	....
AUSTRALASIA.						
Australia:						
Queensland	3,000	(3)	....	44,000	2,000	....
New South Wales	43,000	58,000	....	512,000	1,344,000	....
Victoria	435,000	354,000	....	1,608,000	9,329,000	....
South Australia	141,000	127,000	....	368,000	2,134,000	....
Western Australia	96,000	104,000	....	465,000	1,538,000	....
Tasmania	57,000	78,000	....	1,342,000	2,189,000	....
Total Australia	775,000	722,000	724,000	4,341,000	16,539,000	20,751,000
New Zealand	288,000	213,000	178,000	11,436,000	7,653,000	5,470,000
Total Australasia	1,063,000	935,000	902,000	15,777,000	24,192,000	26,221,000
Grand total	....	....	....	4,362,713,000	....	....

[1] No official statistics. [2] Census of 1911. [3] Less than 500 acres.

TABLE 27.—*Oats: Total production in countries named in Table 26, 1895–1915.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1895	3,008,154,000	1901	2,862,615,000	1907	3,603,896,000	1913	4,697,437,000
1896	2,847,115,000	1902	3,626,303,000	1908	3,591,012,000	1914	4,034,857,000
1897	2,633,971,000	1903	3,378,034,000	1909	4,312,882,000	1915	4,362,713,000
1898	2,903,974,000	1904	3,611,302,000	1910	4,182,410,000		
1899	3,256,256,000	1905	3,510,167,000	1911	3,808,561,000		
1900	3,166,002,000	1906	3,544,961,000	1912	4,617,394,000		

TABLE 28.—*Oats: Average yield per acre in undermentioned countries, 1890–1916.*

Year.	United States.	Russia (European).[1]	Germany.[1]	Austria.[1]	Hungary proper.[1]	France.[2]	United Kingdom.[2]
Average:	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1890–1899	26.1	17.8	40.0	25.3	....	29.8	43.6
1900–1909	29.3	20.0	50.7	29.8	30.7	31.6	44.3
1910–1914	30.5	21.8	54.7	37.5	31.9	31.0	42.9
1906	31.2	15.1	55.7	34.1	34.2	27.0	43.8
1907	23.7	19.7	58.3	35.7	30.0	31.8	45.1
1908	25.0	20.1	50.2	32.0	26.8	29.6	43.5
1909	28.6	25.7	59.0	37.4	33.8	34.1	45.9
1910	31.6	22.5	51.3	31.5	26.8	29.8	44.3
1911	24.4	18.6	49.6	33.7	33.8	30.8	41.5
1912	37.4	23.6	54.1	36.2	31.1	31.9	41.7
1913	29.2	26.3	61.1	39.3	34.6	31.6	43.0
1914	29.7	17.9	57.4	[3] 46.6	33.2	31.0	44.0
1915	37.8	[4] 22.4	36.2	[3] 21.6	30.4	25.6	44.3
1916	30.1	....	....	....	....	30.2	42.5
Average (1907–1916)	29.8	....	....	....	....	30.6	43.6

[1] Bushels of 32 pounds.
[2] Winchester bushels.
[3] Galicia and Bukowina not included.
[4] Poland not included.

OATS—Continued.

TABLE 29.—*Oats: Acreage, production, value, exports, etc., in the United States, 1849-1917.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value, Dec. 1.	Chicago cash price per bushel, contract.[1]				Domestic exports, including oatmeal, fiscal year beginning July 1.[2]	Imports during fiscal year beginning July 1.[3]
						December.		Following May.			
						Low.	High.	Low.	High.		
	Acres.	*Bush.*	*Bushels.*	*Cts.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*	*Bushels.*
1849			*146,584,000*								
1859			*172,643,000*								
1866	8,864,000	30.2	268,141,000	35.1	94,058,000	36	43	59	78	825,895	778,198
1867	10,082,000	27.6	278,698,000	44.5	123,903,000	52	57¼			122,554	780,798
1868	9,666,000	26.4	254,961,000	41.7	106,356,000	43	49½	56¾	62½	481,871	326,659
1869	9,461,000	30.5	288,334,000	38.0	109,522,000	40	44¾	46½	53½	121,517	2,266,785
1869			*282,107,000*								
1870	8,792,000	28.1	247,277,000	39.0	96,444,000	37¾	41	47¼	51	147,572	599,514
1871	8,366,000	30.6	255,743,000	36.2	92,591,000	30¾	33	34¾	42½	262,975	535,250
1872	9,001,000	30.2	271,747,000	29.9	81,304,000	23½	25¾	30	34	714,072	225,555
1873	9,752,000	27.7	270,340,000	34.6	93,474,000	34	40⅝	44	48½	812,873	191,802
1874	10,897,000	22.1	240,369,000	47.1	113,134,000	51¾	54½	57¼	64½	504,770	1,500,040
1875	11,915,000	29.7	354,318,000	32.0	113,441,000	29½	30½	28⅝	31½	1,466,228	121,547
1876	13,359,000	24.0	320,884,000	32.4	103,845,000	31¾	34½	37¼	45¾	2,854,128	41,597
1877	12,826,000	31.7	406,394,000	28.4	115,546,000	24⅛	27	23	27	3,715,479	21,391
1878	13,176,000	31.4	413,579,000	24.6	101,752,000	19⅝	20⅜	24⅜	30½	5,452,136	13,395
1879	12,684,000	28.7	363,761,000	33.1	120,533,000	32¾	36¾	29½	34⅞	766,366	489,576
1879	*16,145,000*	*25.3*	*407,859,000*								
1880	16,188,000	25.8	417,885,000	36.0	150,244,000	29⅛	33½	36¼	39½	402,904	64,412
1881	16,832,000	24.7	416,481,000	46.4	193,199,000	43½	46¾	48¾	56⅜	625,690	1,850,983
1882	18,495,000	26.4	488,251,000	37.5	182,978,000	34¾	41½	38¾	42¾	461,496	815,017
1883	20,325,000	28.1	571,302,000	32.7	187,040,000	29¾	36⅛	30¾	34¼	3,274,622	121,069
1884	21,301,000	27.4	583,628,000	27.7	161,528,000	22½	25¼	34½	37	6,203,104	94,310
1885	22,784,000	27.6	629,409,000	28.5	179,632,000	27	29	26¼	29⅝	7,311,306	149,480
1886	23,658,000	26.4	624,134,000	29.8	186,138,000	25¾	27¼	25⅛	27½	1,374,635	139,575
1887	25,921,000	25.4	659,618,000	30.4	200,700,000	28⅝	30⅞	32½	38	573,080	123,817
1888	26,998,000	26.0	701,735,000	27.8	195,424,000	25	26⅞	21⅜	23⅝	1,191,471	131,501
1889	27,462,000	27.4	751,515,000	22.9	171,781,000	20	21	24¾	30	15,107,238	153,232
1889	*28,321,000*	*28.6*	*809,251,000*								
1890	26,431,000	19.8	523,621,000	42.4	222,048,000	39⅞	43⅞	45¼	54	1,382,836	41,848
1891	25,582,000	28.9	738,394,000	31.5	232,312,000	31⅛	33⅝	28⅛	33½	10,586,644	47,782
1892	27,064,000	24.4	661,035,000	31.7	209,254,000	25⅝	31¼	28¾	32¼	2,700,793	49,433
1893	27,273,000	23.4	638,855,000	29.4	187,576,000	27⅛	29⅛	32½	36	6,290,229	31,759
1894	27,024,000	24.5	662,037,000	32.4	214,817,000	28¾	29⅜	27½	30¾	1,708,824	330,318
1895	27,878,000	29.6	824,444,000	19.9	163,655,000	16⅝	17½	18	19⅝	15,156,618	66,602
1896	27,566,000	25.7	707,346,000	18.7	132,485,000	16½	18¾	16⅞	18¾	37,725,083	131,204
1897	25,730,000	27.2	698,768,000	21.2	147,975,000	21	23⅞	26	32	73,880,307	25,093
1898	25,777,000	28.4	730,907,000	25.5	186,405,000	26	27¾	24	27¾	33,534,362	28,098
1899	26,341,000	30.2	796,178,000	24.9	198,168,000	22¼	23	21¼	23¾	45,048,857	54,576
1899	*29,540,000*	*31.9*	*943,389,000*								
1900	27,365,000	29.6	809,126,000	25.8	208,669,000	21¾	22¾	27⅞	31	42,268,931	32,107
1901	28,541,000	25.8	736,809,000	39.9	293,659,000	42	48¼	41	49½	13,277,612	38,978
1902	28,653,000	34.5	987,843,000	30.7	303,585,000	29¼	32	33⅜	38¼	8,381,805	150,065
1903	27,638,000	28.4	784,094,000	34.1	267,662,000	34¼	38	39⅝	44¾	1,960,740	183,983
1904	27,843,000	32.1	894,596,000	31.3	279,900,000	28¼	32	28⅝	32	8,394,692	55,699
1905	28,047,000	34.0	953,216,000	29.1	277,048,000	29½	32¾	32⅛	34¾	48,434,541	40,025
1906	30,959,000	31.2	964,905,000	31.7	306,293,000	33	35¾	44½	48½	6,386,334	91,289
1907	31,837,000	23.7	754,443,000	44.3	334,568,000	46½	50⅞	52¾	56½	2,518,855	383,418
1908	32,344,000	25.0	807,156,000	47.2	381,171,000	48⅜	50½	56¼	62½	2,333,817	6,691,700
1909	33,204,000	30.3	1,007,353,000								
1909	*35,159,000*	*28.6*	*1,007,143,000*	40.2	405,121,000	40	45	36½	43¼	2,548,726	1,034,511
1910[4]	37,548,000	31.6	1,186,341,000	34.4	408,388,000	31	32½	31⅞	36	3,845,850	107,318
1911	37,763,000	24.4	922,298,000	45.0	414,663,000	46¼	47⅜	50½	58	2,677,749	2,622,357
1912	37,917,000	37.4	1,418,337,000	31.9	452,469,000	31	31¾	35⅛	43	36,455,474	723,899
1913	38,399,000	29.2	1,121,768,000	39.2	439,596,000	37⅝	40⅛	37	42½	2,748,743	22,273,624
1914	38,442,000	29.7	1,141,060,000	43.8	499,431,000	46⅞	49¾	50½	56	100,609,272	630,722
1915	40,996,000	37.8	1,549,030,000	36.1	559,506,000	40⅞	44	39½	49½	98,960,481	665,314
1916	41,527,000	30.1	1,251,837,000	52.4	655,928,000	46¾	54	59½	74	95,106,149	761,644
1917	43,572,000	36.4	1,587,286,000	66.9	1,061,427,000	70¼	80⅝				

[1] Quotations are for No. 2 to 1906.
[2] Oatmeal not included 1866 to 1882, inclusive.
[3] Oatmeal not included 1867 to 1882, inclusive, and 1909.
[4] Figures adjusted to census basis.

OATS—Continued.

TABLE 30.—*Oats: Acreage, production, and total farm value, by States, 1916 and 1917.*

State.	Thousands of acres.		Production (thousands of bushels).		Total value, basis Dec. 1 price (thousands of dollars).	
	1917	1916	1917	1916	1917	1916
Maine	170	160	4,930	5,760	4,190	3,859
New Hampshire	14	12	532	444	447	306
Vermont	88	80	3,168	2,560	2,693	1,664
Massachusetts	12	11	444	352	360	232
Rhode Island	2	2	62	54	46	37
Connecticut	20	17	660	510	521	352
New York	1,275	1,206	44,625	31,356	33,469	19,441
New Jersey	73	69	2,482	2,070	1,737	1,263
Pennsylvania	1,175	1,130	41,125	35,030	30,021	19,967
Delaware	4	4	128	120	100	74
Maryland	47	46	1,457	1,357	1,093	828
Virginia	225	250	5,512	5,875	4,630	3,701
West Virginia	143	140	3,861	3,220	3,050	2,061
North Carolina	340	390	5,780	6,825	5,375	5,050
South Carolina	400	500	6,000	9,000	6,000	7,200
Georgia	650	860	10,400	16,770	12,168	13,248
Florida	55	60	770	900	755	639
Ohio	1,775	1,717	78,100	48,076	49,984	25,480
Indiana	1,820	1,750	76,440	52,500	48,157	26,775
Illinois	4,700	4,470	244,400	172,095	158,860	87,768
Michigan	1,550	1,423	56,575	42,690	36,208	22,626
Wisconsin	2,250	2,200	99,000	81,400	65,340	41,514
Minnesota	3,250	3,325	120,250	88,112	75,758	41,413
Iowa	5,250	5,100	246,750	188,700	155,452	90,576
Missouri	1,480	1,290	59,200	32,250	36,112	17,092
North Dakota	2,575	2,500	38,625	53,750	23,948	23,650
South Dakota	1,925	1,850	65,450	56,425	39,924	25,956
Nebraska	3,038	2,250	115,444	79,875	70,421	37,541
Kansas	2,284	1,550	70,804	36,425	45,315	20,034
Kentucky	310	300	8,060	6,300	6,126	3,780
Tennessee	300	260	7,350	5,460	6,100	3,385
Alabama	540	600	9,720	10,500	9,914	7,875
Mississippi	300	350	5,700	6,300	5,358	4,662
Louisiana	84	110	1,873	2,090	1,761	1,421
Texas	1,425	1,500	37,050	42,750	30,381	26,078
Oklahoma	1,150	1,160	26,450	14,500	19,838	8,265
Arkansas	340	350	9,520	7,350	7,140	4,998
Montana	680	660	13,600	25,080	11,016	11,788
Wyoming	263	250	9,468	8,750	7,574	5,250
Colorado	293	290	11,154	9,570	8,462	5,742
New Mexico	45	64	1,350	1,856	1,134	1,244
Arizona	10	9	400	338	384	270
Utah	100	103	4,400	4,480	3,740	2,733
Nevada	14	14	560	602	538	452
Idaho	275	310	10,450	13,330	8,046	7,198
Washington	292	275	11,242	11,300	9,106	7,293
Oregon	365	360	9,125	17,280	6,844	8,467
California	196	200	6,860	6,500	5,831	4,680
United States	43,572	41,527	1,587,286	1,251,837	1,061,427	655,928

OATS—Continued.

TABLE 31.—*Oats: Production and distribution in the United States, 1897–1917.*

[000 omitted.]

Year.	Old stock on farms Aug. 1.	Crop.	Total supplies.	Stock on farms Mar. 1 following.	Shipped out of county where grown.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1897	71,139	698,768	769,907	271,729	204,147
1898	44,554	730,907	775,461	283,209	193,527
1899	50,537	796,178	846,715	290,937	223,014
1900	54,214	809,126	863,340	292,803	242,850
1901	47,713	736,809	784,522	226,393	143,398
1902	30,570	987,843	1,018,413	364,926	258,438
1903	73,352	784,094	857,446	273,708	223,959
1904	42,194	894,596	936,790	347,166	261,989
1905	55,836	953,216	1,009,052	379,805	277,133
1906	67,688	964,905	1,032,593	384,461	266,182
1907	68,258	754,443	822,701	267,476	210,923
1908	37,797	807,156	844,953	278,847	244,444
1909	26,323	1,007,143	1,033,466	365,438	329,255
1910	61,420	1,186,341	1,247,761	442,665	363,103
1911	67,793	922,298	990,091	289,988	265,958
1912	34,872	1,418,337	1,453,209	604,216	438,084
1913	103,900	1,121,768	1,225,668	419,476	297,326
1914	62,467	1,141,060	1,203,527	379,369	335,539
1915	55,607	1,549,030	1,604,637	598,148	465,823
1916	113,728	1,251,837	1,365,565	394,211	355,092
1917	47,834	1,587,286	1,635,120	....	....

TABLE 32.—*Oats: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average, 1908–1917.	1913	1914	1915	1916	1917	5-year average, 1912–1916.	1917
Me	37.2	34.0	37.0	42.4	38.5	34.6	40.0	41.0	40.0	36.0	29.0	58	55	57	45	67	85	21.03	24.65
N. H	36.4	30.6	31.5	42.8	33.8	39.0	35.0	38.0	38.0	37.0	38.0	60	56	58	54	69	84	21.28	31.92
Vt	37.8	33.3	32.2	41.5	35.0	43.0	39.0	42.5	43.0	32.0	36.0	58	52	55	53	65	85	21.58	30.60
Mass	34.6	33.0	31.0	35.5	35.0	34.0	35.0	37.0	36.0	32.0	37.0	58	54	56	51	66	81	19.02	29.97
R. I	29.3	31.0	25.0	35.0	29.0	28.6	26.0	27.5	33.0	27.0	31.0	57	50	58	50	68	75	15.34	23.25
Conn	31.5	32.6	27.5	36.8	35.1	30.7	28.0	29.0	32.5	30.0	33.0	57	55	55	55	69	79	16.99	26.07
N. Y	32.0	30.1	28.2	34.5	29.5	30.8	33.5	31.5	40.5	26.0	35.0	52	47	51	45	62	75	15.82	26.25
N. J	30.4	30.7	25.5	37.1	28.5	27.6	29.0	29.0	32.5	30.0	34.0	52	47	54	48	61	70	15.07	23.80
Pa	31.5	27.3	26.0	35.2	28.3	33.1	31.0	30.0	38.0	31.0	35.0	51	46	51	44	57	73	15.50	25.55
Del	30.3	29.8	25.5	33.8	30.0	30.5	30.5	27.0	33.5	30.0	32.0	53	51	50	51	62	78	15.69	24.96
Md	28.7	25.5	25.4	30.0	27.0	30.0	28.0	27.0	34.0	29.5	31.0	53	48	52	49	61	75	15.13	23.25
Va	21.2	19.1	19.0	22.0	20.0	22.2	21.5	15.5	25.0	23.	24.5	58	52	58	55	63	84	12.05	20.58
W. Va	23.9	19.0	22.0	25.2	22.0	28.0	24.0	20.0	29.0	23.0	27.0	56	51	55	51	64	79	13.18	21.33
N. C	18.1	16.5	16.5	18.2	16.5	18.6	19.5	17.5	23.0	17.5	17.0	67	61	65	62	74	93	12.40	15.81
S. C	19.9	20.0	21.0	21.0	20.4	21.5	23.5	20.0	19.0	18.0	15.0	74	71	71	67	80	100	14.44	15.00
Ga	19.4	14.2	19.0	18.2	21.5	20.8	22.0	20.0	19.5	19.5	16.0	74	68	70	66	79	117	14.15	18.72
Fla	16.3	16.5	17.0	16.2	13.5	17.2	18.0	18.0	20.0	15.0	14.0	74	70	70	70	71	98	12.38	13.72
Ohio	34.6	2.4	32.5	37.2	32.1	44.0	30.2	30.5	41.0	28.0	44.0	44	40	45	36	53	64	13.98	28.16
Ind	31.8	21.2	30.5	35.4	28.7	40.1	21.4	28.5	40.0	30.0	42.0	42	38	43	34	51	63	12.26	26.46
Ill	35.8	23.0	36.6	38.0	28.8	43.3	23.8	29.3	45.0	38.5	52.0	42	38	44	35	51	65	14.06	33.80
Mich	33.0	29.7	30.5	34.0	28.6	34.9	30.0	33.5	42.0	30.0	36.5	44	39	45	35	53	64	13.78	23.36
Wis	35.4	31.1	35.0	29.8	29.8	37.3	36.5	27.0	46.5	37.0	44.0	43	37	43	36	51	66	14.53	29.04
Minn	32.0	22.0	33.0	28.7	22.8	41.7	37.8	28.0	43.0	26.5	37.0	39	32	40	32	47	63	12.07	23.31
Iowa	35.0	24.3	27.0	37.8	25.5	44.2	34.5	33.0	40.0	37.0	47.0	39	34	41	32	48	63	13.55	29.61
Mo	26.1	19.3	27.0	33.6	14.8	33.0	21.2	21.5	26.0	25.0	40.0	44	45	44	38	53	61	10.74	24.40

OATS—Continued.

TABLE 32.—*Oats: Yield per acre, price per bushel Dec. 1, and value per acre, by States*—Continued.

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).	
	10-year average, 1908-1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average, 1908-1917.	1913	1914	1915	1916	1917	5-year average, 1912-1916.	1917
N. Dak	25.8	23.4	32.0	7.0	23.5	41.4	25.7	28.0	40.0	21.5	15.0	38	30	37	27	44	62	9.49	9.30
S. Dak	27.8	23.0	30.0	23.0	7.4	33.8	26.5	27.5	42.0	30.5	34.0	38	34	38	28	46	61	10.74	20.74
Nebr	27.7	22.0	25.0	28.0	13.9	24.4	26.5	32.0	32.0	35.5	38.0	39	38	40	31	47	61	11.36	23.18
Kans	26.4	22.0	28.2	33.3	15.0	32.0	19.5	33.5	26.5	23.5	31.0	44	45	42	37	55	64	11.35	19.84
Ky	22.3	16.2	22.3	25.0	18.4	26.9	19.8	21.0	26.0	21.0	26.0	53	52	53	48	60	76	11.67	19.76
Tenn	21.9	21.0	20.0	23.0	19.5	21.7	21.0	23.0	24.5	21.0	24.5	55	53	53	50	62	83	11.76	20.34
Ala	18.9	18.0	16.5	18.5	19.2	20.0	20.5	22.0	19.0	17.5	18.0	70	69	69	63	75	102	13.36	18.36
Miss	19.0	17.5	16.0	19.2	18.4	17.4	20.0	23.0	21.5	18.0	19.0	67	63	65	60	74	94	12.84	17.86
La	21.5	20.0	20.0	21.5	21.0	20.8	22.0	23.0	25.0	19.0	22.3	63	57	63	55	68	94	12.86	20.96
Tex	29.1	28.9	18.7	35.0	25.1	36.0	32.5	25.0	35.5	28.5	26.0	54	51	48	42	61	82	15.27	21.32
Okla	23.3	25.0	29.0	36.5	9.0	25.1	18.0	27.5	27.0	12.5	23.0	46	45	41	35	57	75	8.90	17.25
Ark	23.8	21.4	22.8	27.5	20.0	19.9	26.5	24.0	27.0	21.0	28.0	56	53	53	52	68	75	13.01	21.00
Mont	41.7	41.6	51.3	38.0	49.8	48.0	43.5	35.0	52.0	38.0	20.0	44	32	39	32	47	81	15.77	16.20
Wyo	36.6	36.4	35.0	32.0	34.5	41.8	38.0	35.0	42.0	35.0	36.0	51	40	48	43	60	80	17.31	28.80
Colo	37.9	39.5	38.0	39.1	35.0	42.8	35.0	40.0	39.0	33.0	38.0	50	44	45	41	60	76	17.09	28.80
N. Mex	33.7	33.5	40.0	27.4	38.8	34.7	30.0	38.0	36.0	29.0	30.0	60	60	45	50	67	84	17.63	25.20
Ariz	39.9	36.0	37.0	40.1	42.0	44.7	43.0	42.0	37.0	37.5	40.0	73	50	70	64	80	96	27.17	38.40
Utah	46.0	49.5	46.1	43.0	44.7	46.4	46.0	50.0	47.0	43.5	44.0	52	40	43	45	61	85	22.07	37.40
Nev	43.8	45.0	40.0	44.7	45.0	40.0	43.0	52.0	45.0	43.0	40.0	65	65	55	55	75	96	26.87	38.40
Idaho	43.8	44.0	44.5	38.5	44.0	48.9	46.5	44.0	47.0	43.0	38.0	45	32	38	34	54	77	17.58	29.26
Wash	47.1	44.5	49.0	42.8	51.7	48.2	47.5	47.0	50.0	52.0	38.5	48	40	42	37	51	81	20.61	31.18
Oreg	37.3	33.4	37.8	34.5	34.7	38.2	42.3	35.0	44.0	48.0	25.0	48	38	45	37	49	75	17.46	18.75
Cal	34.2	33.5	31.4	37.0	34.0	39.0	31.6	35.0	33.0	32.5	35.0	62	60	53	50	72	85	19.77	29.75
U. S.	31.2	25.0	30.3	31.6	24.4	37.4	29.2	29.7	37.8	30.1	36.4	43.7	39.2	43.8	36.1	52.4	66.9	13.16	24.36

[1] Based upon farm price Dec. 1.

TABLE 33.—*Oats: Farm price per bushel on first of each month, by geographical divisions, 1916 and 1917.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	51.4	39.1	61.0	45.9	74.2	63.4	49.8	38.4	46.2	35.4	65.1	45.4	54.4	39.3
February	55.2	44.6	63.9	50.6	75.0	64.3	53.4	45.5	50.8	41.5	68.2	47.5	57.3	40.8
March	56.9	42.7	68.9	50.7	79.9	64.6	55.3	41.7	51.7	38.2	70.3	51.0	58.8	46.1
April	61.5	42.0	72.7	51.5	83.4	65.8	59.9	40.9	56.8	37.6	72.0	50.1	64.5	43.7
May	71.0	42.6	83.0	52.6	91.0	65.6	69.1	41.9	65.3	38.2	82.6	49.4	79.4	44.0
June	69.9	42.1	85.5	53.9	98.0	66.0	65.7	40.8	62.6	37.3	86.9	50.3	83.2	44.8
July	68.9	40.4	81.3	51.3	94.0	63.9	65.8	38.4	62.7	36.1	79.3	47.2	82.4	45.9
August	73.7	40.1	88.6	50.5	102.4	64.2	70.9	38.6	68.1	35.8	84.9	44.6	79.0	46.1
September	61.7	43.1	82.7	52.2	105.9	66.2	54.9	41.5	51.2	39.0	85.5	51.6	84.9	45.2
October	62.3	44.5	72.0	52.8	109.2	68.9	57.0	42.9	54.4	40.6	80.5	53.7	79.3	44.6
November	61.7	49.0	71.5	58.1	107.2	72.6	57.0	48.1	54.2	44.6	79.5	57.7	75.7	49.4
December	66.9	52.4	75.0	60.3	97.8	74.4	64.7	51.5	62.4	47.9	81.9	63.5	79.8	54.0
Average	62.6	43.9	74.9	52.9	94.5	66.7	58.6	42.8	56.0	40.0	80.9	50.3	74.2	46.2

OATS—Continued.

TABLE 34.—*Oats: Condition of crop, United States, on first of months named, 1897–1917.*

Year.	June.	July.	August.	When harvested.	Year.	June.	July.	August.	When harvested.	Year.	June.	July.	August.	When harvested.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1897....	89.0	87.5	86.0	84.6	1904....	89.2	89.8	86.6	85.6	1911....	85.7	68.8	65.7	64.5
1898....	98.0	92.8	84.2	79.0	1905....	92.9	92.1	90.8	90.3	1912....	91.1	89.2	90.3	92.3
1899....	88.7	90.0	90.8	87.2	1906....	85.9	84.0	82.8	81.9	1913....	87.0	76.3	73.8	74.0
1900....	91.7	85.5	85.0	82.9	1907....	81.6	81.0	75.6	65.5	1914....	89.5	84.7	79.4	75.8
1901....	85.3	83.7	73.6	72.1	1908....	92.9	85.7	76.8	69.7	1915....	92.2	93.9	91.6	91.1
1902....	90.6	92.1	89.4	87.2	1909....	88.7	88.3	85.5	83.8	1916....	86.9	86.3	81.5	78.0
1903....	85.5	81.3	79.5	75.7	1910....	91.0	82.2	81.5	83.3	1917....	88.8	89.4	87.2	90.4

TABLE 35.—*Oats: Wholesale price per bushel, 1912–1917.*

Date.	New York.		Baltimore.		Cincinnati.		Chicago.		Milwaukee.		Duluth.		Detroit.		San Francisco.	
	No. 2 white.[1]		No. 3 white.		No. 2 mixed.		Contract.		No. 3 white.		No. 3 white.		Standard.		White (per 100 lbs).	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Dolls*	*Dolls*
Jan.-June	53½	61	52¾	65	50	61	46⅞	58½	47	59¾	44⅞	56⅛	50½	63½	1.70	2.12½
July-Dec.	38½	62½	37½	66½	32	55	30¼	57	30¾	57	28⅜	51	33½	61	1.47½	1.95
1913.																
Jan.-June	36½	48	38½	47	33½	43½	31⅝	43⅛	31¼	42½	27⅛	41⅜	34½	44½	1.43½	1.67½
July-Dec.	44	50	45	47½	39	47	36⅜	43⅜	37½	44	33⅞	42⅛	41	45½	1.37½	1.57½
1914.																
Jan.-June	43½	48½	42½	46¾	39¼	43	36⅝	42½	36½	43	33⅝	40	39½	45	1.22½	1.46¼
July-Dec.	43½	58½	41½	54½	35	52½	33½	51⅛	34¼	52	33⅛	50⅝	37¾	53	1.20	1.60
1915.																
Jan.-June	53¾	66½	50	64	46	61½	46⅜	60⅛	47¼	61½	44⅛	58⅞	50	62	1.40	1.85
July-Dec.	55	70½	38	66	33	58	35½	60	33¼	63	31⅝	58	36½	65	1.30	1.50
1916.																
Jan......	48½	57½	48	55¼	44	55½	43¼	51	43½	55	42¼	49½	46	55½	1.32½	1.55
Feb......	48½	56½	47	55	42	53	41¾	50	40¾	52½	38⅞	47⅞	44½	53½	1.42½	1.55
Mar......	44½	56	45½	47	42	46	42	47	41	46½	39¼	42½	44½	48	1.40	1.45
Apr......	49¾	51	47	49½	43	46	44½	47	43¾	46¾	41⅛	42⅜	46½	48½	1.40	1.42½
May......	44½	52	43	50½	38	45	39½	49¼	38¾	46½	37⅜	43¾	41	48½	1.40	1.57½
June.....	44½	46	43	44½	38	40½	37⅜	41½	38¼	41½	36⅛	38⅜	41	43	1.50	1.55
Jan.-June	44½	57½	43	55¼	38	55½	37⅜	51	38¼	55	36⅛	49½	41	55½	1.32½	1.57½
July.....	41½	47½	43¾	46	39	42½	38⅝	42	38½	43¼	36⅝	40	43	46	1.50	1.60
Aug......	45¾	54	45	51½	41	47½	41	47	40½	49	38⅜	47¼	42½	49	1.57½	1.72½
Sept.....	45	55	50½	52½	46½	48½	44⅛	47⅛	44	48½	42¼	45¾	48	51½	1.62½	1.72½
Oct......	51½	59½	51	58	47½	55	45½	53¾	46	54¼	43¾	51¼	49½	57	1.62½	2.00
Nov......	58½	64	57½	61½	53½	58½	51½	57	51½	58½	50⅛	57⅛	55	60½	1.95	2.07½
Dec......	55½	61½	57½	60½	84	91	46¾	54	48½	55	44¼	52⅜	54	59	2.00	2.07½
July-Dec.	41½	64	43¾	61½	39	91	38⅝	57	38½	58½	36⅝	57⅛	42½	60½	1.50	2.07½
1917.																
Jan......	61	69½	61	70	53½	60	53½	58⅛	53¾	58¾	50½	57⅛	58	60½	2.00	2.02½
Feb......	65	77	65	73½	57	62½	51¾	56⅜	51½	60½	49¾	56⅞	57	64½	1.95	2.02½
Mar......	73	78	72½	76	62	70	55½	62½	57½	67	53⅝	62½	64½	70	1.96¼	2.22½
Apr......	75	79½	73½	79	68½	74½	63⅛	71⅛	67	77	61	72¾	72	79	2.21¼	2.95
May......	67	79½	66½	80	65	73½	59½	74	61	76	57¼	76½	66	78½	2.60	2.90
June.....	68	76	65½	75½	61½	69	62	69	62½	71½	58¾	69⅛	65	72½	2.50	2.65
Jan.-June	61	79½	61	80	53½	74½	51¾	74	51½	77	49¾	76½	57	79	1.95	2.95
July.....	76	93½	76½	92	73	86½	68½	85	71	89½	65½	89	73	89½	2.25	2.50
Aug......	67	90	62	100	56¼	85½	51	80	52	82¾	51¼	79	56	87½	2.45	2.95
Sept.....	65	70	64	66½	56	62	56¼	61⅛	57¾	63½	55½	61½	58½	64	2.85	3.00
Oct......	64½	68	64½	67½	64	66	59½	61	58⅛	60½	59½	62	55⅝	59⅜	2.50	3.00
Nov......	65	80	66	77	60½	74½	58½	72½	59	75½	57⅛	70½	62½	77	2.70	2.75
Dec......	79	92½	77	87	74	82½	70¼	80⅝	72½	83	67⅛	81⅛	76	83½	2.70	2.75
July-Dec.	64½	93½	62	100	56	86½	51	85	52	89½	51¼	89	55⅝	89½	2.25	3.00

[1] No. 3 white in 1916–1917.

OATS—Continued.

TABLE 36.—*Oats: International trade, calendar years 1911–1916.*

[See "General note," Table 10.]

EXPORTS.

[000 omitted.]

Country.	Average 1911–1913	1915 (prelim.)	1916 (prelim.)
FROM—	*Bushels.*	*Bushels.*	*Bushels.*
Algeria	1,296	4,011	....
Argentina	52,751	40,840	55,421
Bulgaria	278	....	....
Canada	16,583	18,496	72,058
China	412	324	70
Chile	2,499	7,313	....
Denmark	151	2	....
Finland	433	237	9
Germany	30,814	....	....
Netherlands	33,814	31	17
Roumania	10,012	....	....
Russia	65,279	364	27
Sweden	2,312	....	....
United Kingdom	1,411	717	1,271
United States	12,592	104,549	105,838
Other countries	3,727	3,087	....
Total	234,427	179,974	....

IMPORTS.

Country.	Average 1911–1913	1915 (prelim.)	1916 (prelim.)
INTO—			
Austria-Hungary	3,426	....	....
Belgium	8,845	....	....
Denmark	4,126	217	....
Cuba	1,361	1,004	....
Finland	1,187	157	18
France	30,746	56,610	72,324
Germany	41,320	....	....
Itlay	9,040	27,647	38,308
Netherlands	41,901	4,332	4,902
Norway	698	1,096	790
Philippine Islands	486	441	165
Russia	1,643	599	4
Sweden	6,055	2,072	....
Switzerland	12,484	6,913	7,329
United Kingdom	64,755	59,165	48,986
United States	5,557	364	585
Other countries	2,417	8,048	....
Total	236,047	168,665	....

BARLEY.

TABLE 37.—*Barley: Area and production in undermentioned countries, 1915–1917.*

Country.	Area.			Production.		
	1915	1916	1917	1915	1916	1917
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	7,148,000	7,757,000	8,835,000	228,851,000	182,309,000	208,975,000
Canada:						
New Brunswick	2,000	2,000	....	48,000	45,000	....
Quebec	85,000	73,000	....	2,255,000	1,456,000	....
Ontario	449,000	326,000	....	15,369,000	7,498,000	....
Manitoba	570,000	688,000	....	20,641,000	13,729,000	....
Saskatchewan	285,000	367,000	....	10,497,000	9,916,000	....
Alberta	306,000	337,000	....	11,544,000	9,774,000	....
Other	11,000	10,000	....	342,000	352,000	....
Total Canada	1,708,000	1,803,000	....	60,699,000	42,770,000	....
Mexico	(1)	(1)	....	10,000,000	9,859,000	....
Total	....	....	....	299,550,000	234,938,000	....
SOUTH AMERICA.						
Argentina	397,000	431,000	388,000	5,144,000	5,430,000	2,165,000
Chile	147,000	121,000	(1)	3,827,000	4,358,000	....
Uruguay	5,000	10,000	13,000	40,000	115,000	110,000
Total	....	....	....	9,011,000	9,903,000	....

[1] No official statistics.

BARLEY—Continued.

TABLE 37.—*Barley: Area and production in undermentioned countries, 1915–1917*—Continued.

Country.	Area.			Production.		
	1915	1916	1917	1915	1916	1917
EUROPE.						
Austria-Hungary:	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
Austria	[1] 1,578,000	(2)	(2)	[1] 29,733,000	(2)	(2)
Hungary proper	2,830,000	(2)	(2)	56,186,000	(2)	(2)
Croatia-Slavonia	(2)	(2)	(2)	1,938,000	(2)	(2)
Bosnia-Herzegovina	(2)	(2)	(2)	3,000,000	(2)	(2)
Total Austria-Hungary				90,857,000		
Belgium	[3] 84,000	(2)	(2)	4,000,000	(2)	(2)
Bulgaria	[3] 554,000	(2)	(2)	14,697,000	14,739,000	
Denmark	614,000	633,000	594,000	25,890,000	22,317,000	17,866,000
Finland	[4] 273,000	(2)	(2)	5,000,000	(2)	(2)
France [5]	1,575,000	1,538,000	1,789,000	31,787,000	38,268,000	39,557,000
Germany	4,002,000	(2)	(2)	114,077,000	(2)	(2)
Italy	608,000	596,000	469,000	11,051,000	11,041,000	7,422,000
Netherlands	63,000	60,000	52,000	3,380,000	2,498,000	2,573,000
Norway	97,000	98,000	97,000	2,682,000	3,415,000	3,000,000
Roumania	1,371,000	1,454,000		28,688,000	30,038,000	
Russia:						
Russia proper [5]	22,325,000	22,031,000		316,904,000	350,223,000	
Poland	(2)	(2)	(2)	(2)	(2)	
Northern Caucasia	4,400,000	(2)	(2)	75,328,000	(2)	
Total Russia (European)	26,725,000			392,232,000		
Serbia	(2)	(2)	(2)	2,250,000	(2)	(2)
Spain	3,786,000	3,886,000	4,086,000	82,763,000	86,863,000	76,747,000
Sweden	431,000	421,000	438,000	14,254,000	14,621,000	12,203,000
United Kingdom:						
England	1,152,000	1,245,000		34,898,000	40,023,000	
Wales	80,000	87,000		2,467,000	2,731,000	
Scotland	149,000	170,000	159,414	5,183,000	5,340,000	
Ireland	142,000	150,000		5,828,000	6,474,000	
Total United Kingdom	1,523,000	1,652,000		48,376,000	54,568,000	
Total				871,984,000		
ASIA.						
British India	7,821,000	7,924,000	7,856,000	142,847,000	147,653,000	155,417,000
Cyprus	(1)	(1)	(1)	2,000,000	(1)	(1)
Japanese Empire:						
Japan	3,213,000	3,079,000	2,738,000	94,959,000	89,486,000	76,505,000
Formosa	5,000	(1)	(1)	61,000	(1)	(1)
Chosen [6]	1,185,000	(1)	(1)	24,872,000	(1)	(1)
Total Japanese Empire	4,403,000			119,892,000		
Russia:						
Central Asia (4 Governments of)	350,000	(1)	(1)	3,278,000	(1)	
Siberia (4 Governments of)	651,000	(1)	(1)	5,753,000	(1)	
Transcaucasia (1 Government of)	2,000	(1)	(1)	38,000	(1)	
Total	1,003,000			9,069,000		
Total				273,808,000		

[1] No official statistics.
[2] Galicia and Bukowina not included.
[3] Data for 1914.
[4] Data for 1910.
[5] Excludes territory occupied by the enemy.
[6] Data for 1914.

BARLEY—Continued.

TABLE 37.—*Barley: Area and production in undermentioned countries, 1915–1917*—Continued.

Country.	Area.			Production.		
	1915	1916	1917	1915	1916	1917
AFRICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
Algeria	2,703,000	3,009,000	2,839,000	39,866,000	35,969,000	31,461,000
Egypt	463,000	439,000	445,000	13,746,000	13,161,000	13,598,000
Tunis	1,038,000	1,233,000	1,038,000	11,482,000	4,914,000	8,267,000
Union of South Africa	(1)	64,000	57,000	[2] 1,359,000	(1)	1,000,000
Total	....	....	....	66,453,000	....	54,326,000
AUSTRALIA.						
Australasia:						
Queensland	7,000	1,000	....	106,000	8,000	....
New South Wales	5,000	6,000	....	47,000	115,000	....
Victoria	62,000	61,000	....	601,000	1,735,000	....
South Australia	66,000	85,000	....	447,000	1,698,000	....
Western Australia	7,000	10,000	....	24,000	131,000	....
Tasmania	6,000	5,000	....	105,000	116,000	....
Total Australia	154,000	170,000	180,000	1,329,000	3,802,000	4,189,000
New Zealand	18,000	30,000	30,000	597,000	820,000	738,000
Total Australasia	172,000	200,000	210,000	1,926,000	4,622,000	4,927,000
Grand total	....	....	....	1,522,732,000	....	....

[1] No official statistics. [2] Census of 1911.

TABLE 38.—*Barley: Total production of countries named in Table 37, 1895–1915.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1895	915,504,000	1901	1,072,195,000	1907	1,271,237,000	1913	1,650,265,000
1896	932,109,000	1902	1,229,132,000	1908	1,274,897,000	1914	1,463,289,000
1897	864,605,000	1903	1,235,786,000	1909	1,458,263,000	1915	1,522,732,000
1898	1,030,581,000	1904	1,175,784,000	1910	1,388,734,000		
1899	965,720,000	1905	1,180,053,000	1911	1,373,286,000		
1900	959,622,000	1906	1,296,579,000	1912	1,466,977,000		

TABLE 39.—*Barley: Average yield per acre in undermentioned countries, 1890–1916.*

Year.	United States.	Russia (European).[1]	Germany.[1]	Austria.[1]	Hungary proper.[1]	France.[2]	United Kingdom.[2]
Average:	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1890–1899	23.4	13.3	29.4	21.1	....	22.6	39.8
1900–1909	25.5	14.3	35.3	26.3	23.4	23.6	35.0
1910–1914	24.6	15.7	38.0	29.1	25.0	24.6	34.4
1906	28.3	13.0	35.2	26.1	26.8	20.8	36.1
1907	23.8	14.2	38.2	27.3	23.1	24.4	36.8
1908	25.1	14.2	34.9	25.2	21.3	22.6	34.9
1909	22.5	17.9	39.5	28.4	25.1	25.4	38.9
1910	22.5	16.3	34.4	24.9	19.7	23.5	34.3
1911	21.0	14.4	37.0	27.5	26.9	25.0	31.0
1912	29.7	16.2	40.7	29.7	26.9	26.1	33.1
1913	23.8	18.5	41.3	29.7	27.6	24.5	35.1
1914	25.8	12.9	36.8	[3] 33.8	24.1	24.0	35.6
1915	32.0	[4] 14.7	28.4	[3] 18.8	19.7	19.7	31.8
1916	23.6	....	....	....	....	23.8	33.0
Average (1907–1916)	25.0	....	....	....	....	23.9	34.8

[1] Bushels of 48 pounds.
[2] Winchester bushels.
[3] Galicia and Bukowina not included.
[4] Poland not included.

BARLEY—Continued.

TABLE 40.—*Barley: Acreage, production, value, exports, etc., in the United States, 1849–1917.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, low malting to fancy.[1] December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, fiscal year beginning July 1.	Imports, fiscal year beginning July 1.
	Acres.	*Bush.*	*Bushels.*	*Cents.*	*Dollars.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Bushels.*	*Bushels.*
1849			*5,167,000*								
1859			*15,826,000*								
1866	493,000	22.9	11,284,000	70.2	7,916,000	59	70	85	100		3,247,250
1867	1,131,000	22.7	25,727,000	70.1	18,028,000	150	180	227	250	9,810	3,783,966
1868	937,000	24.4	22,896,000	109.0	24,948,000	140	170	149	175	59,077	5,069,880
1869	1,026,000	27.9	28,652,000	70.8	20,298,000	74	85	50	62	255,490	6,727,597
1869			*29,761,000*								
1870	1,109,000	23.7	26,295,000	79.1	0,792,000	68	80	72	95	340,093	4,866,700
1871	1,114,000	24.0	26,718,000	75.8	20,261,000	55½	64	55	71	86,891	5,565,591
1872	1,397,000	19.2	26,846,000	68.6	18,416,000	60	70	71	85	482,410	4,244,751
1873	1,387,000	23.1	32,044,000	86.7	27,794,000	132	158	130	155	320,399	4,891,189
1874	1,581,000	20.6	32,552,000	86.0	27,998,000	120	129½	115	137	91,118	6,255,063
1875	1,790,000	20.6	36,909,000	74.1	27,368,000	81	88	62½	72½	317,781	10,285,957
1876	1,767,000	21.9	38,710,000	63.0	24,403,000	63¾	68½	80	85	1,186,129	6,702,965
1877	1,669,000	21.4	35,638,000	62.5	22,287,000	56¼	64	46½	52½	3,921,501	6,764,228
1878	1,790,000	23.6	42,246,000	57.9	24,454,000	91	100	64	73	715,536	5,720,979
1879	1,681,000	24.0	40,283,000	58.9	23,714,000	86	92	75	80	1,128,923	7,135,258
1879	*1,998,000*	*22.0*	*43,997,000*								
1880	1,843,000	24.5	45,165,000	66.6	30,091,000	100	120	95	105	885,246	9,528,616
1881	1,968,000	20.9	41,161,000	82.3	33,863,000	101	107	100	100	205,930	12,182,722
1882	2,272,000	21.5	48,954,000	62.9	30,768,000	79	82	80	80	433,005	10,050,687
1883	2,379,000	21.1	50,136,000	58.7	29,420,000	62	67	65	74	724,955	8,596,122
1884	2,609,000	23.5	61,203,000	48.7	29,779,000	53	58	65	65	629,130	9,986,507
1885	2,729,000	21.4	58,360,000	56.3	32,868,000	62	65	58	60	252,183	10,197,115
1886	2,653,000	22.4	59,428,000	53.6	31,841,000	51	54	57	57	1,305,300	10,355,594
1887	2,902,000	19.6	56,812,000	51.9	29,464,000	80	80	69	77	550,884	10,831,461
1888	2,996,000	21.3	63,884,000	59.0	37,672,000					1,440,321	11,368,414
1889	3,221,000	24.3	78,333,000	41.6	32,614,000	58	58			1,408,311	11,332,545
1889	*3,221,000*	*24.3*	*78,333,000*								
1890	3,135,000	21.4	67,168,000	62.7	42,141,000					973,062	5,078,733
1891	3,353,000	25.9	86,839,000	52.4	45,470,000					2,800,075	3,146,328
1892	3,400,000	23.6	80,097,000	47.5	38,026,000	65	67	65	65	3,035,267	1,970,129
1893	3,220,000	21.7	69,869,000	41.1	28,729,000	52	54	55	60	5,219,405	791,061
1894	3,171,000	19.4	61,400,000	44.2	27,134,000	53½	55½	51	52	1,563,754	2,116,816
1895	3,300,000	26.4	87,073,000	33.7	29,312,000	33	40	25	36	7,680,331	837,384
1896	2,951,000	23.6	69,695,000	32.3	22,491,000	22	37	24½	35	20,030,301	1,271,787
1897	2,719,000	24.5	66,685,000	37.7	25,142,000	25½	42	36	53	11,237,077	124,804
1898	2,583,000	21.6	55,792,000	41.3	23,064,000	40	50½	36	42	2,267,403	110,475
1899	2,878,000	25.5	73,382,000	40.3	29,594,000	35	45	36	44	23,661,662	189,757
1899	*4,470,000*	*26.8*	*119,635,000*								
1900	2,894,000	20.4	58,926,000	40.9	24,075,000	37	61	37	57	6,293,207	171,004
1901	4,296,000	25.6	109,933,000	45.2	49,705,000	56	63	64	72	8,714,268	57,406
1902	4,661,000	29.0	134,954,000	45.9	61,899,000	36	70	48	56	8,429,141	56,462
1903	4,993,000	26.4	131,861,000	45.6	60,166,000	42	61½	38	59	10,881,627	90,708
1904	5,146,000	27.2	139,749,000	42.0	58,652,000	38	52	40	50	10,661,655	81,020
1905	5,096,000	26.8	136,551,000	40.5	54,993,000	37	53	42	55½	17,729,360	18,049
1906	6,324,000	28.3	178,916,000	41.5	74,236,000	44	56	66	85	8,238,842	38,319
1907	6,448,000	23.8	153,597,000	66.6	102,290,000	78	102	60	75	4,349,078	199,741
1908	6,646,000	25.1	166,756,000	55.4	92,442,000	57	64½	66	75	6,580,393	2,644
1909	7,011,000	24.3	170,284,000								
1909	*7,699,000*	*22.5*	*173,344,000*	54.0	93,539,000	55	72	50	68	4,311,566	
1910[2]	7,743,000	22.5	173,832,000	57.8	100,426,000	72	90	75	115	9,399,346	
1911	7,627,000	21.0	160,240,000	86.9	139,182,000	102	130	68	132	1,585,242	
1912	7,530,000	29.7	223,824,000	50.5	112,957,000	43	77	45	68	17,536,703	
1913	7,499,000	23.8	178,189,000	53.7	95,731,000	50	79	51	66	6,644,747	
1914	7,565,000	25.8	194,953,000	54.3	105,903,000	60	75	74½	82	26,754,522	
1915	7,148,000	32.0	228,851,000	51.6	118,172,000	62	77	70	83	27,473,160	
1916	7,757,000	23.5	182,309,000	88.1	160,646,000	95	125	128	165	16,381,077	
1917	8,835,000	23.7	208,975,000	113.7	237,539,000	125	163				

[1] Prices 1895 to 1908 for No. 3 grade.

[2] Figures adjusted to census basis.

BARLEY—Continued.

TABLE 41.—*Barley: Acreage, production, and total farm value, by States, 1917.*

[000 omitted.]

State.	Acreage.	Production.	Farm value Dec. 1.	State.	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Dollars.*		*Acres.*	*Bushels.*	*Dollars.*
Maine	7	147	191	Kansas	750	7,500	8,625
New Hampshire	1	31	54	Kentucky	5	140	161
Vermont	17	493	690	Tennessee	6	120	173
New York	110	3,080	4,004	Texas	9	180	247
Pennsylvania	13	364	510	Oklahoma	9	162	240
Maryland	6	156	203	Montana	90	1,350	1,390
Virginia	12	360	500	Wyoming	27	783	1,018
Ohio	40	1,320	1,558	Colorado	168	5,544	5,766
Indiana	22	671	698	New Mexico	13	364	506
Illinois	66	2,475	2,995	Arizona	33	1,155	1,732
Michigan	130	3,445	4,100	Utah	33	1,221	1,465
Wisconsin	600	19,200	23,808	Nevada	12	420	500
Minnesota	1,400	37,800	41,958	Idaho	190	5,510	5,786
Iowa	300	10,500	12,285	Washington	170	4,930	5,670
				Oregon	182	5,278	6,070
Missouri	6	150	141	California	1,350	39,150	46,980
North Dakota	1,825	22,812	22,812				
South Dakota	1,020	26,520	29,172	United States	8,835	208,975	237,529
Nebraska	213	5,644	5,531				

TABLE 42.—*Barley: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average, 1908–1917.	1913	1914	1915	1916	1917	5-year average, 1912–1916.	1917
Me.	27.3	28.0	28.5	31.0	28.0	26.2	28.0	30.0	26.5	26.0	21.0	87	80	81	75	104	130	22.76	27.30
N. H.	27.6	24.0	25.0	26.0	24.0	28.0	28.0	32.0	30.0	28.0	31.0	91	80	82	79	90	175	24.21	54.25
Vt.	31.8	33.0	30.0	31.0	30.5	35.0	32.0	34.5	35.0	27.5	29.0	85	80	75	75	100	140	26.65	40.60
N. Y.	26.8	26.0	24.8	28.3	25.0	26.0	26.7	28.0	32.0	23.3	28.0	82	69	71	75	101	130	20.70	36.40
Pa.	26.3	26.0	21.8	26.5	25.0	27.5	26.0	28.0	29.5	25.0	28.0	76	71	70	75	75	140	19.53	36.20
Md.	29.7	30.0	32.0	31.0	23.0	27.0	29.0	33.0	34.0	32.0	26.0	72	64	66	70	73	130	21.17	33.80
Va.	27.2	28.0	28.5	29.3	23.0	25.0	26.0	26.0	29.0	27.5	30.0	80	70	80	75	85	139	20.58	41.70
Ohio.	28.1	27.5	25.9	28.5	27.2	31.0	24.0	25.0	31.0	27.8	33.0	69	58	59	54	80	118	16.94	38.94
Ind.	26.5	23.0	23.5	27.0	26.5	29.5	25.0	25.0	28.0	27.0	30.5	68	50	67	65	75	104	17.08	31.72
Ill.	30.5	28.5	28.0	30.2	8.0	31.5	26.0	29.5	34.0	32.0	37.5	72	57	61	57	103	121	20.37	45.38
Mich.	25.8	25.5	24.7	26.0	24.0	26.0	24.8	26.0	29.5	24.5	26.5	73	60	65	62	91	119	17.85	31.54
Wis.	28.9	30.0	28.0	25.9	25.5	29.4	25.0	27.3	35.5	30.0	32.0	74	60	62	56	105	124	19.90	39.68
Minn.	24.0	25.0	23.6	21.0	19.0	28.2	24.0	23.3	30.5	19.0	27.0	64	48	53	49	87	111	13.35	29.97
Iowa.	27.8	27.0	22.0	29.5	21.9	31.0	25.0	26.0	31.0	29.5	35.0	66	55	55	49	91	117	17.24	40.95
Mo.	23.6	23.0	25.0	27.0	20.0	24.8	22.0	24.0	25.0	20.0	25.0	71	60	65	63	93	94	15.90	23.50
N. Dak.	19.5	19.5	21.0	5.5	19.5	29.9	20.0	19.5	32.0	15.5	12.5	57	40	45	44	80	100	10.74	12.50
S. Dak.	21.7	26.5	19.5	18.2	5.4	26.0	17.5	23.0	32.0	22.7	26.0	61	46	50	46	83	110	12.81	28.60
Nebr.	22.2	23.5	22.0	18.5	11.0	22.0	16.0	23.5	31.0	28.0	26.5	55	49	47	42	75	98	12.43	25.24
Kans.	17.2	16.0	18.0	18.0	6.5	23.5	8.1	24.5	31.0	16.0	10.0	59	55	47	42	77	115	10.14	11.50
Ky.	26.7	25.0	24.0	24.0	28.7	26.0	26.6	28.5	30.0	26.0	28.0	80	78	77	77	90	115	21.74	32.28
Tenn.	24.6	25.0	24.0	23.0	28.0	26.0	25.0	27.0	24.0	23.7	20.0	87	70	82	75	100	144	20.43	28.80
Tex.	23.5	24.0	19.4	30.0	18.0	29.3	24.0	25.0	28.0	17.0	20.0	88	81	70	68	80	137	18.49	27.40
Okla.	19.7	23.0	23.0	30.0	10.0	20.0	9.0	25.0	26.5	12.5	18.0	72	80	53	50	100	148	11.24	26.64
Mont.	31.0	35.0	38.0	28.0	34.5	36.5	31.0	30.5	34.0	28.0	15.0	64	48	53	48	76	103	17.60	15.45
Wyo.	32.6	35.0	31.0	30.0	34.0	34.0	30.5	33.0	36.0	33.0	29.0	74	61	64	55	87	130	21.86	37.70
Colo.	34.1	33.0	36.0	32.0	29.0	39.0	32.5	38.5	36.0	32.0	33.0	66	56	55	48	82	104	20.48	34.32
N. Mex.	32.2	42.0	40.0	25.0	33.0	35.0	24.0	34.0	33.0	28.0	28.0	86	72	75	70	100	139	23.75	38.92
Ariz.	37.2	38.0	40.0	36.0	36.5	40.0	39.0	36.0	37.0	35.0	35.0	88	73	60	56	108	150	28.68	52.50
Utah.	40.8	45.0	40.0	36.0	43.0	45.0	38.5	45.0	42.5	36.0	37.0	66	55	50	52	76	120	23.94	44.40
Nev.	40.1	30.0	38.0	40.0	40.0	41.0	41.0	47.0	48.0	41.0	35.0	83	90	65	70	95	119	35.13	41.65
Idaho.	38.8	41.0	40.0	33.0	42.0	43.5	42.0	38.0	40.5	39.0	29.0	62	48	50	52	82	105	22.88	30.45
Wash.	37.0	30.5	39.5	29.0	37.0	43.0	40.5	39.0	41.5	41.3	29.0	66	52	52	56	84	115	24.41	33.35
Oreg.	33.0	29.0	31.5	31.5	34.0	36.0	35.0	30.0	36.0	38.5	29.0	68	55	61	62	80	115	22.09	33.35
Cal.	28.1	23.5	26.5	31.0	28.0	30.0	26.0	30.0	29.0	28.0	29.0	76	68	59	62	95	120	20.19	34.80
U. S.	25.1	25.1	24.3	22.5	21.0	29.7	23.8	25.8	32.0	23.5	23.7	66.7	53.7	54.3	51.6	88.1	113.7	15.80	26.89

[1] Based upon farm price Dec. 1.

BARLEY—Continued.

TABLE 43.—*Barley: Condition of crop, United States, on first of months named, 1896–1917.*

Year.	June.	July.	August.	When harvested.	Year.	June.	July.	August.	When harvested.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1896	98.0	88.1	82.9	83.1	1907	84.9	84.4	84.5	78.5
1897	87.4	88.5	87.5	86.4	1908	89.7	86.2	83.1	81.2
1898	78.8	85.7	79.3	79.2	1909	90.6	90.2	85.4	80.5
1899	91.4	92.0	93.6	86.7	1910	89.6	73.7	70.0	69.8
1900	86.2	76.3	71.6	70.7	1911	90.2	72.1	66.2	65.5
1901	91.0	91.3	86.9	83.8	1912	91.1	88.3	89.1	88.9
1902	93.6	93.7	90.2	89.7	1913	87.1	76.6	74.9	73.4
1903	91.5	86.8	83.4	82.1	1914	95.5	92.6	85.3	82.4
1904	90.5	88.5	88.1	87.4	1915	94.6	94.1	93.8	94.2
1905	93.7	91.5	89.5	87.8	1916	86.3	87.9	80.0	74.6
1906	93.5	92.5	90.3	89.4	1917	89.3	85.4	77.9	76.3

TABLE 44.—*Barley: Farm price per bushel on first of each month, by geographical divisions, 1916 and 1917.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	87.1	54.9	102.7	75.4	65.0	74.0	98.5	60.7	78.8	50.5	81.7	61.4	93.7	59.6
February	92.7	61.7	109.8	74.9	75.0	72.0	102.1	67.3	87.8	60.5	89.1	59.4	95.3	61.7
March	96.9	59.6	106.2	78.6	90.0	76.0	106.8	67.5	91.0	53.0	108.0	64.4	100.8	67.8
April	102.3	57.2	114.2	79.2	90.0	72.0	112.9	64.9	99.7	53.0	101.0	63.2	101.5	60.6
May	120.1	59.6	147.8	79.6	......	74.0	125.5	65.4	118.0	55.9	133.3	63.8	119.9	62.9
June	119.3	59.6	159.0	81.5	101.0	73.3	138.8	66.6	107.0	56.0	124.2	59.4	127.4	62.2
July	106.6	59.3	153.8	80.8	93.0	74.0	125.2	67.1	99.3	56.0	124.3	55.5	107.6	61.3
August	114.5	59.3	148.4	74.6	110.0	85.0	128.4	66.9	114.8	55.3	135.1	57.4	107.2	63.0
September	110.0	72.9	139.7	82.0	100.0	60.0	121.1	89.9	100.7	70.8	134.0	64.8	117.1	69.4
October	113.9	76.5	134.8	93.4	107.0	80.0	125.0	90.7	110.2	72.8	138.6	99.6	113.6	77.0
November	111.3	83.2	131.5	94.0	100.0	70.0	123.2	98.6	106.5	80.4	154.1	78.1	112.2	81.7
December	113.7	88.1	132.4	98.3	136.2	80.5	122.3	102.0	108.7	83.4	136.4	92.7	117.0	89.1
Average	108.1	71.6	130.2	86.0	101.1	73.4	118.4	83.0	103.0	70.0	128.4	72.1	110.7	72.5

TABLE 45.—*Barley: Wholesale price per bushel, 1912–1917.*

Date.	Cincinnati.		Chicago.		Milwaukee.		Minneapolis.		San Francisco.	
	Spring malt.		Low malting to fancy.		No. 3.		All grades.		Feed (per 100 lbs.).	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Jan.–June	110	132	60	140	95	138	50	130	152½	195
July–Dec	55	78	40	110	64	110	34	95	115	152½
1913.										
Jan.–June	54½	70	42	71	60	73	39	63	130	150
July–Dec	57	80	43	85	60	82	42	73	122½	140
1914.										
Jan.–June	60	70	49	79	53	68	41	65	90	132½
July–Dec	70	80	50	82	51½	82	40	76	95	130
1915.										
Jan.–June	72	102	66	91	70½	93	58	86	100	162½
July–Dec	70	102	51	85	54	81	42	78	100	132½

BARLEY—Continued.

TABLE 45.—*Barley: Wholesale price per bushel, 1912–1917*—Continued.

Date.	Cincinnati.		Chicago.		Milwaukee.		Minneapolis.		San Francisco.	
	Spring malt.		Low malting to fancy.		No. 3.		All grades.		Feed (per 100 lbs.).	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1916.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
January	83	88	68	84	71	82	61	76½	127½	132½
February	89	98	64	83	68	79½	59	75½	130	135
March	83	98	64	78	70½	77	59	72½	130	135
April	89	98	64	83	68	79½	59	75½	130	135
May	91	102	70	83	74½	80	60	75½	130	136¼
June	93	102	70	86	73	78	60	73½	127½	132½
Jan.-June	83	102	64	86	68	82	59	76½	127½	136¼
July	93	102	68	80	70	80	57	74½	127½	145
August	93	136	68	115	75	113	57	108	140	170
September	123	136	84	117	97	115	63	101	165	170
October	123	132	85	123	105	123	60	106	167½	202½
November	136	145	98	128	112	128	72	112	200	225
December	136	145	95	125	112	124	70	110	215	225
July-Dec.	93	145	68	128	70	128	57	112	127½	225
1917.										
January	135	155	102	134	120½	129	85	122	215	227½
February	140	155	108	130	122	129	85	117	215	227½
March	140	162	108	136	127	137	92	129	215	227½
April	153	170	116	162	138	162½	102	155	225	305
May	167	182	128	165	153	166	99	155	230	240
June	153	170	116	162	138	162½	102	155	225	305
Jan.-June	135	182	102	165	120½	166	85	155	215	305
July	175	182	120	160	152	162	95	160	205	230
August	175	185	112	150	120	152	93	150	227½	257½
September	158	171	116	146	124	144	98	149	230	250
October	153	171	120	144	127	141½	88	138	240	250
November	147	160	115	141	123	140	95	137	240	252½
December	150	176	125	163	136	160	111	160	250	285
July-Dec.	147	185	112	163	120	162	88	160	205	285

TABLE 46.—*Barley and malt: International trade, calendar years 1911–1916.*

[See "General note," Table 10.]

EXPORTS.

[000 omitted.]

Country.	Barley.			Malt.			Barley and malt in terms of barley.		
	Average 1911–1913	1915 (prelim.)	1916 (prelim.)	Average 1911–1913	1915 (prelim.)	1916 (prelim.)	Average 1911–1913	1915 (prelim.)	1916 (prelim.)
FROM—	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Algeria	4,720	1,690	....	....	....	....	4,720	1,690	....
Argentina	917	3,440	3,104	....	....	....	917	3,440	3,104
Austria-Hungary	7,529	....	....	11,816	....	....	18,271	....	....
Belgium	3,629	....	....	246	....	....	3,853	....	....
British India	17,129	7,441	....	....	....	....	17,129	7,441	....
Bulgaria	1,700	....	....	....	....	....	1,700	....	....
Canada	6,656	4,665	9,906	15	12	81	6,670	4,676	9,980
Chile	608	1,287	....	25	298	....	631	1,558	....
China	660	101	45	....	....	....	660	191	45
Denmark	3,473	3	....	97	....	....	3,561	3	....
France	609	536	135	33	701	545	639	1,173	630
Germany	139	....	....	1,194	....	....	1,225	....	....
Netherlands	28,995	141	....	678	11	....	29,611	151	....
Roumania	16,690	....	....	3	....	....	16,692	....	....
Russia	168,289	[illegible]	123	189	343	401	168,461	643	488
United Kingdom	107	79	6	908	3,982	1,745	932	3,699	1,593
United States	8,177	26,491	22,486	244	2,253	5,103	8,400	28,539	27,125
Other countries	15,560	2,124	....	10	1	....	15,569	2,125	....
Total	285,587	48,419	....	15,458	7,601	....	299,641	55,329	....

BARLEY—Continued.

TABLE 46.—*Barley and malt: International trade, calendar years 1911–1916*—Continued.

IMPORTS.

Country.	Barley.			Malt.			Barley and malt in terms of barley.		
	Average 1911–1913	1915 (prelim.)	1916 (prelim.)	Average 1911–1913	1915 (prelim.)	1916 (prelim.)	Average 1911–1913	1915 (prelim.)	1916 (prelim.)
INTO—	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Argentina	3	1	1	1,437	720	1,085	1,310	656	988
Austria-Hungary	838	....	....	1	....	....	839	....	....
Belgium	19,546	....	....	759	....	....	20,236	....	....
Brazil	1	7	2	1,074	944	718	978	865	655
British South Africa	2	5	....	383	232	287	351	216	261
Canada	33	39	2	147	43	9	166	78	10
Cuba	278	343	....	....	....	....	278	343	....
Denmark	2,041	4,414	....	62	....	....	2,098	4,414	....
Egypt	690	365	70	218	95	169	889	451	224
France	6,993	4,242	10,200	178	145	227	7,155	4,374	10,406
Finland	311	241	199	237	354	404	526	563	566
Germany	150,706	....	....	3,122	....	....	153,544	....	....
Italy	815	201	38	....	474	522	815	632	513
Netherlands	37,616	5,083	5,846	3,893	1,635	....	41,184	6,569	5,846
Norway	4,218	1,133	2,291	126	259	192	4,333	1,368	2,465
Russia	940	271	1	37	....	....	974	271	1
Switzerland	1,143	1,057	1,172	3,626	1,743	1,207	4,440	2,642	2,268
United Kingdom	51,636	27,969	36,909	100	7	54	51,727	27,975	36,957
Other countries	1,751	688	....	556	515	....	2,253	1,157	....
Total	279,591	46,059	....	15,956	7,166	....	294,096	52,574	....

RYE.

TABLE 47.—*Rye: Area and production in undermentioned countries, 1915–1917.*

Country.	Area.			Production.		
	1915	1916	1917	1915	1916	1917
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	3,129,000	3,213,000	4,102,000	54,050,000	48,862,000	60,145,000
Canada:						
Quebec	9,000	8,000	....	145,000	118,000	....
Ontario	78,000	69,000	....	1,551,000	1,208,000	....
Manitoba	6,000	30,000	....	155,000	557,000	....
Saskatchewan	3,000	23,000	....	76,000	548,000	....
Alberta	17,000	18,000	....	463,000	440,000	....
Other	(1)	(1)	....	4,000	5,000	....
Total Canada	112,000	148,000	....	2,394,000	2,876,000	....
Mexico	(2)	(2)	(2)	70,000	70,000	70,000
Total	....	....	....	56,514,000	51,808,000	....
SOUTH AMERICA.						
Argentina	229,000	212,000	180,000	1,811,000	2,008,000	858,000
Chile	4,000	11,000	(2)	185,000	187,000	....
Uruguay	(1)	(1)	(1)	1,000	1,000	1,000
Total	....	....	....	1,997,000	2,196,000	....
EUROPE.						
Austria-Hungary:						
Austria	[3] 3,120,000	(2)	(2)	[3] 51,211,000	(2)	(2)
Hungary	2,625,000	(2)	(2)	45,975,000	(2)	(2)
Croatia-Slavonia	(2)	(2)	(2)	2,500,000	(2)	(2)
Bosnia-Herzegovina	(2)	(2)	(2)	600,000	(2)	(2)
Total Austria-Hungary	....	....	....	100,286,000	....	....

[1] Less than 500 acres. [2] No official statistics. [3] Galicia and Bukowina not included.

RYE—Continued.

TABLE 47.—*Rye: Area and production in undermentioned countries, 1915-1917*—Contd.

Country.	Area.			Production.		
	1915	1916	1917	1915	1916	1917
EUROPE—continued.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
Belgium	[1] 645,000	(2)	(2)	18,000,000	(2)	(2)
Bulgaria	[1] 527,000	(2)	(2)	7,622,000	8,490,000	....
Denmark	521,000	481,000	436,000	13,001,000	10,569,000	8,858,000
Finland	[3] 592,000	(2)	(2)	10,000,000	(2)	(2)
France [4]	2,309,000	2,149,000	2,002,000	33,148,000	33,351,000	27,509,000
Germany	15,843,000	(2)	(2)	360,310,000	(2)	(2)
Italy	294,000	290,000	279,000	4,362,000	5,582,000	4,460,000
Netherlands	546,000	499,000	463,000	13,726,000	12,391,000	11,958,000
Norway	48,000	48,000	48,000	829,000	943,000	656,000
Roumania	187,000	200,000	....	2,911,000	(2)	(2)
Russia:						
Russia proper [4]	59,766,000	55,637,000	....	875,422,000	843,740,000	....
Poland	(2)	(2)	(2)	(2)	(2)	(2)
Northern Caucasia	328,000	(2)	(2)	4,615,000	(2)	(2)
Total	60,094,000	....	....	880,037,000	....	....
Serbia	(2)	(2)	(2)	800,000	(2)	(2)
Spain	1,820,000	1,846,000	1,800,000	26,102,000	28,782,000	24,365,000
Sweden	965,000	913,000	813,000	23,133,000	22,929,000	15,747,000
United Kingdom	62,000	60,000	64,000	1,700,000	(2)	....
Total	....	....	....	1,495,967,000	....	....
ASIA.						
Russia:						
Central Asia (4 Governments of)	340,000	(3)	(2)	2,785,000	(2)	(2)
Siberia (4 Governments of)	2,452,000	(2)	(2)	20,143,000	(2)	(2)
Transcaucasia (1 Government of)	1,000	(2)	(2)	17,000	(2)	(2)
Total Russia (Asiatic)	2,793,000	....	....	22,945,000	....	....
AUSTRALASIA.						
Australia:						
Queensland	(5)	(5)	....	1,000	1,000	....
New South Wales	3,000	3,000	....	36,000	32,000	....
Victoria	2,000	3,000	....	13,000	43,000	....
South Australia	1,000	3,000	....	6,000	31,000	....
Western Australia	1,000	1,000	....	3,000	4,000	....
Tasmania	1,000	1,000	....	9,000	17,000	....
Total Australia	8,000	11,000	10,000	67,000	127,000	131,000
Grand total	....	....	....	1,577,490,000	....	....

[1] Data for 1914.
[2] No official statistics.
[3] Census of 1910.
[4] Excludes territory occupied by the enemy.
[5] Less than 500 acres.

TABLE 48.—*Rye: Total production of countries named in Table 47, 1895-1915.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1895	1,468,212,000	1901	1,416,022,000	1907	1,538,778,000	1913	1,880,387,000
1896	1,499,250,000	1902	1,647,845,000	1908	1,590,057,000	1914	1,596,882,000
1897	1,300,645,000	1903	1,659,961,000	1909	1,747,123,000	1915	1,577,490,000
1898	1,461,171,000	1904	1,742,112,000	1910	1,673,473,000		
1899	1,583,179,000	1905	1,495,751,000	1911	1,753,933,000		
1900	1,557,634,000	1906	1,433,395,000	1912	1,886,517,000		

RYE—Continued.

TABLE 49.—*Rye: Average yield per acre in undermentioned countries, 1890–1916.*

Year.	United States.	Russia (European).[1]	Germany.[1]	Austria.[1]	Hungary proper.[1]	France.[2]	Ireland.[1]
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Average:							
1890–1899	13.9	10.4	20.9	16.1	....	17.6	25.2
1900–1909	15.7	11.5	25.6	19.0	17.6	17.1	27.5
1910–1914	16.3	12.5	28.3	22.2	18.5	16.1	29.9
1906	16.7	8.8	25.1	19.9	19.8	16.3	27.6
1907	16.4	10.8	25.8	18.9	16.0	18.2	27.0
1908	16.4	11.0	28.0	22.0	17.5	16.8	29.2
1909	13.4	12.6	28.8	22.3	17.8	18.1	30.8
1910	16.0	12.3	27.1	21.3	18.9	14.7	30.3
1911	15.6	10.5	28.2	20.9	18.7	15.8	29.0
1912	16.8	14.3	29.5	23.3	19.4	16.5	30.6
1913	16.2	13.5	30.4	22.0	19.6	17.0	30.0
1914	16.8	12.1	26.4	[3] 23.7	16.1	16.6	29.4
1915	17.3	[4] 14.6	22.8	[3] 16.4	17.5	14.3	29.2
1916	15.3	....	....	....	....	15.4	29.0
Average (1907–1916)	16.0	....	....	....	....	16.3	29.5

[1] Bushels of 56 pounds.
[2] Winchester bushels.
[3] Galicia and Bukowina not included.
[4] Poland not included.

TABLE 50.—*Rye: Acreage, production, value, exports, etc., in the United States, 1849–1917.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage harvested.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, No. 2. December. Low.	Chicago cash price per bushel, No. 2. December. High.	Chicago cash price per bushel, No. 2. Following May. Low.	Chicago cash price per bushel, No. 2. Following May. High.	Domestic exports, including rye flour, fiscal year beginning July 1.
	Acres.	*Bush.*	*Bushels.*	*Cents.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels*
1849	....	......	*14,189,000*	......	....	.....	.....	.....	.....	....
1859	....	......	*21,101,000*	......	....	.....	.....	.....	.....	....
1866	1,548,000	13.5	20,865,000	82.2	17,150,000	.....	.....	142	150	234,971
1867	1,689,000	13.7	23,184,000	100.4	23,281,000	132	157	173	185	564,901
1868	1,651,000	13.6	22,505,000	94.9	21,349,000	106½	118	100	115½	92,869
1869	1,658,000	13.6	22,528,000	77.0	17,342,000	66	77½	78	83½	199,450
1869	....	......	*16,919,000*	......	....	.....	.....	.....	.....	....
1870	1,176,000	13.2	15,474,000	73.2	11,327,000	67	74	81	91	87,174
1871	1,070,000	14.4	15,366,000	71.1	10,928,000	62	63¾	75	93	832,689
1872	1,049,000	14.2	14,889,000	67.6	10,071,000	57½	70	68½	70	611,749
1873	1,150,000	13.2	15,142,000	70.3	10,638,000	70	81	91	102	1,923,404
1874	1,117,000	13.4	14,991,000	77.4	11,610,000	93	99½	103	107½	267,058
1875	1,360,000	13.0	17,722,000	67.1	11,894,000	67	68¾	61½	70½	589,159
1876	1,468,000	13.9	20,375,000	61.4	12,505,000	65½	73	70	92½	2,234,856
1877	1,413,000	15.0	21,170,000	57.6	12,202,000	55½	56½	54	60	4,249,684
1878	1,623,000	15.9	25,843,000	52.5	13,566,000	44	44½	47	52	4,877,821
1879	1,625,000	14.5	23,639,000	65.6	15,507,000	73½	81	73½	85	2,943,894
1879	*1,842,000*	*10.8*	*19,832,000*	......	....	.....	.....	.....	.....	....
1880	1,768,000	13.9	24,541,000	75.6	18,565,000	82	91½	115	118	1,955,155
1881	1,789,000	11.6	20,705,000	93.3	19,327,000	96½	98	77	83	1,003,609
1882	2,228,000	13.4	29,960,000	61.5	18,439,000	57	58½	62	67	2,206,212
1883	2,315,000	12.1	28,059,000	58.1	16,301,000	56½	60	60½	62½	6,247,590
1884	2,344,000	12.2	28,640,000	51.9	14,857,000	51	52	68	73	2,974,390
1885	2,129,000	10.2	21,756,000	57.9	12,595,000	58½	61	58	61	216,699
1886	2,130,000	11.5	24,489,000	53.8	13,181,000	53	54½	54½	56½	377,302
1887	2,053,000	10.1	20,693,000	54.5	11,283,000	55½	61½	63	68	94,827
1888	2,365,000	12.0	28,415,000	58.8	16,722,000	50	52	39	41½	309,266
1889	2,171,000	13.1	28,420,000	42.3	12,010,000	44	45½	49½	54	2,280,975
1889	*2,172,000*	*13.1*	*28,421,000*	......	....	.....	.....	.....	.....	....

RYE—Continued.

TABLE 50.—*Rye: Acreage, production, value, exports, etc., in the United States, 1849–1917*—Continued.

Year.	Acreage harvested.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, No. 2. December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, including rye flour, fiscal year beginning July 1.
	Acres.	*Bush.*	*Bushels.*	*Cents.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*
1890	2,142,000	12.0	25,807,000	62.9	16,230,000	64½	68½	83	92	358,263
1891	2,176,000	14.6	31,752,000	77.4	24,589,000	86	92	70¼	79	12,068,628
1892	2,164,000	12.9	27,979,000	54.2	15,160,000	46	51	50½	62	1,493,924
1893	2,038,000	13.0	26,555,000	51.3	13,612,000	45	47½	41½	48	219,152
1894	1,945,000	13.7	26,728,000	50.1	13,395,000	47½	49	62½	67	32,045
1895	1,890,000	14.4	27,210,000	44.0	11,965,000	32	35¾	33	36½	1,011,128
1896	1,831,000	13.3	24,369,000	40.9	9,961,000	37	42½	32¾	35½	8,575,663
1897	1,704,000	16.1	27,363,000	44.7	12,240,000	45¾	47	48	75	15,562,035
1898	1,643,000	15.6	25,658,000	46.3	11,875,000	52½	55½	56½	62	10,169,822
1899	1,659,000	14.4	23,962,000	51.0	12,214,000	49	52	53	56¼	2,382,012
1899	*2,054,000*	*12.4*	*25,569,000*	......	....	.....	.....	.....	.....	....
1900	1,591,000	15.1	23,996,000	51.2	12,295,000	45¾	49¾	51½	54	2,345,512
1901	1,988,000	15.3	30,345,000	55.7	16,910,000	59	65¾	54½	58	2,712,077
1902	1,979,000	17.0	33,631,000	50.8	17,081,000	48	49¾	48	50½	5,445,273
1903	1,907,000	15.4	29,363,000	54.5	15,994,000	50½	52½	69¾	78	781,068
1904	1,793,000	15.2	27,242,000	68.8	18,748,000	73	75	70	84	29,749
1905	1,730,000	16.5	28,486,000	61.1	17,414,000	64	68	58	62	1,387,826
1906	2,002,000	16.7	33,375,000	58.9	19,671,000	61	65	69	87½	769,717
1907	1,926,000	16.4	31,566,000	73.1	23,068,000	75	82	79	86	2,444,588
1908	1,948,000	16.4	31,851,000	73.6	23,455,000	75	77¼	83	90	1,295,701
1909	2,006,000	16.1	32,239,000	......	....	.....	.....	.....	.....	....
1909	*2,196,000*	*13.4*	*29,520,000*	71.8	21,163,000	72	80	74	80	242,262
1910[1]	2,185,000	16.0	34,897,000	71.5	24,953,000	80	82	90	113	40,123
1911	2,127,000	15.6	33,119,000	83.2	27,557,000	91	94	90	95½	31,384
1912	2,117,000	16.8	35,664,000	66.3	23,636,000	58	64	60	64	1,854,738
1913	2,557,000	16.2	41,381,000	63.4	26,220,000	61	65	62	67	2,272,492
1914	2,541,000	16.8	42,779,000	86.5	37,018,000	107½	112½	115	122	13,026,778
1915	3,129,000	17.3	54,050,000	83.4	45,083,000	94½	98½	96½	99½	15,250,151
1916	3,213,000	15.2	48,862,000	122.1	59,676,000	130	151	200	240	13,703,527
1917	4,102,000	14.7	60,145,000	166.3	100,025,000	176	184	.....	.....	....

[1] Figures adjusted to census basis.

TABLE 51.—*Rye: Acreage, production, and total farm value, by States, 1917.*

[000 omitted.]

State.	Acreage.	Production.	Farm value Dec. 1.	State.	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Dollars.*		*Acres.*	*Bushels.*	*Dollars.*
Vermont	1	20	35	Missouri	30	441	728
Massachusetts	3	57	114	North Dakota	1,040	9,880	16,203
Connecticut	7	144	302	South Dakota	350	5,600	8,680
New York	135	2,565	4,720	Nebraska	215	3,354	5,199
New Jersey	69	1,276	2,233	Kansas	76	1,140	1,904
Pennsylvania	260	4,420	7,514	Kentucky	30	375	656
Delaware	1	16	28	Tennessee	12	120	234
Maryland	24	384	645	Alabama	4	38	102
Virginia	77	1,155	2,021	Texas	2	20	39
West Virginia	20	270	456	Oklahoma	9	90	153
North Carolina	52	520	1,040	Arkansas	2	27	40
South Carolina	17	170	484	Montana	9	114	188
Georgia	15	128	346	Wyoming	18	252	391
Ohio	90	1,620	2,608	Colorado	27	432	631
Indiana	200	3,000	4,800				
				Utah	13	104	166
Illinois	43	752	1,241	Idaho	2	31	42
Michigan	341	5,115	8,440	Washington	7	89	156
Wisconsin	410	7,585	12,819	Oregon	31	356	605
Minnesota	410	7,585	12,667				
Iowa	50	900	1,395	United States	4,102	60,145	100,025

RYE—Continued.

TABLE 52.—*Rye: Condition of crop, United States, on first of months named, 1891–1918.*

Year.	December of previous year.	April.	May.	June.	When harvested.	Year.	December of previous year.	April.	May.	June.	When harvested.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1891	99.0	95.4	97.2	95.4	93.9	1905	90.5	92.1	93.5	94.0	93.2
1892	88.8	87.0	88.9	91.0	92.8	1906	95.4	96.9	92.9	89.9	91.3
1893	89.4	85.7	82.7	84.6	85.3	1907	96.2	92.0	88.0	88.1	89.7
1894	94.6	94.4	90.7	93.2	87.0	1908	91.4	89.1	90.3	91.3	91.2
1895	96.2	87.0	88.7	85.7	80.7	1909	87.6	87.2	88.1	89.6	91.4
1896	94.9	82.9	87.7	85.2	88.4	1910	91.1	92.3	91.3	90.6	87.5
1897	99.8	88.9	88.0	89.9	93.4	1911	92.6	89.3	96.0	88.6	85.0
1898	91.0	92.1	94.5	97.1	94.6	1912	93.3	87.9	87.5	87.7	88.2
1899	98.9	84.9	85.2	84.5	85.6	1913	93.5	89.3	91.0	90.9	88.6
1900	98.2	84.8	88.5	87.6	80.4	1914	95.3	91.3	93.4	93.6	92.9
1901	99.1	93.1	94.6	93.9	93.0	1915	93.6	89.5	93.3	92.0	92.0
1902	89.9	85.4	83.4	88.1	90.2	1916	91.5	87.8	88.7	86.9	87.0
1903	95.1	97.9	93.3	90.6	89.5	1917	88.8	86.0	88.8	84.3	79.4
1904	92.7	82.3	81.2	86.3	88.9	1918	84.1	......	......	......	....

TABLE 53.—*Rye: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average, 1908–1917.	1913	1914	1915	1916	1917	5-year average, 1912–1916.	1917
Vt.	18.6	15.0	15.5	17.5	22.5	20.0	18.0	20.0	17.0	20.0	20.0	101	90	80	85	120	175	17.73	35.00
Mass.	17.9	16.5	16.2	17.0	16.0	18.5	18.5	19.0	20.0	18.5	19.0	112	98	101	102	127	200	19.94	38.00
Conn.	19.3	18.5	18.7	20.0	18.5	17.5	19.3	19.0	21.5	19.6	20.5	108	92	98	102	125	210	19.78	43.05
N. Y.	17.6	16.5	17.0	18.3	16.7	16.5	17.2	17.7	18.7	18.0	19.0	97	75	89	93	128	184	16.32	34.96
N. J.	17.8	16.2	16.3	18.0	16.4	17.5	18.0	18.5	20.0	19.0	18.5	94	80	82	92	117	175	16.80	32.38
Pa.	16.9	16.5	15.3	17.0	15.1	17.5	17.5	18.0	18.0	17.0	17.0	91	74	83	84	109	170	15.00	28.90
Del.	15.2	15.5	14.0	15.5	15.0	14.0	14.0	17.5	15.5	15.0	16.0	97	79	92	99	123	178	14.46	28.48
Md.	15.5	15.0	14.1	16.1	14.5	15.5	14.4	17.0	16.5	15.5	16.0	92	76	86	88	110	168	13.91	26.88
Va.	13.0	12.5	12.3	13.5	11.5	12.5	12.3	13.0	14.5	12.5	15.0	97	81	90	93	107	175	11.83	26.25
W. Va.	13.5	13.0	13.5	12.9	11.0	13.0	13.5	14.5	14.0	16.0	13.5	100	87	90	93	119	169	13.55	22.82
N. C.	9.9	8.9	9.4	10.0	10.0	9.3	10.3	10.0	11.5	9.7	10.0	114	98	105	105	130	200	11.01	20.00
S. C.	10.1	9.6	9.8	10.0	10.0	9.5	10.5	11.5	10.0	9.8	10.0	164	150	150	151	185	285	16.00	28.50
Ga.	9.3	8.7	9.0	10.4	9.5	9.2	9.5	9.3	9.2	9.5	8.5	155	135	150	140	160	270	13.55	22.95
Ohio.	16.5	16.5	17.2	16.5	15.5	15.5	16.5	17.0	17.5	14.5	18.0	90	69	81	83	120	161	13.74	28.98
Ind.	15.2	15.0	16.5	15.8	13.7	14.5	15.2	16.3	16.0	14.0	15.0	87	62	85	82	119	160	12.58	24.00
Ill.	16.9	17.1	17.8	17.4	16.8	16.0	16.5	16.0	18.5	15.5	17.5	89	65	85	83	122	165	13.96	28.88
Mich.	14.9	15.5	15.5	15.3	14.6	13.3	14.3	16.0	15.5	14.3	15.0	89	62	91	85	130	165	12.77	24.75
Wis.	17.4	19.0	16.3	16.0	17.0	18.3	17.5	16.5	18.5	16.2	18.5	89	57	91	87	132	169	14.73	31.26
Minn.	18.7	18.5	19.0	17.0	18.7	23.0	19.0	18.8	19.5	15.0	18.5	83	48	89	81	127	167	14.44	30.90
Iowa.	18.4	20.0	17.8	18.5	18.0	19.0	18.2	19.0	18.5	17.0	18.0	82	60	77	80	115	155	14.34	27.90
Mo.	14.0	12.8	15.0	15.0	14.1	14.8	15.0	14.0	13.5	11.0	14.7	93	75	87	86	123	165	12.08	24.26
N. Dak.	14.9	18.0	18.4	8.5	16.6	18.0	14.4	17.1	15.0	13.3	9.5	80	45	84	79	125	164	11.55	15.58
S. Dak.	16.5	17.5	17.5	17.0	10.0	19.5	13.2	17.0	19.5	18.0	16.0	78	50	78	76	118	155	13.21	24.80
Nebr.	15.7	16.0	16.5	16.0	13.0	16.0	14.5	16.0	17.5	16.0	15.6	79	60	74	73	116	155	12.17	24.18
Kans.	14.8	13.3	14.2	14.0	11.0	15.9	14.0	20.0	16.0	14.5	15.0	88	75	80	76	110	167	13.08	25.05
Ky.	12.6	13.5	12.7	13.0	12.0	13.0	12.4	13.7	12.0	11.2	12.5	102	87	95	94	129	175	12.20	21.88
Tenn.	11.3	12.5	10.7	11.0	11.9	11.5	12.0	13.0	10.5	10.0	10.0	110	99	98	103	135	195	12.04	19.50
Ala.	11.1	16.6	11.3	12.0	10.0	11.5	11.0	13.0	10.0	13.0	9.5	147	140	110	135	175	268	16.27	25.46
Tex.	13.2	15.5	11.2	11.5	10.0	16.6	15.0	14.8	17.0	10.0	10.0	116	101	99	103	120	196	15.51	19.60
Okla.	12.1	13.5	13.5	13.7	9.5	12.0	9.5	16.0	13.5	10.0	10.0	100	86	95	77	125	170	11.34	17.00
Ark.	10.9	10.0	10.5	12.0	10.0	10.5	11.5	10.5	10.5	10.0	13.5	106	95	105	100	115	150	10.99	20.25
Mont.	21.3	20.0	29.0	20.0	23.0	23.5	21.0	21.0	22.5	20.5	12.7	79	55	70	65	96	165	14.93	20.96
Wyo.	19.1	22.0	26.0	18.5	20.0	19.0	19.0	17.0	20.0	15.5	14.0	90	64	81	90	108	155	14.60	21.70
Colo.	16.5	15.5	22.0	14.0	12.0	19.5	17.0	17.5	17.5	14.0	16.0	78	60	65	70	105	146	11.85	23.36
Utah.	15.6	15.5	22.0	18.5	15.5	15.0	17.0	17.5	15.5	12.0	8.0	79	60	60	65	100	160	10.60	12.80
Idaho.	20.0	20.0	21.5	20.0	22.5	22.0	22.0	20.0	20.0	17.0	15.5	75	58	67	68	95	135	13.82	20.92
Wash.	18.9	19.5	21.0	20.5	22.0	20.0	21.0	19.7	18.2	14.5	12.7	92	60	85	75	111	175	14.42	22.22
Oreg.	16.6	18.0	17.0	15.1	19.5	16.0	17.5	16.0	18.0	17.0	11.5	100	75	100	90	115	170	15.21	19.55
U. S.	16.1	16.4	16.1	16.0	15.6	16.8	16.2	16.8	17.3	15.2	14.7	89.0	63.4	86.5	83.4	122.1	166.3	13.79	24.38

[1] Based upon farm price Dec. 1.

RYE—Continued.

TABLE 54.—*Rye: Farm price per bushel on first of each month, by geographical divisions, 1916 and 1917.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	118.5	85.3	117.4	88.8	116.0	90.9	123.1	86.5	116.1	81.4	125.8	97.2	111.1	77.8
February	123.5	88.3	123.1	92.7	115.2	92.6	129.2	89.8	121.5	84.6	129.5	89.8	105.1	78.9
March	126.0	85.6	125.7	88.2	121.3	96.8	128.8	86.8	125.6	81.2	142.2	91.7	106.2	80.7
April	135.6	83.6	132.9	90.4	126.2	96.0	136.8	84.6	137.8	76.7	138.5	92.3	125.2	81.7
May	164.1	83.7	163.8	88.7	154.7	93.7	165.6	84.4	164.9	78.8	169.7	92.2	152.0	78.3
June	183.0	83.8	190.6	90.2	165.3	91.8	181.2	84.9	186.1	78.1	160.2	91.3	153.2	73.6
July	177.1	83.3	183.1	89.4	159.0	87.9	180.6	83.3	175.7	79.4	159.0	84.0	159.5	81.8
August	178.1	83.4	181.4	88.6	176.7	90.5	182.3	84.6	175.1	77.9	187.7	96.3	153.6	80.0
September	161.9	99.7	177.3	96.9	174.3	95.7	157.6	102.0	155.7	100.1	190.8	109.3	168.0	90.2
October	169.8	104.1	175.2	99.6	185.7	103.2	169.7	108.9	164.6	102.0	204.8	119.5	167.6	91.8
November	168.8	115.3	179.9	115.8	177.9	103.7	167.8	117.3	163.3	114.8	198.3	129.5	159.1	105.9
December	166.3	122.1	175.9	115.9	189.9	120.3	165.5	127.8	161.9	121.6	182.7	133.0	158.1	107.8
Average	157.2	97.8	162.5	98.8	163.1	97.8	158.4	99.8	155.8	93.6	174.5	106.4	146.8	89.5

TABLE 55.—*Rye: Wholesale price per bushel, 1912–1917.*

Date.	Philadelphia.		Cincinnati.		Chicago.		Duluth.		San Francisco (per 100 lbs.)	
			No. 2.		No. 2.					
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
1912.										
January-June	82	105	78	100	75	96½	66	91½	147½	172½
July-December	68	85	62	81	58	76	53	70	140	172½
1913.										
January-June	65	70	60	70	58	65½	52	59	132½	147½
July-December	65	77	60	72	61	70½	50	65	135	165
1914.										
January-June	65	75	62	71	58	67	50	62	152½	165
July-December	65	125	60	115	55	112½	57	107	130	165
1915.										
January-June	105	130	107	133	111½	131	106	128	160	225
July-December	90	112	92	112	91	119	87	111	145	165
1916.										
January	106	112	99	104	97	104¾	93	98	155	160
February	110	115	90	106	90	103	87	97	150	160
March	115	118	90	100	90½	96	87	91	152½	160
April	105	110	98	104	94	98½	91	96	152½	155
May	95	105	92	101	96½	99½	91	95	152½	155
June	90	95	92	100	97	99½	91	95	152½	155
January-June.	90	118	90	106	90	104¾	87	98	150	160
July	90	100	96	105	94	101	89	95	152½	155
August	100	110	103	127½	100	126½	94	120	152½	180
September	110	125	123	128	115	125½	115	122	175	200
October	125	150	125	141	124	141	120	138	195	225
November	143	155	139	155	140	153	137	149	215	235
December	135	155	138	153	130	151	138	150	225	265
July-December	90	155	96	155	94	153	89	150	152½	265
1917.										
January	140	155	140	152	138	148½	136	144	250	265
February	140	158	146	154	140	152	134	147	240	265
March	153	175	153	164	152	170	147	165	240	250
April	170	205	170	192	168	205	164	200	230	305
May	200	245	200	220	200	240	198	240	350	400
June	235	215	230	240	230	245	218	235	(1)	(1)
January-June.	140	245	140	240	138	245	134	240	230	400
July	240	245	220	280	210	243	185	298	290	300
August	(1)	(1)	170	215	165	215	168	190	290	300
September	(1)	(1)	174	190	179	192	180	190	290	350
October	(1)	(1)	177	188	178	190½	175	186	325	400
November	173	186	170	180	176	180½	174	178	390	400
December	175	186	179	184	176	184	179	184½	390	400
July-December	173	245	170	280	165	243	168	298	290	400

[1] Nominal.

RYE—Continued.

TABLE 56.—*Rye (including flour): International trade, calendar years 1911–1916.*

[See "General note," Table 10.]

EXPORTS.

[000 omitted.]

Country.	Average 1911-1913	1915 (prelim.)	1916 (prelim.)	Country.	Average 1911-1913	1915 (prelim.)	1916 (prelim.)
FROM—	*Bushels.*	*Bushels.*	*Bushels.*	FROM—	*Bushels.*	*Bushels.*	*Bushels.*
Argentina	443	194	129	Roumania	3,411	....	....
Belgium	914	....	....	Russia	34,921	13,331	12,315
Bulgaria	2,336	....	....	United States	855	13,655	15,838
Canada	69	501	989	Other countries	511	69	....
Denmark	303	1	....				
Germany	44,951	....	....	Total	107,587	27,777	....
Netherlands	18,870	26	14				

IMPORTS.

Country.	Average 1911-1913	1915 (prelim.)	1916 (prelim.)	Country.	Average 1911-1913	1915 (prelim.)	1916 (prelim.)
INTO—				INTO—			
Austria-Hungary	1,224	....	....	Norway	10,520	7,885	7,329
Belgium	6,157	....	....	Russia	5,231	1	....
Denmark	8,587	2,707	....	Sweden	3,769	1,770	....
Finland	15,472	13,425	12,639	Switzerland	729	16	42
France	4,138	36	14	United Kingdom	2,195	1,436	2,054
Germany	16,900	....	....	Other countries	677	77	....
Italy	721	4	1				
Netherlands	31,023	2,232	721	Total	107,343	29,589	....

BUCKWHEAT.

TABLE 57.—*Buckwheat: Acreage, production, and value in the United States, 1849–1917.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage (thousands of acres).	Average yield per acre (bushels).	Production (thousands of bushels).	Average farm price Dec. 1 (cents per bushel).	Farm value Dec. 1 (thousands of dollars).
1849	....	....	*8,957*	....	....
1859	....	....	*17,572*	....	....
1866	1,046	21.8	22,792	67.6	15,413
1867	1,228	17.4	21,359	78.7	16,812
1868	1,114	17.8	19,864	78.0	15,490
1869	1,029	16.9	17,431	71.9	12,535
1869	....	....	*9,822*	....	....
1870	537	18.3	9,842	70.5	6,937
1871	414	20.1	8,329	74.5	6,208
1872	448	18.1	8,134	73.5	5,979
1873	454	17.3	7,838	75.0	5,879
1874	453	17.7	8,017	72.9	5,844
1875	576	17.5	10,082	62.0	6,255
1876	666	14.5	9,669	66.6	6,436
1877	650	15.7	10,177	66.9	6,808
1878	673	18.2	12,247	52.6	6,441
1879	640	20.5	13,140	59.8	7,856
1879	*848*	*13.9*	*11,817*	....	....
1880	823	17.8	14,618	59.4	8,682
1881	829	11.4	9,486	86.5	8,206
1882	847	13.0	11,019	73.0	8,039
1883	857	8.9	7,669	82.2	6,304
1884	879	12.6	11,116	58.9	6,549
1885	914	13.8	12,626	55.9	7,057
1886	918	12.9	11,869	54.5	6,465
1887	911	11.9	10,844	56.5	6,122
1888	913	13.2	12,050	63.3	7,628
1889	837	14.5	12,110	50.5	6,113
1889	*837*	*14.5*	*12,110*	....	....

Year.	Acreage (thousands of acres).	Average yield per acre (bushels).	Production (thousands of bushels).	Average farm price Dec. 1 (cents per bushel).	Farm value Dec. 1 (thousands of dollars).
1890	845	14.7	12,433	57.4	7,133
1891	849	15.0	12,761	57.0	7,272
1892	861	14.1	12,143	51.8	6,296
1893	816	14.9	12,132	58.3	7,074
1894	789	16.1	12,668	55.6	7,040
1895	763	20.1	15,341	45.2	6,936
1896	755	18.7	14,090	39.2	5,522
1897	718	20.9	14,997	42.1	6,319
1898	678	17.3	11,722	45.0	5,271
1899	670	16.6	11,094	55.7	6,181
1899	*807*	*13.9*	*11,234*	....	....
1900	638	15.0	9,567	55.8	5,341
1901	811	18.6	15,126	56.3	8,523
1902	805	18.1	14,530	59.6	8,655
1903	804	17.7	14,244	60.7	8,651
1904	794	18.9	15,008	62.2	9,331
1905	760	19.2	14,585	58.7	8,565
1906	789	18.6	14,642	59.6	8,727
1907	800	17.9	14,290	69.8	9,975
1908	803	19.8	15,874	75.6	12,004
1909	834	20.9	17,438	....	....
1909	*878*	*16.9*	*14,849*	70.1	10,346
1910 [1]	860	20.5	17,598	66.1	11,636
1911	833	21.1	17,549	72.6	12,735
1912	841	22.9	19,249	66.1	12,720
1913	805	17.2	13,833	75.5	10,445
1914	792	21.3	16,881	76.4	12,892
1915	769	19.6	15,056	78.7	11,843
1916	828	14.1	11,662	112.7	13,147
1917	1,006	17.4	17,460	160.1	27,954

[1] Figures adjusted to census basis.

BUCKWHEAT—Continued.

TABLE 58.—*Buckwheat: Acreage, production, and total farm value, by States, 1917.*

[000 omitted.]

State.	Acreage.	Production.	Farm value Dec. 1.	State.	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Bush.*	*Dolls.*		*Acres.*	*Bush.*	*Dolls.*
Maine	15	322	483	Ohio	25	430	658
New Hampshire	2	38	70	Indiana	10	150	232
Vermont	13	286	429	Illinois	4	76	129
Massachusetts	2	30	50	Michigan	75	675	992
Connecticut	3	52	104	Wisconsin	23	281	489
New York	330	5,940	9,504	Minnesota	11	154	208
New Jersey	16	288	455	Iowa	11	132	264
Pennsylvania	350	6,300	10,269	Missouri	6	90	130
Delaware	3	60	89	Nebraska	2	32	48
Maryland	11	220	363	Tennessee	4	68	102
Virginia	33	696	1,044				
West Virginia	45	900	1,530	United States	1,006	17,460	27,954
North Carolina	12	240	312				

TABLE 59.—*Buckwheat: Condition of crop, United States, on first of months named, 1897–1917.*

Year.	Aug.	Sept.	When harvested.	Year.	Aug.	Sept.	When harvested.	Year.	Aug.	Sept.	When harvested.
	P. ct.	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*
1897	91.9	95.1	90.8	1904	92.8	91.5	88.7	1911	82.9	83.8	81.4
1898	87.2	88.8	76.2	1905	92.6	91.8	91.6	1912	88.4	91.6	89.2
1899	93.2	75.2	70.2	1906	93.2	91.2	84.9	1913	85.5	75.4	65.9
1900	87.9	80.5	72.8	1907	91.9	77.4	80.1	1914	88.8	87.1	83.3
1901	91.1	90.9	90.5	1908	89.4	87.8	81.6	1915	92.6	88.6	81.9
1902	91.4	86.4	80.5	1909	86.4	81.0	79.5	1916	87.8	78.5	66.9
1903	93.9	91.0	83.0	1910	87.9	82.3	81.7	1917	92.2	90.2	74.8

TABLE 60.—*Buckwheat: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents)						Value per acre (dollars).[1]	
	10-year average, 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average, 1908–1917.	1913	1914	1915	1916	1917	5-year average, 1912–1916.	1917
Me	28.2	30.0	28.0	32.5	30.0	29.4	32.0	29.0	26.0	24.0	21.5	78	56	60	70	95	150	19.38	32.25
N. H	25.8	21.5	22.0	31.0	27.3	31.0	31.0	25.0	30.0	20.0	19.0	87	66	70	81	100	183	20.92	34.77
Vt	24.2	22.0	22.0	24.0	24.3	30.0	25.0	28.0	27.0	17.5	22.0	87	80	82	82	105	150	21.02	33.00
Mass	18.4	18.0	19.3	22.0	21.0	21.0	17.0	18.5	16.0	16.0	15.0	98	80	84	95	140	166	16.92	24.90
Conn	18.8	18.2	19.5	19.5	19.0	20.5	17.0	18.5	20.0	19.0	17.3	105	95	95	96	120	200	18.75	34.60
N. Y	20.0	21.4	24.0	23.0	21.3	23.8	14.3	23.0	19.0	12.0	18.0	87	81	76	80	122	160	14.83	28.80
N. J	20.6	20.0	21.8	21.5	20.0	22.0	22.0	21.0	21.0	19.0	18.0	87	76	83	83	108	158	17.59	28.44
Pa	19.6	19.2	19.5	19.5	21.9	21.2	18.5	20.5	21.0	14.0	18.0	84	73	76	78	111	163	15.30	29.34
Del	19.9	30.0	19.8	20.5	19.0	16.0	17.0	19.0	18.5	19.0	20.0	81	69	76	75	118	148	14.61	29.60
Md	18.5	18.5	16.6	18.5	20.0	17.5	16.5	18.5	20.0	19.0	20.0	86	75	81	72	110	165	15.02	33.00
Va	19.4	18.0	18.0	18.0	16.0	21.5	23.1	19.4	20.0	19.2	21.1	86	80	84	80	95	150	17.03	31.65
W. Va	21.4	18.0	22.7	23.0	24.0	24.0	21.0	21.5	22.0	18.3	20.0	91	78	83	80	101	170	17.66	34.00
N. C	18.5	16.4	19.8	19.0	19.0	17.5	19.3	19.0	17.5	17.5	20.0	86	78	83	82	85	130	14.99	26.00
Ohio	19.8	18.5	21.2	18.0	21.0	19.5	18.0	24.0	23.0	17.7	17.2	88	76	76	77	110	153	16.55	26.32
Ind	17.2	17.0	17.3	17.7	18.3	19.0	18.5	17.5	14.0	18.0	15.0	87	75	78	80	112	155	14.55	23.25
Ill	18.4	18.2	18.2	20.0	18.1	22.0	17.0	17.7	17.0	17.0	19.0	100	80	95	90	130	170	17.08	32.30
Mich	14.6	13.5	14.3	15.3	18.0	17.0	15.0	18.5	14.5	11.0	9.0	81	70	71	72	115	147	11.56	13.23
Wis	14.9	15.2	12.3	14.0	17.5	17.0	16.5	17.5	13.0	14.0	12.2	89	69	76	83	116	174	12.59	21.23
Minn	16.8	18.2	15.2	16.0	18.0	21.0	16.5	17.0	17.5	15.0	14.0	81	61	70	75	112	135	13.21	18.90
Iowa	15.4	15.5	15.0	14.9	17.5	19.0	14.0	18.3	13.0	15.0	12.0	97	81	77	80	125	200	13.77	24.00
Mo	15.3	20.1	21.0	16.5	10.0	15.0	11.0	15.5	15.0	14.0	15.0	101	85	93	90	133	144	14.03	21.60
Nebr	18.0	18.0	16.0	20.0	16.0	18.0	20.0	18.5	20.0	17.0	16.0	97	79	84	95	110	150	17.05	24.00
Tenn	17.0	15.3	15.0	15.0	16.0	18.0	15.0	22.3	18.0	18.0	17.0	88	75	78	76	100	150	14.87	25.50
U. S	19.5	19.8	20.9	20.5	21.1	22.9	17.2	21.3	19.6	14.1	17.4	85.4	75.5	76.4	78.7	112.7	160.1	15.13	27.79

[1] Based upon farm price Dec. 1.

BUCKWHEAT—Continued.

TABLE 61.—*Buckwheat: Farm price per bushel on first of each month, by geographical divisions, 1916 and 1917.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.	
	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	117.2	81.5	121.3	81.6	100.2	82.5	113.1	78.1	125.0	87.7	100.0	80.0
February	114.6	80.7	117.0	81.1	100.3	81.3	116.7	75.6	127.0	93.0	85.0	76.0
March	124.8	83.2	130.0	83.0	102.7	84.9	117.9	79.6	143.5	102.7	100.0	74.0
April	128.3	83.1	132.7	83.5	114.5	81.9	117.4	79.0	149.5	101.0	98.0	76.0
May	150.6	84.9	156.7	85.2	127.8	83.1	138.7	84.4	175.0	93.5	121.0	74.0
June	183.7	87.0	191.9	88.7	166.6	81.2	162.3	80.0	175.0	100.0	126.0	74.0
July	209.2	93.1	219.3	94.8	187.6	85.6	180.1	90.6	217.5	87.0	150.0	77.0
August	189.3	89.0	193.5	90.8	175.9	83.9	179.8	76.9	220.5	91.7	139.0	75.0
September	164.3	86.4	170.7	87.1	150.1	84.4	149.4	82.4	183.0	98.5	75.0	76.0
October	151.4	90.4	153.5	90.8	174.1	84.6	144.0	94.4	135.0	87.5	101.0	80.0
November	151.2	102.9	156.7	104.6	150.0	88.8	151.1	105.9	135.5	115.0	100.0	77.0
December	160.1	112.7	161.2	114.8	157.8	99.1	155.1	114.4	159.3	120.4	150.0	100.0

FLAX.

TABLE 62.—*Flax: Area and production in undermentioned countries, 1914-1916.*

[000 omitted.]

Country.	Area.			Production.					
				Seed.			Fiber.		
	1914	1915	1916	1914	1915	1916	1914	1915	1916
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*	*Pounds.*	*Pounds*	*Pounds.*
United States	1,645	1,387	1,474	13,749	14,030	14,296	....	....	....
Canada:									
Quebec	1	1	1	8	7	5	....	....	....
Ontario	5	5	4	84	62	42	....	....	....
Manitoba	40	34	15	338	374	210	....	....	....
Saskatchewan	958	697	493	6,131	9,061	6,692	....	....	....
Alberta	80	70	81	614	1,124	1,310	....	....	....
Total, Canada	1,084	807	599	7,175	10,628	8,260	....	....	....
Mexico	(1)	(1)	(1)	150	150	150	....	....	....
Total	(1)	(1)	(1)	21,074	24,808	22,706	....	....	....
SOUTH AMERICA.									
Argentina	4,397	4,258	4,001	36,928	45,040	39,289	....	....	....
Uruguay	128	101	44	963	588	391	....	....	....
Total	4,525	4,359	4,045	37,891	45,628	39,680	....	....	....
EUROPE.									
Austria-Hungary:									
Austria	[2] 57	[2] 44	(1)	[2] 455	[2] 332	(1)	[2] 37,046	[2] 26,110	(1)
Hungary proper	[3] 32	(1)	(1)	[3] 255	(1)	(1)	[3] 29,999	(1)	(1)
Croatia-Slavonia	[3] 16	(1)	(1)	[3] 18	(1)	(1)	[3] 8,640	(1)	(1)
Bosnia-Herzegovina	(1)	(1)	(1)	[3] 4	(1)	(1)	[3] 1,000	(1)	(1)
Total, Austria-Hungary	....	....	....	732	....	....	76,685	....	....

[1] No official statistics. [2] Galicia and Bukowina not included. [3] Data for 1913.

FLAX—Continued.

TABLE 62.—*Flax: Area and production in undermentioned countries, 1914–1916*—Cont'd.

[000 omitted.]

Country.	Area.			Production.					
				Seed.			Fiber.		
	1914	1915	1916	1914	1915	1916	1914	1915	1916
EUROPE—continued.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels*	*Bushels.*	*Pounds.*	*Pounds.*	*Pounds.*
Belgium	32	(1)	(1)	[2] 387	(1)	(1)	[2] 39,437	(1)	(1)
Bulgaria	2	(1)	(1)	[3] 8	(1)	(1)	(1)	(1)	(1)
France [3]	46	20	15	336	161	(1)	23,370	11,061	(1)
Ireland	49	53	91	(1)	(1)	(1)	18,202	21,648	32,461
Italy	22	21	21	323	323	362	5,071	5,512	5,512
Netherlands	19	22	....	218	295	(1)	10,811	12,922	(1)
Roumania	21	14	20	165	134	(1)	2,137	1,187	(1)
Russia:									
Russia proper	3,401	2,843	3,505	14,222	16,593	(1)	....	....	....
Poland	(1)	(1)	(1)	(1)	(1)	(1)	....	....	....
Northern Caucasia	182	48	(1)	1,391	499	(1)	....	....	....
Total	3,583	2,891	....	15,613	17,092	....	[4] 868,632	[5] 815,438	....
Serbia	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Sweden [5]	3	(1)	(1)	3	(1)	(1)	401	(1)	(1)
Total	....	....	....	17,785	....	....	1,044,746	....	....
ASIA.									
British India [6]	3,031	3,325	3,334	15,448	15,880	19,040	....	....	....
Russia:									
Central Asia (4 Governments of)	100	83	(1)	762	566	(1)	....	....	....
Siberia (4 Governments of)	191	152	(1)	1,584	796	(1)	....	....	....
Transcaucasia (1 Government of)	(1)	(1)	(1)	(1)	(1)	(1)	....	....	....
Total	....	....	....	17,794	....	....	....	....	....
AFRICA.									
Algeria	(1)	(1)	(1)	[3] 15	(1)	(1)	(1)	(1)	(1)
Grand total	....	....	....	94,559	....	....	1,044,746	....	....

[1] No official statistics.
[2] Data for 1913.
[3] Excludes territory occupied by the enemy.
[4] Includes 2 Governments in Siberia.
[5] Includes hemp.
[6] Including certain native States.

TABLE 63.—*Flax (seed and fiber): Total production of countries named in Table 62, 1896–1914.*

Year.	Production.		Year.	Production.	
	Seed.	Fiber.		Seed.	Fiber.
	Bushels.	*Pounds.*		*Bushels.*	*Pounds.*
1896	82,684,000	1,714,205,000	1906	88,165,000	1,871,723,000
1897	57,596,000	1,498,054,000	1907	102,960,000	2,012,390,000
1898	72,938,000	1,780,693,000	1908	100,850,000	1,907,591,000
1899	66,348,000	1,138,763,000	1909	100,820,000	1,384,521,000
1900	62,432,000	1,315,931,000	1910	85,253,000	913,112,000
1901	72,314,000	1,050,260,000	1911	101,339,000	1,011,350,000
1902	83,891,000	1,561,840,000	1912	130,291,000	1,429,967,000
1903	110,455,000	1,492,383,000	1913	132,477,000	1,384,757,000
1904	107,743,000	1,517,922,000	1914	94,559,000	1,044,746,000
1905	100,458,000	1,494,229,000			

FLAX—Continued.

TABLE 64.—*Flaxseed: Acreage, production, value, and condition in the United States, 1849-1917.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Condition of growing crop.			
						July 1.	Aug. 1.	Sept. 1.	When harvested.
	Acres.	*Bushels.*	*Bushels.*	*Cents.*	*Dollars.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1849			*562,000*						
1859			*567,000*						
1869			*1,730,000*						
1879			*7,170,000*						
1889	*1,319,000*	*7.8*	*10,250,000*						
1899	*2,111,000*	*9.5*	*19,979,000*						
1902	3,740,000	7.8	29,285,000	105.2	30,815,000				
1903	3,233,000	8.4	27,301,000	81.7	22,292,000	86.2	80.3	80.5	74.0
1904	2,264,000	10.3	23,401,000	99.3	23,229,000	86.6	78.9	85.8	87.0
1905	2,535,000	11.2	28,478,000	84.4	24,049,000	92.7	96.7	94.2	91.5
1906	2,506,000	10.2	25,576,000	101.3	25,899,000	93.2	92.2	89.0	87.4
1907	2,864,000	9.0	25,851,000	95.6	24,713,000	91.2	91.9	85.4	78.0
1908	2,679,000	9.6	25,805,000	118.4	30,577,000	92.5	86.1	82.5	81.2
1909	2,742,000	9.4	25,856,000						
1909	*2,083,000*	*9.4*	*19,513,000*	153.0	29,796,000	95.1	92.7	88.9	84.9
1910 [1]	2,467,000	5.2	12,718,000	231.7	29,472,000	65.0	51.7	48.3	47.2
1911	2,757,000	7.0	19,370,000	182.1	35,272,000	80.9	71.0	68.4	69.6
1912	2,851,000	9.8	28,073,000	114.7	32,202,000	88.9	87.5	86.3	83.8
1913	2,291,000	7.8	17,853,000	119.9	21,399,000	82.0	77.4	74.9	74.7
1914	1,645,000	8.4	13,749,000	126.0	17,318,000	90.5	82.1	72.9	77.4
1915	1,387,000	10.1	14,030,000	174.0	24,410,000	88.5	91.2	87.6	84.5
1916	1,474,000	9.7	14,296,000	248.6	35,541,000	90.3	84.0	84.8	86.2
1917	1,809,000	4.7	8,473,000	296.8	25,148,000	84.0	60.6	50.2	51.3

[1] Figures adjusted to census basis.

TABLE 65.—*Flaxseed: Acreage, production, and total farm value, by States, 1917.*

State.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Bushels.*	*Dollars.*	*Dollars.*
Minnesota	220,000	9.0	1,980,000	2.95	5,841,000
Iowa	12,000	11.0	132,000	2.75	363,000
Missouri	6,000	8.5	51,000	2.75	140,000
North Dakota	965,000	3.9	3,764,000	3.00	11,292,000
South Dakota	140,000	7.0	980,000	2.99	2,930,000
Nebraska	5,000	5.5	28,000	2.50	70,000
Kansas	34,000	7.0	238,000	2.90	690,000
Montana	422,000	3.0	1,266,000	2.95	3,735,000
Wyoming	3,000	6.5	20,000	2.61	52,000
Colorado	2,000	7.0	14,000	2.50	35,000
United States	1,809,000	4.7	8,473,000	2.97	25,148,000

FLAX—Continued.

TABLE 66.—*Flaxseed: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average, 1908–1917.	1913	1914	1915	1916	1917	5-year average, 1912–1916.	1917
Minn.	9.3	10.6	10.0	7.5	8.0	10.2	9.0	9.3	10.5	8.5	9.0	176	123	128	176	240	295	14.82	26.55
Iowa	10.1	10.9	9.8	12.2	8.0	11.5	9.4	9.5	9.0	10.0	11.0	165	123	120	150	215	275	14.44	30.25
Mo.	6.9	7.0	8.1	8.4	3.0	6.0	5.0	8.0	8.0	7.0	8.5	157	115	104	135	212	275	9.26	23.38
N. Dak.	7.9	9.0	9.3	3.6	7.6	9.7	7.2	8.3	9.9	10.3	3.9	179	121	128	178	252	300	14.79	11.70
S. Dak.	8.1	10.7	9.4	5.0	5.3	8.6	7.2	7.5	11.0	9.3	7.0	175	120	123	167	247	299	13.78	20.93
Nebr.	8.0	11.0	8.5	8.0	5.0	9.5	6.0	7.0	11.0	8.0	5.5	163	110	119	147	230	250	12.33	13.75
Kans.	6.1	6.5	7.0	8.2	3.0	6.0	6.0	6.0	5.7	5.8	7.0	165	116	125	145	234	290	8.82	20.30
Mont.	9.0	11.5	12.0	7.0	7.7	12.0	9.0	8.0	10.5	9.5	3.0	174	115	120	170	248	295	14.96	8.85
Wyo.	9.3	....	....	10.0	....	12.0	9.9	7.0	13.0	7.0	6.5	210	.....	.....	145	225	261	.....	16.96
Colo.	7.2	....	....	7.0	7.0	8.0	5.0	8.0	9.4	6.0	7.0	164	115	100	120	195	250	9.35	17.50
U. S.	8.2	9.6	9.4	5.2	7.0	9.8	7.8	8.4	10.1	9.7	4.7	177.5	119.9	126.0	174.0	248.6	296.8	14.57	13.90

[1] Based upon farm price Dec. 1.

TABLE 67.—*Flaxseed: Farm price per bushel, on first of each month, by geographical divisions, 1916 and 1917.*

Month.	United States.		North Central States east of Mississippi River.		North Central States west of Mississippi River.		Far Western States.	
	1917	1916	1917	1916	1917	1916	1917	1916
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
January	250.7	185.9	228.0	....	249.9	184.7	255.0	193.0
February	253.7	210.9	230.0	200.0	257.8	211.2	238.0	210.0
March	253.1	202.5	238.0	150.0	253.8	204.6	251.0	192.0
April	266.1	202.1	270.0	192.0	265.8	201.8	267.0	205.0
May	300.6	191.8	280.0	198.0	298.6	190.9	309.0	197.0
June	298.8	176.5	....	180.0	295.3	174.1	313.0	191.0
July	278.0	163.2	300.0	160.0	275.9	164.1	286.0	158.0
August	271.6	178.1	276.0	161.0	279.1	176.3	242.0	190.0
September	302.8	190.2	304.0	200.0	306.1	188.6	290.0	200.0
October	308.5	199.2	337.0	200.0	316.7	199.1	275.0	200.0
November	295.9	234.7	....	218.0	294.9	234.0	300.0	210.0
December	296.8	248.6	....	240.0	297.3	248.9	294.0	247.8

FLAX—Continued.

TABLE 68.—*Flaxseed: Wholesale price per bushel, 1912–1917.*

Date.	Cincinnati.		Minneapolis.		Milwaukee. No. 1 Northwestern.		Duluth.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.								
January–June	$2.50	$2.56	$2.01	$2.36	$2.01¼	$2.39	$2.00	$2.53
July–December	1.50	2.80	1.22	2.10	1.24½	2.18½	1.22	2.20¾
1913.								
January–June	1.50	1.50	1.23⅛	1.40	1.25½	1.42¾	1.22⅝	1.39
July–December	1.50	1.50	1.31¼	1.53¼	1.30¾	1.54½	1.34⅜	1.53⅛
1914.								
January	1.50	1.50	1.47¼	1.61¼	1.45¼	1.75	1.48	1.63¼
June	1.40	1.50	1.28	1.88	1.30	1.93	1.28¾	1.93
1915.								
January–June	1.70	1.80	1.59½	2.08½	1.51½	2.05	1.61½	2.09
July–December	1.70	1.70	1.52½	2.21	1.52½	2.18	1.53	2.20½
1916.								
January			2.15¾	2.41¼	2.15¾	2.38	2.17¾	2.42¾
February			2.25	2.39	2.25	2.35	2.23	2.43⅜
March	2.85	2.85	2.15¾	2.35½	2.15¾	2.32½	2.15¾	2.32½
April	2.85	2.85	2.00	2.22¼	2.00	2.19¼	2.01	2.19¼
May	2.85	2.85	1.83½	2.09¼	1.83½	2.05¼	1.84½	2.05¾
June	2.85	2.85	1.73½	1.89	1.73½	1.84½	1.76	1.97¾
January–June	2.85	2.85	1.73½	2.41¼	1.73½	2.38	1.76	2.43⅜
July	2.85	2.85	1.77	2.12½	1.77	2.08	1.80	2.11½
August	1.50	1.50	1.60	2.28	2.04	2.24	2.05	2.26½
September	1.50	1.50	2.00¾	2.31	2.00¾	2.28	2.02½	2.31
October	1.50	1.80	2.40	2.70	2.40	2.67	2.43	2.72
November	1.80	2.25	2.59¾	2.93½	2.59¾	2.89	2.65¾	2.94½
December	2.25	2.25	2.75	2.94	2.76½	2.88¾	2.79½	2.93¼
July–December	1.50	2.85	1.60	2.94	1.77	2.89	1.80	2.94½
1917.								
January	2.25	2.25	2.83¼	2.94¼	2.83¼	2.91¼	2.85¼	2.92¾
February	2.25	2.25	2.75	2.93¼	2.75¾	2.82½	2.78	2.86
March	2.25	2.25	2.75¼	3.00	2.75¼	2.91	2.79¼	2.95½
April	2.60	2.80	2.21½	3.39	2.93	3.33	2.98	3.39
May	3.00	3.25	2.92	3.61	2.92	3.55	2.95	3.64
June	3.25	3.25	2.87	3.32	2.81½	3.26	2.85½	3.28
January–June	2.25	3.25	2.21½	3.61	2.75¼	3.55	2.78	3.64
July	3.25	3.25	2.64	3.36	2.68	3.30	2.69	3.35
August	3.25	3.30	3.30	3.76	3.26	3.71	3.28	3.79
September	3.30	3.30	3.16	3.55½	3.16	3.55	3.24	3.57
October	3.30	3.30	3.05	3.35½	3.01½	3.30½	3.02¾	3.32½
November	3.30	4.20	3.18½	3.43	3.18½	3.41	3.00	3.46
December	4.20	4.25	3.21	3.57	3.21	3.54	3.21	3.54
July–December	3.25	4.25	2.64	3.76	2.68	3.71	2.69	3.79

RICE.

TABLE 69.—*Rice: Area and production in undermentioned countries, 1914-1916.*

[Expressed in terms of hulled rice.]

Country.	Area.			Production.		
	1914	1915	1916	1914	1915	1916
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Pounds.*	*Pounds.*	*Pounds.*
United States	694,000	803,000	869,000	656,917,000	804,083,000	1,135,028,000
Hawaii [1]	9,000	(2)	(2)	25,820,000	(2)	(2)
Porto Rico [1]	16,000	(2)	(2)	4,298,000	(2)	(2)
Central America:						
Guatemala	(2)	(2)	(2)	24,085,000	24,015,000	13,744,000
Salvador	27,000	(2)	(2)	12,344,000	(2)	(2)
Costa Rica	7,000	(2)	(2)	(2)	(2)	(2)
Honduras	(2)	(2)	(2)	(2)	3,252,000	(2)
Mexico	41,000	(2)	66,000	33,921,000	(2)	34,222,000
SOUTH AMERICA.						
Argentina	10,000	8,000	17,000	(2)	(2)	(2)
Brazil: Sao Paulo	(2)	(2)	(2)	116,416,000	79,380,000	153,235,000
British Guiana	34,000	47,000	(2)	51,160,000	91,630,000	(2)
Dutch Guiana	(2)	(2)	(2)	6,913,000	(2)	(2)
Peru	(2)	(2)	(2)	(2)	85,500,000	88,000,000
EUROPE.						
Bulgaria	[3] 7,000	8,000	9,000	8,165,000	8,889,000	16,000,000
France	[3] 1,000	(2)	(2)	[3] 980,000	(2)	(2)
Italy	361,000	356,000	353,000	741,263,000	762,900,000	708,058,000
Russia (Northern Caucasia)	1,000	(2)	(2)	729,000	(2)	(2)
Spain	97,000	99,000	100,000	336,925,000	320,022,000	328,931,000
ASIA.						
British India [4]	76,625,000	78,152,000	79,700,000	61,022,080,000	73,525,760,000	76,336,960,000
Ceylon	685,000	785,000	....	[5] 290,819,000	[5] 319,356,000	(2)
Federated Malay States	[3] 124,000	(2)	(2)	[3] 87,321,000	(2)	(2)
Japanese Empire:						
Japan	7,434,000	7,491,000	7,543,000	17,908,918,000	17,569,018,000	18,315,793,000
Formosa	1,263,000	1,241,000	(2)	1,447,709,000	1,503,101,000	(2)
Korea	2,645,000	(2)	(2)	3,819,869,000	3,571,182,000	3,936,361,000
Java and Madura [6]	6,346,000	(2)	(2)	7,826,026,000	(2)	(2)
Philippine Islands	3,076,000	2,794,000	2,819,000	1,403,516,000	1,099,914,000	1,234,332,000
Russia: Transcaucasia and Turkestan [7]	666,000	635,000	(2)	512,383,000	379,817,000	(2)
Straits Settlements	[8] 92,000	(2)	89,000	(2)	(2)	(2)
Siam	5,096,000	5,181,000	....	5,711,132,000	5,517,167,000	....
AFRICA.						
Egypt	37,000	331,000	150,000	54,777,000	512,439,000	236,528,000
Madagascar	1,013,000	1,198,000	1,176,000	878,541,000	1,023,012,000	1,017,470,000
Nyasaland	(2)	(2)	(2)	2,695,000	1,606,000	....
OCEANIA.						
Australia	(9)	(2)	(2)	7,000	(2)	(10)
Fiji	12,000	(2)	(2)	(2)	(2)	(2)

[1] Census of 1909.
[2] No official statistics.
[3] Data for 1913.
[4] Excluding a large area, the production of which is not officially reported.
[5] Excluding production for Matara, which in 1913 was 55,183,000 pounds.
[6] Excluding Soerakarta, Djokjakarta, and private lands.
[7] Excluding Khiva and Bokhara.
[8] Data for 1912.
[9] Less than 500 acres.
[10] Less than 500 bushels.

RICE—Continued.

TABLE 70.—*Rice (cleaned): Total production in principal countries for which estimates are available, 1900–1914.*

[The figures below include the principal countries for which estimates are available. The totals shown are merely approximate. China and French Indo-China are not included below. Three Provinces of China in 1910 produced 47,204,000,000 pounds of rice. The totals below may represent at least two-thirds of the total world production of rice.]

Year.	Production.	Year.	Production.	Year.	Production.
	Pounds.		*Pounds.*		*Pounds.*
1900	100,400,000,000	1905	102,400,000,000	1910	126,100,000,000
1901	94,400,000,000	1906	105,800,000,000	1911	102,100,000,000
1902	101,600,000,000	1907	100,300,000,000	1912	97,300,000,000
1903	101,800,000,000	1908	102,900,000,000	1913	100,700,000,000
1904	110,700,000,000	1909	127,700,000,000	1914	102,986,000,000

TABLE 71.—*Rice: Acreage, production, value, and condition, in the United States, 1904–1917.*

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Condition of growing crop.			
						July 1.	Aug. 1.	Sept. 1.	When harvested.
	Acres.	*Bushels.*	*Bushels.*	*Cents.*	*Dollars.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
1904	662,000	31.9	21,096,000	65.8	13,892,000	88.2	90.2	89.7	87.3
1905	482,000	28.2	13,607,000	95.2	12,956,000	88.0	92.9	92.2	89.3
1906	575,000	31.1	17,855,000	90.3	16,121,000	82.9	83.1	86.8	87.2
1907	627,000	29.9	18,738,000	85.8	16,081,000	88.7	88.6	87.0	88.7
1908	655,000	33.4	21,890,000	81.2	17,771,000	92.9	94.1	93.5	87.7
1909	720,000	33.8	24,368,000						
1909	*610,000*	*35.8*	*21,839,000*	79.6	17,383,000	90.7	84.5	84.7	81.2
1910	723,000	33.9	24,510,000	67.8	16,624,000	86.3	87.6	88.8	88.1
1911	696,000	32.9	22,934,000	79.7	18,274,000	87.7	88.3	87.2	85.4
1912	723,000	34.7	25,054,000	93.5	23,423,000	86.3	86.3	88.8	89.2
1913	827,000	31.1	25,744,000	85.8	22,090,000	88.4	88.7	88.0	80.3
1914	694,000	34.1	23,649,000	92.4	21,849,000	86.5	87.6	88.9	88.0
1915	803,000	36.1	28,947,000	90.6	26,212,000	90.5	90.0	82.3	80.9
1916	869,000	47.0	40,861,000	88.9	36,311,000	92.7	92.2	91.2	91.5
1917	964,000	37.6	36,278,000	189.4	68,717,000	85.1	85.0	78.4	79.7

TABLE 72.—*Rice: Acreage, production, and farm value, by States, 1917.*

State.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Bushels.*	*Dollars*	*Dollars.*
North Carolina	300	26.0	8,000	1.95	16,000
South Carolina	3,000	25.0	75,000	1.95	146,000
Georgia	900	30.0	27,000	1.95	53,000
Florida	800	26.0	21,000	1.95	41,000
Missouri	400	45.0	18,000	1.90	34,000
Alabama	400	27.0	12,000	1.90	23,000
Mississippi	2,100	30.0	63,000	1.90	120,000
Louisiana	500,000	36.5	18,250,000	1.90	34,675,000
Texas	230,000	27.0	6,210,000	2.00	12,420,000
Arkansas	146,200	41.0	5,994,000	1.90	11,389,000
California	80,000	70.0	5,600,000	1.75	9,800,000
United States	964,100	37.6	36,278,000	1.89	68,717,000

RICE—Continued.

TABLE 73.—*Rice: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1908-1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average, 1908-1917.	1913	1914	1915	1916	1917	5-year average, 1912-1916.	1917
N. C.	25.1	25.2	30.2	26.5	25.6	25.0	24.0	26.3	21.0	21.0	26.0	95	80	75	85	85	195	19.42	50.70
S. C.	22.7	24.0	25.6	21.0	11.7	25.0	30.0	26.0	24.3	14.0	25.0	100	90	92	90	90	195	21.73	48.75
Ga.	26.7	25.0	23.9	22.0	26.8	30.0	32.0	28.0	29.3	20.0	30.0	98	83	89	88	87	195	24.33	58.50
Fla.	24.7	25.0	25.0	21.0	25.0	25.0	25.0	25.0	25.0	25.0	26.0	88	60	70	75	75	195	18.50	50.70
Mo.	48.7	....	....	....	....	....	....	....	50.0	51.0	45.0	130	....	....	100	100	190	.....	85.50
Ala.	28.2	45.0	35.0	25.0	20.0	30.0	22.0	28.0	25.0	25.0	27.0	86	60	70	75	75	190	19.46	51.30
Miss.	30.3	31.0	30.0	30.0	36.0	35.0	28.0	30.0	25.0	28.0	30.0	91	70	85	88	80	190	24.20	57.00
La.	34.4	33.0	33.8	34.4	31.5	33.5	29.0	32.1	34.2	46.0	36.5	94	84	93	90	90	190	31.51	69.35
Tex.	34.0	34.5	34.0	33.0	34.3	35.5	32.0	33.8	30.5	45.0	27.0	96	86	92	89	86	200	31.57	54.00
Ark.	41.3	41.0	40.0	40.0	39.0	37.5	36.0	39.8	48.4	50.5	41.0	99	90	90	95	96	190	39.59	77.90
Cal.	52.5	....	....	33.0	40.0	50.0	48.0	53.3	66.7	59.0	70.0	97	100	100	90	78	175	50.57	122.50
U. S.	35.5	33.4	33.8	33.9	32.9	34.7	31.1	34.1	36.1	47.0	37.6	94.9	85.8	92.4	90.6	88.9	189.4	33.01	71.28

[1] Based upon farm price Dec. 1.

TABLE 74.—*Rice: Wholesale price per pound, 1912–1917.*

Date.	New York.		Cincinnati.		Lake Charles.		New Orleans.		Houston.	
	Domestic (good).		Prime.		Rough, per 162 pounds.		Honduras, cleaned.		Head rice, cleaned.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Dolls.*	*Dolls.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Jan.-June	4¼	5¼	6	7	....	....	2¼	5¾	4½	5¼
July-Dec	4¾	5¼	6	7	....	....	2	6	4	5⅜
1913.										
Jan.-June	4¾	5	5¼	6¼	2.50	3.82	2⅜	5⅝	4	5½
July-Dec	4¾	5¼	5¾	6¼	2.00	3.76	1.15	7	4¼	6
1914.										
Jan.-June	4¾	5	5¾	6¼	1.40	3.76	1¼	6¼	3⅜	5¾
July-Dec	4¾	5⅞	5¾	6¼	2.00	4.55	1½	6⅝	3	5½
1915.										
Jan.-June	5	5½	5¾	6½	2.85	4.61½	2¼	5¾	4½	5
July-Dec	4½	5½	5	6½	2.80	3.65	2	5½	4½	5⅜
1916.										
January	5	5¼	5¼	5¾	2.65	3.35	2	5	4	4½
February	5	5¼	5¼	5¾	3.00	3.55	2	5¼	4	4¼
March	5	5¼	5¼	5¾	2.85	3.80	2½	5¼	4	4¾
April	5	5¼	5¼	5¾	3.00	4.02	2⅜	5⅛	4	4½
May	5	5¼	5¼	5¾	3.25	4.02	2⅞	5⅛	3¾	4¼
June	5	5¼	5¼	5¾	3.75	4.25	2⅞	5½	3¾	4¼
Jan.-June	5	5¼	5¼	5¾	2.65	4.25	2	5½	3¾	4¾
July	5	5¼	5¼	5¾	....	....	2¾	5⅛	3¾	4¼
August	5	5⅜	5¼	5¾	....	....	2½	5	3¾	4¼
September	5	5⅜	5¼	5¾	2.60	3.38	2¼	4¾	4	4¼
October	5	5⅜	5¼	5¾	2.65	3.40	2½	5	4¼	4¾
November	5	5½	5¼	5¾	3.35	3.65	2½	5¼	4½	4¼
December	5¼	5½	5¼	5¾	3.25	3.60	2½	5¼	4½	4¾
July-Dec	5	5½	5¼	5¾	2.60	3.65	2¼	5¼	3¾	4¾

RICE—Continued.

TABLE 74.—*Rice: Wholesale price per pound, 1912–1917*—Continued.

Date.	New York.		Cincinnati.		Lake Charles.		New Orleans.		Houston.	
	Domestic (good).		Prime.		Rough, per 162 pounds.		Honduras, cleaned.		Head rice, cleaned.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1917.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Dolls.*	*Dolls.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	5¼	5½	5¼	5¾	2.70	3.40	2½	5¼	4¾	5
February	5¼	5½	5¼	5¾	3.00	3.75	2½	5¼	4¾	5⅛
March	5¼	5⅞	5¼	6	3.20	4.25	2½	5⅝	4⅞	5½
April	5½	8¾	5½	8	3.60	6.21	2¾	7¼	5	8
May	8½	9	7½	8¼	4.10	7.00	3⅜	8⅛	7¾	8
June	8¼	9	8	8¼	....	....	4⅛	8½	7½	7¾
Jan.-June	5¼	9	5¼	8¼	2.70	7.00	2½	8½	4¾	8
July	8	8¾	8	8¼	5.50	6.00	4⅛	8½	7¼	7¾
August	7⅜	8½	8	8½	5.50	6.68	4¼	7⅞	7	7½
September	7⅜	8¼	8	8½	5.50	6.50	4½	8¼	7	7¼
October	7½	9	8¼	8½	5.93	7.50	5	8⅜	7½	8
November	8¾	9¼	8¼	8½	5.65	7.38	5	8¼	7¾	8¼
December	8¾	9	8¼	8¾	5.34	7.20	5⅛	8⅜	7¾	8¼
July-Dec	7⅜	9¼	8	8¾	5.34	7.50	4⅛	8½	7	8¼

TABLE 75.—*Rice: International trade, calendar years 1909–1916.*

[Mostly cleaned rice. Under rice is included paddy, unhulled, rough, cleaned, polished, broken, and cargo rice, in addition to rice flour and meal. Rice bran is not included. Rough rice or paddy, where specifically reported, has been reduced to terms of cleaned rice at ratio of 162 pounds rough or unhulled to 100 pounds cleaned. "Rice, other than whole or cleaned rice," in the returns of United Kingdom is not considered paddy, since the chief sources of supply indicate that it is practically all hulled rice. Cargo rice, a mixture of hulled and unhulled, is included without being reduced to terms of cleaned. Broken rice and rice flour and meal are taken without being reduced to terms of whole cleaned rice. See "General note," Table 10.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913	1915 (prelim.)	1916 (prelim.)	Country.	Average, 1909–1913	1915 (prelim.)	1916 (prelim.)
FROM—	*Pounds.*	*Pounds.*	*Pounds.*	FROM—	*Pounds.*	*Pounds.*	*Pounds.*
Belgium	99,948	....	....	Penang	357,548	....	....
British India	5,337,516	329,591	....	Siam	1,928,507	2,171,027	....
Dutch East Indies	132,400	79,844	....	Singapore	758,875	....	....
France	79,087	113,098	41,875	Other countries	866,020	633,217	....
French Indo-China	2,288,040	2,977,728	....				
Germany	396,628	....	....	Total	12,720,845	6,615,050	....
Netherlands	476,276	7,545	9,127				

IMPORTS.

Country.	Average, 1909–1913	1915 (prelim.)	1916 (prelim.)	Country.	Average, 1909–1913	1915 (prelim.)	1916 (prelim.)
INTO—				INTO—			
Austria-Hungary	183,411	....	....	Netherlands	778,682	123,756	144,254
Belgium	180,830	....	....	Penang	511,035	....	....
Brazil	24,753	15,317	....	Perak	179,187	186,268	....
British India	278,272	391,607	....	Philippine Islands	412,781	481,576	418,512
Ceylon	821,654	....	....	Russia	250,461	303,729	166,779
China	704,992	1,130,141	1,504,536	Selangor	159,178	178,438	
Cuba	262,207	319,894	....	Singapore	975,095	....	....
Dutch East Indies	1,178,111	[1] 735,838	....	United Kingdom	768,853	1,305,701	988,577
Egypt	98,690	54,809	17,368	United States	209,814	254,568	215,712
France	517,861	576,325	501,923	Other countries	1,242,092	731,867	....
Germany	913,772	....	....				
Japan	655,676	94,158	63,613	Total	11,439,950	6,904,889	....
Mauritius	132,543	12,897	....				

[1] Java and Madura only.

STATISTICS OF CROPS OTHER THAN GRAIN CROPS.

POTATOES.

TABLE 76.—*Potatoes: Area and production of undermentioned countries, 1914–1916.*

Country.	Area.			Production.		
	1914	1915	1916	1914	1915	1916
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	3,711,000	3,734,000	3,565,000	409,921,000	359,721,000	286,953,000
Canada:						
Prince Edward Island	32,000	31,000	31,000	6,806,000	3,558,000	6,386,000
Nova Scotia	32,000	34,000	34,000	7,165,000	4,759,000	6,935,000
New Brunswick	41,000	40,000	39,000	10,534,000	5,772,000	7,488,000
Quebec	115,000	117,000	112,000	21,811,000	17,510,000	14,672,000
Ontario	154,000	155,000	133,000	25,772,000	14,362,000	8,113,000
Manitoba	27,000	28,000	32,000	3,172,000	3,104,000	4,709,000
Saskatchewan	31,000	30,000	47,000	4,085,000	4,428,000	7,319,000
Alberta	26,000	27,000	29,000	3,652,000	5,155,000	4,783,000
British Columbia	15,000	16,000	15,000	2,675,000	3,956,000	2,892,000
Total Canada	476,000	479,000	473,000	85,672,000	62,604,000	63,297,000
Mexico	(1)	(1)	(1)	[1] 924,000	(1)	(1)
Newfoundland	(1)	(1)	(1)	[1] 1,524,000	(1)	(1)
Total	....	....	....	498,041,000	....	....
SOUTH AMERICA.						
Argentina	293,000	306,000	322,000	28,366,000	29,597,000	31,138,000
Chile	81,000	78,000	79,000	9,169,000	9,546,000	11,598,000
Total	....	....	....	37,535,000	39,143,000	42,736,000
EUROPE.						
Austria-Hungary:						
Austria	[4] 1,774,000	[4] 1,757,000	(1)	[4] 285,070,000	[4] 232,203,000	(1)
Hungary proper	1,513,000	1,577,000	(1)	195,266,000	209,356,000	(1)
Croatia-Slavonia	[5] 194,000	(1)	(1)	[5] 21,140,000	(1)	(1)
Bosnia-Herzegovina	[5] 67,000	(1)	(1)	[5] 2,998,000	(1)	(1)
Total Austria-Hungary	3,548,000	....	....	504,474,000	....	....
Belgium	411,000	(1)	(1)	[5] 117,613,000	(1)	(1)
Bulgaria	[2] 8,000	(1)	(1)	[3] 503,000	(1)	(1)
Denmark	[1] 151,000	165,000	159,000	37,331,000	42,349,000	26,629,000
Finland	[6] 181,000	(1)	(1)	18,736,000	(1)	(1)
France	3,676,000	3,223,000	3,222,000	440,652,000	332,788,000	335,507,000
Germany	8,367,000	8,827,000	(1)	1,674,377,000	1,983,161,000	882,000,000
Italy	727,000	725,000	729,000	61,104,000	56,768,000	54,277,000
Luxemburg	(1)	(1)	(1)	5,288,000	(1)	(1)
Malta	4,000	3,000	(1)	1,080,000	568,000	(1)
Netherlands	421,000	438,000	413,000	120,780,000	126,741,000	88,490,000
Norway	101,000	113,000	111,000	27,512,000	19,957,000	29,189,000
Roumania [7]	26,000	28,000	35,000	2,654,000	3,765,000	(1)
Do [8]	56,000	52,000	(1)	1,083,000	865,000	(1)
Russia, European:						
Russia proper	8,652,000	6,815,000	5,879,000	891,579,000	770,709,000	662.169,000
Poland	(1)	(1)	(1)	(1)	(1)	(1)
Northern Caucasia	201,000	165,000	....	17,907,000	15,796,000	....
Total European Russia, excluding Poland	8,856,000	6,980,000	....	909,486,000	786,505,000	....
Serbia	[3] 31,000	(1)	(1)	[3] 2,173,000	(1)	(1)
Spain	688,000	(1)	(1)	76,657,000	(1)	(1)
Sweden	375,000	382,000	373,000	63,209,000	78,806,000	51,972,000
Switzerland	137,000	159,000	200,000	22,046,000	38,672,000	18,000,000

[1] No official statistics.
[2] Data for 1906.
[3] Data for 1912.
[4] Galicia and Bukowina not included.
[5] Data for 1913.
[6] Data for 1910.
[7] Grown alone.
[8] Grown with corn.

POTATOES.—Continued.

TABLE 76.—*Potatoes: Area and production of undermentioned countries, 1914-1916*—Con.

Country.	Area.			Production.		
	1914	1915	1916	1914	1915	1916
EUROPE—continued.						
United Kingdom:	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
England	436,000	437,000	400,000	104,804,000	100,881,000	88,484,000
Scotland	152,000	144,000	130,000	40,230,000	36,291,000	19,825,000
Wales	25,000	26,000	28,000	5,445,000	5,821,000	5,018,000
Ireland	583,000	594,000	586,000	128,642,000	138,509,000	90,845,000
Total United Kingdom	1,196,000	1,201,000	1,144,000	279,121,000	281,502,000	204,172,000
Total				4,365,909,000		
ASIA.						
Japan	205,000	225,000	231,000	32,312,000	35,103,000	39,006,000
Russia, Asiatic:						
Central Asia (4 governments of)	104,000	106,000	(1)	7,560,000	7,974,000	
Siberia (4 governments of)	441,000	296,000	(1)	47,075,000	24,307,000	
Transcaucasia (1 government of)	2,000	2,000	(1)	90,000	100,000	
Total Asiatic Russia	547,000	404,000		54,725,000	32,381,000	
Total				87,037,000	67,484,000	
AFRICA.						
Algeria	[2] 48,000	(1)	(1)	[2] 2,119,000	(1)	(1)
Union of South Africa	[3] 62,000			[3] 3,685,000	(1)	(1)
Total				5,804,000		
AUSTRALASIA.						
Australia:						
Queensland	10,000	8,000	6,000	618,000	598,000	278,000
New South Wales	39,000	30,000	20,000	3,989,000	1,520,000	1,658,000
Victoria	75,000	65,000	57,000	6,593,000	7,064,000	6,489,000
South Australia	11,000	8,000	4,000	1,230,000	673,000	485,000
Western Australia	5,000	5,000	5,000	665,000	550,000	527,000
Tasmania	31,000	32,000	29,000	3,001,000	2,946,000	2,983,000
Total Australia	171,000	148,000	121,000	16,096,000	13,351,000	12,421,000
New Zealand	29,000	22,000	30,000	5,869,000	4,952,000	4,809,000
Total Australasia	200,000	170,000	151,000	21,965,000	18,303,000	17,230,000
Grand total				5,016,291,000		

[1] No official statistics. [2] Data for 1913. [3] Census of 1911.

TABLE 77.—*Potatoes: Total production of countries mentioned in Table 76, 1900-1914.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1900	4,382,031,000	1904	4,298,049,000	1908	5,295,013,000	1912	5,872,953,000
1901	4,669,958,000	1905	5,254,598,000	1909	5,595,567,000	1913	5,802,910,000
1902	4,674,000,000	1906	4,789,112,000	1910	5,242,278,000	1914	5,016,291,000
1903	4,409,793,000	1907	5,122,078,000	1911	4,842,109,000		

TABLE 78.—*Potatoes: Average yield, per acre, of undermentioned countries in 1900-1916.*

Year.	United States.	Russia (European).[1]	Germany.[1]	Austria.[1]	Hungary proper.[1]	France.[1]	United Kingdom.[1]
Average:	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1900-1909	91.4	99.9	200.0	151.1	118.7	133.8	193.8
1910-1915	97.6	107.9	205.7	145.6	122.2	116.3	222.8
1906	102.2	94.9	193.3	158.4	128.7	99.5	192.2
1907	95.4	102.4	205.3	173.2	126.6	136.2	171.0
1908	85.7	102.9	209.2	154.0	96.6	163.7	231.1
1909	106.8	111.5	208.9	157.3	125.2	160.3	222.1
1910	93.8	121.1	196.1	160.0	117.4	81.9	209.1
1911	80.9	104.2	153.9	137.2	106.3	121.8	241.5
1912	113.4	121.5	223.5	149.0	129.2	142.9	177.0
1913	90.4	110.6	235.8	134.7	118.4	127.3	242.0
1914	110.5	102.8	200.1	160.7	129.0	119.9	233.3
1915	96.3	[2] 87.1	224.7	132.1	132.8	103.9	234.1
1916	80.4					104.1	178.5
Average (1907-1916)	95.4					126.2	214.0

[1] Bushels of 60 pounds. [2] Poland not included.

POTATOES—Continued.

TABLE 79.—*Potatoes: Acreage, production, value, exports, etc., in the United States, 1849–1917.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, fair to fancy.[1] December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, fiscal year beginning July 1.	Imports during fiscal year beginning July 1.
	Acres.	*Bush.*	*Bushels.*	*Cts.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*	*Bushels.*
1849	......	......	*65,798,000*	......	......	......	......	......	......	155,595	......
1859	......	......	*111,149,000*	......	......	......	......	......	......	380,372	......
1866	1,069,000	100.2	107,201,000	47.3	50,723,000	......	......	......	......	512,380	198,265
1867	1,192,000	82.0	97,783,000	65.9	64,462,000	......	......	......	......	378,605	209,555
1868	1,132,000	93.8	106,090,000	59.3	62,919,000	......	......	......	......	508,249	138,470
1869	1,222,000	109.5	133,886,000	42.9	57,481,000	......	......	......	......	596,968	75,336
1869	......	......	*143,337,000*	......	......	......	......	......	......	......	......
1870	1,325,000	86.6	114,775,000	65.0	74,621,000	......	......	......	......	553,070	458,758
1871	1,221,000	98.7	120,462,000	53.9	64,905,000	......	......	......	......	621,537	96,259
1872	1,331,000	85.3	113,516,000	53.5	60,692,000	......	......	......	......	515,306	346,840
1873	1,295,000	81.9	106,089,000	65.2	69,154,000	......	......	......	......	497,413	549,073
1874	,310,000	80.9	105,981,000	61.5	65,223,000	......	......	......	......	609,642	188,757
1875	1,510,000	110.5	166,877,000	34.4	57,358,000	......	......	......	......	704,379	92,148
1876	1,742,000	71.7	124,827,000	61.9	77,320,000	......	......	......	......	529,650	3,205,555
1877	1,792,000	94.9	170,092,000	43.7	74,272,000	......	......	......	......	744,409	528,584
1878	1,777,000	69.9	124,127,000	58.7	72,924,000	......	......	......	......	625,342	2,624,149
1879	1,837,000	98.9	181,626,000	43.6	79,154,000	......	......	......	......	696,080	721,868
1879	......	......	*169,459,000*	......	......	......	......	......	......	......	......
1880	1,843,000	91.0	167,660,000	48.3	81,062,000	......	......	......	......	638,840	2,170,372
1881	2,042,000	53.5	109,145,000	91.0	99,291,000	......	......	......	......	408,286	8,789,860
1882	2,172,000	78.7	170,973,000	55.7	95,305,000	......	......	......	......	439,443	2,362,362
1883	2,289,000	90.9	208,164,000	42.2	87,849,000	......	......	......	......	554,613	425,408
1884	2,221,000	85.8	190,642,000	39.6	75,524,000	......	......	......	......	380,868	658,633
1885	2,266,000	77.2	175,029,000	44.7	78,153,000	......	......	33	50	494,948	1,937,416
1886	2,287,000	73.5	168,051,000	46.7	78,442,000	44	47	65	90	434,864	1,432,490
1887	2,357,000	56.9	134,103,000	68.2	91,507,000	70	83	65	85	403,880	8,259,538
1888	2,533,000	79.9	202,365,000	40.2	81,414,000	30	37	24	45	471,955	883,380
1889	2,648,000	77.4	204,881,000	35.4	72,611,000	33	45	30	60	406,618	3,415,578
1889	......	......	*217,546,000*	......	......	......	......	......	......	......	......
1890	2,652,000	55.9	148,290,000	75.8	112,342,000	82	93	95	110	341,189	5,401,912
1891	2,715,000	93.7	254,424,000	35.8	91,013,000	30	40	30	50	557,022	186,871
1892	2,548,000	61.5	156,655,000	66.1	103,568,000	60	72	70	98	845,720	4,317,021
1893	2,605,000	70.3	183,034,000	59.4	108,662,000	51	60	64	88	803,111	3,002,578
1894	2,738,000	62.4	170,787,000	53.6	91,527,000	43	58	40	70	572,957	1,341,533
1895	2,955,000	100.6	297,237,000	26.6	78,985,000	18	24	10	23	680,049	175,240
1896	2,767,000	91.1	252,235,000	28.6	72,182,000	18	26	19	26	926,646	246,178
1897	2,535,000	64.7	164,016,000	54.7	89,643,000	50	62	60	87	605,187	1,171,378
1898	2,558,000	75.2	192,306,000	41.4	79,575,000	30	36	33	52	579,833	530,420
1899	2,581,000	88.6	228,783,000	39.0	89,329,000	35	46	27	39	809,472	155,861
1899	*2,939,000*	*93.0*	*273,318,000*	......	......	......	......	......	......	......	......
1900	2,611,000	80.8	210,927,000	43.1	90,811,000	40	48	35	60	741,483	371,911
1901	2,864,000	65.5	187,598,000	76.7	143,979,000	75	82	58	100	528,484	7,656,162
1902	2,966,000	96.0	284,633,000	47.1	134,111,000	42	48	42	60	843,075	358,505
1903	2,917,000	84.7	247,128,000	61.4	151,638,000	60	66	95	116	484,042	3,161,581
1904	3,016,000	110.4	332,830,000	45.3	150,673,000	32	38	20	25	1,163,270	186,199
1905	2,997,000	87.0	260,741,000	61.7	160,821,000	55	66	48	73	1,000,326	1,948,160
1906	3,013,000	102.2	308,038,000	51.1	157,547,000	40	43	55	75	1,530,461	176,917
1907	3,128,000	95.4	298,262,000	61.8	184,184,000	46	58	50	80	1,203,894	403,952
1908	3,257,000	85.7	278,985,000	70.6	197,039,000	60	77	70	150	763,651	8,383,966
1909	3,525,000	106.8	376,537,000	......	......	......	......	......	......	......	......
1909	*3,669,000*	*106.1*	*389,195,000*	54.1	210,662,000	20	58	16	34	999,476	353,208
1910[2]	3,720,000	93.8	349,032,000	55.7	194,566,000	30	48	35	75	2,383,887	218,984
1911	3,619,000	80.9	292,737,000	79.9	233,778,000	70	100	90	200	1,237,276	13,734,695
1912	3,711,000	113.4	420,647,000	50.5	212,550,000	40	65	33	70	2,028,261	337,230
1913	3,668,000	90.4	331,525,000	68.7	227,903,000	50	70	60	90	1,794,073	3,645,993
1914	3,711,000	110.5	409,921,000	48.7	199,460,000	30	66	34	150	3,135,474	270,942
1915	3,734,000	96.3	359,721,000	61.7	221,992,000	53	95	80	110	4,017,760	209,532
1916	3,565,000	80.5	286,953,000	146.1	419,333,000	125	190	200	375	2,489,001	3,079,025
1917	4,390,000	100.8	442,536,000	122.9	543,865,000	93	135	......	......	......	......

[1] Burbank to 1910.

[2] Figures adjusted to census basis.

POTATOES—Continued.

TABLE 80.—*Potatoes: Acreage, production, and total farm value, by States, 1917.*

[000 omitted.]

State.	Acreage.	Production.	Farm value Dec. 1.	State.	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Dollars.*		*Acres.*	*Bushels.*	*Dollars.*
Maine	150	20,250	26,325	North Dakota	90	3,870	5,031
New Hampshire	21	2,247	3,752	South Dakota	80	7,200	7,992
Vermont	30	3,000	4,200	Nebraska	147	12,495	13,370
Massachusetts	38	4,370	7,648	Kansas	78	4,446	6,758
Rhode Island	5	675	1,181	Kentucky	70	6,720	9,408
Connecticut	29	3,190	5,232	Tennessee	52	4,888	6,159
New York	400	38,000	49,400	Alabama	41	2,952	5,373
New Jersey	98	11,172	15,753	Mississippi	14	1,092	1,835
Pennsylvania	321	29,532	39,868	Louisiana	25	1,600	2,944
Delaware	13	1,235	1,606	Texas	46	2,760	5,796
Maryland	60	6,000	7,140	Oklahoma	36	2,484	4,471
Virginia	200	19,800	24,750	Arkansas	30	2,400	3,768
West Virginia	65	7,475	9,867	Montana	57	5,415	5,523
North Carolina	50	4,500	6,435	Wyoming	30	4,650	4,836
South Carolina	15	1,440	3,024	Colorado	70	9,310	8,472
Georgia	19	1,596	3,112	New Mexico	11	1,276	2,105
Florida	25	2,275	4,664	Arizona	4	420	630
Ohio	160	16,000	22,880	Utah	23	4,347	3,391
Indiana	92	8,464	11,765	Nevada	15	3,105	3,726
Illinois	150	13,500	20,520				
				Idaho	39	6,084	4,806
Michigan	378	35,910	37,706	Washington	79	9,875	9,085
Wisconsin	307	34,998	31,498	Oregon	75	8,100	6,480
Minnesota	300	33,600	30,576	California	105	15,225	22,838
Iowa	138	13,110	17,174				
Missouri	109	9,483	12,992	United States	4,390	442,536	543,865

TABLE 81.—*Potatoes: Condition of crop, United States, on first of months named, 1896–1917.*

Year.	July.	Aug.	Sept.	Oct.	Year.	July.	Aug.	Sept.	Oct.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1896	99.0	94.8	83.2	81.7	1907	90.2	88.5	80.2	77.0
1897	87.8	77.9	66.7	61.6	1908	89.6	82.9	73.7	68.7
1898	95.5	83.9	77.7	72.5	1909	93.0	85.8	80.9	78.8
1899	93.8	93.0	86.3	81.7	1910	86.3	75.8	70.5	71.8
1900	91.3	88.2	80.0	74.4	1911	76.0	62.3	59.8	62.3
1901	87.4	62.3	52.2	54.0	1912	88.9	87.8	87.2	85.1
1902	92.9	94.8	89.1	82.5	1913	86.2	78.0	69.9	67.7
1903	88.1	87.2	84.3	74.6	1914	83.6	79.0	75.8	78.3
1904	93.9	94.1	91.6	89.5	1915	91.2	92.0	82.7	74.2
1905	91.2	87.2	80.9	74.3	1916	87.8	80.8	67.4	62.6
1906	91.5	89.0	85.3	82.2	1917	90.1	87.9	82.7	79.0

POTATOES—Continued.

TABLE 82.—*Potatoes: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average, 1908–1917.	1913	1914	1915	1916	1917	5-year average, 1912–1916.	1917
Me	205	225	225	220	180	198	220	260	179	204	135	71	53	33	70	142	130	145.26	175.50
N. H	125	100	130	150	125	140	122	159	95	120	107	91	83	60	95	166	167	114.30	178.69
Vt	122	73	155	130	105	140	127	168	108	112	100	77	72	47	81	139	140	98.11	140.00
Mass	115	95	125	125	93	130	105	155	120	91	115	100	85	71	94	175	175	113.77	201.25
R. I	125	150	125	136	110	113	130	165	110	74	135	103	90	70	92	185	175	111.52	236.25
Conn	105	80	120	125	85	107	92	140	95	95	110	101	87	65	96	175	164	102.39	180.40
N. Y	93	82	120	102	74	106	74	145	62	70	95	82	80	44	82	158	130	69.18	123.50
N. J	102	72	90	105	73	108	95	108	130	122	114	92	82	61	75	155	141	100.33	160.74
Pa	83	72	78	88	56	109	88	105	72	70	92	84	80	58	75	148	135	70.21	124.20
Del	89	82	96	103	60	100	87	80	95	90	95	86	75	70	75	125	130	75.00	123.50
Md	87	77	80	95	45	112	87	78	97	95	100	78	67	60	62	133	119	71.31	119.00
Va	92	88	92	98	45	87	94	65	125	130	99	84	80	77	61	137	125	87.23	123.75
W. Va	89	84	98	92	45	112	83	54	117	88	115	91	90	81	65	158	132	80.59	151.80
N. C	78	79	74	89	48	85	80	52	90	95	90	94	82	92	73	140	143	75.35	128.70
S. C	82	81	85	90	70	90	80	70	80	75	96	132	130	125	115	175	210	103.11	201.60
Ga	74	78	81	82	72	78	81	60	65	60	84	119	105	105	99	175	195	77.05	163.80
Fla	85	83	95	90	90	93	76	80	80	74	91	136	117	113	115	200	205	104.32	186.55
Ohio	82	77	93	82	65	112	64	95	82	45	100	85	85	53	70	182	143	60.68	143.00
Ind	77	57	95	84	58	114	53	80	95	44	92	84	84	56	56	177	139	55.48	127.88
Ill	75	71	91	75	50	101	46	60	110	58	90	89	89	61	59	179	152	61.37	136.80
Mich	90	72	105	105	94	105	96	121	59	48	95	61	53	30	56	160	105	48.01	99.75
Wis	99	80	102	95	116	120	109	124	87	47	114	60	54	30	45	147	90	49.02	102.60
Minn	100	76	115	61	115	135	110	114	106	60	112	58	52	32	39	130	91	50.16	101.92
Iowa	80	80	89	72	74	109	48	86	105	42	95	80	82	59	54	175	131	54.09	124.45
Mo	69	80	85	86	27	84	38	45	98	60	87	92	93	73	60	180	137	58.59	119.19
N. Dak	90	85	110	41	120	128	85	109	90	93	43	66	56	42	41	115	130	54.61	55.90
S. Dak	83	90	80	44	72	105	78	90	115	66	90	70	63	47	35	137	111	51.98	99.90
Nebr	74	78	78	60	52	80	48	80	105	73	85	77	78	54	42	150	107	55.01	90.95
Kans	63	80	79	57	22	82	40	62	83	71	57	99	91	77	74	165	152	64.51	86.64
Ky	79	62	92	92	39	101	49	45	126	84	96	90	102	84	55	142	140	68.81	134.40
Tenn	74	80	75	80	41	88	64	43	88	82	94	91	97	91	63	149	126	68.09	118.44
Ala	81	85	80	80	78	81	84	79	80	90	72	114	105	101	90	169	182	93.00	131.04
Miss	83	91	87	85	83	89	80	80	90	65	78	109	100	95	84	160	168	83.14	131.04
La	67	82	75	55	69	73	70	70	51	65	64	110	96	97	95	167	184	70.54	117.76
Tex	58	71	50	51	57	63	52	61	65	50	60	127	112	104	105	190	210	70.22	126.00
Okla	62	78	70	60	18	60	60	70	85	53	69	116	105	90	84	195	180	71.31	124.20
Ark	73	82	70	84	55	70	72	60	90	65	80	109	100	97	76	190	157	77.30	125.60
Mont	141	138	180	120	150	165	140	140	155	125	95	72	67	64	50	120	102	95.38	96.90
Wyo	128	158	160	100	42	140	140	108	150	130	155	84	65	70	60	128	104	101.40	161.20
Colo	116	125	160	100	35	95	115	120	135	138	133	71	65	50	55	135	91	86.85	121.03
N. Mex	90	100	85	47	80	100	68	100	100	102	116	113	140	95	95	175	165	105.74	191.40
Ariz	101	110	90	92	95	125	75	110	95	115	105	134	135	120	100	180	150	138.30	157.50
Utah	162	160	180	142	140	185	180	140	125	180	189	68	58	60	63	130	78	118.36	147.42
Nev	165	120	180	150	160	178	160	130	172	190	207	85	68	70	70	130	120	134.80	248.40
Idaho	159	130	200	142	180	185	170	155	125	150	156	63	50	48	56	127	79	94.71	123.24
Wash	142	120	170	131	160	167	123	128	135	165	125	65	60	55	53	98	92	87.51	115.00
Oreg	125	99	160	105	130	155	135	97	115	150	108	64	58	60	60	90	80	77.71	86.40
Cal	130	107	130	130	135	130	119	138	130	141	145	90	70	70	75	140	150	111.86	217,50
U. S	95.9	85.7	106.8	93.8	80.9	113.4	90.4	110.5	96.3	80.5	100.8	76.0	68.7	48.7	61.7	146.1	122.9	70.05	123.89

[1] Based upon farm price Dec. 1.

POTATOES—Continued.

TABLE 83.—*Potatoes: Farm price per bushel on first of each month, by geographical divisions, 1916 and 1917.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	117.3	70.6	152.8	85.1	141.4	77.4	159.1	67.5	151.2	57.9	165.3	81.7	122.4	63.0
February	172.4	88.0	188.3	106.4	164.6	88.4	187.4	87.4	165.3	73.4	191.2	100.5	139.6	76.1
March	210.7	94.4	270.3	109.2	219.0	94.1	247.2	88.7	226.7	82.4	269.3	119.6	204.1	87.8
April	234.7	97.6	241.5	113.6	237.0	100.2	239.6	90.5	235.7	85.1	282.5	121.9	201.8	90.4
May	279.6	94.8	295.0	109.8	264.8	102.6	300.5	87.7	276.4	81.1	308.7	112.3	239.6	91.1
June	274.0	98.8	293.0	114.8	263.6	108.0	287.6	91.9	273.0	84.3	284.3	107.9	235.8	97.1
July	247.9	102.3	260.9	121.2	239.9	101.3	257.2	96.6	254.4	90.2	248.9	109.9	217.7	96.6
August	170.8	95.4	176.4	101.5	162.4	85.3	153.3	96.0	169.1	83.0	176.8	88.3	181.1	116.9
September	139.1	109.3	144.0	106.8	132.4	91.9	112.8	128.1	125.1	105.0	172.6	105.6	159.0	104.0
October	122.1	112.0	124.3	110.7	120.8	93.8	107.3	132.3	117.7	112.0	156.8	126.4	124.7	85.8
November	127.8	135.7	146.4	146.5	131.4	127.4	118.3	149.0	115.3	130.9	157.4	148.5	106.0	102.0
December	122.9	146.1	136.4	151.3	136.7	143.7	114.2	163.4	111.5	144.6	159.7	165.6	106.0	120.2

TABLE 84.—*Potatoes: Wholesale price, 1912–1917.*

Date.	New York.		Chicago.		Minneapolis.		St. Louis.		Cincinnati.		Denver.		San Francisco.	
	State and western, per 180 pounds.		Fair to fancy, per bushel.		Per bushel.		Burbank,[1] per bushel.		Per bushel.		Per 100 pounds.		Burbank, Rivers, per 100 pounds.[1]	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.														
Jan.–June	......	......	$0.50	$2.00	......	......	$0.90	$1.52	$0.88	$1.50	......	......	......	......
July–Dec	......	......	.32	1.15	......	......	.35	1.20	.50	1.15	......	......	......	......
1913.														
Jan.–June	$1.70	$2.87	.15	.70	$0.33	$0.60	.30	.87	.30	1.00	$0.50	$4.00	$0.20	$1.65
July–Dec	1.75	2.37	.50	.82	.50	1.00	.45	.93	.65	1.00	.60	2.50	.50	1.25
1914.														
Jan.–June	2.00	3.00	.56	1.75	.55	1.35	.65	1.60	.65	1.15	1.00	2.50	.80	1.65
July–Dec	1.25	2.12	.28	1.65	.28	1.50	.33	1.50	.45	1.70	.90	2.75	.60	1.30
1915.														
Jan.–June	1.00	1.75	.18	1.50	.30	.65	.38	.55	.30	.50	.90	2.25	1.00	3.50
July–Dec	1.75	3.00	.17	.95	.25	1.00	.22	.96	.30	.90	.85	2.25	.85	1.50
1916.														
January	2.85	3.85	.80	1.30	.75	1.35	.94	1.13	.65	1.18	1.40	2.15	.90	1.60
February	3.00	3.60	.80	1.30	.87	1.25	.88	1.03	1.05	1.10	1.50	2.15	1.00	1.60
March	3.30	3.75	.80	1.05	.77	1.20	.73	1.09	1.00	1.12	1.50	2.00	1.00	1.75
April	3.00	3.85	.60	1.00	.62	1.10	.78	1.06	.85	1.12	1.50	2.00	1.25	1.75
May	3.00	3.90	.80	1.10	.75	1.25	.92	1.28	.85	1.30	1.65	5.00	1.00	1.60
June	3.00	3.90	.85	1.30	.85	1.20	1.03	1.35	1.15	1.30	1.65	3.25	1.35	2.25
Jan.–June.	2.85	3.90	.60	1.30	.62	1.35	.73	1.35	.65	1.30	1.40	5.00	.90	2.25
July	......	......	.65	1.05	.75	1.10	.50	.83	.80	1.25	1.65	3.25	1.30	1.90
August	......	......	.65	1.90	.90	1.05	.55	2.00	.80	1.15	1.65	3.00	1.15	2.25
September	......	......	.95	2.00	1.05	1.50	.90	2.10	.90	1.30	1.75	2.50	1.00	2.00
October	3.40	5.00	1.00	1.90	1.00	1.50	1.10	1.73	1.25	1.70	1.75	3.00	1.25	2.50
November	4.50	5.25	1.35	1.85	1.50	1.75	1.53	1.80	1.50	1.75	2.50	3.00	1.85	2.40
December	4.25	5.25	1.25	1.90	1.40	1.70	1.38	1.85	1.65	1.90	2.25	3.00	1.96	2.27
July–Dec.	3.40	5.25	.65	2.00	.75	1.75	.50	2.10	.80	1.90	1.65	3.25	1.00	2.50

[1] 1917 quotations refer to various kinds, for San Francisco.

POTATOES—Continued.

TABLE 84.—*Potatoes: Wholesale price, 1912–1917*—Continued.

Date.	New York. State and western, per 180 pounds.		Chicago. Fair to fancy, per bushel.		Minneapolis Per bushel.		St. Louis. Burbank, per bushel.		Cincinnati. Per bushel.		Denver. Per 100 pounds.		San Francisco. Burbank, Rivers, per 100 pounds.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1917.														
January	4.75	7.00	1.60	2.25	1.50	2.25	1.70	2.18	1.85	2.20	2.25	3.50	2.00	3.00
February	6.00	10.50	1.90	3.05	1.80	2.80	1.98	2.93	2.15	3.00	3.00	5.25	2.75	4.10
March	6.75	9.00	2.00	2.85	2.10	3.05	2.13	2.70	2.45	3.00	3.50	5.25	2.75	4.00
April	7.00	10.25	2.25	4.50	2.15	3.10	2.23	3.28	2.45	3.35	3.50	5.75	2.90	5.00
May	8.25	11.00	2.00	3.75	2.35	2.90	2.25	3.35	2.50	3.25	5.00	6.50	2.50	4.50
June	9.00	11.00	1.00	3.70	2.40	4.20	3.00	3.33	2.40	3.90	4.15	6.25	1.90	4.00
Jan.-June.	4.75	11.00	1.00	4.50	1.50	4.20	1.70	3.35	1.85	3.90	2.25	6.50	1.90	5.00
July	......	......	1.00	2.85	1.00	2.75	......	......	1.50	2.50	3.00	4.25	1.75	2.50
August	......	......	.90	1.65	1.10	1.30	......	......	1.25	1.70	2.25	4.00	2.00	2.75
September	3.00	4.75	.90	1.40	.90	1.40	1.05	1.50	1.10	1.30	2.00	2.75	1.75	2.35
October	4.00	5.75	1.00	1.60	.90	1.45	1.14	1.70	1.10	1.60	2.00	2.75	1.75	2.35
November	3.45	4.75	.96	1.50	1.17	1.50	.90	1.50	2.25	2.75	2.25	2.75	1.75	2.10
December	3.50	4.73	.93	1.35	.99	1.29	.87	1.44	2.15	2.75	2.00	2.75	1.25	1.95
July-Dec.	3.00	5.75	.90	2.85	.90	2.75	.87	1.70	1.10	2.75	2.00	4.25	1.25	2.75

TABLE 85.—*Potatoes: International trade, calendar years 1911–1916.*

GENERAL NOTE.—Substantially the international trade of the world. It should not be expected that the world export and import totals for any year will agree. Among sources of disagreement are these (1) Different periods of time covered in the "year" of the various countries; (2) imports received in year subsequent to year of export; (3) want of uniformity in classification of goods among countries; (4) different practices and varying degrees of failure in recording countries of origin and ultimate destination; (5) different practices of recording reexported goods; (6) opposite methods of treating free ports; (7) clerical errors, which, it may be assumed, are not infrequent.

The exports given are domestic exports, and the imports given are imports for consumption as far as it is feasible and consistent so to express the facts. While there are some inevitable omissions, on the other hand there are some duplications because of reshipments that do not appear as such in official reports. For the United Kingdom, import figures refer to imports for consumption, when available, otherwise total imports, less exports, of "foreign and colonial merchandise." Figures for the United States include Alaska, Porto Rico, and Hawaii.

EXPORTS.

[000 omitted.]

Country.	Average, 1911–1913.	1915 (prelim.)	1916 (prelim.)	Country.	Average, 1911–1913.	1915 (prelim.)	1916 (prelim.)
From—	*Bush.*	*Bush.*	*Bush.*	*From—*	*Bush.*	*Bush.*	*Bush.*
Argentina	543	224	1,014	Netherlands	16,451	8,819	6,238
Austria-Hungary	1,451	......	......	Portugal	500	90	......
Belgium	8,692	......	......	Russia	7,762	319	45
Canada	1,207	885	1,558	Spain	1,835	2,101	1,956
China	288	375	334	United Kingdom	6,246	1,231	1,346
Denmark	928	......	......	United States	1,814	3,900	3,230
France	8,683	3,865	1,819	Other countries	1,924	1,395	......
Germany	12,412	......	......				
Italy	3,975	391	2,066	Total	75,151	23,978	......
Japan	440	383	454				

IMPORTS.

Country.	Average, 1911–1913.	1915 (prelim.)	1916 (prelim.)	Country.	Average, 1911–1913.	1915 (prelim.)	1916 (prelim.)
Into—				*Into—*			
Algeria	1,218	979	......	Norway	215	64	488
Argentina	1,337	1,533	235	Philippine Islands	334	317	305
Austria-Hungary	4,070	......	......	Portugal	273	127	......
Belgium	4,921	......	......	Russia	309	287	2
Brazil	939	322	167	Sweden	700	......	......
Canada	525	348	573	Switzerland	3,172	1,117	2,857
Cuba	2,001	2,751	......	United Kingdom	11,382	4,011	3,331
Egypt	599	400	353	United States	5,707	236	886
Finland	479	412	109	Other countries	2,311	1,774	......
France	7,143	1,330	2,577				
Germany	29,180	......	......	Total	78,767	16,087	......
Netherlands	1,952	79	2				

SWEET POTATOES.

TABLE 86.—*Sweet potatoes: Acreage, production, and value, in the United States, 1849-1917.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Bushels.*	*Cents.*	*Dollars.*
1849			*38,268,000*		
1859			*42,095,000*		
1869			*21,710,000*		
1879			*33,379,000*		
1889			*43,950,000*		
1899	*537,000*	*79.1*	*42,517,000*	*46.7*	*19,870,000*
1900	544,000	88.9	48,346,000	50.6	24,478,000
1901	547,000	81.7	44,697,000	57.5	25,720,000
1902	532,000	85.2	45,344,000	58.1	26,358,000
1903	548,000	89.2	48,870,000	58.3	28,478,000
1904	548,000	88.9	48,705,000	60.4	29,424,000
1905	551,000	92.6	51,034,000	58.3	29,734,000
1906	551,000	90.2	49,948,000	62.2	31,063,000
1907	565,000	88.2	49,813,000	70.0	34,858,000
1908	599,000	92.4	55,352,000	66.1	36,564,000
1909	*641,000*	*92.4*	*59,232,000*	69.4	41,052,000
1910	641,000	93.5	59,938,000	67.1	40,216,000
1911	605,000	90.1	54,538,000	75.5	41,202,000
1912	583,000	95.2	55,479,000	72.6	40,264,000
1913	625,000	94.5	59,057,000	72.6	42,884,000
1914	603,000	93.8	56,574,000	73.0	41,294,000
1915	731,000	103.5	75,639,000	62.1	46,980,000
1916	774,000	91.7	70,955,000	84.8	60,141,000
1917	953,000	91.4	87,141,000	110.3	96,121,000

TABLE 87.—*Sweet potatoes: Acreage, production, and total farm value, by States, 1917.*

[000 omitted.]

State.	Acreage.	Production.	Farm value Dec. 1.	State.	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Dollars.*		*Acres.*	*Bushels.*	*Dollars.*
New Jersey	24	2,880	4,608	Missouri	8	896	1,263
Pennsylvania	1	110	154	Kansas	4	368	589
Delaware	5	560	672	Kentucky	12	1,140	1,425
Maryland	10	1,180	1,180	Tennessee	30	2,850	2,992
Virginia	40	4,160	4,576	Alabama	178	16,020	14,738
West Virginia	2	280	392	Mississippi	85	5,525	5,359
North Carolina	90	8,550	8,978	Louisiana	62	4,898	5,094
South Carolina	80	7,600	7,904	Texas	84	6,552	9,173
Georgia	125	11,625	12,206	Oklahoma	15	1,350	2,160
Florida	35	3,500	4,025	Arkansas	40	4,400	4,224
Ohio	1	95	166	New Mexico	2	236	484
Indiana	3	318	525	California	6	1,002	1,503
Illinois	8	776	1,164				
Iowa	3	270	567	United States	953	87,141	96,121

SWEET POTATOES—Continued.

TABLE 88.—*Sweet potatoes: Condition of crop, United States, on first of months named, 1897–1917.*

Year.	July.	Aug.	Sept.	Oct.	Year.	July.	Aug.	Sept.	Oct.	Year.	July.	Aug.	Sept.	Oct.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1897...	86.5	86.4	85.4	....	1904...	87.3	88.5	89.9	86.1	1911...	78.4	77.7	79.1	78.1
1898...	......	92.0	90.6	89.9	1905...	90.6	90.1	89.5	88.6	1912...	86.9	85.0	84.1	82.0
1899...	85.1	84.1	80.7	74.9	1906...	90.9	91.2	88.7	86.0	1913...	86.5	85.8	81.4	80.1
1900...	93.7	92.2	83.6	80.0	1907...	85.9	85.7	85.7	82.7	1914...	77.1	75.5	81.8	80.7
1901...	93.1	80.7	78.7	79.0	1908...	89.8	88.8	88.7	85.5	1915...	88.7	85.5	87.5	85.0
1902...	83.6	78.3	77.2	79.7	1909...	89.7	86.9	81.3	77.8	1916...	90.4	85.9	82.7	79.2
1903...	90.2	88.7	91.1	83.7	1910...	87.3	85.7	83.9	80.2	1917...	81.9	84.8	85.7	83.2

TABLE 89.—*Sweet potatoes: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1908–1917.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	10-year average, 1908–1917.	1913.	1914.	1915.	1916.	1917.	5-year average, 1912–1916.	1917.
N. J..........	126	133	123	140	130	120	138	100	155	100	120	93	78	95	70	120	160	106.39	192.00
Pa............	107	102	88	105	121	120	110	105	105	100	110	96	90	86	75	135	140	98.61	154.00
Del...........	125	125	125	115	140	120	135	120	135	125	112	72	60	70	62	81	120	86.31	134.40
Md............	122	110	115	110	115	125	141	125	130	126	118	72	60	70	70	88	100	90.55	118.00
Va............	102	95	100	100	90	90	108	92	110	130	104	76	70	76	65	90	110	80.30	114.40
W. Va........	107	72	100	101	110	115	91	92	110	140	140	101	100	98	92	126	140	112.45	196.00
N. C..........	97	93	99	105	86	90	100	90	105	107	95	65	61	65	56	75	105	62.87	99.75
S. C..........	93	88	95	91	84	105	92	85	105	86	95	73	75	70	65	85	104	68.25	98.80
Ga............	86	86	93	83	81	90	87	85	85	80	93	71	68	69	61	81	105	58.77	97.65
Fla...........	109	115	105	108	108	112	110	120	112	100	100	80	75	80	68	86	115	84.48	115.00
Ohio..........	101	83	110	98	113	118	90	110	95	99	95	108	106	96	98	150	175	109.05	166.2
Ind...........	99	71	101	104	114	116	78	100	104	100	106	105	103	90	90	150	165	103.44	174.90
Ill............	94	80	110	110	89	98	70	84	110	90	97	104	106	95	82	125	150	89.96	145.50
Iowa..........	95	93	110	98	105	90	80	100	95	91	90	130	150	127	108	192	210	124.30	189.00
Mo............	88	91	90	102	91	88	56	84	100	70	112	103	105	96	82	150	141	82.01	157.92
Kans.........	93	105	96	101	75	99	50	110	110	92	92	117	110	106	100	150	160	104.31	147.20
Ky............	91	84	88	85	96	90	75	105	105	90	95	87	94	77	70	100	125	78.27	118.75
Tenn.........	92	89	87	85	85	90	80	100	105	100	95	75	80	69	59	87	105	69.35	99.75
Ala...........	89	85	80	85	97	100	95	93	90	74	90	69	67	65	57	74	92	60.23	82.80
Miss..........	90	92	82	94	85	97	98	90	110	82	65	66	62	.63	55	67	97	58.61	63.05
La............	88	86	90	93	90	84	85	87	92	90	79	67	70	64	50	66	104	55.04	82.16
Tex...........	79	88	50	56	71	75	80	101	98	89	78	97	95	87	70	90	140	78.11	109.20
Okla..........	84	88	70	70	75	92	64	102	115	74	90	110	104	89	73	135	160	88.29	144.00
Ark...........	95	100	58	98	92	88	90	95	130	91	110	81	80	77	61	90	96	77.11	105.60
N. Mex.......	137	125	180	100	150	141	125	143	160	125	118	134	130	113	120	180	205	177.83	241.90
Cal...........	151	105	160	160	140	156	170	161	135	160	167	99	100	87	80	100	150	144.94	250.50
U. S....	93.6	92.4	90.1	93.5	90.1	95.2	94.5	93.8	103.5	91.7	91.4	75.5	72.6	73.0	62.1	84.8	110.3	69.62	100.86

[1] Based upon farm price Dec. 1.

SWEET POTATOES—Continued.

TABLE 90.—*Sweet potatoes: Wholesale price per barrel, 1912–1917.*

Date.	Baltimore.		St. Louis.		New Orleans.[1]		New York.			
							Jersey.		Southern.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.										
Jan.–June	$2.00	$4.50	$1.50	$3.50	$1.75	$2.00	$2.50	$3.50	$2.00	$3.00
July–Dec	1.00	6.00	.75	5.00	2.00	2.00	1.50	3.50	.50	6.00
1913.										
Jan.–June	2.00	3.50	1.63	3.75	2.00	2.00	2.00	3.00	1.75	2.50
July–Dec	.75	7.00	.88	6.25	2.00	2.00	1.25	3.50	.40	5.50
1914.										
Jan.–June	1.00	2.50	1.50	2.50	1.00	3.20	1.50	2.00	.75	1.50
July–Dec	1.00	5.50	1.75	4.50	.80	3.50	2.00	3.50	.75	5.00
1915.										
Jan.–June	1.50	5.50	2.50	4.50	1.00	3.00	2.50	3.00	2.00	3.50
July–Dec	.75	6.50	1.50	3.40	.70	3.00	.50	2.50	.50	5.00
1916.										
January	1.00	2.25	1.75	2.65	1.00	1.70	1.75	2.50	1.00	2.00
February	1.50	2.25	1.85	2.25	.50	1.70	1.75	2.50	....	....
March	1.50	2.50	1.50	2.10	.80	1.50	....	....	....	....
April	1.50	2.75	1.50	1.75	.80	1.30	....	....	1.50	2.00
May	1.75	3.00	1.50	1.50	.70	1.30	....	....	1.50	2.00
June	1.50	2.25	2.25	2.25	.50	1.20	....	....	....	....
Jan.–June	1.00	3.00	1.50	2.65	.50	1.70	1.75	2.50	1.00	2.00
July	4.00	5.50	....	....	.80	1.20	....	....	3.50	5.50
August	1.75	4.25	2.50	3.25	1.00	2.00	....	....	1.00	5.00
September	1.25	2.35	2.35	2.80	1.00	2.50	....	....	1.25	3.50
October	1.50	2.25	2.25	2.90	1.00	1.50	2.00	3.50	1.25	3.00
November	1.75	3.00	2.85	2.85	1.00	1.50	2.50	3.25	1.75	3.50
December	2.50	4.00	2.00	3.00	1.00	1.70	....	....	2.00	4.25
July–Dec	1.25	5.50	2.00	3.25	.80	2.50	2.00	3.25	1.00	5.50
1917.										
January	2.75	4.00	.75	1.40	.65	.90	....	....	....	....
February	3.00	5.50	1.10	2.00	.75	1.25	....	....	....	....
March	4.00	5.50	1.25	2.00	.65	1.25	....	....	3.75	5.25
April	3.50	6.00	1.50	2.25	1.00	2.25	....	....	2.50	5.00
May	4.50	6.00	2.00	2.75	2.00	2.25	....	....	....	....
June	4.50	6.00	....	....	....	....	....	....	....	....
Jan.–June	2.75	6.00	.75	2.75	.65	2.25	....	....	2.50	5.25
July	10.00	12.00	....	....	....	....	....	....	....	....
August	3.00	8.50	1.25	2.50	....	....	....	....	1.25	9.00
September	2.50	4.25	.50	1.75	....	....	4.00	5.00	1.25	5.75
October	2.25	3.50	.40	1.35	....	....	3.25	5.00	1.50	5.00
November	.50	3.50	.75	1.50	.90	1.60	1.50	5.00	.50	4.00
December	1.00	6.00	1.10	2.00	.80	1.60	....	....	1.00	4.00
July–Dec	.50	12.00	.40	2.50	.80	1.60	1.50	5.00	.50	9.00

[1] Prices as quoted were per half-barrel sack of 80 pounds; barrel prices obtained by doubling same.

HAY.

TABLE 91.—*Hay: Acreage, production, value, exports, etc., in the United States, 1849–1917.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per ton Dec. 1.	Farm value Dec. 1.	Chicago prices No. 1 timothy per ton, by carload lots. December.		Following May.		Domestic exports, fiscal year beginning July 1.
						Low.	High.	Low.	High.	
	Acres.	*Tons.*[1]	*Tons.*[1]	*Dolls.*	*Dollars.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Tons.*[2]
1849			*13,839,000*							
1859			*19,084,000*							
1866	17,669,000	1.23	21,779,000	10.14	220,836,000					5,028
1867	20,021,000	1.31	26,277,000	10.21	268,301,000					5,645
1868	21,542,000	1.21	26,142,000	10.08	263,589,000					
1869	18,591,000	1.42	26,420,000	10.18	268,933,000					6,723
1869			*27,316,000*							
1870	19,862,000	1.23	24,525,000	12.47	305,743,000					4,581
1871	19,009,000	1.17	22,239,000	14.30	317,940,000					5,266
1872	20,319,000	1.17	23,813,000	12.94	308,025,000					4,557
1873	21,894,000	1.15	25,085,000	12.53	314,241,000					4,889
1874	21,770,000	1.15	25,134,000	11.94	300,222,000					7,183
1875	23,508,000	1.19	27,874,000	10.78	300,378,000					7,528
1876	25,283,000	1.22	30,867,000	8.97	276,991,000			9.00	10.00	7,287
1877	25,368,000	1.25	31,629,000	8.37	264,880,000	9.50	10.50	9.75	10.75	9,514
1878	26,931,000	1.47	39,608,000	7.20	285,016,000	8.00	8.50	9.00	11.50	8,127
1879	27,485,000	1.29	35,493,000	9.32	330,804,000	14.00	14.50	14.00	15.00	13,739
1879	*30,631,000*	*1.15*	*35,151,000*							
1880	25,864,000	1.23	31,925,000	11.65	371,811,000	15.00	15.50	17.00	19.00	12,662
1881	30,889,000	1.14	35,135,000	11.82	415,131,000	16.00	16.50	15.00	16.50	10.570
1882	32,340,000	1.18	38,138,000	9.73	371,170,000	11.50	12.25	12.00	13.00	13,309
1883	35,516,000	1.32	46,864,000	8.19	383,834,000	9.00	10.00	12.50	17.00	16,908
1884	38,572,000	1.26	48,470,000	8.17	396,139,000	10.00	11.50	15.50	17.50	11,142
1885	39,850,000	1.12	44,732,000	8.71	389,753,000	11.00	12.00	10.00	12.00	13,390
1886	36,502,000	1.15	41,796,000	8.46	353,438,000	9.50	10.50	11.00	12.50	13,873
1887	37,665,000	1.10	41,454,000	9.97	413,440,000	13.50	14.50	17.00	21.00	18,198
1888	38,592,000	1.21	46,643,000	8.76	408,500,000	11.00	11.50	10.50	21.00	21,928
1889	52,949,000	1.26	66,831,000	7.04	470,394,000	9.00	10.00	9.00	14.00	36,274
1889	*52,949,000*	*1.26*	*66,831,000*							
1890	50,713,000	1.19	60,198,000	7.87	473,570,000	9.00	10.50	12.50	15.50	28,066
1891	51,044,000	1.19	60,818,000	8.12	494,114,000	12.50	15.00	13.50	14.00	35,201
1892	50,853,000	1.18	59,824,000	8.20	490,428,000	11.00	11.50	12.00	13.50	33,084
1893	49,613,000	1.33	65,766,000	8.68	570,883,000	10.00	10.50	10.00	10.50	54,446
1894	48,321,000	1.14	54,874,000	8.54	468,578,000	10.00	11.00	10.00	10.25	47,117
1895	44,206,000	1.06	47,079,000	8.35	393,186,000	12.00	12.50	11.50	12.00	59,052
1896	43,260,000	1.37	59,282,000	6.55	388,146,000	8.00	8.50	8.50	9.00	61,658
1897	42,427,000	1.43	60,665,000	6.62	401,391,000	8.00	8.50	9.50	10.50	81,827
1898	42,781,000	1.55	66,377,000	6.00	398,061,000	8.00	8.25	9.50	10.50	64,916
1899	41,328,000	1.37	56,656,000	7.27	411,926,000	10.50	11.50	10.50	12.50	72,716
1899	*43,127,000*	*1.25*	*53,828,000*							
1900	39,133,000	1.28	50,111,000	8.89	445,539,000	11.50	14.00	12.50	13.50	89,364
1901	39,391,000	1.28	50,591,000	10.01	506,192,000	13.00	13.50	12.50	13.50	153,431
1902	39,825,000	1.50	59,858,000	9.06	542,036,000	12.00	12.50	13.50	15.00	50,974
1903	39,934,000	1.54	61,306,000	9.07	556,276,000	10.00	12.00	12.00	15.00	60,730
1904	39,999,000	1.52	60,696,000	8.72	529,108,000	10.50	11.50	11.00	12.00	66,557
1905	39,362,000	1.54	60,532,000	8.52	515,960,000	10.00	12.00	11.50	12.50	70,172
1906	42,476,000	1.35	57,146,000	10.37	592,540,000	15.50	18.00	15.50	20.50	58,602
1907	44,028,000	1.45	63,677,000	11.68	743,507,000	13.00	17.50	13.00	14.00	77,281
1908	45,970,000	1.52	70,050,000	9.02	631,683,000	11.50	12.00	12.00	13.00	64.641
1909	45,744,000	1.42	64,938,000							
1909	*51,041,000*	*1.35*	*68,833,000*	10.49	722,385,000	16.00	17.00	12.50	16.00	55,007
1910[3]	51,015,000	1.36	69,378,000	12.14	842,252,000	16.00	19.00	18.50	23.50	55,223
1911	48,240,000	1.14	54,916,000	14.29	784,926,000	20.00	22.00	24.00	28.00	59,730
1912	49,530,000	1.47	72,691,000	11.79	856,695,000	13.00	18.00	14.00	16.50	60,720
1913	48,954,000	1.31	64,116,000	12.43	797,077,000	14.50	18.00	15.00	17.50	50,151
1914	49,145,000	1.43	70,071,000	11.12	779,068,000	15.00	16.00	16.50	17.50	105,508
1915	51,108,000	1.68	85,920,000	10.63	913,644,000	14.50	16.50	17.50	20.00	178,336
1916	55,721,000	1.64	91,192,000	11.22	1,022,930,000	15.00	17.50	19.00	22.00	85,529
1917	53,516,000	1.49	79,528,000	17.09	1,359,491,000	26.00	28.00			

[1] 2,000 pounds. [2] 2,240 pounds. [3] Figures adjusted to census basis.

HAY—Continued.

TABLE 92.—*Hay: Acreage, production, and total farm value, by States, 1917.*

[000 omitted.]

State.	Acreage.	Production.	Farm value Dec. 1.	State	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Dollars.*		*Acres.*	*Bushels.*	*Dollars.*
Maine	1,160	1,566	17,383	North Dakota	550	484	5,566
New Hampshire	506	683	8,196	South Dakota	735	1,102	11,681
Vermont	945	1,531	17,606	Nebraska	1,590	2,544	38,669
Massachusetts	460	690	13,731	Kansas	1,478	2,217	36,802
Rhode Island	60	90	1,827	Kentucky	975	1,268	25,740
Connecticut	350	525	10,238	Tennessee	892	1,142	22,041
New York	4,185	6,110	92,261	Alabama	1,448	1,158	18,760
New Jersey	350	508	10,160	Mississippi	261	371	5,676
Pennsylvania	3,092	4,329	75,758	Louisiana	260	416	5,949
Delaware	78	98	2,009	Texas	450	450	9,000
Maryland	442	552	10,985	Oklahoma	575	920	14,168
Virginia	850	986	21,002	Arkansas	390	573	8,824
West Virginia	790	1,003	21,163	Montana	759	1,063	19,772
North Carolina	440	528	10,402	Wyoming	560	952	16,184
South Carolina	250	280	5,768	Colorado	970	2,376	39,442
Georgia	535	562	11,240	New Mexico	202	384	8,064
Florida	100	110	2,002	Arizona	157	550	13,640
Ohio	2,925	4,154	78,926	Utah	392	1,137	17,055
Indiana	2,146	3,004	56,175	Nevada	234	679	10,796
Illinois	2,750	3,438	68,760				
				Idaho	725	2,175	34,800
Michigan	2,558	3,837	65,996	Washington	808	1,778	35,560
Wisconsin	2,703	4,595	79,494	Oregon	840	1,638	28,665
Minnesota	1,850	2,868	34,703	California	2,400	4,560	87,552
Iowa	3,160	3,887	65,302				
Missouri	3,180	3,657	63,998	United States.	53,516	79,528	1,359,491

TABLE 93.—*Hay: Yield per acre, price per ton Dec. 1, and value per acre, by States.*

State.	Average yield per acre (tons).											Farm price per ton (dollars).						Value per acre (dollars).[1]	
	10-year average 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average, 1908–1917	1913	1914	1915	1916	1917	5-year average, 1912–1916	1917
Me.	1.15	0.90	0.95	1.25	1.10	1.16	1.00	1.15	1.15	1.45	1.35	13.50	13.90	13.10	14.90	12.40	11.10	15.99	14.98
N. H.	1.13	.92	.97	1.20	1.05	1.25	1.00	1.15	1.00	1.45	1.35	16.00	17.20	17.00	17.40	14.50	12.00	18.78	16.20
Vt.	1.37	1.11	1.25	1.35	1.30	1.50	1.28	1.20	1.35	1.70	1.62	13.73	14.50	14.60	15.50	12.60	11.50	19.88	18.63
Mass.	1.30	1.20	1.15	1.28	1.08	1.25	1.21	1.32	1.50	1.56	1.50	20.30	21.10	21.50	22.00	19.00	19.90	28.69	29.85
R. I.	1.23	1.50	1.10	1.18	1.00	1.13	1.17	1.17	1.24	1.35	1.50	20.60	21.20	20.20	22.50	20.00	20.30	25.68	30.45
Conn.	1.27	1.20	1.15	1.35	1.10	1.15	1.14	1.25	1.35	1.55	1.50	19.76	20.10	19.50	20.00	18.50	19.50	25.77	29.25
N. Y.	1.25	1.20	1.05	1.32	1.02	1.25	1.14	1.20	1.30	1.62	1.46	14.56	15.30	14.60	15.70	11.90	15.10	18.65	22.05
N. J.	1.40	1.60	1.25	1.50	1.05	1.44	1.30	1.35	1.45	1.60	1.45	18.58	19.00	19.50	19.00	17.60	20.00	27.11	29.00
Pa.	1.35	1.50	1.20	1.38	1.00	1.43	1.32	1.28	1.40	1.60	1.40	15.35	14.90	14.50	15.60	13.80	17.50	20.89	21.50
Del.	1.30	1.60	1.40	1.43	.88	1.33	1.30	1.10	1.20	1.45	1.26	16.59	15.70	17.00	17.00	15.90	20.50	20.50	25.83
Md.	1.27	1.60	1.20	1.35	.72	1.51	1.26	1.15	1.20	1.48	1.25	15.92	15.20	15.30	16.20	14.00	19.90	19.73	24.88
Va.	1.15	1.30	1.30	1.19	.64	1.20	1.27	.72	1.35	1.35	1.16	16.04	15.50	17.20	15.70	15.00	21.30	18.35	24.71
W. Va.	1.24	1.45	1.25	1.20	.66	1.38	1.25	.92	1.50	1.54	1.27	15.70	14.90	17.20	15.00	14.50	21.10	19.99	26.80
N. C.	1.35	1.50	1.38	1.50	1.05	1.30	1.31	1.15	1.85	1.30	1.20	16.35	16.50	17.10	16.50	17.50	19.70	23.23	23.64
S. C.	1.20	1.25	1.23	1.25	1.08	1.15	1.16	1.15	1.30	1.30	1.12	16.99	18.70	17.00	15.60	16.70	20.60	20.79	23.07
Ga.	1.33	1.75	1.35	1.40	1.35	1.35	1.40	1.35	1.15	1.15	1.05	16.60	17.90	16.20	15.10	16.20	20.00	21.17	21.00
Fla.	1.29	1.35	1.38	1.33	1.30	1.25	1.35	1.35	1.20	1.25	1.10	16.90	18.20	17.20	16.00	16.00	18.20	21.92	20.02
Ohio.	1.36	1.53	1.43	1.39	.98	1.36	1.30	1.13	1.44	1.57	1.42	13.25	12.80	13.40	12.70	10.60	19.00	16.88	26.98
Ind.	1.28	1.50	1.40	1.30	.94	1.37	1.00	1.00	1.50	1.44	1.40	12.82	14.10	14.10	11.00	10.90	18.70	15.20	26.18
Ill.	1.25	1.53	1.45	1.33	.82	1.30	.98	.85	1.54	1.45	1.25	13.03	14.10	14.40	10.80	11.30	20.00	15.09	25.00

[1] Based upon farm price Dec. 1.

HAY—Continued.

TABLE 93.—*Hay: Yield per acre, price per ton Dec. 1, and value per acre, by States*—Continued.

State.	Average yield per acre (tons).											Farm price per ton (dollars).						Value per acre (dollars).	
	10-year average 1908–1917	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average 1908–1917	1913	1914	1915	1916	1917	5-year average 1912–1916	1917
Mich	1.35	1.45	1.30	1.30	1.10	1.33	1.05	1.28	1.40	1.70	1.50	12.80	13.10	12.00	12.20	10.00	17.20	16.04	25.80
Wis	1.56	1.70	1.53	1.00	1.20	1.60	1.62	1.75	1.75	1.70	1.70	11.96	11.10	9.30	9.90	11.60	17.30	18.13	29.41
Minn	1.57	1.68	1.75	1.00	1.00	1.53	1.50	1.89	1.91	1.85	1.55	7.70	6.60	6.10	6.40	7.00	12.10	11.28	18.76
Iowa	1.41	1.70	1.64	1.05	.80	1.40	1.48	1.38	1.80	1.60	1.23	9.86	9.60	10.10	8.70	9.00	16.80	14.30	20.66
Mo	1.13	1.50	1.35	1.30	.60	1.30	.60	.70	1.52	1.30	1.15	11.10	14.50	13.60	8.50	9.30	17.50	11.19	20.12
N. Dak	1.24	1.30	1.37	.55	1.10	1.40	1.14	1.45	1.50	1.70	.88	6.41	5.80	5.20	5.70	6.00	11.50	8.12	10.12
S. Dak	1.41	1.50	1.50	.80	.55	1.46	1.20	1.70	2.00	1.90	1.50	6.44	6.50	5.70	5.30	5.40	10.60	9.45	15.90
Nebr	1.56	1.55	1.50	1.00	.85	1.35	1.34	1.69	2.60	2.10	1.60	8.16	8.70	6.90	5.80	7.10	15.20	12.93	24.32
Kans	1.42	1.50	1.45	1.15	.85	1.50	.90	1.51	2.30	1.55	1.50	8.67	12.50	7.40	5.60	7.60	16.60	11.70	24.90
Ky	1.21	1.35	1.36	1.29	.95	1.23	.87	.95	1.40	1.40	1.30	14.49	16.50	16.00	12.50	12.60	20.30	16.31	26.39
Tenn	1.32	1.50	1.50	1.40	1.00	1.30	1.21	1.20	1.47	1.38	1.28	15.19	16.20	17.00	13.90	15.00	19.30	20.33	24.70
Ala	1.32	1.60	1.50	1.43	1.40	1.25	1.36	1.31	1.45	1.10	.80	13.62	14.20	13.80	12.40	13.00	16.20	17.58	12.96
Miss	1.44	1.50	1.47	1.42	1.50	1.48	1.33	1.45	1.40	1.40	1.42	12.10	13.50	12.00	11.00	11.00	15.30	16.93	21.73
La	1.60	1.40	1.50	1.75	1.30	1.65	1.50	1.90	1.75	1.70	1.60	11.80	12.50	12.00	10.30	11.00	14.30	19.85	22.88
Tex	1.30	1.65	.95	1.15	1.00	1.40	1.16	1.75	1.70	1.20	1.00	11.44	11.80	9.80	7.90	10.50	20.00	14.29	20.00
Okla	1.30	1.45	.90	1.05	.80	1.25	.85	1.13	2.30	1.70	1.60	8.44	10.40	7.90	5.60	9.00	15.40	11.04	24.64
Ark	1.30	1.50	1.25	1.35	1.15	1.23	1.20	1.05	1.60	1.25	1.47	12.12	13.50	12.90	10.30	12.50	15.40	15.32	22.64
Mont	1.85	2.00	1.79	1.40	2.00	1.90	1.80	2.50	2.00	1.70	1.40	10.46	9.60	8.70	7.50	11.00	18.60	17.70	26.04
Wyo	2.07	2.00	2.40	2.40	2.10	1.90	1.90	2.30	2.20	1.80	1.70	9.87	6.70	7.50	7.80	12.00	17.00	17.02	28.90
Colo	2.23	2.50	2.50	2.00	2.00	2.19	2.05	2.40	2.20	2.05	2.45	10.02	10.00	7.40	7.60	11.00	16.60	19.32	40.67
N. Mex	2.23	2.00	2.60	2.10	2.60	2.33	2.08	2.50	2.20	2.00	1.90	11.88	12.10	9.30	8.80	14.00	21.00	23.12	39.90
Ariz	3.36	3.20	3.30	2.10	3.86	3.40	4.00	3.20	3.20	3.80	3.50	13.07	11.00	8.80	9.60	14.50	24.80	39.76	86.80
Utah	2.64	2.50	2.90	3.00	2.50	2.78	2.33	2.75	2.50	2.20	2.90	9.72	9.10	7.70	8.00	15.00	15.00	23.52	43.50
Nev	2.84	2.00	2.35	3.40	3.40	3.00	2.75	3.25	3.00	2.40	2.90	10.06	11.00	8.30	7.50	9.60	15.90	25.77	46.11
Idaho	2.88	3.25	2.85	3.00	3.10	2.80	2.30	2.65	2.70	2.50	3.00	8.94	7.20	7.30	7.70	12.10	16.00	21.78	48.00
Wash	2.24	2.25	2.10	2.10	2.40	2.20	2.30	2.20	2.30	2.40	2.20	12.93	10.90	11.00	10.80	13.80	20.00	25.89	44.00
Oreg	2.10	2.00	2.05	2.10	2.10	2.20	2.10	2.00	2.20	2.30	1.95	10.71	9.00	9.20	9.50	10.90	17.50	20.31	34.12
Cal	1.71	1.35	1.70	1.83	1.75	1.53	1.50	1.95	1.80	1.75	1.90	12.36	13.50	8.20	11.20	12.60	19.20	19.88	36.48
U. S.	1.45	1.52	1.42	1.36	1.14	1.47	1.31	1.43	1.68	1.64	1.49	12.04	12.43	11.12	10.63	11.22	17.09	17.13	25.40

TABLE 94.—*Hay: Farm price per ton on first of each month, by geographical divisions, 1916 and 1917.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
January	10.86	10.94	13.21	16.26	15.45	15.86	10.92	11.43	7.72	7.17	12.63	10.74	12.99	9.93
February	11.34	11.40	13.50	16.64	15.56	16.66	11.50	11.82	8.19	7.63	13.18	11.15	13.62	10.47
March	11.54	11.62	13.20	16.48	15.99	16.25	11.62	11.91	8.33	7.42	13.59	11.36	14.39	11.86
April	12.53	11.78	13.20	17.19	16.35	16.54	11.96	12.20	9.39	7.51	14.26	11.61	17.23	11.48
May	13.94	12.22	13.31	17.91	17.55	16.87	13.08	12.70	10.76	7.76	15.87	11.89	20.37	11.89
June	14.68	12.46	13.71	18.33	18.52	17.13	14.29	13.07	11.55	7.63	16.48	12.11	20.76	12.36
July	13.96	12.09	13.63	17.74	17.40	16.31	14.51	12.74	11.12	7.69	15.51	11.60	18.06	11.69
August	12.90	10.68	12.85	15.43	17.52	15.03	13.31	10.29	10.68	6.94	15.81	10.94	14.75	10.98
September	13.26	10.42	13.08	13.66	16.87	15.11	12.96	10.47	11.55	7.23	15.07	10.89	15.73	10.69
October	13.83	10.36	13.06	13.47	16.80	15.10	14.00	10.39	11.98	7.08	15.65	10.85	16.80	10.86
November	15.16	10.68	14.53	13.33	17.91	15.04	16.19	10.41	13.31	7.58	16.51	11.62	17.14	11.59
December	17.09	11.22	15.42	13.37	20.53	15.30	18.36	10.87	15.32	7.92	17.49	12.23	18.02	12.25

HAY.—Continued.

TABLE 95.—*Hay: Wholesale price (baled) per ton, 1912–1917.*

Date.	Chicago.		Cincinnati.		St. Louis.		New York.		San Francisco.	
	No. 1 timothy.		No. 1 timothy.		No. 1 timothy.		No. 1 timothy.[1]		No. 1 wheat, light bales.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.										
Jan.–June	$17.50	$28.00	$21.50	$31.00	$19.50	$31.00	$25.00	$32.00	....	....
July–Dec	13.00	22.00	15.50	27.00	13.00	24.50	21.50	29.00	....	....
1913.										
Jan.–June	13.00	18.50	14.00	19.00	12.00	18.50	19.50	23.00	....	....
July–Dec	13.50	19.50	15.25	21.00	13.50	24.00	20.00	22.00	....	....
1914.										
Jan.–June	13.50	17.50	17.50	21.00	15.00	23.00	19.50	23.00	$13.00	$21.00
July–Dec	13.00	18.50	17.50	21.50	14.50	22.50	18.50	25.00	{[2] 7.50 11.00}	14.00
1915.										
Jan.–June	14.50	18.00	18.00	22.00	16.00	22.00	25.00	11.00	14.00	....
July–Dec	12.00	21.00	13.00	23.00	12.00	24.00	31.50	13.00	18.00	....
1916.										
January	15.50	17.00	18.00	21.00	15.00	20.00	24.00	26.00	16.00	18.00
February	14.50	16.50	19.00	21.00	15.00	19.00	25.00	26.00	16.00	19.00
March	15.00	18.50	19.50	20.50	15.00	20.00	26.00	28.00	17.00	18.00
April	17.50	20.00	20.00	22.00	14.00	20.50	26.00	28.00	17.00	18.00
May	17.50	20.00	21.00	24.00	16.50	21.00	26.50	30.00	17.00	18.00
June	17.00	19.00	18.00	22.00	15.00	20.00	27.00	31.00	14.50	18.00
Jan.–June	14.50	20.00	18.00	24.00	14.00	21.00	24.00	31.00	14.50	19.00
July	14.00	18.00	18.00	18.50	11.00	19.50	24.00	28.00	14.50	16.50
August	9.50	18.00	15.00	18.00	11.50	18.00	24.00	25.00	15.00	17.00
September	12.50	18.00	16.00	16.50	13.00	17.25	20.00	26.00	16.00	18.50
October	14.50	17.00	14.25	16.50	14.00	17.00	18.00	20.00	17.50	18.50
November	13.00	17.00	15.00	16.50	14.50	17.50	18.50	23.00	17.50	19.00
December	15.00	17.50	15.50	16.50	15.50	18.50	19.00	22.00	18.00	20.00
July–Dec	9.50	18.00	14.25	18.50	11.00	19.50	18.00	28.00	14.50	20.00
1917.										
January	15.00	16.00	15.00	17.00	15.00	17.50	18.00	22.00	19.00	21.00
February	15.00	16.50	15.00	16.00	14.50	17.50	20.00	22.00	20.00	23.00
March	15.00	16.50	15.50	18.00	15.50	21.00	20.00	23.00	22.00	28.00
April	16.00	21.50	17.00	21.50	18.00	25.00	21.00	23.00	29.00	35.00
May	19.00	22.00	18.00	21.50	19.00	23.00	21.00	24.00	30.00	35.00
June	17.50	20.00	17.00	19.00	17.50	22.00	22.00	23.00	20.00	31.00
Jan.–June	15.00	22.00	15.00	21.50	14.50	25.00	18.00	24.00	19.00	35.00
July	16.50	19.00	16.50	18.75	15.00	22.00	20.00	22.50	19.00	24.00
August	17.50	24.00	18.00	20.00	15.00	28.00	21.00	24.00	22.00	24.00
September	19.00	23.00	19.00	23.00	21.00	25.50	23.00	25.00	21.00	25.00
October	22.00	28.00	22.00	27.50	23.00	31.00	23.00	25.00	25.00	28.00
November	26.00	28.50	27.00	30.00	28.00	30.00	26.00	34.00	27.00	34.00
December	26.00	28.00	28.50	30.00	29.00	32.00	28.00	32.00	29.00	30.00
July–Dec	16.50	28.50	16.50	30.00	15.00	32.00	20.00	34.00	19.00	34.00

[1] Per hundred pounds, 1900, 1901 and 1907.

[2] New hay.

CLOVER AND TIMOTHY SEED.

TABLE 96.—*Clover and timothy seed: Wholesale price, 1912–1917.*

Date.	Clover (bushels of 60 pounds). Cincinnati. Prime. Low.	Clover, Cincinnati, Prime. High.	Clover, Chicago. Poor to prime. Low.	Clover, Chicago, Poor to prime. High.	Clover, Toledo. Poor to choice. Low.	Clover, Toledo, Poor to choice. High.	Clover, Detroit. Low.	Clover, Detroit. High.	Timothy. Cincinnati. Per bushel (of 45 pounds). Low.	Timothy, Cincinnati, Per bushel. High.	Timothy, Chicago. Poor to choice (per 100 pounds). Low.	Timothy, Chicago, Poor to choice. High.	Timothy, Milwaukee. Per 100 pounds. Low.	Timothy, Milwaukee, Per 100 pounds. High.	Timothy, St. Louis. Poor to prime (per 100 pounds). Low.	Timothy, St. Louis, Poor to prime. High.
	Dols.	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*
1912.																
Jan.-June.....	10.00	13.00	5.40	13.80	4.00	14.20	12.00	14.00	4.00	6.50	11.50	16.25	5.00	15.50	2.50	15.50
July-Dec......	9.00	11.00	4.80	10.80	3.00	11.72½	10.25	12.50	1.50	5.00	3.80	12.00	2.50	10.00	2.75	10.00
1913.																
Jan.-June.....	8.00	11.50	4.20	13.20	3.00	13.85	11.15	13.40	1.50	1.80	2.50	5.40	2.50	4.60	2.00	4.00
July-Dec......	5.00	9.00	4.20	9.60	1.60	12.75	7.50	9.45	2.50	5.40	3.50	5.90	3.75	5.50	2.25	5.50
1914.																
Jan.-June.....	5.00	9.00	7.00	15.00	2.00	9.45	7.40	9.40	1.40	2.25	3.00	5.75	3.00	5.50	2.00	5.35
July-Dec......	5.00	9.25	9.00	18.50	2.40	11.40	8.20	11.25	1.40	2.70	3.50	7.85	3.50	7.00	3.25	7.00
1915.																
Jan.-June.....	6.50	9.65	7.00	14.55	7.25	9.55	7.85	9.60	2.00	3.60	4.00	7.00	4.50	7.00	3.00	7.00
July-Dec......	6.50	12.20	7.00	20.50	7.40	13.10	7.70	12.55	1.90	3.75	4.50	8.00	4.50	8.00	3.00	7.50
1916.																
January.......	8.40	10.50	8.00	19.00	11.65	12.10	11.85	12.10	2.30	3.30	5.00	8.00	4.75	8.00	6.00	7.50
February.....	8.75	11.50	9.00	22.00	11.95	13.70	12.00	13.25	2.30	3.30	4.50	8.50	4.75	8.50	5.75	7.15
March..........	7.75	11.25	10.00	20.50	10.65	12.75	10.75	12.75	2.00	3.20	4.00	8.00	4.00	7.75	3.75	6.50
April...........	7.00	9.00	7.00	17.00	8.30	10.70	8.75	10.75	1.85	3.00	4.00	8.00	4.00	7.75	5.00	6.25
May............	6.50	8.40	8.00	14.00	8.45	8.85	8.75	8.85	1.80	2.80	4.50	8.50	4.50	8.50	4.00	7.25
June...........	6.50	8.40	6.00	14.00	8.70	9.00	8.85	9.00	1.80	2.80	5.00	8.50	5.00	8.50	4.00	7.50
Jan.-June.	6.50	11.50	6.00	22.00	8.30	13.70	8.75	13.25	1.80	3.30	4.00	8.50	4.00	8.50	3.75	7.50
July...........	6.50	9.00	7.00	14.00	8.72½	9.35	8.90	9.30	1.50	2.80	4.00	7.50	4.50	8.00	4.00	6.80
August........	8.00	9.50	7.00	16.00	8.40	11.10	8.60	10.75	1.20	2.50	3.00	5.50	4.50	5.00	3.00	5.40
September....	7.00	9.00	6.00	14.75	8.80	10.05	8.75	9.70	1.20	1.90	3.00	5.00	4.35	5.25	3.25	4.65
October........	7.00	9.25	8.00	17.00	9.62½	10.85	9.50	10.60	1.20	2.00	3.00	5.50	3.50	5.50	3.00	4.75
November....	8.50	10.00	12.00	18.00	10.45	11.15	10.60	11.00	1.30	2.15	3.00	5.50	3.75	5.50	3.50	4.90
December.....	8.75	10.00	12.00	17.50	10.35	10.80	10.25	10.85	1.30	2.15	3.00	5.75	4.00	5.75	4.00	5.05
July-Dec..	6.50	10.00	6.00	18.00	8.40	11.15	8.60	11.00	1.20	2.80	3.00	7.50	3.50	8.00	3.00	6.80
1917.																
January.......	8.75	10.20	12.00	18.35	10.62	11.02½	10.65	11.00	1.30	2.00	3.00	5.50	4.00	5.75	4.15	4.75
February.....	9.00	11.00	12.00	19.90	10.90	11.97½	10.75	11.80	1.60	2.00	3.00	5.50	4.65	5.50	3.50	5.00
March..........	8.50	11.00	12.00	19.65	10.00	11.80	10.75	11.80	1.60	2.10	3.00	5.75	4.60	5.75	3.90	5.00
April...........	8.00	10.25	12.00	18.25	10.50	10.85	10.60	10.90	1.65	2.50	3.00	8.00	4.75	7.75	4.15	6.50
May............	8.40	10.60	12.00	18.75	10.60	11.25	10.70	11.10	2.50	3.35	4.00	8.40	6.75	8.40	5.50	7.60
June...........	9.20	10.60	12.00	18.75	10.75	11.20	10.80	11.20	2.65	3.35	7.00	8.25	6.50	8.40	6.00	7.60
Jan.-June.	8.00	11.00	12.00	19.90	10.00	11.97½	10.60	11.20	1.30	3.35	3.00	8.40	4.00	8.40	3.50	7.60
July...........	9.20	10.60	12.00	20.00	10.95	12.00	10.80	11.85	2.60	3.35	4.00	8.50	6.75	8.00	6.00	7.50
August........	9.50	11.50	14.00	21.50	11.00	13.00	11.90	12.50	2.75	3.50	4.00	8.50	7.00	8.50	6.50	8.25
September....	10.25	12.85	15.00	23.00	12.75	13.60	12.75	13.50	2.50	3.30	6.00	8.00	6.50	8.00	7.00	8.00
October........	10.65	13.10	17.00	25.65	13.50	15.25	13.50	15.25	2.50	3.15	5.50	8.50	6.50	8.50	6.75	7.60
November....	11.60	14.60	18.00	28.00	15.25	16.35	15.35	16.00	2.50	3.00	5.00	7.75	6.25	7.50	6.50	7.40
December.....	12.00	16.00	26.00	28.00	15.00	15.00	16.00	16.50	2.50	3.00	5.00	7.50	6.50	7.75	6.40	7.25
July-Dec..	9.20	16.00	12.00	28.00	10.95	16.35	10.80	16.50	2.50	3.50	4.00	8.50	6.25	8.50	6.00	8.25

COTTON.

TABLE 97.—*Cotton: Area and production of undermentioned countries, 1914–1916.*

[Bales of 478 pounds net.]

Country.	Area.			Production.		
	1914	1915	1916	1914	1915	1916
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bales.*	*Bales.*	*Bales.*
United States [1]	36,832,000	31,412,000	34,985,000	16,135,000	11,192,000	11,450,000
Porto Rico	(2)	(2)	(2)	[3] 693	[3] 739	[3] 379
St. Croix	(2)	(2)	(2)	[4] 290	(2)	(2)
West Indies:						
British—						
Barbados	2,985	(2)	(2)	598	[4] 648	[4] 299
Grenada	(2)	(2)	(2)	[4] 749	[4] 772	(2)
Jamaica	(2)	(2)	(2)	[4] 67	[4] 88	(2)
Leeward Islands	(2)	(2)	(2)	[4] 2,413	(2)	(2)
St. Lucia	(2)	(2)	(2)	[4] 11	[4] 7	(2)
St. Vincent	5,006	(2)	(2)	[4] 884	[4] 791	(2)
Dominican Republic	(2)	(2)	(2)	[4] 771	(2)	(2)
Haiti	(2)	(2)	(2)	[5] 8,970	(2)	(2)
SOUTH AMERICA.						
Argentina	5,478	8,154	9,118	(2)	(2)	(2)
Brazil	(2)	(2)	(2)	385,000	440,000	420,000
Chile	[5] 334	(2)	(2)	[5] 740	(2)	(2)
Ecuador	(2)	(2)	(2)	[4] 165	(2)	(2)
Peru	(2)	(2)	137,474	[4] 105,617	[4] 97,429	[4] 113,472
EUROPE.						
Bulgaria	1,730	(2)	(2)	(2)	(2)	(2)
Malta	1,006	946	(2)	411	384	(2)
ASIA.						
British India [6]	24,595,000	17,746,000	21,212,000	4,359,000	3,128,000	3,576,000
Ceylon	219	152	(2)	(2)	(2)	(2)
Cyprus	(2)	(2)	(2)	9,498	5,619	(2)
Dutch East Indies	(2)	(2)	(2)	[5] 18,966	(2)	(2)
Indo-China	(2)	(2)	(2)	[4] 116	[4] 93	(2)
Japanese Empire:						
Japan	5,887	6,565	5,384	4,582	4,840	4,216
Korea	150,738	(2)	(2)	33,322	(2)	(2)
Philippine Islands	[7] 7,541	...	...	[7] 6,098	...	...
Russia, Asiatic:						
Transcaucasia	364,460	291,568	231,000	132,198	132,649	(2)
Central Asia	1,442,757	1,833,185	1,900,349	1,176,477	1,424,114	1,101,489
Total	1,807,217	2,124,753	2,131,349	1,308,675	1,556,763	...
Siam	(2)	(2)	(2)	6,694	(2)	(2)
AFRICA.						
British Africa:						
Lagos	(2)	(2)	(2)	11,000	5,000	8,000
Nyasaland Protectorate [8]	(2)	(2)	(2)	7,000	8,000	7,000
East Africa Protectorate	(2)	(2)	(2)	400	250	170
Gold Coast	(2)	(2)	(2)	80	80	80
Nigeria, Northern	(2)	(2)	(2)	800	1,000	9,000
Nigeria, southern	(2)	(2)	(2)	130	80	80
Uganda Protectorate	(2)	(2)	(2)	35,000	21,000	21,000
Union of South Africa	(2)	(2)	(2)	[4] 87	[4] 243	...
Egypt	1,822,000	1,231,000	1,719,000	1,337,000	989,000	1,248,000
French Africa:						
Dahomey	(2)	(2)	(2)	[4] 621	[4] 315	...
Guinea	(2)	(2)	(2)	[4] 168	(2)	...
Ivory Coast	(2)	(2)	(2)	[4] 339	[4] 437	...
German Africa:						
East Africa	(2)	(2)	(2)	[5] 10,109	(2)	...
Togo	(2)	(2)	(2)	[5] 2,322	(2)	...
Italian Africa:						
Eritrea	(2)	(2)	(2)	[4] 378	(2)	...
Sudan (Anglo-Egyptian)	(2)	(2)	(2)	8,000	20,000	14,000
OCEANIA.						
British:						
Fiji	(2)	(2)	(2)	24	8	...
Queensland	(2)	(2)	(2)	14	13	...
Solomon Islands	(2)	(2)	(2)	[5] 24	(2)	...
French:						
New Caledonia	(2)	(2)	(2)	[4] 1,596	[4] 2,124	...

[1] Linters not included. Quantity of linters produced: 856,900 bales in 1914, 931,141 bales in 1915, and 1,330,714 bales in 1916.

[2] No official statistics.

[3] Exports to foreign countries plus shipments to the United States.

[4] Exports.

[5] 1913 figures.

[6] Includes native States.

[7] Census of 1902.

[8] Includes Rhodesia.

COTTON—Continued.

TABLE 98.—*Cotton: Total production of countries for which estimates were available, 1900–1910.*

Year.	Production.	Year.	Production.	Year.	Production.
	Bales.[1]		*Bales.*[1]		*Bales.*[1]
1900	15,893,591	1904	21,005,175	1908	23,688,292
1901	15,926,048	1905	18,342,075	1909	20,679,334
1902	17,331,503	1906	22,183,148	1910	22,433,269
1903	17,278,881	1907	18,328,613		

[1] Bales of 478 pounds.

TABLE 99.—*Cotton: Acreage, production, value, exports, etc., in the United States, 1866–1917.*

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per pound Dec. 1.	Farm value Dec. 1.	New York closing prices, per pound, on middling upland. December. Low.	December. High.	May of following year. Low.	May of following year. High.	Domestic exports, fiscal year beginning July 1.
	Acres.	*Pounds.*	*Bales.*	*Cents.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bales.*[1]
1866	7,599,000	129.0	1,750,000			$33\frac{1}{2}$	$34\frac{3}{4}$	$27\frac{1}{2}$	$28\frac{1}{2}$	1,322,917
1867	7,828,000	189.8	2,340,000			$15\frac{1}{4}$	$17\frac{1}{4}$	$30\frac{1}{2}$	$32\frac{3}{4}$	1,569,527
1868	6,799,000	192.2	2,380,000			$24\frac{5}{8}$	$25\frac{3}{8}$	$28\frac{5}{8}$	$28\frac{3}{4}$	1,288,656
1869	7,743,000	196.9	3,012,000			25	$25\frac{1}{2}$	$22\frac{1}{2}$	$23\frac{1}{2}$	1,917,117
1870	8,885,000	198.9	3,800,000			15	$15\frac{7}{8}$	$14\frac{7}{8}$	$17\frac{5}{8}$	2,925,856
1871	7,558,000	148.2	2,553,000			$19\frac{1}{8}$	$20\frac{1}{4}$	$23\frac{3}{4}$	$26\frac{3}{8}$	1,867,075
1872	8,483,000	188.7	3,920,000			$19\frac{1}{8}$	$20\frac{1}{4}$	$19\frac{1}{4}$	$19\frac{5}{8}$	2,400,127
1873	9,510,000	179.7	3,683,000			$15\frac{5}{8}$	$16\frac{1}{2}$	$17\frac{3}{4}$	$18\frac{7}{8}$	2,717,205
1874	11,764,000	147.5	3,941,000			$14\frac{1}{8}$	$14\frac{7}{8}$	$16\frac{1}{8}$	$16\frac{3}{8}$	2,520,838
1875	11,934,000	190.6	5,123,000			$13\frac{1}{16}$	$13\frac{5}{16}$	$11\frac{13}{16}$	$13\frac{1}{8}$	2,982,811
1876	11,677,000	167.8	4,438,000	9.0	174,724,000	$12\frac{1}{16}$	$12\frac{1}{2}$	$10\frac{13}{16}$	$11\frac{3}{8}$	2,890,738
1877	12,133,000	163.8	4,370,000			$11\frac{1}{4}$	$11\frac{1}{2}$	$10\frac{5}{8}$	$11\frac{1}{4}$	3,215,067
1878	12,344,000	191.2	5,244,000	8.3	194,875,000	$8\frac{13}{16}$	$9\frac{1}{2}$	$11\frac{7}{8}$	$13\frac{3}{4}$	3,256,746
1879	14,480,000	181.0	5,755,000	10.3	269,305,000	$12\frac{3}{8}$	$13\frac{7}{16}$	$11\frac{11}{16}$	$11\frac{7}{8}$	3,644,363
1880	15,951,000	184.5	6,343,000	9.8	289,083,000	$11\frac{7}{8}$	12	$10\frac{7}{16}$	$10\frac{7}{8}$	4,382,009
1881	16,711,000	149.8	5,456,000			$11\frac{7}{8}$	$12\frac{1}{8}$	$12\frac{1}{16}$	$12\frac{3}{8}$	3,480,792
1882	16,277,000	185.7	6,957,000	9.1	275,513,000	$10\frac{1}{4}$	$10\frac{7}{16}$	$10\frac{1}{2}$	$11\frac{1}{8}$	4,576,378
1883	16,778,000	164.8	5,701,000	9.1	250,977,000	$10\frac{3}{8}$	$10\frac{9}{16}$	$11\frac{1}{2}$	$11\frac{3}{4}$	3,725,145
1884	17,440,000	153.8	5,682,000	9.2	246,575,000	$10\frac{7}{16}$	$11\frac{7}{16}$	$10\frac{11}{16}$	11	3,783,319
1885	18,301,000	164.4	6,575,000	8.4	251,775,000	$9\frac{3}{16}$	$9\frac{7}{16}$	$9\frac{3}{16}$	$9\frac{5}{16}$	4,116,149
1886	18,455,000	169.5	6,446,000	8.1	251,856,000	$9\frac{3}{16}$	$9\frac{9}{16}$	$10\frac{3}{4}$	$11\frac{7}{16}$	4,338,915
1887	18,641,000	182.7	7,020,000	8.5	290,901,000	$10\frac{1}{2}$	$10\frac{5}{8}$	$9\frac{15}{16}$	$10\frac{1}{16}$	4,528,883
1888	19,059,000	180.4	6,941,000	8.5	292,139,000	$9\frac{3}{4}$	$9\frac{7}{8}$	11	$11\frac{3}{16}$	4,770,065
1889	20,175,000	159.7	7,473,000	8.5	275,249,000	$10\frac{1}{4}$	$10\frac{1}{4}$	$11\frac{15}{16}$	$12\frac{3}{4}$	4,913,925
1890	19,512,000	187.0	8,674,000	8.6	313,360,000	$9\frac{3}{16}$	$9\frac{7}{16}$	$8\frac{7}{8}$	$8\frac{15}{16}$	5,814,718
1891	19,059,000	179.4	9,018,000	7.2	247,633,000	$7\frac{3}{4}$	$8\frac{1}{16}$	$7\frac{1}{4}$	$7\frac{7}{16}$	5,870,440
1892	15,911,000	209.2	6,664,000	8.3	277,194,000	$9\frac{3}{8}$	10	$7\frac{5}{8}$	$7\frac{13}{16}$	4,424,230
1893	19,525,000	149.9	7,493,000	7.0	204,983,000	$7\frac{13}{16}$	$8\frac{1}{16}$	$7\frac{1}{8}$	$7\frac{3}{8}$	5,366,565
1894	23,688,000	195.3	9,476,000	4.6	212,335,000	$5\frac{11}{16}$	$5\frac{13}{16}$	$6\frac{3}{4}$	$7\frac{3}{8}$	7,034,866
1895	20,185,000	155.6	7,161,000	7.6	238,503,000	$8\frac{1}{4}$	$8\frac{9}{16}$	8	$8\frac{3}{8}$	4,670,453
1896	23,273,000	184.9	8,533,000	6.7	286,169,000	$7\frac{1}{16}$	$7\frac{11}{16}$	$7\frac{5}{8}$	$7\frac{13}{16}$	6,207,510
1897	24,320,000	182.7	10,898,000	6.7	296,816,000	$5\frac{13}{16}$	$5\frac{15}{16}$	$6\frac{5}{16}$	$6\frac{9}{16}$	7,725,572
1898	24,967,000	220.6	11,189,000	5.7	315,449,000	$5\frac{5}{8}$	$5\frac{7}{8}$	$6\frac{1}{8}$	$6\frac{1}{4}$	7,575,438
1899	24,327,000	183.8	9,345,000	7.0	326,215,000	$7\frac{1}{2}$	$7\frac{3}{4}$	9	$9\frac{7}{8}$	6,252,451
1900	24,933,000	194.4	10,123,000	9.2	463,310,000	$9\frac{3}{4}$	$10\frac{5}{16}$	$8\frac{1}{16}$	$8\frac{5}{16}$	6,718,125
1901	26,774,000	170.0	9,510,000	7.0	334,088,000	8	$8\frac{3}{4}$	$9\frac{3}{8}$	$9\frac{3}{4}$	7,057,949
1902	27,175,000	187.3	10,631,000	7.6	403,718,000	$8\frac{1}{2}$	$8\frac{7}{8}$	10.75	12.15	7,138,284
1903	27,052,000	174.3	9,851,000	10.5	516,763,000	11.95	14.10	12.75	13.90	6,179,712
1904	31,215,000	205.9	13,438,000	9.0	603,438,000	6.85	9.00	7.85	8.85	8,678,644
1905	27,010,000	186.6	10,575,000	10.8	569,791,000	11.65	12.60	11.25	12.00	7,268,090
1906	32,049,000	202.5	13,274,000	9.6	635,534,000	10.45	11.25	11.50	12.90	9,036,434
1907	29,660,000	179.1	11,107,000	10.4	575,226,000	11.70	12.20	10.20	11.50	7,633,997
1908	32,444,000	194.9	13,242,000	8.7	575,092,000	9.10	9.35	10.85	11.80	8,895,970
1909	30,938,000	154.3	10,005,000	13.9	697,681,000	14.65	16.15	14.50	16.05	6,413,416
1910	32,403,000	170.7	11,609,000	14.1	820,407,000	14.80	15.25	15.35	16.15	8,067,882
1911	36,045,000	207.7	15,693,000	8.8	687,888,000	9.20	9.65	11.30	11.90	11,070,251
1912	34,283,000	190.9	13,703,000	11.9	817,055,000	12.75	13.20	11.80	12.10	9,124,591
1913	37,089,000	182.0	14,156,000	12.2	862,708,000	12.50	13.50	12.90	14.50	9,521,881
1914	36,832,000	209.2	16,135,000	6.8	549,036,000	7.25	7.80	9.50	10.40	8,807,157
1915	31,412,000	170.3	11,192,000	11.3	631,460,000	11.95	12.75	12.30	13.35	6,168,140
1916	34,985,000	156.6	11,450,000	19.6	1,122,295,000	16.20	20.30	19.60	22.10	6,176,134
1917 (prel.)	33,634,000	155.7	10,949,000	27.7	1,517,558,000	29.85	31.85			

[1] Bales of 500 pounds, gross weight.

COTTON—Continued.

TABLE 100.—*Cotton: Acreage harvested, by States, 1908–1917.*

[Thousands of acres.]

State.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917 [1]
Virginia	28	25	33	43	47	47	45	34	42	45
North Carolina	1,458	1,359	1,478	1,624	1,545	1,576	1,527	1,282	1,451	1,453
South Carolina	2,545	2,492	2,534	2,800	2,695	2,790	2,861	2,516	2,780	2,876
Georgia	4,848	4,674	4,873	5,504	5,335	5,318	5,433	4,825	5,277	5,028
Florida	265	237	257	308	224	188	221	193	191	183
Alabama	3,591	3,471	3,560	4,017	3,730	3,760	4,007	3,340	3,225	2,195
Mississippi	3,395	3,291	3,317	3,340	2,889	3,067	3,054	2,735	3,110	2,801
Louisiana	1,550	930	975	1,075	929	1,244	1,299	990	1,250	1,350
Texas	9,316	9,660	10,060	10,943	11,338	12,597	11,931	10,510	11,400	11,052
Arkansas	2,296	2,218	2,238	2,363	1,991	2,502	2,480	2,170	2,600	2,645
Tennessee	754	735	765	837	783	865	915	772	887	857
Missouri	87	79	100	129	103	112	145	96	133	140
Oklahoma	2,311	1,767	2,204	3,050	2,665	3,009	2,847	1,895	2,562	2,838
California	....	....	9	12	9	14	47	39	52	117
Arizona	....	....	....	....	....	....	....	....	....	39
All other	....	....	....	....	....	....	20	15	25	15
United States	32,444	30,938	32,403	36,045	34,283	37,089	36,832	31,412	34,985	33,634

[1] Preliminary estimate.

TABLE 101.—*Cotton: Production of lint (excluding linters) in 500-pound gross weight bales, by States, and total value of crop, 1908 to 1917.*

[Thousands of bales and dollars. As finally reported by U. S. Bureau of the Census.]

State.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917 [1]
Virginia	12	10	15	30	24	23	25	16	27	16
North Carolina	647	601	706	1,076	866	792	931	699	655	570
South Carolina	1,171	1,100	1,164	1,649	1,182	1,378	1,534	1,134	932	1,235
Georgia	1,931	1,804	1,767	2,769	1,777	2,317	2,718	1,909	1,821	1,820
Florida	62	54	59	83	53	59	81	48	41	40
Alabama	1,346	1,024	1,194	1,716	1,342	1,495	1,751	1,021	533	505
Mississippi	1,656	1,083	1,263	1,204	1,046	1,311	1,246	954	812	895
Louisiana	470	253	246	385	376	444	449	341	443	615
Texas	3,815	2,523	3,049	4,256	4,880	3,945	4,592	3,227	3,726	3,115
Arkansas	1,033	714	821	939	792	1,073	1,016	816	1,134	895
Tennessee	344	247	332	450	277	379	384	303	382	206
Missouri	62	45	60	97	56	67	82	48	63	51
Oklahoma	691	545	923	1,022	1,021	840	1,262	640	823	890
California	....	....	6	10	8	23	50	29	44	67
Arizona	....	....	....	....	....	....	....	....	....	24
All other	2	2	4	7	3	10	14	7	14	5
United States	13,242	10,005	11,609	15,693	13,703	14,156	16,135	11,192	11,450	10,949
Total value of crop	$588,810	$688,350	$809,710	$749,890	$786,800	$885,350	$591,130	$627,940	$994,060	....

[1] Preliminary estimate.

TABLE 102.—*Cotton: Condition of crop, United States, monthly, 1896–1917.*

[Prior to 1901 figures of condition relate to first of month following dates indicated.]

Year.	May 25.	June 25.	July 25.	Aug. 25.	Sept. 25.	Year.	May 25.	June 25.	July 25.	Aug. 25.	Sept. 25.
	P. ct.	*P. ct.*	*P. ct*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1896	97.2	92.5	80.1	64.2	60.7	1907	70.5	72.0	75.0	72.7	67.7
1897	83.5	86.0	86.9	78.3	70.0	1908	79.7	81.2	83.0	76.1	69.7
1898	89.0	91.2	91.2	79.8	75.4	1909	81.1	74.6	71.9	63.7	58.5
1899	85.7	87.8	84.0	68.5	62.4	1910	82.0	80.7	75.5	72.1	65.9
1900	82.5	75.8	76.0	68.2	67.0	1911	87.8	88.2	89.1	73.2	71.1
1901	81.5	81.1	77.2	71.4	61.4	1912	78.9	80.4	76.5	74.8	69.6
1902	95.1	84.7	81.9	64.0	58.3	1913	79.1	81.8	79.6	68.2	64.1
1903	74.1	77.1	79.7	81.2	65.1	1914	74.3	79.6	76.4	78.0	73.5
1904	83.0	88.0	91.6	84.1	75.8	1915	80.0	80.2	75.4	69.2	60.8
1905	77.2	77.0	74.9	72.1	71.2	1916	77.5	81.1	72.3	61.2	56.3
1906	84.6	83.3	82.9	77.3	71.6	1917	69.5	70.3	70.3	67.8	60.4

COTTON—Continued.

TABLE 103.—*Cotton: Yield per acre, price per pound Dec. 1, and value per acre, by States.*

State.	Yield per acre (pounds of lint).											Farm price per pound (cents).						Value per acre (dollars).[1]	
	10-year average, 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917[2]	10-year average, 1908–1917.	1913	1914	1915	1916	1917	5-year average, 1912–1916.	1917
Va.	240	210	190	212	330	250	240	265	225	310	170	13.6	13.1	7.3	11.4	19.4	27.8	33.31	47.26
N. C.	242	211	210	227	315	267	239	290	260	215	187	13.6	12.6	6.9	11.2	19.4	27.7	30.70	51.80
S. C.	220	219	210	216	280	209	235	255	215	160	205	13.7	12.7	6.9	11.3	19.6	28.4	25.80	58.22
Ga.	192	190	184	173	240	159	208	239	189	165	173	13.8	12.8	6.9	11.4	19.9	28.8	23.44	49.82
Fla.	123	112	110	110	130	113	150	175	120	105	105	20.6	17.0	12.2	14.8	31.0	50.5	22.98	53.02
Ala.	159	179	142	160	204	172	190	209	146	79	110	13.6	12.7	6.7	11.1	19.5	28.0	18.11	30.80
Miss.	176	233	157	182	172	173	204	195	167	125	153	13.9	12.6	6.8	11.5	20.5	28.5	21.01	43.60
La.	165	145	130	120	170	193	170	165	165	170	218	13.3	11.7	6.9	11.2	19.1	26.7	21.30	58.21
Tex.	163	196	125	145	186	206	150	184	147	157	135	13.2	11.5	6.8	11.1	19.4	26.7	20.05	36.04
Ark.	188	215	153	175	190	190	205	196	180	209	162	13.6	11.6	6.6	11.6	19.6	28.2	24.39	45.68
Tenn.	193	218	158	207	257	169	210	200	188	206	115	13.5	12.7	6.4	11.3	19.5	27.3	24.37	31.40
Mo.	271	340	271	285	360	260	286	270	240	225	175	13.1	11.5	6.5	11.0	19.0	27.5	29.79	48.12
Okla.	164	143	147	200	160	183	132	212	162	154	150	12.8	11.4	6.5	11.3	19.0	26.5	19.42	39.75
Cal.	404	.....	.....	335	300	450	500	500	380	400	275	14.1	13.0	7.0	11.2	20.0	28.0	55.76	77.00
Ariz.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	291	....	....	....	....	....	27.7	.....	80.61
U. S.	179.2	194.9	154.3	170.7	207.7	190.9	182.0	209.2	170.3	156.6	155.7	13.5	12.2	6.8	11.3	19.6	27.7	21.85	45.12

[1] Based upon farm price Dec. 1. [2] Preliminary.

TABLE 104.—*Cotton: Farm price per pound on first of each month, by geographical divisions, 1916 and 1917.*

Month.	United States.		South Atlantic States.		N. Cent. States west of Miss. R.		South Central States.		Far Western States.	
	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
January	17.1	11.4	17.1	11.5	18.2	10.7	17.0	11.4	....	....
February	16.8	11.5	16.9	11.5	15.5	11.2	16.7	11.5	23.0	....
March	15.9	11.1	16.3	11.1	16.5	9.0	15.6	11.1	16.0	12.0
April	18.0	11.5	19.2	11.6	15.1	10.6	17.5	11.5	....	....
May	18.9	11.5	19.4	11.6	15.0	11.2	18.6	11.4	....	....
June	20.2	12.2	21.1	12.3	19.3	11.0	19.8	12.2	25.0	....
July	24.7	12.5	25.6	12.6	....	11.1	24.3	12.4	....	....
August	24.3	12.6	24.7	12.8	22.0	12.2	24.1	12.5	....	....
September	23.4	14.6	23.4	14.8	....	12.0	23.4	14.6	....	....
October	23.3	15.5	23.8	15.6	24.8	....	23.2	15.5	19.0	....
November	27.3	18.0	28.2	18.4	28.0	18.0	26.9	17.8	....	....
December	27.7	19.6	28.7	19.9	27.5	19.0	27.2	19.5	27.9	20.0

COTTON—Continued.

TABLE 105.—*Cotton: Closing price of middling upland per pound, 1912–1917.*

Date.	New York.		New Orleans.		Memphis.		Galveston.		Savannah.		Charleston.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.												
Jan.-June	9.35	12.00	9 3/16	12 1/4	9 7/16	12 1/8	9 3/8	12 1/8	8 5/8	12	8 3/4	11 9/16
July-Dec	10.75	13.40	10 11/16	13 1/4	11	13 1/4	10 7/8	13 5/16	10 9/16	12 3/4	11	12 3/4
1913.												
Jan.-June	11.70	13.40	12 1/8	13	12	13 1/8	12	13	11 7/8	12 3/4	11 3/4	12 5/8
July-Dec	11.90	14.50	11 7/8	14	11 3/4	13 3/4	11 3/4	14 3/8	11 1/4	14 1/8	12 3/8	13 7/8
1914.												
Jan.-June	12.30	14.50	12 3/8	13 15/16	13	13 3/4	12 1/2	14	12 3/8	13 7/8	12 1/4	13 1/2
July-Dec	7.25	13.25	6 1/2	13 9/16	6 1/2	13 3/4	6 5/8	13 5/8	6 1/2	13 7/8	6 1/2	8 1/2
1915.												
Jan.-June	7.90	10.60	7 3/8	9.68	7 1/8	9.50	7 3/4	10.10	7 3/8	9 3/4	7 1/4	9 5/8
July-Dec	8.90	12.75	8.50	12.13	8.62	12.25	8.50	12.60	8 1/2	12 1/2	9	12
1916.												
January	11.80	12.60	11.75	12.19	12.00	12.38	12.05	12.50	12	12 1/4	11 5/8	12
February	11.20	12.15	11.13	11.62	11.38	12.00	11.45	12.10	11 1/2	12	11	11 5/8
March	11.45	12.15	11.13	12.00	11.38	12.00	11.60	12.35	11 1/2	12 1/8	11	11 3/4
April	11.95	12.20	11.88	11.88	12.00	12.00	12.20	12.35	11 7/8	12	11 5/8	11 5/8
May	12.30	13.35	12.00	12.94	12.12	13.00	12.40	13.30	12	12 3/4	11 3/4	12 3/4
June	12.65	13.45	12.63	13.06	13.00	13.25	12.95	13.75	12 5/8	13	12 3/8	12 3/4
Jan.-June	11.20	13.45	11.13	13.06	11.38	13.25	11.45	13.75	11 1/2	13	11	12 3/4
July	12.90	13.30	13.00	13.13	13.12	13.25	13.65	13.75	13	13	12 5/8	12 3/4
August	13.35	16.40	13.13	15.63	13.37	15.75	13.75	16.00	13	15 3/4	13	15 1/2
September	15.15	16.30	14.69	15.63	15.15	15.75	15.05	16.00	14 3/4	15 7/8	14 1/2	15 1/2
October	16.60	19 30	16.00	18.75	16.00	18.75	16.25	18.90	16 1/8	19	16	18 3/4
November	18.75	20.95	18.13	20.38	18.75	20.50	18.60	20.85	18 3/4	20 5/8	18 1/2	20 1/2
December	16.20	20.30	17.25	20.25	18.00	20.50	17.00	20.40	18 1/4	20 1/2	19 1/2	20 1/8
July-Dec	12.90	20.95	13.00	20.38	13.12	20.50	13.65	20.85	13	20 5/8	12 5/8	20 1/2
1917.												
January	16.75	18.80	16.81	18.13	17.00	18.50	17.10	18.50	18 1/4	18 5/8	17 1/4	18 1/4
February	14.30	17.05	16.63	17.19	17.00	17.00	14.50	17.80	18 1/2	18 1/2	18 1/2	18 1/2
March	17.00	19.30	16.50	18.75	17.00	19.00	16.90	19.00	18 1/2	19 3/8	17 7/8	19
April	19.35	21.15	18.75	20.25	19.00	20.50	19.00	20.25	19 1/4	20 3/4	19	20 3/4
May	19.60	22.10	19.37	21.19	19.50	21.25	19.25	21.50	20 1/4	21 1/2	19 3/4	21
June	22.65	27.40	21.44	26.25	21.50	26.06	22.00	26.50	21 7/8	26 3/4	21 1/4	26
Jan.-June	14.30	27.40	16.50	26.25	17.00	26.00	14.50	26.50	18 1/4	26 3/4	17 1/4	26
July	24.60	27.65	24.25	26.00	25.50	26.00	25.10	26.55	25	26 3/4	24	26
August	23.10	28.00	22.50	26.50	25.00	26.50	22.75	27.50	22.63	27	22	25 5/8
September	21.20	26.30	20.13	24.13	22.00	24.50	21.20	25.10	20	24 1/2	20	24
October	25.25	29.95	24.13	27.75	24.00	28.50	24.40	27.75	24 1/4	28	23 3/4	27 3/4
November	28.75	31.25	27.13	29.13	28.50	29.75	27.15	29.50	27 3/4	29.13	27 1/4	29
December	29.85	31.85	28.19	30.13	29.50	30.00	28.25	30.35	28.88	30	29	30 1/4
July-Dec	21.20	31.85	20.13	30.13	22.00	30.00	21.20	30.35	20	30	20	30 1/4

COTTON—Continued.

TABLE 106.—*Cotton: International trade, calendar years 1909–1916.*

[Expressed in bales of 500 pounds gross weight, or 478 pounds net. The figures for cotton refer to ginned and unginned cotton and linters, but not to mill waste, cotton batting, *scarto* (Egypt and Sudan). Wherever unginned cotton has been separately stated in the original reports it has been reduced to ginned cotton in this statement at the ratio of 3 pounds unginned to 1 pound ginned. See "General note," table 85.]

EXPORTS.

[000 omitted.]

Country.	Average 1909–1913.	1915 (prelim.)	1916 (prelim.)	Country.	Average 1909–1913.	1915 (prelim.)	1916 (prelim.)
From—	*Bales.*	*Bales.*	*Bales.*	*From—*	*Bales.*	*Bales.*	*Bales.*
Belgium	159	....	....	Netherlands	145	181	2
Brazil	83	24	5	Persia [1]	118	....	....
British India	1,966	2,103	....	Peru	87	97	....
China	240	202	237	United States	9,008	9,126	7,603
Egypt	1,442	1,430	1,122	Other countries	169	183	....
France	316	40	116				
Germany	232	....	....	Total	13,965	13,386	....

IMPORTS.

Country.	Average 1909–1913.	1915 (prelim.)	1916 (prelim.)	Country.	Average 1909–1913.	1915 (prelim.)	1916 (prelim.)
Into—				*Into—*			
Austria-Hungary	906	....	....	Russia	886	641	57
Belgium	496	....	....	Spain	382	660	471
Canada	137	197	205	Sweden	93	580	....
France	1,435	1,052	1,192	Switzerland	113	147	123
Germany	2,258	....	....	United Kingdom	4,164	4,820	4,045
Italy	896	1,344	1,170	United States	215	424	402
Japan	1,405	2,015	2,299	Other countries	319	297	....
Mexico	23	....	....				
Netherlands	277	365	177	Total	14,005	12,542	....

[1] Year beginning Mar. 21.

COTTONSEED OIL.

TABLE 107.—*Cottonseed oil: International trade, calendar years 1909–1916.*

[See "General note," Table 85.]

EXPORTS.

[000 omitted.]

Country.	Average 1909–1913.	1915 (prelim.)	1916 (prelim.)	Country.	Average 1909–1913.	1915 (prelim.)	1916 (prelim.)
From—	*Gallons.*	*Gallons.*	*Gallons.*	*From—*	*Gallons.*	*Gallons.*	*Gallons.*
Belgium	1,086	....	....	United Kingdom	7,189	7,827	770
China	281	2,303	1,972	United States	38,968	47,016	25,095
Egypt	476	1,253	418	Other countries	44	425	....
France	335	160	40				
Netherlands	52	4,265	26	Total	48,431	63,249	....

IMPORTS.

Country.	Average 1909–1913.	1915 (prelim.)	1916 (prelim.)	Country.	Average 1909–1913.	1915 (prelim.)	1916 (prelim.)
Into—				*Into—*			
Algeria	364	....	....	Mexico	3,607	....	....
Australia	142	320	....	Netherlands	5,352	19,021	8,071
Austria-Hungary	39	....	....	Norway	1,504	3,539	3,146
Belgium	2,251	....	....	Roumania	633	....	....
Brazil	624	377	181	Senegal	422	....	....
Canada	2,817	4,083	4,745	Serbia	336	....	....
Egypt	257	3	....	Sweden	696	....	....
France	3,289	3,524	2,015	United Kingdom	5,899	8,337	2,935
Germany	6,918	....	....	Other countries	4,191	5,582	....
Italy	4,600	472	145				
Malta [1]	265	....	....	Total	44,498	45,578	....
Martinique	292	320	....				

[1] Year beginning Apr. 1.

TOBACCO.

TABLE 108.—*Tobacco: Area and production of undermentioned countries, 1914-1916.*

Country.	Area.			Production.		
	1914	1915	1916	1914	1915	1916
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Pounds.*	*Pounds.*	*Pounds.*
United States	1,223,500	1,369,900	1,413,400	1,034,679,000	1,062,237,000	1,153,278,000
Porto Rico	18,040	16,308	(1)	[2] 9,285,333	[2] 8,084,914	....
Canada:						
Ontario	4,750	4,500	2,933	5,000,000	4,050,000	3,000,000
Quebec	5,000	4,500	2,958	6,000,000	4,950,000	2,943,000
Total	9,750	9,000	5,891	11,000,000	9,000,000	5,943,000
Costa Rica	2,734	(1)	2,701	(1)	(1)	900,000
Cuba	(1)	(1)	(1)	80,770,080	50,077,920	42,043,000
Dominican Republic	(1)	(1)	(1)	(1)	8,050,000	17,250,000
Guatemala	1,236	(1)	(1)	(1)	(1)	....
Jamaica	[3] 1,144	(1)	(1)	(1)	(1)	(1)
Mexico	(1)	(1)	(1)	[4] 42,869,690	(1)	(1)
SOUTH AMERICA.						
Argentina	36,744	37,955	18,187	(1)	(1)	(1)
Brazil	(1)	(1)	(1)	[5] 59,481,096	[5] 59,734,874	[5] 46,942,748
Chile	(1)	1,033	(1)	6,282,228	3,260,824	(1)
Colombia	(1)	(1)	(1)	[5] 5,818,989	(1)	(1)
Uruguay	2,503	1,181	1,181	1,737,805	(1)	883,824
EUROPE.						
Austria-Hungary:						
Austria	[6] 4,262	(1)	(1)	[6] 6,908,555	(1)	(1)
Hungary	[3] 117,429	(1)	(1)	[3] 105,489,669	(1)	(1)
Croatia-Slavonia	[3] 190	(1)	(1)	[3] 106,703	(1)	(1)
Bosnia-Herzegovina	(1)	(1)	(1)	(1)	(1)	(1)
Total	....	....	....	....	....	....
Belgium	10,309	(1)	(1)	19,702,290	(1)	(1)
Bulgaria	[3] 17,297	(1)	(1)	33,069,000	(1)	(1)
Denmark	[7] 524	(1)	(1)	(1)	(1)	(1)
France	38,135	19,560	17,529	53,291,796	33,990,082	20,217,505
Germany	25,587	22,313	31,396	50,191,866	(1)	(1)
Italy	18,038	19,768	17,297	20,943,700	(1)	17,637,000
Netherlands	929	860	877	(1)	(1)	(1)
Roumania	27,070	32,232	28,880	16,970,129	18,566,921	(1)
Russia:						
Russia proper	95,324	96,161	(1)	147,744,290	163,982,988	(1)
Poland	(1)	(1)	(1)	(1)	(1)	(1)
Northern Caucasia	31,254	45,564	(1)	33,978,353	48,922,335	(1)
Sweden	(1)	(1)	(1)	1,444,013	(1)	(1)
Switzerland	618	618	618	815,702	947,978	1,047,185
ASIA.						
British India [8]	1,038,256	1,105,330	(1)	(1)	(1)	(1)
British North Borneo	(1)	(1)	(1)	[3] 3,621,754	(1)	(1)
Ceylon	12,841	14,484	(1)	(1)	[5] 3,118,321	2,752,000
Dutch East Indies:						
Java and Madura	394,636	(1)	(1)	[6] 108,979,540	(1)	(1)
Sumatra, East Coast of	(1)	(1)	(1)	46,632,068	(1)	(1)
Japanese Empire:						
Japan	88,670	75,423	72,227	126,206,328	108,415,099	104,167,350
Korea	50,905	(1)	(1)	36,135,227	(1)	(1)
Formosa	934	1,768	(1)	1,153,931	2,073,244	(1)
Philippine Islands	150,459	131,808	145,574	103,024,183	84,442,714	90,695,423
Russia, Asiatic	57,960	41,059	(1)	42,950,903	30,996,375	(1)
AFRICA.						
Algeria	[7] 22,733	(1)	(1)	[7] 21,556,138	(1)	(1)
Tunis	297	314	(1)	376,325	(1)	(1)
Nyasaland	[3] 10,499	(1)	(1)	(1)	(1)	(1)
Rhodesia	[3] 5,000	(1)	(1)	[3] 3,000,000	(1)	(1)
Union of South Africa	[9] 19,365	(1)	(1)	[9] 14,961,199	(1)	(1)
OCEANIA.						
Australia	3,007	2,373	1,906	2,827,552	1,890,672	[10] 1,302,000
Fiji	[3] 144	(1)	(1)	[3] 81,312	(1)	(1)

[1] No official statistics.
[2] Exports, fiscal year beginning July 1.
[3] 1913 figures.
[4] 1907 figures.
[5] Exports.
[6] Excludes Galicia and Bukowina.
[7] 1912 figures.
[8] Includes certain native states.
[9] Census of 1911.
[10] Excludes Victoria.

TOBACCO—Continued.

TABLE 109.—*Tobacco: Total production of countries for which estimates were available, 1900–1911.*[1]

Year.	Production.	Year.	Production.	Year.	Production.
	Pounds.		*Pounds.*		*Pounds.*
1900	2,201,193,000	1904	2,146,641,000	1908	2,382,601,000
1901	2,270,213,000	1905	2,279,728,000	1909	2,742,500,000
1902	2,376,054,000	1906	2,270,298,000	1910	2,833,729,000
1903	2,401,268,000	1907	2,391,061,000	1911	2,566,202,000

[1] Data for 1911 not strictly comparable with earlier years.

TABLE 110.—*Tobacco: Acreage, production, value, condition, etc., in the United States, 1849–1917.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage (000 omitted).	Average yield per acre.	Production (000 omitted).	Average farm price per pound Dec. 1.	Farm value Dec. 1 (000 omitted).	Domestic exports of unmanufactured, fiscal year beginning July 1.	Imports of unmanufactured, fiscal year beginning July 1.	Condition of growing crop. July 1.	Aug. 1.	Sept. 1.	When harvested.
	Acres.	*Lbs.*	*Lbs.*	*Cts.*	*Dolls.*	*Pounds.*	*Pounds.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1849			*199,753*								
1859			*434,209*								
1869			*262,735*								
1879	*639*	*739.7*	*472,661*								
1889	*695*	*702.5*	*488,257*								
1899	*1,101*	*788.5*	*868,113*								
1900	1,046	778.0	814,345	6.6	53,661	315,787,782	26,851,253	88.5	82.9	77.5	76.1
1901	1,039	788.0	818,953	7.1	58,283	301,007,365	29,428,837	86.5	72.1	78.2	81.5
1902	1,031	797.3	821,824	7.0	57,564	368,184,084	34,016,956	85.6	81.2	81.5	84.1
1903	1,038	786.3	815,972	6.8	55,515	311,971,831	31,162,636	85.1	82.9	83.4	82.3
1904	806	819.0	660,461	8.1	53,383	334,302,091	33,288,378	85.3	83.9	83.7	85.6
1905	776	815.6	633,034	8.5	53,519	312,227,202	41,125,970	87.4	84.1	85.1	85.8
1906	796	857.2	682,429	10.0	68,233	340,742,864	40,898,807	86.7	87.2	86.2	84.6
1907	821	850.5	698,126	10.2	71,411	330,812,658	35,005,131	81.3	82.8	82.5	84.8
1908	875	820.2	718,061	10.3	74,130	287,900,946	43,123,196	86.6	85.8	84.3	84.1
1909	1,180	804.3	949,357								
1909	*1,295*	*815.3*	*1,055,765*	10.1	106,599	357,196,074	46,853,389	89.8	83.4	80.2	81.3
1910 [1]	1,366	807.7	1,103,415	9.3	102,142	355,327,072	48,203,288	85.3	78.5	77.7	80.2
1911	1,013	893.7	905,109	9.4	85,210	379,845,320	54,740,380	72.6	68.0	71.1	80.5
1912	1,226	785.5	962,855	10.8	104,063	418,796,906	67,977,118	87.7	82.8	81.1	81.8
1913	1,216	784.3	953,734	12.8	122,481	449,749,982	61,174,751	82.8	78.3	74.5	76.6
1914	1,224	845.7	1,034,679	9.8	101,411	348,346,091	45,764,728	66.0	66.5	71.4	81.8
1915	1,370	775.4	1,062,237	9.1	96,281	443,293,156	48,013,335	85.5	79.7	80.7	81.9
1916	1,413	816.0	1,153,278	14.7	169,672	411,598,416	46,136,347	87.6	84.4	85.5	85.6
1917	1,447	827.1	1,196,451	24.9	297,442			86.8	88.1	84.5	87.8

[1] Figures adjusted to census basis.

TABLE 111.—*Tobacco: Acreage, production, and total farm value, by States, 1917.*

State.	Acreage.	Production.	Farm value Dec. 1.	State.	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Pounds.*	*Dollars.*		*Acres.*	*Pounds.*	*Dollars.*
New Hamp.	100	167,000	45,000	Ohio	103,200	99,072,000	24,768,000
Vermont	100	165,000	45,000	Indiana	14,800	14,060,000	3,374,000
Mass	8,400	11,833,000	4,544,000	Illinois	700	560,000	106,000
Connecticut	21,100	29,540,000	11,343,000	Wisconsin	48,300	45,885,000	8,030,000
New York	2,500	3,125,000	688,000	Missouri	3,000	2,820,000	598,000
Pennsylvania	41,500	58,100,000	12,201,000	Kentucky	474,000	426,600,000	96,838,000
Maryland	28,600	22,594,000	4,519,000	Tennessee	101,000	81,810,000	13,908,000
Virginia	185,000	129,500,000	34,318,000	Alabama	200	146,000	51,000
West Vriginia	11,300	9,040,000	2,712,000	Louisiana	600	210,000	74,000
N. Carolina	325,000	204,750,000	64,496,000	Texas	200	134,000	70,000
S. Carolina	72,000	51,120,000	11,809,000	Arkansas	300	210,000	49,000
Georgia	1,600	1,600,000	912,000				
Florida	3,100	3,410,000	1,944,000	U. S.	1,446,600	1,196,451,000	297,442,000

TOBACCO—Continued.

TABLE 112.—*Tobacco: Yield per acre, price per pound Dec. 1, and value per acre, by States.*

State.	Yield per acre (pounds).											Farm price per pound (cents).						Value per acre (dollars).[1]	
	10-year average 1908–1917.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	10-year average 1908–1917.	1913	1914	1915	1916	1917	5-year average 1912–1916.	1917
New Hampshire	1,676	1,800	1,700	1,720	1,700	1,700	1,650	1,770	1,400	1,650	1,670	17.0	18.0	18.0	12.0	17.0	27.0	275.62	450.90
Vermont	1,621	1,735	1,675	1,600	1,700	1,700	1,550	1,700	1,300	1,600	1,650	17.0	18.0	18.0	11.0	19.0	27.0	269.30	445.50
Massachusetts	1,580	1,650	1,600	1,730	1,650	1,700	1,550	1,750	1,100	1,660	1,409	20.5	21.0	17.7	14.5	25.0	38.4	323.21	541.06
Connecticut	1,608	1,680	1,650	1,730	1,625	1,700	1,550	1,770	1,350	1,630	1,400	21.6	21.0	18.5	17.0	27.0	38.4	346.45	537.60
New York	1,223	1,175	1,175	1,250	1,330	1,300	1,020	1,300	1,200	1,230	1,250	11.8	12.2	12.0	9.5	13.0	22.0	143.63	275.00
Pennsylvania	1,344	1,325	985	1,500	1,420	1,450	1,200	1,450	1,350	1,360	1,400	10.7	7.5	8.5	9.2	14.2	21.0	130.76	294.00
Maryland	734	700	710	690	735	660	740	800	740	770	790	10.1	9.3	8.0	8.5	16.0	20.0	74.34	158.00
Virginia	732	815	775	780	800	600	770	650	750	680	700	12.2	13.9	9.0	9.4	14.6	26.5	81.46	185.50
West Virginia	784	750	875	640	750	760	680	820	870	900	800	13.4	12.0	11.0	10.0	15.0	30.0	95.48	240.00
North Carolina	632	670	600	600	710	620	670	650	620	550	630	15.1	18.5	11.5	11.2	20.0	31.5	95.47	198.45
South Carolina	710	865	800	630	810	700	760	730	580	520	710	11.7	13.8	9.7	7.0	14.0	23.1	73.08	164.01
Georgia	914	975	700	680	900	830	1,000	1,000	880	1,180	1,000	31.0	31.0	25.0	23.0	27.0	57.0	265.88	570.00
Florida	938	990	710	680	940	840	1,000	1,000	910	1,210	1,100	32.1	31.0	30.0	23.0	30.0	57.0	286.86	627.00
Ohio	871	670	925	810	925	920	750	900	900	950	960	11.3	11.4	8.8	9.0	13.0	25.0	90.58	240.00
Indiana	861	700	950	880	910	800	750	900	840	930	950	11.4	11.0	9.0	7.3	13.0	24.0	83.54	228.00
Illinois	768	755	750	790	750	760	700	780	850	750	800	10.7	11.5	12.0	9.0	10.0	19.0	78.80	152.00
Wisconsin	1,138	1,130	1,180	1,050	1,250	1,290	1,180	1,180	900	1,270	950	10.7	12.0	11.0	6.0	12.5	17.5	125.21	166.25
Missouri	925	875	885	1,050	800	1,000	650	1,200	900	950	940	13.5	12.7	13.0	12.0	15.0	21.2	121.81	199.28
Kentucky	840	815	835	810	880	780	760	910	810	900	900	10.6	10.0	8.4	7.8	12.7	22.7	79.56	204.30
Tennessee	766	800	730	760	810	660	720	820	750	800	810	9.0	8.4	7.5	6.3	10.1	17.0	59.38	137.70
Alabama	593	450	600	500	700	750	700	700	500	300	730	27.5	25.0	28.0	22.0	30.0	35.0	166.70	255.50
Louisiana	477	850	550	550	450	300	450	400	420	450	350	30.8	25.0	35.0	30.0	28.0	35.0	118.90	122.50
Texas	645	800	650	600	650	700	600	580	500	700	670	25.6	22.0	21.0	27.0	20.0	52.0	130.26	348.40
Arkansas	617	610	600	650	600	650	650	610	600	500	700	17.1	16.4	18.0	17.0	20.0	23.2	107.08	162.40
United States	816.0	820.2	804.3	807.7	893.7	785.5	784.3	845.7	775.4	816.0	827.1	12.1	12.8	9.8	9.1	14.7	24.9	91.77	205.61

[1] Based upon farm price Dec. 1.

TOBACCO—Continued.

TABLE 113.—*Tobacco: Acreage, production, and farm value, by types and districts, 1916 and 1917.*

Type and district.	Acreage (thousands of acres).		Yield per acre (pounds).		Production (thousands of pounds).		Average farm price per pound Dec. 1 (cents).		Total farm value (thousands of dollars).[1]	
	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916
I. CIGAR TYPES.										
New England	29.7	31.3	1,404	1,638	41,705	51,285	38.3	26.4	15,977	13,522
New York	2.5	3.7	1,250	1,230	3,125	4,551	22.0	13.0	688	592
Pennsylvania	41.5	36.1	1,400	1,360	58,100	49,096	21.0	14.2	12,201	6,972
Ohio—Miami Valley	63.6	60.0	970	970	61,692	58,200	24.0	12.0	14,806	6,984
Wisconsin	48.3	43.9	950	1,270	45,885	55,753	17.5	12.5	8,030	6,969
Georgia and Florida	4.7	3.8	1,066	1,199	5,010	4,559	57.0	29.0	2,856	1,322
II. CHEWING, SMOKING, SNUFF, AND EXPORT TYPES.										
Burley district	262.0	265.0	960	970	251,520	257,050	30.7	15.5	77,217	39,843
Dark districts of Kentucky and Tennessee:										
Paducah district	100.0	100.0	800	780	80,000	78,000	14.0	9.8	11,200	7,644
Henderson or stemming district	101.6	107.0	890	890	90,424	95,230	15.5	10.0	14,016	9,523
One-Sucker district	50.0	48.0	900	870	45,000	41,760	20.0	10.0	9,000	4,176
Clarksville and Hopkinsville district	118.8	125.0	800	790	95,040	98,750	14.8	10.8	14,066	10,665
Virginia sun-cured district	11.0	12.0	800	690	8,800	8,280	28.5	14.0	2,508	1,159
Virginia dark district	62.0	65.6	830	820	51,460	53,792	17.0	10.4	8,748	5,594
Bright yellow district:										
Old belt—Virginia and North Carolina	235.0	240.0	600	570	141,000	136,800	32.0	18.9	45,120	25,855
New belt—Eastern North Carolina and South Carolina	272.0	230.0	670	550	182,240	126,500	29.6	19.2	53,943	24,288
Maryland and eastern Ohio export	32.0	30.0	810	780	25,920	23,400	20.0	15.6	5,184	3,650
Perique-Louisiana	.6	.2	350	450	210	90	35.0	28.0	74	25
All other	11.3	11.8	825	863	9,320	10,182	19.4	8.7	1,808	889

[1] Based upon farm price Dec. 1.

TABLE 114.—*Tobacco: Wholesale price per pound, 1912–1917.*

Date.	Cincinnati,[1] leaf, plug, stock, common to good red.		Hopkinsville, leaf, common to fine.		Louisville, leaf (burley, dark red), common to good.		Clarksville, leaf, common to fine.		Richmond, leaf, smokers, common to to fine.		Baltimore, leaf (Maryland), medium to fine red.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Jan.-June	6.00	13.00	8.00	16.00	7.50	12.00	9.50	15.00	6.00	12.00	8.50	13.00
July-Dec	5.00	14.00	9.00	16.00	7.00	13.00	9.50	15.00	6.00	12.00	8.50	15.00
1913.												
Jan.-June	5.50	13.75	7.00	14.00	7.00	14.00	9.00	14.00	6.00	16.00	8.50	15.00
July-Dec	5.50	13.75	8.75	14.00	9.00	16.00	8.50	15.00	7.00	16.00	8.50	15.00
1914.												
Jan.-June	5.50	14.00	8.00	14.00	9.00	16.00	9.50	16.00	7.00	20.00	8.50	15.00
July-Dec	5.50	13.00	7.50	14.00	9.00	16.00	7.50	16.00	7.00	20.00	8.00	15.00
1915.												
Jan.-June	6.00	13.00	4.00	12.50	8.00	14.00	6.00	13.00	7.00	20.00	8.00	13.00
July-Dec	5.00	13.00	5.50	10.00	10.00	15.00	6.00	13.00	7.00	20.00	8.00	14.00
1916.												
January	5.00	14.00	5.00	10.25	10.00	15.00	[1]7.50	13.00	7.00	20.00	9.00	14.00
February	5.00	14.00	5.50	10.50	10.00	15.00	4.50	13.00	7.00	20.00	9.00	14.00
March	5.00	14.00	5.00	11.75	10.00	15.00	4.50	10.00	7.00	20.00	9.00	14.00
April	5.00	14.00	6.00	11.75	10.00	16.00	4.50	10.00	9.00	18.00	9.00	14.00
May	5.00	16.00	7.00	14.00	11.00	16.00	4.50	12.00	9.00	18.00	9.00	15.00
June	7.50	16.00	......	......	11.00	16.00	4.50	12.00	9.00	18.00	9.50	16.00
Jan.-June.	5.00	16.00	5.00	14.00	10.00	16.00	4.50	13.00	7.00	20.00	9.00	16.00

[1] February to December, 1917, inclusive, burley, dark and bright red, common to good.

TOBACCO—Continued.

TABLE 114.—*Tobacco: Wholesale price per pound, 1912–1917*—Continued.

Date.	Cincinnati, leaf, plug, stock, common to good red.		Hopkinsville, leaf, common to fine.		Louisville, leaf (burley, dark red), common to good.		Clarksville, leaf, common to fine.		Richmond, leaf, smokers, common to fine.		Baltimore, leaf (Maryland), medium to fine red.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1916.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
July	7.50	17.00	7.50	14.00	11.00	16.00	4.50	12.00	9.00	18.00	11.00	17.00
August	9.00	17.00	....	....	11.00	16.00	4.50	10.00	9.00	18.00	13.00	19.00
September	9.00	17.00	....	....	11.00	16.00	4.50	10.00	9.00	18.00	16.00	21.00
October	9.00	17.00	....	....	11.00	16.00	....	....	9.00	18.00	17.00	21.00
November	9.00	17.00	....	....	11.00	16.00	....	....	9.00	18.00	17.00	21.00
December	9.00	17.00	9.50	14.50	11.00	19.00	....	....	9.00	18.00	17.00	21.00
July-Dec.	7.50	17.00	7.50	14.50	11.00	19.00	4.50	12.00	9.00	18.00	11.00	21.00
1917.												
January	....	....	10.75	17.00	13.00	19.00	....	....	9.00	18.00	17.00	21.00
February	16.00	21.00	11.00	19.00	15.00	20.00	....	14.10	9.00	18.00	17.00	21.00
March	16.00	21.00	10.50	16.00	15.00	20.00	8.00	14.00	9.00	18.00	17.00	21.00
April	15.00	21.00	10.00	16.00	15.00	20.00	....	....	9.00	18.00	18.00	24.00
May	15.00	20.00	10.00	14.50	15.00	20.00	8.00	14.00	12.00	27.00	18.00	24.00
June	15.00	20.00	10.50	14.00	15.00	20.00	8.00	14.50	12.00	27.00	19.00	24.00
Jan.-June.	15.00	21.00	10.00	19.00	13.00	20.00	8.00	14.50	9.00	27.00	17.00	24.00
July	15.00	20.00	10.50	14.00	17.00	24.00	12.00	15.00	12.00	27.00	19.00	26.00
August	15.00	20.00	....	....	21.00	24.00	6.00	14.00	....	....	21.00	26.00
September	15.00	20.00	....	....	22.00	24.00	....	....	....	....	22.00	28.00
October	15.00	28.00	....	....	22.00	24.00	....	....	....	....	22.00	28.00
November	23.00	28.00	....	....	24.00	32.00	....	....	....	....	22.00	28.00
December	23.00	28.00	13.50	20.50	24.00	32.00	....	....	....	....	22.00	28.00
July-Dec.	15.00	28.00	10.50	20.50	17.00	32.00	6.00	15.00	12.00	27.00	19.00	28.00

TABLE 115.—*Tobacco (unmanufactured): International trade, calendar years 1909–1916.*

[Tobacco comprises leaf, stems, strippings, and *tombac*, but not snuff. See "General note," table 85.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).	Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).
From—	*Pounds.*	*Pounds.*	*Pounds.*	*From—*	*Pounds.*	*Pounds.*	*Pounds.*
Aden[1]	7,739	7,421	....	Mexico	1,845	....	....
Algeria	11,681	14,282	....	Netherlands	3,786	10,948	4,760
Austria-Hungary	23,192	....	....	Paraguay	11,361	15,782	....
Brazil	59,991	59,735	46,943	Persia[2]	3,874	....	....
British India	28,874	32,877	....	Philippine Islands	26,018	24,663	39,655
Bulgaria	4,310	....	....	Russia	23,283	6,499	16,106
Ceylon	4,093	....	....	United States	381,127	435,895	483,955
Cuba	38,035	38,799	....	Other countries	94,995	40,956	....
Dominican Republic	22,395	13,747	....				
Dutch East Indies	163,823	181,749	....	Total	928,535	916,585	....
Greece	18,113	33,232	....				

IMPORTS.

Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).	Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).
Into—				*Into—*			
Aden[1]	11,619	8,717	....	Italy	47,732	36,693	43,037
Argentina	14,988	17,644	19,168	Netherlands	57,218	59,627	59,787
Australia	13,740	14,047	....	Norway	3,994	4,591	5,143
Austria-Hungary	49,984	....	....	Portugal	6,565	4,733	....
Belgium	22,094	....	....	Nigeria	6,050	....	....
British India	6,538	5,315	....	Spain	51,026	40,789	33,492
Canada	17,891	18,245	20,878	Sweden	9,772	....	....
China	15,113	10,230	19,618	Switzerland	17,949	17,591	21,826
Denmark	8,774	....	....	United Kingdom	117,956	190,606	151,196
Egypt	19,005	15,472	15,000	United States	52,768	41,304	49,473
Finland	9,597	13,719	14,947	Other countries	51,366	27,052	....
France	63,914	51,425	65,924				
Germany	168,437	....	....	Total	844,090	577,800	....

[1] Year beginning Apr. 1.

[2] Year beginning Mar. 21.

APPLES.

TABLE 116.—*Apples: Production and prices, Dec. 1, by States, 1911–1917.*

State.	Production (bushels, 000 omitted).							Farm price per bushel (cents).						
	1911	1912	1913	1914	1915	1916	1917	1911	1912	1913	1914	1915	1916	1917
Maine	6,800	5,400	3,000	7,400	2,160	5,040	4,617	55	50	100	53	89	75	95
New Hampshire	1,600	2,200	800	2,000	1,058	1,596	1,035	79	55	113	53	90	90	120
Vermont	2,250	2,600	700	3,200	972	3,312	1,286	78	79	123	57	94	90	130
Massachusetts	3,000	3,300	2,300	4,400	2,655	3,450	2,186	89	76	134	65	90	99	155
Rhode Island	400	300	300	400	176	261	198	62	82	116	65	108	107	150
Connecticut	2,400	1,700	2,100	2,500	1,534	1,830	1,316	70	75	94	65	97	100	144
New York	39,000	44,000	19,500	49,600	25,585	37,800	14,059	59	50	95	45	78	75	132
New Jersey	3,100	1,700	2,100	3,400	2,331	2,250	2,041	60	72	85	55	80	100	125
Pennsylvania	20,500	12,700	10,200	23,100	15,254	18,621	12,150	54	70	89	50	71	80	126
Delaware	300	420	180	500	366	249	450	85	82	117	58	70	100	110
Maryland	2,600	2,650	1,300	3,500	2,400	2,400	2,525	52	60	100	41	63	80	97
Virginia	7,200	15,000	5,200	15,300	13,176	13,299	9,974	74	60	86	46	63	78	101
West Virginia	7,800	10,300	1,000	12,400	7,540	10,032	5,994	71	55	130	49	64	76	122
North Carolina	3,600	7,600	3,000	9,000	5,916	7,074	6,156	88	75	95	49	75	80	114
South Carolina	470	600	260	800	663	588	818	126	100	145	85	117	125	155
Georgia	800	1,400	900	2,000	1,875	1,623	1,754	118	101	108	80	90	117	120
Ohio	18,700	10,600	4,800	13,300	17,952	8,601	6,336	54	67	110	63	55	100	150
Indiana	8,900	4,200	6,600	4,300	11,618	3,921	5,915	68	84	88	70	53	120	121
Illinois	10,600	5,800	8,200	3,700	14,148	4,848	7,500	68	79	94	84	47	115	110
Michigan	12,300	17,200	8,900	17,200	9,450	12,480	5,160	70	50	82	49	74	87	140
Wisconsin	3,000	2,000	4,000	2,200	4,418	2,634	3,029	93	88	95	90	75	110	134
Minnesota	1,300	700	1,800	700	1,235	1,266	1,445	102	98	105	90	102	145	155
Iowa	9,500	1,500	7,100	1,600	9,660	4,725	5,775	81	101	112	97	70	145	145
Missouri	11,600	19,200	7,900	12,500	18,860	8,100	12,375	70	53	93	71	51	105	106
South Dakota	240	200	320	200	301	348	349	114	104	145	117	115	150	170
Nebraska	3,600	2,800	2,300	1,200	3,800	1,701	2,400	83	88	108	96	66	140	140
Kansas	2,400	6,700	2,700	3,100	6,375	2,550	3,375	100	71	110	95	76	130	135
Kentucky	6,100	9,600	6,900	9,000	12,510	6,441	9,125	92	85	92	78	69	113	117
Tennessee	2,900	8,900	3,900	8,600	6,076	4,900	5,000	104	81	106	75	81	107	122
Alabama	700	1,200	900	1,600	1,596	1,140	1,453	130	100	115	94	95	140	140
Mississippi	240	450	370	500	424	225	315	122	106	112	95	105	120	145
Texas	200	500	300	500	562	450	345	128	115	130	108	100	135	156
Oklahoma	1,050	1,700	1,100	1,500	2,340	627	1,300	120	92	122	90	94	145	130
Arkansas	3,000	5,100	4,[illegible]	5,000	3,550	1,838	2,683	115	92	102	83	70	100	135
Montana	900	900	840	900	1,040	768	911	115	103	142	76	70	110	100
Wyoming	20	30	30	.....	.....	.....	.....	.....	.....	150	138	145	180	.....
Colorado	2,700	3,100	3,300	4,500	2,080	2,112	2,640	122	80	108	70	70	94	80
New Mexico	680	750	650	900	820	357	657	119	120	128	98	87	160	150
Arizona	110	130	90	100	120	138	135	195	204	217	186	170	182	205
Utah	460	680	610	800	427	75	650	110	89	96	63	95	160	80
Nevada	100	260	160	200	120	45	192	151	124	132	125	135	175	160
Idaho	1,200	1,650	1,400	1,700	1,720	400	1,995	112	85	98	78	85	114	95
Washington	3,500	7,700	6,900	8,300	7,300	14,858	17,897	118	70	93	64	80	80	125
Oregon	1,500	4,100	3,500	3,600	3,128	3,855	3,500	111	69	85	81	75	85	105
California	4,700	5,700	3,000	6,000	4,690	5,754	5,592	92	90	117	76	85	98	115
United States	214,020	235,220	145,410	253,200	230,011	204,582	174,608	72.1	66.3	98.1	59.4	69.0	91.2	122.0

TABLE 117.—*Approximate relative production of principal varieties of apples, expressed as percentages of a normal crop of all apples.*

Variety.	United States.	Maine.	New York.	Pennsylvania.	Virginia.	West Virginia.	Ohio.	Michigan.	Illinois.	Missouri.	Kentucky.	Arkansas.	Washington.	Oregon.	California.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct6*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Arkansas (Mammoth Black Twig)	0.7	0.2	.....	0.3	3.1	0.7	0.6	0.0	0.9	1.1	0.9	2.3	0.3	.....	0.3
Arkansas Black	.9	.....	.....	.2	.7	.8	.1	.....	.7	1.5	3.0	3.0	2.3	1.1	1.0
Baldwin	13.4	34.5	31.3	17.8	2.8	5.8	15.1	17.0	2.8	1.5	2.9	.4	7.8	12.6	3.2
Ben Davis	13.3	9.8	5.0	6.0	11.4	15.7	13.9	8.5	37.	34.2	16.8	44.1	7.4	4.9	3.9
Early Harvest (Prince's Harvest)	2.8	.9	;9	3.1	4.7	3.9	3.7	1.8	2.2	2.8	6.4	2.0	.8	.7	.7

APPLES—Continued.

TABLE 117.—*Approximate relative production of principal varieties of apples, expressed as percentages of a normal crop of all apples*—Continued.

Variety.	United States.	Maine.	New York.	Pennsylvania.	Virginia.	West Virginia.	Ohio.	Michigan.	Illinois.	Missouri.	Kentucky.	Arkansas.	Washington.	Oregon.	California.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Fall Pippin	1.7	0.7	1.7	3.1	1.8	1.5	1.8	1.6	1.1	0.4	2.4	0.7	0.8	0.8	0.6
Fameuse (Snow)	1.3	3.5	2.4	.6	.1	.0	.6	3.0	1.5	.4	.0	.1	.3	.2	.0
Gano	1.6	.3	.2	.8	.6	1.6	1.3	.3	3.8	6.5	.2	6.6	.8	1.0	.2
Golden Russet	1.4	1.7	2.0	2.5	.3	1.6	.9	3.7	.7	.3	1.0	.1	.3	.6	.1
Gravenstein	1.1	2.3	.9	1.0	.1	.1	.3	.1	.1	.1	.0	.....	4.1	7.3	8.9
Grimes (Grimes Golden)	2.2	.2	.1	2.6	2.6	4.6	5.0	1.2	4.9	3.6	2.6	2.1	1.6	.4	.1
Horse (Yellow Horse)	.9	.....	.....	.....	1.0	.0	.0	.0	.2	.5	2.1	1.5	.....	.1	.....
Jonathan	3.6	.8	.4	1.4	1.0	1.7	1.8	2.2	9.3	10.4	2.5	3.7	13.8	4.4	1.7
Limbertwig (Red Limbertwig)	1.6	.0	.0	.....	2.5	.8	.3	.0	.6	1.5	4.0	5.8	.....	.2	.3
McIntosh (McIntosh Red)	.9	3.7	1.6	.7	.1	.1	.1	.3	.4	.1	.1	.....	.3	.1	.1
Maiden Blush	2.0	.3	1.0	3.0	1.5	2.5	4.5	2.6	2.3	2.8	4.5	1.0	.3	.2	.4
Missouri (Missouri Pippin)	.8	.0	.0	.0	.2	.1	.1	.1	1.2	3.0	.5	1.4	.5	.1	.9
Northern Spy	6.1	7.1	13.1	11.4	.8	4.2	7.7	17.9	1.4	1.1	1.4	.5	3.8	7.4	.6
Northwestern Greening	.9	.3	.9	.4	.0	.4	.6	1.9	.3	.3	.4	.....	1.0	.1	.2
Oldenburg (Duchess of Oldenburg)	1.9	2.9	2.2	1.1	.1	.5	1.0	5.0	1.7	.5	.1	.....	1.1	.3	.1
Red Astrachan	1.9	3.9	2.1	3.5	.8	2.1	2.7	2.8	.8	.8	.3	.5	1.7	2.2	3.3
Red June (Carolina Red June)	1.6	.....	.7	.3	1.8	1.3	.2	.0	1.2	1.9	4.3	2.7	1.3	1.3	1.4
Rhode Island Greening (Greening)	4.7	4.1	14.8	5.5	.3	1.4	5.7	5.4	.8	.3	.2	.6	2.2	2.6	2.7
Rome Beauty	3.1	.1	.3	2.1	1.2	18.7	10.8	.2	3.8	1.7	9.6	1.8	12.2	5.6	2.4
Stayman Winesap	1.5	.6	.1	1.8	5.3	1.9	1.3	.1	.5	1.8	1.9	1.7	2.7	1.8	.9
Tolman (Talman Sweet)	1.0	2.6	2.1	1.1	.1	.4	.5	2.4	.3	.2	.3	.....	.9	.....	.0
Tompkins King (King of Tompkins Co)	1.4	2.4	4.1	1.5	.0	.5	.6	2.1	.1	.1	.0	.....	2.7	5.1	1.1
Wealthy	2.2	5.4	1.8	1.2	.0	1.1	1.2	3.7	1.6	1.3	.4	.1	1.5	1.1	.1
White Pearmain (White Winter Pearmain)	.5	.....	.1	.0	.2	.2	.1	.0	.2	.3	.3	.1	.6	.5	7.5
Winesap	5.1	.5	.1	1.8	20.7	1.8	1.8	.4	5.6	6.8	14.0	8.4	7.1	2.9	1.4
Wolf River	.9	1.4	.3	.3	.2	.6	.5	1.5	.4	.7	.3	.....	.8	1.7	.1
Yellow Bellflower	1.4	1.7	.3	2.3	.2	1.5	1.3	1.2	.5	1.0	.6	.1	1.9	3.4	18.6
Yellow Newtown (Albermarle; Newtown Pippin)	1.6	.0	.2	.6	7.0	.3	.4	.3	.2	.1	.2	.....	2.9	11.3	28.7
Yellow Transparent	1.5	1.1	.3	1.7	1.5	3.2	2.1	1.4	2.1	1.1	3.2	.4	1.5	1.6	.2
York Imperial (Johnson Fine Winter)	2.1	.....	.1	7.5	15.1	5.0	1.3	.3	.8	1.1	.1	.1	.2	.9	.1
Other varieties	10.4	7.0	8.9	12.8	10.2	13.4	10.1	11.0	7.4	8.2	12.5	8.2	12.5	15.5	8.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NOTE.—In important apple-producing States not included in table, the principal varieties and their respective percentages of all apples in a normal crop are:

Indiana.—Ben Davis 22.8, Baldwin 7.2, Grimes Golden 6.7, Winesap 6.7, Maiden Blush 5.8, Rome Beauty 4.4, Northern Spy 4.2 *North Carolina.*—Limbertwig 14.3, Winesap 12.2, Ben Davis 7.5, Early Harvest 7.2, Horse 7.2, Red June 5.9. *Tennessee.*—Winesap 14.1, Ben Davis 12.2, Limbertwig 12.1, Early Harvest 8.4, Horse 6.3, Red June 5.4. *Iowa.*—Ben Davis 15.2, Wealthy 12.4, Jonathan 10.3, Oldenburg 8.9, Grimes Golden 4.9, Northwestern Greening 4.3. *Kansas.*—Ben Davis 19.4, Winesap 15.3, Jonathan 13.8, Missouri Pippin 8.6, Gano 6.0, Maiden Blush 4.3. *Colorado.*—Ben Davis 26.3, Jonathan 18.3, Gano 7.8, Rome Beauty 4.8, Winesap 4.1. *Massachusetts.*—Baldwin 48.4, Rhode Island Greening 9.3, Gravenstein 5.7, McIntosh Red 5.7, Northern Spy 5.1. *Nebraska.*—Ben Davis 21.3, Winesap 13.6, Jonathan 9.4, Wealthy 6.2, Oldenburg 5.8, Grimes Golden 4.8, Missouri Pippin 4.2, Gano 4.0. *Wisconsin.*—Oldenburg 14.7, Wealthy 13.7, Northwestern Greening 11.1, Fameuse (Snow) 8.0, Wolf River 7.5, Ben Davis 5.1, Golden Russet 4.2. *Maryland.*—Ben Davis 17.0, York Imperial 16.2, Baldwin 8.8, Winesap 7.6, Stayman Winesap 7.0, Arkansas 4.4, Early Harvest 4.2. *New Jersey.*—Baldwin 25.2, Ben Davis 14.5, Rome Beauty 5.0, Early Harvest 4.7, Rhode Island Greening 4.3, Northern Spy 4.2. *Vermont.*—Baldwin 15.1, Rhode Island Greening 12.8, Northern Spy 12.0, Fameuse (Snow) 8.1, McIntosh 6.1, Ben Davis 5.6, Yellow Bellflower 4.2. *Connecticut.*—Baldwin 42.2, Rhode Island Greening 16.9, Golden Russet 5.2. *New Hampshire.*—Baldwin 51.9, Rhode Island Greening 5.9, Northern Spy 5.2, McIntosh 4.4. *Idaho.*—Jonathan 21.3, Rome Beauty 16.6, Ben Davis 13.1, Gano 7.8, Winesap 4.6. *Okalahoma.*—Ben Davis 25.8, Missouri Pippin 12.1, Jonathan 8.2, Winesap 8.1, Arkansas Black 5.6, Gano 4.0. *Georgia.*—Horse 14.3, Ben Davis 12.2, Red June 10.0, Limbertwig 8.8, Winesap 7.6, Early Harvest 6.1, Arkansas Black 1.6.

PEACHES.

TABLE 118.—*Peaches: Production, and prices Sept. 15, by States, 1911–1917.*

State.	Production, bushels (000 omitted).							Farm price per bushel (cents).						
	1911	1912	1913	1914	1915	1916	1917	1911	1912	1913	1914	1915	1916	1917
New Hampshire	.....	.....	44	3	58	24	47	.....	.....	190	.....	150	200	185
Massachusetts	97	51	105	31	152	66	145	275	220	180	180	130	226	200
Rhode Island	22	16	29	14	29	14	20	.....	.....	175	170	103	148	180
Connecticut	249	128	263	142	335	134	268	200	221	147	175	96	190	170
New York	1,536	1,400	1,742	530	2,106	1,238	2,244	142	160	140	160	90	140	140
New Jersey	440	638	483	1,140	1,275	689	871	175	135	150	98	70	160	170
Pennsylvania	1,096	660	922	1,541	2,044	1,069	1,440	180	186	180	125	80	150	170
Delaware	249	521	312	608	842	346	647	.....	150	125	95	39	150	125
Maryland	492	672	480	1,032	1,248	600	975	138	140	105	98	35	150	120
Virginia	318	1,058	312	911	1,358	660	800	138	96	150	100	80	128	160
West Virginia	230	788	132	886	1,164	520	608	154	112	210	105	75	150	175
North Carolina	437	2,093	598	1,863	1,955	897	1,541	124	93	120	95	90	138	125
South Carolina	649	1,020	405	1,166	864	545	1,130	128	105	125	110	100	105	120
Georgia	2,145	6,175	1,950	5,785	5,330	3,510	4,716	140	101	130	100	100	155	160
Florida	126	190	112	188	177	119	122	150	100	.....	100	75	200	.....
Ohio	1,735	1,055	931	1,653	2,448	1,350	496	140	141	200	140	97	155	215
Indiana	1,147	185	1,276	1,128	648	888	592	118	169	130	110	120	135	210
Illinois	2,310	82	1,998	1,755	874	780	364	84	146	115	105	110	150	195
Michigan	2,228	700	1,539	1,247	2,360	2,010	744	111	165	150	140	97	124	200
Iowa	240	24	632	472	112	64	30	152	133	135	135	150	200	220
Missouri	2,700	900	4,320	3,780	3,300	1,050	890	98	107	93	90	85	105	135
Nebraska	36	240	210	192	120	30	0	125	156	150	150	140	225	235
Kansas	851	2,016	875	1,760	2,442	150	121	124	100	150	120	100	180	195
Kentucky	770	1,210	1,430	1,980	1,320	880	1,034	109	94	90	75	95	110	150
Tennessee	360	2,820	1,140	2,640	2,460	900	900	125	77	110	78	80	95	120
Alabama	840	2,760	1,140	2,310	2,640	1,110	1,830	100	100	100	100	90	100	145
Mississippi	460	1,800	1,020	1,440	1,540	400	375	121	96	98	85	83	88	120
Louisiana	190	693	460	356	456	587	478	83	150	110	100	88	75	150
Texas	1,201	4,140	2,107	1,196	4,081	2,860	2,352	148	97	120	140	87	100	170
Oklahoma	656	2,121	860	220	2,408	230	1,150	128	68	120	130	57	120	135
Arkansas	2,346	4,524	3,120	3,180	5,940	750	840	107	78	90	87	63	87	125
Colorado	363	1,035	360	1,025	650	405	1,200	175	100	124	60	125	125	200
New Mexico	86	84	52	106	154	40	60	85	137	150	130	65	170	195
Arizona	51	54	57	60	60	56	60	225	215	200	175	.....	200	195
Utah	208	323	284	380	212	84	900	183	106	115	71	95	125	130
Nevada	10	10	8	9	7	1	6	.....	.....	.....	.....	120	.....	.....
Idaho	81	112	92	120	162	25	165	154	134	120	100	70	165	120
Washington	320	445	446	486	566	415	504	106	76	110	96	80	96	100
Oregon	190	292	311	387	432	276	250	174	133	130	110	84	100	110
California	7,41[illegible]	9,308	7,150	10,387	9,768	11,733	14,151	111	94	182	80	55	80	100
United States	34,880	52,343	39,707	54,109	64,097	37,505	45,066	122.1	102.0	131.6	97.7	80.0	113.0	135.9

PEARS.

TABLE 119.—*Pears: Production, and prices Nov. 15, 1911–1917.*

State.	Production (bushels; 000 omitted).							Farm price per bushel (cents).						
	1911	1912	1913	1914	1915	1916	1917	1911	1912	1913	1914	1915	1916	1917
Maine	42	38	32	40	30	36	24	.....	.....	125	.....	.....	.....	.....
New Hampshire	24	19	24	22	18	25	19	125	75	.....	.....	.....	.....	.....
Vermont	25	20	20	17	17	24	14	.....	75	100	.....	.....	120	.....
Massachusetts	114	71	121	98	75	114	71	120	88	.....	105	.....	120	.....
Rhode Island	14	11	16	13	10	14	7	.....	150	.....	.....	85	100	.....
Connecticut	46	32	55	43	36	46	29	108	138	250	.....	.....	.....	.....
New York	1,886	1,128	2,016	1,298	1,375	1,675	1,708	55	80	79	85	105	100	140
New Jersey	970	749	598	876	596	687	590	38	54	65	50	59	68	75
Pennsylvania	646	418	456	608	494	509	448	70	85	100	70	74	90	120
Delaware	262	315	77	210	228	164	294	100	40	.....	38	50	....	65
Maryland	455	616	224	560	483	378	525	.....	95	.....	25	.....	50	70
Virginia	122	282	68	234	261	122	194	110	73	151	73	68	100	115
West Virginia	49	76	11	72	63	42	33	120	80	130	94	100	120	135
North Carolina	52	207	58	187	150	75	150	125	89	122	85	80	100	125
South Carolina	52	117	42	109	91	56	100	100	92	110	94	95	85	125
Georgia	111	212	118	208	203	135	140	100	93	140	94	95	100	135
Florida	88	73	58	112	104	54	46	78	62	.....	.....	.....	....	100
Ohio	736	624	400	544	560	376	334	60	65	110	70	65	100	125
Indiana	585	448	474	422	410	351	410	72	70	70	69	70	95	100
Illinois	499	448	422	422	496	354	456	85	70	88	90	70	100	95
Michigan	829	540	707	840	550	1,007	1,080	60	75	92	58	72	65	121
Wisconsin	18	13	22	22	23	26	.....	125	90	.....	99	.....	....	.....
Iowa	57	60	102	84	106	63	82	110	105	120	120	81	130	145
Missouri	148	332	184	283	294	164	265	115	85	120	85	80	105	125
Nebraska	10	15	13	14	18	10	14	175	111	170	147	120	....	175
Kansas	70	142	63	109	133	106	140	157	100	160	110	110	160	170
Kentucky	160	336	160	308	264	160	204	125	91	100	85	78	100	125
Tennessee	32	196	79	152	195	59	75	140	99	120	100	80	110	170
Alabama	48	172	90	132	168	90	80	125	100	120	98	95	95	150
Mississippi	40	154	106	142	160	50	30	150	100	100	100	80	90	105
Louisiana	24	52	48	52	55	48	52	100	100	130	83	75	....	115
Texas	147	296	187	266	301	322	280	134	110	113	85	105	105	160
Oklahoma	33	54	23	28	68	11	45	175	120	160	125	110	160	150
Arkansas	47	113	55	98	135	68	102	100	105	120	100	89	115	125
Montana	11	12	10	12	12	6	11	183	.....	165	.....	125		.....
Colorado	160	193	130	206	99	99	320	155	93	175	.....	.....	....	210
New Mexico	43	52	46	60	64	36	46	125	.....	140	.....	160	....	.....
Arizona	16	20	17	20	22	18	21	.....	142	215	190	.....	....	.....
Utah	51	52	42	56	31	12	48	88	110	130	100	135	....	120
Nevada	2	8	6	7	4	2	6	.....	.....	.....	.....	.....	....	.....
Idaho	65	81	71	66	75	50	70	173	100	150	135	130	....	150
Washington	372	477	464	536	564	551	595	100	80	99	65	103	95	115
Oregon	441	554	559	540	525	555	600	88	80	110	100	96	120	130
California	1,848	2,015	1,634	1,958	1,650	3,124	3,523	65	78	70	96	115	95	100
United States	11,450	11,843	10,108	12,086	11,216	11,874	13,281	74.6	80.2	92.7	78.5	89.7	93.3	115.8

HOPS.

TABLE 120.—*Hops: Area and production of undermentioned countries, 1914–1916.*

Country.	Area.			Production.		
	1914	1915	1916	1914	1915	1916
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Pounds.*	*Pounds.*	*Pounds.*
United States	(1)	44,700	43,900	[2] 43,415,352	52,986,000	50,595,000
Canada	[3] 1,164	(1)	(1)	[3] 1,208,450	(1)	(1)
Total				44,623,802		
EUROPE.						
Austria-Hungary:						
Austria	[4] 45,664	[4] 41,043	(1)	[4] 36,252,442	[4] 20,479,000	(1)
Hungary	[5] 5,444	(1)	(1)	[5] 4,623,928	2,755,750	(1)
Croatia-Slavonia	[5] 751	(1)	(1)	[5] 292,991	(1)	(1)
Total Austria-Hungary	51,859			41,169,361		
Belgium	6,140	(1)	(1)	7,560,000	(1)	(1)
France	6,748	5,471	5,379	7,031,438	4,909,000	4,957,704
Germany	68,410	58,654	(1)	51,227,408	32,106,251	(1)
Russia	(1)	(1)	(1)	15,889,632	[6] 10,472,712	(1)
United Kingdom: England	36,661	34,744	31,352	56,812,896	28,516,208	34,479,872
Total				177,888,095		
AUSTRALASIA.						
Australia:						
Victoria	117		107	107,632		95,760
South Australia	3		3	4,480		784
Tasmania	1,353		1,405	1,554,560		2,013,760
Total	1,473	1,545	1,515	1,666,672	1,798,048	2,110,304
Grand total				224,178,569		

[1] No official statistics.
[2] Commercial movement for year beginning July 1.
[3] Census of 1910.
[4] Galicia and Bukowina not included.
[5] 1913 figures.
[6] Excludes Poland.

TABLE 121.—*Hops: Total production of countries named in Table 120, 1895–1914.*

Year.	Production.	Year.	Production.	Year.	Production.
	Pounds.		*Pounds.*		*Pounds.*
1895	204,894,000	1902	170,063,000	1909	128,173,000
1896	168,509,000	1903	174,457,000	1910	188,951,000
1897	189,219,000	1904	178,802,000	1911	163,810,000
1898	166,100,000	1905	277,260,000	1912	224,493,000
1899	231,563,000	1906	180,998,000	1913	174,642,000
1900	174,683,000	1907	215,923,000	1914	224,179,000
1901	201,902,000	1908	230,220,000		

TABLE 122.—*Hops: Acreage, production, and value in the United States, 1915–1917.*

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per pound Dec. 1.	Farm value Dec. 1.
	Acres.	*Pounds.*	*Pounds.*	*Cents.*	*Dollars.*
1915	44,653	1,186.6	52,986,000	11.7	6,203,000
1916	43,900	1,152.5	50,595,000	12.0	6,073,000
1917	29,900	929.4	27,788,000	33.7	9,363,000

HOPS—Continued.

TABLE 123.—*Hops: Wholesale price per pound, 1912–1917.*

Date.	New York.		Cincinnati.		Chicago.		San Francisco.					
	Choice State.		Prime.		Pacific coast, good to choice.		Sacramento Valley, choice.		Willamette Valley, choice.[1]		Eastern Washington, choice.[2]	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Jan.-June	37	56	41	49	40	50	40	50	38	50	36	50
July-Dec	22	42	22½	34	20	30	17	20½	18½	21	18½	21
1913.												
Jan.-June	17	32	18	23	15	24	18	20	19	21	19	21
July-Dec	17	48	18	32	17	31	18	28	18	30	19	30
1914.												
Jan.-June	36	48	21	27½	18	27	16	28	16	30	16	30
July-Dec	23	50	13½	22	13	22	10	19	11	20	10	20
1915.												
Jan.-June	13	25	16	17	10	18	9	15	10	16	10	15
July-Dec	13	30	15½	16	10	16	7½	14	10	16	10	15
1916.												
January	24	27	14	15½	14	16	7½	11	9	12½	9	12½
February	21	25	14	15	14	16	8	11	10	12½	10	12½
March	22	23	14	15	15	17	8	11	10	12½	10	12½
April	19	23	14	15	15	17	8	11	10	12½	10	12½
May	18	20	14	15	14	16	8	11	10	12½	10	12½
June	20	22	14	15	14	16	8	11	10	12½	10	12½
Jan.-June	18	27	14	15½	14	17	7½	11	9	12½	9	12½
July	16	21	13	14½	14	16	8	11	10	12½	10	12½
August	15	18	14	14	13	15	8	11	10	12½	10	12½
September	28	55	13	16	12	14	8	14	7	14	8	13
October	53	55	15½	16½	14	18	13	14	13	14	12	13
November	49	53	15	16	11	17	10	14	9	11	8	14
December	47	50	14	15½	10	16	10	14	9	11	7	14
July-Dec	15	55	13	16½	10	18.	8	14	7	14	7	14
1917.												
January	45	50	14	15	13	15	9	10½	7	11	9	11½
February	45	47	14	15	12	14	8	10½	7	11	9	11½
March	39	42	13	14	12	14	6	10	7	11	8	11½
April	38	42	12	13	10	13	5	9	7	11	6	11
May	34	42	12	13	10	12	5	9	7	11	6	10
June	34	38	11	12	10	12	5	9	7	11	6	10
Jan.-June	34	50	11	15	10	15	5	10½	7	11	6	11½
July	34	40	13	16	10	12	5	10	7	12	6	11
August	38	40	16	26	22	25	12	27½	12	30	13	30
September	88	90	25	40	42	46	......	27½	......	30	......	30
October	78	90	40	43	33	37	30	37½	32½	40	32½	40
November	70	78	32	38	26	20	20	30	20	32½	22½	32½
December	53	70	30	32	24	28	20	20	22½	22½	20	20
July-Dec	34	90	13	43	10	46	5	37½	7	40	6	40

[1] 1912 quotations are for all grades. Called "Oregon" hops in 1916.
[2] Called "Washington" hops in 1916.

HOPS—Continued.

TABLE 124.—*Hops: International trade, calendar years 1909–1916.*

[Lupulin and *hopfenmehl* (hop meal) are not included with hops in the data shown. See "General note," Table 85.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913.	1915 (Preliminary).	1916 (Preliminary).
From—	*Pounds.*	*Pounds.*	*Pounds.*
Austria-Hungary	18,333	....	....
Belgium	4,814	....	....
France	335	1,259	1,432
Germany	17,564	....	....
Netherlands	1,405	1,120	....
New Zealand	352	486	....
Russia	2,348	485	542
United Kingdom	2,162	928	1,206
United States	15,416	20,865	13,506
Other countries	212	384	....
Total	62,941	25,527	....

IMPORTS.

Country.	Average, 1909–1913.	1915 (Preliminary).	1916 (Preliminary).
Into—			
Australia	1,106	994	....
Austria-Hungary	938	....	....
Belgium	6,915	....	....
British India	246	141	....
British South Africa	498	458	439
Canada	1,396	955	781
Denmark	1,027	....	....
France	5,436	102	709
Germany	7,688	....	....
Netherlands	2,938	3,484	....
Russia	1,258	....	....
Sweden	987	....	....
Switzerland	1,257	967	779
United Kingdom	21,028	22,327	16,369
United States	6,235	6,767	631
Other countries	4,123	2,761	....
Total	63,076	38,956	....

BEANS.

TABLE 125.—*Beans: Area and production of undermentioned countries, 1914–1916.*

Country.	Area.			Production.		
	1914	1915	1916	1914	1915	1916
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	[1] 875,000	[1] 928,000	1,244,000	[1] 11,585,000	[1] 10,321,000	12,029,000
Canada:						
Nova Scotia	1,000	1,000	1,000	18,000	15,000	14,000
New Brunswick	(2)	(2)	(2)	6,000	6,000	4,000
Quebec	5,000	5,000	4,000	89,000	103,000	78,000
Ontario	38,000	37,000	27,000	684,000	600,000	317,000
British Columbia	(2)	....	....	....	....	1,914,000
Total Canada	44,000	43,000	32,000	797,000	724,000	413,000
SOUTH AMERICA.						
Argentina	72,000	(3)	(3)	(3)	(3)	(3)
Brazil	(3)	(3)	(3)	[4] 163	[4] 10,000	[4] 1,675,000
Chile	76,000	106,000	....	1,377,000	1,876,000	1,914,000
EUROPE.						
Austria-Hungary:						
Austria[5]	[6] 664,000	(3)	(3)	[6] 8,725,000	(3)	(3)
Hungary[7]	[6] 28,000	(3)	(3)	[6] 393,000	(3)	(3)
Do.[8]	[6] 1,471,000	(3)	(3)	[6] 7,865,000	(3)	(3)
Croatia-Slavonia[7]	[6] 24,000	(3)	(3)	[6] 337,000	(3)	(3)
Do.[8]	[6] 411,000	(3)	(3)	[6] 1,760,000	(3)	(3)
Total Austria-Hungary	[6] 2,598,000	....	....	[6] 19,080,000	....	....

[1] Five States.
[2] Less than 500 acres.
[3] No official estimates.
[4] Exports.
[5] Includes other pulse.
[6] 1913 figures.
[7] Grown alone.
[8] Grown with corn.

BEANS—Continued.

TABLE 125.—*Beans: Area and production of undermentioned countries, 1914–1916*—Con.

Country.	Area.			Production.		
	1914	1915	1916	1914	1915	1916
EUROPE—continued.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
Belgium [1]	20,000	(2)	(2)	514,000	(2)	(2)
Bulgaria [1]	212,000	(2)	(2)	2,482,000	(2)	(2)
Denmark	[1] 10,000	7,000	11,000	211,000	192,000	269,000
France	547,000	[3] 494,000	....	9,354,000	[3] 8,177,000	....
Italy	2,705,000	2,702,000	2,555,000	16,997,000	24,629,000	17,372,000
Luxemburg	[4] 3,000	(2)	(2)	[4] 61,000	(2)	(2)
Netherlands	59,000	58,000	59,000	1,946,000	1,905,000	....
Roumania [5]	161,000	186,000	188,000	2,122,000	1,993,000	(2)
Do.[7]	1,409,000	1,455,000	(2)	3,666,000	3,573,000	(2)
Russia: [6]						
Russia proper	1,175,000	[3] 978,000	744,000	8,482,000	[3] 8,373,000	[3] 7,758,000
Poland	(2)	(2)	(2)	(2)	(2)	(2)
Northern Caucasia	9,000	3,000	(2)	94,000	48,000	(2)
Total European Russia	1,184,000	981,000	....	8,576,000	8,421,000	....
Serbia	[1] 30,000	(2)	(2)	[1] 1,491,000	(2)	(2)
Spain	1,149,000	1,201,000	1,225,000	12,527,000	13,226,000	14,755,000
Sweden	6,000	8,000	6,000	75,000	148,000	195,000
United Kingdom:						
England	283,000	257,000	228,000	8,907,000	7,353,000	7,087,000
Wales	1,000	1,000	1,000	36,000	29,000	29,000
Scotland	6,000	5,000	5,000	243,000	202,000	202,000
Ireland	1,000	1,000	1,000	57,000	42,000	48,000
Total United Kingdom	291,000	264,000	235,000	9,243,000	7,626,000	7,366,000
ASIA.						
British India [8]	8,951,000	13,778,000	13,224,000	[9] 72,315,000	[9] 143,397,000	[9] 127,979,000
Japanese Empire:						
Japan	1,569,000	1,587,000	(2)	25,921,000	27,026,000	(2)
Formosa [8]	92,000	91,000	(2)	681,000	786,000	(2)
Chosen	1,480,000	(2)	(2)	16,530,000	(2)	(2)
Total Japanese Empire	3,141,000	....	....	43,132,000	....	....
Russia (9 governments)	3,000	3,000	....	35,000	21,000	....
AFRICA.						
Algeria	[1] 136,000	(2)	(2)	[1] 1,022,000	(2)	(2)
Egypt	445,000	647,000	522,000	(2)	(2)	(2)
AUSTRALASIA.						
Australia	(10)	(11)	1,000	(11)	(11)	10,000

[1] 1912 figures.
[2] No official statistics.
[3] Excludes territory occupied by the enemy.
[4] 1913 figures.
[5] Grown alone.
[6] Includes lentils.
[7] Grown with corn.
[8] Includes other pulse.
[9] Incomplete.
[10] Included under peas.

BEANS—Continued.

TABLE 126.—*Beans: Acreage, production, and value in the United States, 1914–1917.*

[Leading producing States.]

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Bushels.*	*Dollars.*	*Dollars.*
1914	875,000	13.2	11,585,000	2.26	26,213,000
1915	928,000	11.1	10,321,000	2.59	26,771,000
1916	1,107,000	9.7	10,715,000	5.10	54,686,000
1917	1,832,000	8.6	15,701,000	6.52	102,426,000

TABLE 127.—*Beans: Wholesale price per bushel, 1912–1917.*

Date.	Boston.		Chicago.		Detroit.		San Francisco.	
	Pea.		Pea.		Pea.		Small white. (per 100 lbs.).	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Jan.–June	2.55	3.05	2.35	2.98	2.32	2.70	4.00	4.75
July–Dec	2.55	3.10	1.90	3.20	2.15	2.70	4.00	4.80
1913.								
Jan.–June	2.35	2.60	1.25	2.50	1.80	2.20	4.50	5.85
July–Dec	2.15	2.40	1.15	2.25	1.75	2.05	4.50	5.85
1914.								
Jan.–June	2.10	2.35	1.60	2.30	1.80	2.10	4.75	5.50
July–Dec	2.15	3.10	1.95	3.10	1.85	2.90	4.00	6.00
1915.								
Jan.–June	2.95	3.50	2.40	3.50	2.15	3.20	4.50	5.70
July–Dec	2.85	4.10	2.62	4.10	2.60	3.60	4.50	6.40
1916.								
January	3.95	4.10	3.85	4.15	3.55	3.70	6.35	6.40
February	3.90	4.10	3.55	4.15	3.60	3.70	6.35	6.40
March	3.80	4.00	3.45	4.60	3.50	3.65	6.35	6.40
April	3.80	4.10	3.00	4.60	3.65	3.75	6.25	6.65
May	3.80	4.35	3.50	4.25	3.80	4.10	6.65	7.25
June	4.00	5.85	3.75	8.00	4.10	6.00	7.25	11.50
Jan.–June	3.80	5.85	3.00	8.00	3.50	6.00	6.25	11.50
July	5.00	6.50	5.00	8.00	5.50	7.00	10.00	11.00
August	4.50	6.00	5.00	7.00	5.50	5.75	7.50	10.00
September	4.50	5.75	5.00	6.25	4.90	5.75	8.00	8.50
October	4.50	6.75	5.40	6.25	4.90	6.50	7.50	9.50
November	6.75	7.25	6.50	7.50	6.00	6.75	9.50	10.50
December	6.50	7.25	6.40	7.50	5.75	6.40	10.50	10.50
July–Dec	4.50	7.25	5.00	8.00	4.90	7.00	7.50	11.00
1917.								
January	6.50	6.90	6.40	6.80	6.25	6.65	10.50	11.00
February	6.90	7.50	6.75	7.50	6.45	7.25	10.50	12.00
March	7.35	7.85	7.35	8.00	7.25	7.60	11.50	12.50
April	7.85	9.25	7.60	11.00	7.80	10.00	12.25	16.00
May	9.00	10.25	9.75	11.25	9.00	10.00	15.00	16.00
June	9.00	10.00	9.50	10.00	8.00	9.00	15.00	16.00
Jan.–June	6.50	10.25	6.40	11.25	6.25	10.00	10.50	16.00
July	8.75	9.25	8.75	10.00	7.90	8.25	14.00	15.75
August	8.00	8.50	7.25	8.60	7.25	8.00	13.75	14.00
September	8.00	8.35	7.25	8.00	7.25	8.00	12.75	13.75
October	8.25	9.25	7.85	9.50	8.25	9.25	12.50	13.25
November	9.25	15.00	8.75	14.50	8.00	13.25	12.25	12.50
December	14.00	14.75	13.25	14.50	12.10	13.25	11.75	12.25
July–Dec	8.00	15.00	7.25	14.50	7.25	13.25	11.75	15.75

PEAS.

TABLE 128.—*Peas: Area and production of undermentioned countries, 1914–1916.*

Country.	Area.			Production.		
	1914	1915	1916	1914	1915	1916
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	[1] 1,305,000	(2)	(2)	[1] 7,129,000	(2)	(2)
Canada:						
Prince Edward Island	(3)	(3)	(3)	3,000	1,000	1,000
Nova Scotia	(3)	(3)	(3)	4,000	3,000	3,000
New Brunswick	(3)	(3)	(3)	10,000	7,000	7,000
Quebec	24,000	24,000	22,000	432,000	404,000	302,000
Ontario	179,000	169,000	126,000	2,864,000	3,007,000	1,796,000
Manitoba	(3)	(3)	....	....	....	....
Saskatchewan	(3)	(3)	2,000	....	9,000	52,000
Alberta	(3)	(3)	1,000	8,000	9,000	13,000
British Columbia	1,000	1,000	1,000	41,000	39,000	44,000
Total Canada	206,000	196,000	152,000	3,362,000	3,479,000	2,218,000
SOUTH AMERICA.						
Chile [4]	27,000	32,000	36,000	373,000	471,000	515,000
EUROPE.						
Austria	[5] 71,000	[5] 54,000	(2)	[5] 1,373,000	[6] 497,000	(2)
Hungary [6]	[7] 30,000	(2)	(2)	[7] 426,000	(2)	(2)
Croatia-Slavonia [6]	[7] 10,000	(2)	(2)	[7] 147,000	(2)	(2)
Belgium	[8] 12,000	(2)	(2)	[8] 400,000	(2)	(2)
France [6]	61,000	[9] 49,000	(2)	1,116,000	[9] 854,000	(2)
Italy [4]	(2)	(2)	(2)	3,368,000	3,020,000	2,704,000
Luxemburg [6]	[7] 2,000	(2)	(2)	[7] 28,000	(2)	(2)
Netherlands	65,000	61,000	61,000	1,871,000	1,818,000	(2)
Roumania [6]	55,000	44,000	77,000	857,000	750,000	(2)
Russia:						
Russia proper	2,183,000	[9] 1,395,000	[9] 1,070,000	17,329,000	[9] 13,457,000	[9] 12,201,000
Poland	(2)	(2)	(2)	(2)	(2)	(2)
Northern Caucasia	5,000	3,000	(2)	72,000	73,000	(2)
Total Russia, European	2,188,000	1,398,000	....	17,401,000	13,530,000	....
Serbia	(2)	(2)	(2)	[7] 70,000	(2)	(2)
Spain [4]	1,268,000	1,346,000	1,392,000	11,016,000	11,382,000	13,369,000
Sweden	55,000	54,000	55,000	717,000	1,150,000	1,123,000
United Kingdom:						
England	129,000	98,000	85,000	3,063,000	2,461,000	2,137,000
Wales	(3)	(3)	(3)	10,000	8,000	9,000
Scotland	(3)	(3)	(3)	5,000	3,000	4,000
Ireland	(3)	(3)	(3)	9,000	6,000	5,000
Total United Kingdom	130,000	98,000	86,000	3,087,000	2,478,000	2,155,000
ASIA.						
Japan	108,000	110,000	(2)	2,168,000	2,123,000	(2)
Russia (9 governments)	77,000	82,000	(2)	941,000	552,000	(2)
AFRICA.						
Algeria	[8] 26,000	(2)	(2)	[8] 277,000	(2)	(2)
AUSTRALASIA.						
Australia	[10] 39,000	[10] 41,000	25,000	[10] 448,000	[10] 371,000	404,000
New Zealand	14,000	13,000	9,000	453,000	367,000	168,000

[1] Census for 1909.
[2] No official statistics.
[3] Less than 500 acres.
[4] Includes chick-peas, lentils, and vetches.
[5] Galicia and Bukowina not included.
[6] Includes lentils.
[7] 1913 figures.
[8] 1912 figures.
[9] Excludes territory occupied by the enemy.
[10] Includes beans.

SUGAR.

TABLE 129.—*Sugar: Production in the United States and its possessions, 1856–57 to 1917–18.*[1]

[Data for 1912-13 and subsequently beet sugar, also Louisiana and Hawaii cane sugar, estimated by United States Department of Agriculture; Porto Rico, by Treasury Department of Porto Rico; Philippine Islands, production estimated by the Philippine Department of Agriculture and exports for years ending June 30. For sources of data for earlier years, see Yearbook for 1912, p. 650. A short ton is 2,000 pounds.]

Year.	Beet sugar (chiefly refined).	Cane sugar (chiefly raw).					Total.
		Louisiana.	Other States.[2]	Porto Rico.	Hawaii.	Philippine Islands.[3]	
Average:	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1856–7 to 1860–61	....	132,402	5,978	75,364	....	46,446	260,190
1861–62 to 1865–66	269	74,036	1,945	71,765	....	54,488	202,503
1866–67 to 1870–71	448	44,768	3,818	96,114	....	81,485	226,633
1871–72 to 1875–76	403	67,341	4,113	87,606	([4])	119,557	279,020
1876–77 to 1880–81	470	104,920	5,327	76,579	27,040	169,067	383,403
1881–82 to 1885–86	692	124,868	7,280	87,441	76,075	189,277	485,633
1886–87 to 1890–91	1,922	163,049	8,439	70,112	125,440	186,129	555,091
1891–92 to 1895–96	19,406	268,655	6,634	63,280	162,538	286,629	807,142
1896–97 to 1900–1901	58,287	282,399	4,405	61,292	282,585	134,722	823,690
1901–2 to 1905–6	239,730	352,053	12,126	141,478	403,308	108,978	1,257,673
1906–7 to 1910–11	479,153	348,544	13,664	282,136	516,041	145,832	1,785,370
1901–2	184,606	360,277	4,048	103,152	355,611	75,011	1,082,705
1902–3	218,406	368,734	4,169	100,576	437,991	123,108	1,252,984
1903–4	240,604	255,894	22,176	138,096	367,475	82,855	1,107,100
1904–5	242,113	398,195	16,800	151,088	426,248	125,271	1,359,715
1905–6	312,921	377,162	13,440	214,480	429,213	138,645	1,485,861
1906–7	483,612	257,600	14,560	206,864	440,017	132,602	1,535,255
1907–8	463,628	380,800	13,440	230,095	521,123	167,242	1,776,328
1908–9	425,884	397,600	16,800	277,093	535,156	123,876	1,776,409
1909–10	512,469	364,000	11,200	346,786	517,090	140,783	1,892,328
1910–11	510,172	342,720	12,320	349,840	566,821	164,658	1,946,531
1911–12	599,500	352,874	8,000	371,076	595,038	205,046	2,131,534
1912–13	692,556	153,573	9,000	398,004	546,524	[5] 345,077	2,144,734
1813–14	733,401	292,698	7,800	351,666	612,000	[5] 408,339	2,405,904
1914–15	722,054	242,700	3,920	346,490	646,000	[5] 421,192	2,382,356
1915–16	874,220	137,500	1,120	483,590	592,763	[5] 412,274	2,501,467
1916–17	820,657	303,900	7,000	503,081	644,663	[3] 262,425	....
1917–18 (preliminary)	765,207	233,000	2,240	546,000	....	....	....

[1] Census returns give production of beet sugar for 1899 as 81,729 short tons; for 1904, 253,921; 1909, 501,682; production of cane sugar in Louisiana for 1839, 59,974 short tons; 1849, 226,001 hogsheads; 1859, 221,726 hogsheads; 1869, 80,706 hogsheads; 1879, 171,706 hogsheads; 1889, 146,062 short tons; 1898, 278,497 short tons; 1899, 159,583; and 1909, 325,516 short tons; cane sugar in other States, 1839, 491 short tons; in 1849, 21,576 hogsheads; in 1859, 9,256 hogsheads; in 1869, 6,337 hogsheads; in 1879, 7,166 hogsheads; in 1889, 4,580 short tons; in 1899, 1,691; and in 1909, 8,687 short tons.

[2] Includes Texas only, subsequent to 1902–3. Unofficial returns.

[3] Exports, for years ending June 30.

[4] Complete data not available for this period. Production in 1878–79, 1,254 short tons; in 1879–80, 1,304 short tons.

[5] Production.

SUGAR—Continued.

TABLE 130.—*Sugar beets and beet sugar: Production in the United States, 1911–1917.*

State and year.[1]	Number of factories.	Average length of campaign.	Sugar made (chiefly refined).	Sugar beets used.				Analysis of beets.		Recovery of sucrose.[4]		Loss.[5]
				Area harvested.	Average yield per acre.	Quantity worked.	Average price per ton.	Percentage of sucrose.[2]	Purity coefficient.[3]	Percentage of weight of beets.	Percentage of total sucrose in beets.	
	No.	Days.	Short tons.	Acres.	Short tons.	Short tons.	Dolls.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.
California:												
1917	14	92	209,325	161,909	8.16	1,321,716	7.60	18.48	82.09	15.84	85.71	2.64
1916	11	108	236,322	141,097	10.37	1,462,895	6.30	18.35	84.13	16.15	88.01	2.28
1915	11	97	195,343	122,737	10.2	1,249,111	5.86	17.82	82.65	15.64	87.77	2.10
1914	10	97	169,004	101,000	10.4	1,082,000	5.68	18.46	82.70	15.62	84.62	2.84
Colorado:												
1917	15	91	234,303	161,476	10.84	1,749,875	7.28	15.40	85.16	13.39	86.95	2.01
1916	14	102	252,147	188,568	10.25	1,933,591	6.06	15.00	85.79	13.04	86.93	1.96
1915	14	104	273,780	171,222	11.0	1,888,860	5.88	16.53	84.84	14.49	87.66	2.04
1914	13	96	220,799	135,400	12.6	1,706,300	5.68	15.35	84.22	12.94	84.30	2.41
Idaho:												
1917	7	70	38,376	37,745	7.59	286,446	7.06	16.74	84.84	13.40	80.05	3.34
1916	5	86	45,874	42,135	7.87	331,478	6.16	16.95	86.39	13.84	81.65	3.11
1915	4	100	51,225	35,068	9.7	339,859	5.08	17.85	87.14	15.07	84.43	2.78
1914	4	78	39,613	25,300	10.5	264,400	4.96	17.78	87.74	14.98	84.25	2.80
Michigan:												
1917	14	53	64,247	82,151	5.62	461,721	8.04	16.28	86.57	13.91	85.44	2.37
1916	15	49	69,341	99,619	5.05	502,705	6.14	16.37	85.22	13.79	84.24	2.58
1915	15	78	129,997	122,000	8.2	997,972	5.91	15.45	84.08	13.03	84.34	2.42
1914	15	68	110,630	101,300	8.5	857,100	5.23	15.78	82.85	12.91	81.81	2.87
Ohio:												
1917	5	70	24,467	24,234	8.36	202,624	7.18	16.24	86.25	12.08	74.38	4.16
1916	4	45	18,234	24,767	5.56	137,696	6.83	15.89	83.36	13.24	83.32	2.65
1915	4	80	33,472	25,684	10.9	279,427	5.29	14.19	81.99	11.98	84.13	2.21
1914	3	56	21,425	17,800	10.4	184,700	5.04	14.50	83.82	11.60	80.00	2.90
Utah:												
1917	15	82	83,662	80,289	8.68	696,522	7.04	15.61	82.27	12.01	76.94	3.60
1916	11	95	90,277	68,211	10.38	708,237	5.73	16.05	84.79	12.75	79.44	3.30
1915	8	96	85,014	56,226	11.2	629,204	4.91	16.43	85.06	13.51	82.23	2.92
1914	7	100	78,619	41,300	13.7	564,600	4.79	17.03	85.60	13.92	81.74	3.11
Other States:												
1917[6]	21	60	110,827	116,993	7.75	906,641	7.37	15.17	81.87	12.22	80.55	2.95
1916	14	66	108,462	100,911	8.35	843,071	6.18	15.69	82.67	12.87	82.03	2.82
1915	11	84	105,389	78,364	9.8	765,860	5.67	16.38	84.24	13.76	84.00	2.62
1914	8	76	81,964	58,300	10.8	629,500	5.67	15.80	83.35	13.02	82.40	2.78
United States:												
1917	91	74	765,207	664,797	8.46	5,625,545	7.39	16.28	83.89	13.60	83.54	2.68
1916	74	80	820,657	665,308	8.90	5,919,673	6.12	16.30	84.74	13.86	85.03	2.44
1915	67	92	874,220	611,301	10.1	6,150,293	5.67	16.49	84.38	14.21	86.17	2.28
1914	60	85	722,054	483,400	10.9	5,288,500	5.45	16.38	83.89	13.65	83.33	2.73
1913	71	85	733,401	580,006	8.76	5,659,462	5.69	15.78	83.22	12.96	82.13	2.82
1912	73	86	692,556	555,300	9.41	5,224,377	5.82	16.31	84.49	13.26	81.12	3.05
1911	66	94	599,500	473,877	10.68	5,062,333	5.50	15.89	82.21	11.84	74.51	4.05

[1] Acreage and production of beets are credited, as in former reports, to the State in which the beets were made into sugar.
[2] Based upon weight of beets.
[3] Percentage of sucrose (pure sugar) in the total soluble solids of the beets.
[4] Percentage of sucrose actually extracted by factories.
[5] Percentage of sucrose (based upon weight of beets) remaining in molasses and pulp.
[6] Includes 4 factories in Nebraska, 4 in Wisconsin, 2 in Montana, 3 in Wyoming, and 1 each in Illinois, Indiana, Minnesota, Iowa, Kansas, Nevada, Oregon, and Washington.

SUGAR—Continued.

TABLE 131.—*Cane-sugar production of Louisiana, 1911–1917.*

[Figures for 1917 are from returns made before the end of the season, and are subject to revision.]

Year of cane harvest.	Factories in operation.	Sugar made.	Average sugar made, per ton of cane.	Cane used for sugar.			Molasses made.[1]	
				Area.	Average per acre.	Production.	Total.	Per ton of sugar.
	Number.	*Short tons.*	*Pounds.*	*Acres.*	*Short tons.*	*Short tons.*	*Gallons.*	*Gallons.*
1911	188	352,874	120	310,000	19	5,887,292	35,062,525	99
1912	126	153,573	142	197,000	11	2,162,574	14,302,169	93
1913	153	292,698	139	248,000	17	4,214,000	24,046,320	82
1914	149	242,700	152	213,000	15	3,199,000	17,177,443	71
1915	136	137,500	135	183,000	11	2,018,000	12,743,000	93
1916	150	303,900	149	221,000	18	4,072,000	26,154,000	86
1917	139	233,000	130	....	....	3,600,000	....	....

[1] Figures for molasses, 1911–1914, are as reported by the Louisiana Sugar Planters' Association; figures for later years as reported by Bureau of Crop Estimates, U. S. Department of Agriculture.

TABLE 132.—*Cane-sugar production of Hawaii, 1913–1917.*

Island, and year ending Sept. 30.	Factories in operation.	Average length of campaign.	Sugar made.	Cane used for sugar.			Total area in cane.	Average extraction of sugar.	
				Area harvested.	Average yield per acre.	Production.		Per cent of cane.	Per short ton of cane.
	Number.	*Days.*	*Short tons.*	*Acres.*	*Short tons.*	*Short tons.*	*Acres.*	*Per cent.*	*Pounds.*
Hawaii:									
1917	....	184	232,140	52,700	36	1,898,000	100,300	12.23	245
1916	....	179	197,130	52,627	33	1,713,759	98,787	11.50	230
1915	....	196	240,300	50,800	41	2,099,000	100,200	11.45	229
1914	23	174	213,000	51,000	36	1,854,000	....	11.49	230
1913	24	170	197,212	53,600	32	1,703,000	....	11.58	232
Kauai:									
1917	....	207	119,218	25,400	41	1,040,000	51,300	11.46	229
1916	....	191	108,632	21,392	43	927,970	51,712	11.71	234
1915	....	203	115,700	21,000	45	941,000	49,200	12.30	246
1914	9	214	121,000	21,600	50	1,089,000	....	11.11	222
1913	9	198	100,340	20,800	42	841,000	....	11.93	239
Maui:									
1917	....	160	147,755	23,600	47	1,108,000	49,300	13.33	267
1916	....	168	150,311	19 911	55	1,098,247	51,897	13.69	274
1915	....	174	160,300	19,800	57	1,126,000	44,400	14.24	285
1914	7	167	145,000	19,400	54	1,054,000	....	13.76	275
1913	7	152	124,820	19,700	47	929,000	....	13.44	269
Oahu:									
1917	....	214	145,550	22,200	53	1,174,000	44,200	12.39	248
1916	....	179	136,690	21,489	52	1,119,448	43,936	12.21	244
1915	....	205	129,700	21,600	47	1,019,000	46,000	12.73	255
1914	7	188	133,000	20,700	44	903,000	....	14.73	295
1913	10	157	124,152	20,500	49	1,003,000	....	12.38	248
Territory of Hawaii:									
1917	....	190	644,663	123,900	42	5,220,000	245,100	12.35	247
1916	....	180	592,763	115,419	42	4,859,424	246,332	12.20	244
1915	....	195	646,000	113,200	46	5,185,000	239,800	12.46	249
1914	46	183	612,000	112,700	43	4,900,000	....	12.49	250
1913	50	169	546,524	114,600	39	4,476,000	....	12.21	244

SUGAR—Continued.

TABLE 133.—*Sugar: Wholesale price per pound, on New York market, 1912–1917.*

Date.	Raw.				Refined									
	Molasses, 89° polarization.		Centrifugal, 96° polarization.		Cut loaf.		Powdered.		Granulated, fine or standard.		Soft sugar No. 1.		Soft sugar No. 15.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High
1912.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Jan.–June	3.33	4.30	3.83	4.80	5.80	6.65	5.10	5.90	5.60	5.85	4.85	5.15	4.25	5.05
July–Dec.	3.23	3.86	3.73	4.36	5.70	5.90	5.00	5.20	4.90	5.15	4.65	4.95	4.05	4.35
1913.														
Jan.–June	2.75	3.23	3.25	3.73	5.05	5.70	4.35	5.00	4.25	4.95	4.00	4.65	3.40	4.05
July–Dec.	2.62	3.30	3.12	3.80	5.05	5.60	4.25	4.90	4.15	4.85	4.05	4.55	3.45	3.95
1914.														
Jan.–June	2.27	2.98	2.92	3.48	5.05	5.25	3.95	4.40	3.85	4.35	3.60	4.10	3.00	3.50
July–Dec.	2.61	5.87	3.26	6.52	5.25	8.40	4.40	7.60	3.85	7.55	4.10	7.30	3.50	6.70
1915.														
Jan.–June	3.20	4.27	3.95	5.02	5.85	7.00	5.05	6.20	4.95	6.15	4.70	5.85	4.10	5.25
July–Dec.	2.73	4.43	3.50	5.20	5.80	7.05	5.00	6.25	4.90	6.20	4.65	5.90	4.05	5.30
1916.														
January	3.56	4.00	4.33	4.77	6.65	6.85	5.85	6.05	5.75	6.00	5.50	5.70	4.90	5.10
February	3.93	4.31	4.70	5.08	6.90	7.40	6.10	6.35	6.00	6.30	5.75	6.10	5.15	5.50
March	4.12	5.25	4.83	6.02	7.40	8.15	6.35	7.10	6.25	7.05	6.10	6.85	5.50	6.25
April	5.06	5.69	5.83	6.46	8.15	8.55	7.10	7.50	7.00	7.45	6.85	7.25	6.25	6.65
May	5.25	5.75	6.02	6.52	8.55	8.80	7.50	7.75	7.40	7.70	7.25	7.50	6.65	6.90
June	5.25	5.63	6.02	6.40	8.80	8.80	7.75	7.75	7.65	7.70	7.50	7.50	6.90	6.90
Jan.–June.	3.56	5.75	4.33	6.52	6.65	8.80	5.85	7.75	5.75	7.70	5.50	7.50	4.90	6.90
July	5.31	5.63	6.08	6.40	8.80	8.80	7.75	7.75	7.65	7.70	7.50	7.50	6.90	6.90
August	4.09	5.50	4.89	6.27	8.15	8.80	7.10	7.75	7.00	7.70	6.85	7.50	6.25	6.90
September	4.09	5.25	4.89	6.02	7.40	8.15	6.35	7.10	6.25	7.05	6.10	6.85	5.50	6.25
October	5.00	5.88	5.77	6.65	7.90	8.65	6.85	7.60	6.75	7.55	6.60	7.35	6.00	6.75
November	4.87	5.75	5.64	6.52	8.65	8.65	7.60	7.60	7.50	7.55	7.35	7.35	6.75	6.75
December	4.25	4.87	5.02	5.64	8.00	8.65	6.95	7.60	6.85	7.55	6.70	7.35	6.10	6.75
July–Dec..	4.09	5.88	4.89	6.65	7.40	8.80	6.35	7.75	6.25	7.70	6.10	7.50	5.50	6.90
1917.														
January	3.98	4.62	4.75	5.39	7.90	8.00	6.85	6.95	6.75	6.90	6.60	6.70	6.00	6.10
February	3.87	4.63	4.64	5.52	7.90	8.40	6.85	7.35	6.75	7.30	6.60	7.10	6.00	6.50
March	4.25	5.19	5.02	5.96	8.15	8.40	7.10	7.35	7.00	7.30	6.85	7.10	6.25	6.50
April	5.00	5.69	5.77	6.46	8.40	9.00	7.35	7.65	7.25	7.55	7.10	7.35	6.50	6.75
May	5.20	5.52	5.95	6.27	......	9.00	......	7.65	7.50	7.55	......	7.35	......	6.75
June	5.06	5.77	5.83	6.52	......	9.00	......	7.65	7.50	7.55	......	7.35	......	6.75
Jan.–June.	3.87	5.77	4.64	6.52	7.90	9.00	6.85	7.65	6.75	7.55	6.60	7.35	6.00	6.75
July	5.23	6.02	6.23	7.02	9.00	9.40	7.65	8.05	7.50	7.95	7.35	7.60	6.75	7.15
August	6.02	6.89	7.02	7.77	9.65	9.90	8.30	8.55	8.15	8.45	8.00	8.25	7.40	7.65
September	6.02	6.05	6.90	7.02	9.90	9.90	8.55	8.55	8.40	8.45	8.25	8.25	7.55	7.65
October	6.02	6.02	6.90	6.90	9.85	9.90	8.50	8.55	8.35	8.45	8.20	8.25	7.60	7.65
November	6.02	6.02	6.90	6.90	9.85	9.85	8.50	8.50	8.35	8.40	8.20	8.20	7.60	7.60
December	5.90	6.02	5.92	6.90	9.65	9.85	8.30	8.50	8.15	8.40	8.00	8.20	7.40	7.60
July–Dec..	5.23	6.89	5.92	7.77	9.00	9.90	7.65	8.55	7.50	8.45	7.35	8.25	6.75	7.65

SUGAR—Continued.

TABLE 134.—*Sugar: International trade, calendar years 1909–1916.*

[The following kinds and grades have been included under the head of sugar: Brown, white, candied, caramel, *chancaca* (Peru), crystal cube, maple, muscovado, *panela*. The following have been excluded: "Candy" (meaning confectionery), confectionery, glucose, grape sugar, jaggery, molasses, and sirup. See "General note," Table 85.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909-1913.	1915 (Prelim).	1916 (Prelim).	Country.	Average, 1909-1913.	1915 (Prelim).	1916 (Prelim).
From—	*Pounds.*	*Pounds.*	*Pounds.*	*From—*	*Pounds.*	*Pounds.*	*Pounds.*
Argentina	141	118,658	891	Guadeloupe	75,270	75,202	....
Austria-Hungary	1,697,659	....	....	Martinique	85,110	85,814	....
Barbados	51,657	....	....	Mauritius	452,510	504,983	....
Belgium	308,952	....	....	Netherlands	400,980	327,486	101,819
Brazil	76,568	130,235	118,663	Peru	293,472	485,580	....
British Guiana	212,393	260,342	....	Philippine Islands	358,865	465,199	744,030
British India	53,222	34,474	....	Reunion	83,316	77,710	....
China	29,867	32,950	25,555	Russia	587,028	206,415	117,078
Cuba	4,019,798	5,731,998	....	Trinidad and Tobago	87,510	113,362	....
Dominican Republic	184,703	226,634	....	United Kingdom	65,207	11,292	10,296
Dutch East Indies	2,825,111	3,023,765	....	Other countries	660,878	1,361,825	....
Egypt	16,171	58,939	63,533				
Fiji	157,633	191,661	269,983				
France	413,795	222,651	208,308	Total	14,944,141	13,747,175	....
Germany	1,746,322	....	....				

IMPORTS.

Country.	Average, 1909-1913.	1915 (Prelim).	1916 (Prelim).	Country.	Average, 1909-1913.	1915 (Prelim).	1916 (Prelim).
Into—				*Into—*			
Argentina	103,380	79	66,930	Netherlands	165,443	37,281	17,392
Australia	152,465	260,144	....	New Zealand	125,924	141,692	....
British India	1,431,980	1,091,344	....	Norway	104,651	129,930	136,552
British South Africa	60,517	17,379	7,385	Persia	218,703	....	....
Canada	595,785	599,701	700,600	Portugal	79,262	71,843	....
Chile	169,931	156,612	....	Singapore	163,220	....	....
China	687,243	636,877	689,472	Switzerland	236,403	267,724	243,296
Denmark	43,627	....	....	United Kingdom	3,707,211	3,675,608	3,125,674
Egypt	86,041	45,226	16,477	United States[1]	4,245,034	5,286,218	5,532,322
Finland	100,153	101,774	110,510	Other countries	1,027,604	305,010	....
France	372,395	1,149,743	1,160,151				
Italy	18,499	6,776	166,849	Total	14,249,356	14,257,960	....
Japan	353,885	276,999	213,485				

[1] Not including receipts from Hawaii, amounting to an average for five years 1909–1913 of 1,089,659,793, in 1915 to 1,212,360,888, and in 1916 to 1,160,018,550 pounds; and from Porto Rico, to an average for the five years 1909–1913 of 642,628,376, in 1915 to 638,101,561, and in 1916 to 907,373,407 pounds.

SUGAR—Continued.

TABLE 135.—*Sugar production*[1] *of undermentioned countries, campaigns of 1914–15, to 1916–17.*

BEET SUGAR (RAW).

Country.	1914–15	1915–16	1916–17
NORTH AMERICA.	*Short tons.*	*Short tons.*	*Short tons.*
United States[1]	722,054	871,220	820,657
Canada[1]	15,657	19,758	....
Total	737,711	893,978	....
EUROPE.			
Austria-Hungary	1,766,215	1,212,530	804,679
Belgium	225,064	124,501	....
Denmark	168,652	138,008	124,339
France[1]	333,954	119,802	205,177
Germany	2,755,750	1,895,956	....
EUROPE—continued.	*Short tons.*	*Short tons.*	*Short tons.*
Italy	184,084	198,414	....
Netherlands[1]	316 455	263,826	287,370
Roumania	33,259	....	....
Russia	1,947,486	1,699,485	1,600,000
Serbia	2,000	....	....
Spain	112 231	117,334	131,108
Sweden	169,836	140,340	....
Switzerland	4,134	2,646	1,984
Total	8,019,120	5,942,842	....
Grand total	8,756,831	6,836,820	....

CANE SUGAR.

Country.	1914–15	1915–16	1916–17
NORTH AMERICA.	*Short ston.*	*Short tons.*	*Short tons.*
United States:			
Louisiana	243,000	137,500	304,700
Texas[2]	4,000	1,120	7,000
Hawaii	646,000	592,763	647,000
Porto Rico	346,490	483,590	510,800
St. Croix[3]	4,497	16,534	....
Central America:			
British Honduras	840	....	....
Costa Rica	2,926	3,500	....
Guatemala	43,108	49,261	....
Nicaragua	7,818	10,000	15,000
Mexico[2]	121,000	....	....
West Indies:			
British—			
Antigua	10,248	9,397	....
Barbados	32,932	41,664	39,536
Jamaica	25,852	24,653	....
St. Christopher-Nevis	10,080	....	....
St. Lucia[3]	....	....	....
Trinidad and Tobago	65,881	71,939	79,398
Cuba	2,967,427	2,967,427	2,865,353
Dominican Republic[3]	119,000	140,443	149,543
French—			
Guadaloupe[3]	44,000	....	....
Martinique[3]	44,000	....	....
Total	4,739,099	4,549,791	....
SOUTH AMERICA.			
Argentina	370,324	164,572	92,669
Brazil	[2] 269,000	....	....
Guiana:			
British[3]	136,891	130,171	....
Dutch[3]	13,000	....	....
Paraguay	1,694	....	....
Peru	289,729	277,780	....
Total	1,080,638	572,523	....
EUROPE.	*Short tons.*	*Short tons.*	*Short tons.*
Spain	6,168	4,700	6,239
ASIA.			
British India	2,757,440	2,950,080	2,941,120
Formosa	222,000	315,000	450,939
Japan	60,000	....	....
Java	1,436,818	1,411,913	1,760,535
Philippine Islands	421,192	412,274	....
Total	4,897,450	5,089,267	....
AFRICA.			
Egypt	83,486	91,104	92,725
Mauritius	275,250	236,465	313,600
Natal	110,176	129,339	128,244
Portuguese East Africa	45,000	....	....
Reunion	44,000	....	....
Total	557,912	456,908	....
OCEANIA.			
Australia	275,381	179,788	336,000
Fiji	106,794	95,831	....
Total	382,175	275,619	....
Total cane sugar	11,663,442	10,948,808	....
Total beet and cane sugar	20,420,273	17,885,628	....

[1] Refined sugar. [2] Unofficial figures. [3] Exports.

SUGAR—Continued.

TABLE 136.—*Sugar: Total production of countries mentioned in Table 131, 1895–96 to 1915–16.*

Year.	Production.			Year.	Production.		
	Cane.[1]	Beet.	Total.		Cane.[1]	Beet.	Total.
	Short tons.	*Short tons.*	*Short tons.*		*Short tons.*	*Short tons.*	*Short tons.*
1895–96	3,259,000	4,832,000	8,091,000	1906–7	8,365,000	7,587,000	15,952,000
1896–97	3,171,000	5,519,000	8,720,000	1907–8	7,926,000	7,390,000	15,316,000
1897–98	3,206,000	5,457,000	8,663,000	1908–9	8,654,000	7,350,000	16,004,000
1898–99	3,355,000	5,616,000	8,971,000	1909–10	9,423,000	6,991,000	16,414,000
1899–1900	3,389,000	6,262,000	9,651,000	1910–11	9,540,000	9,042,000	18,582,000
1900–1901	4,084,000	6,795,000	10,879,000	1911–12	10,275,000	7,072,000	17,347,000
1901–2	6,818,000	7,743,000	14,561,000	1912–13	10,908,000	9,509,769	20,518,000
1902–3	6,782,000	6,454,000	13,236,000	1913–14	[2]11,270,200	9,433,783	20,703,983
1903–4	6,909,000	6,835,000	13,744,000	1914–15	[3]11,316,952	8,756,831	20,073,783
1904–5	7,662,000	5,525,000	13,187,000	1915–16	[4]10,948,808	6,836,820	17,885,628
1905–6	7,551,000	8,090,000	15,641,000				

[1] Prior to 1901–2 these figures include exports instead of production for British India.
[2] Excluding Costa Rica, Guatemala, and Salvador.
[3] Excluding Salvador and St. Lucia.
[4] Excluding Costa Rica, Guatemala, Salvador, Mexico, St. Christopher, St. Lucia, Guadeloupe, Martinique, Brazil, Dutch Guiana, Paraguay, Japan Portuguese East Africa, Reunion, and Australia.

TABLE 137.—*Beet and sugar production of undermentioned countries.*

Country and year.	Factories in operation.	Sugar made, raw.	Beets used for sugar.			Average extraction of sugar.	
			Area harvested.	Average yield per acre.	Quantity worked.	Percentage of weight of beets used.	Per short ton of beets used.
Austria-Hungary:	*Number.*	*Short tons.*	*Acres.*	*Short tons.*	*Short tons.*	*Per cent.*	*Pounds.*
1910–11	214	1,549,102	918,201	11.95	11,038,503	17.5	281
1911–12	210	1,180,605	968,771	8.18	8,623,578	16.6	274
1912–13	218	2,093,439	1,088,088	13.00	13,911,305	14.8	301
Belgium:			*Area cultivated.*		*Produced.*	*P. c. of wt. of beets produced.*	*Per ton of beets produced.*
1910–11	92	299,035	148,858	13.41	1,996,977	14.97	299
1911–12	89	258,780	145,119	11.45	1,660,872	15.58	312
1912–13	88	309,308	152,913	12.47	1,907,358	16.22	324
1913–14	84	249,395	129,527	11.85	1,534,311	16.25	325
Denmark:							
1910–11	8	110,792	....	....	817,381	13.56	271
1911–12	8	128,032	....	....	809,616	15.81	316
1912–13	9	148,447	79,986	14.49	1,159,369	12.80	256
1913–14	9	179,002	....	....	1,025,140	17.46	349
France:		*Refined.*	*Area harvested.*		*Worked.*	*P. c. of wt. of beets used.*	*Per ton of beets used.*
1910–11	239	717,033	549,969	10.76	6,426,226	11.80	236
1911–12	220	512,986	555,575	8.09	4,669,083	11.41	228
1912–13	213	967,440	566,539	12.99	7,960,926	13.15	263
1913–14	206	790,790	534,230	12.24	6,539,725	12.09	242
1914–15	69	333,953	242,781	11.92	2,892,878	11.54	231
1915–16	64	149,801	146,305	8.65	1,265,518	11.84	237
Germany:[1]		*Raw.*					
1910–11	354	2,770,001	1,180,913	14.72	17,360,003	15.96	319
1911–12	342	1,551,797	1,247,213	8.03	9,987,473	15.54	311
1912–13	342	2,901,564	1,353,181	13.56	18,344,738	15.82	316
1913–14	341	2,885,572	1,316,655	14.19	18,672,939	15.45	309

[1] The production of sugar in Germany, including refined from imported raw sugar, was 2,983,085 short tons in 1912–13 and 2,993,704 in 1913–14.

SUGAR—Continued.

TABLE 137.—*Beet and sugar production of undermentioned countries*—Continued.

Country and year.	Factories in operation.	Sugar made, raw.	Beets used for sugar: Area harvested.	Beets used for sugar: Average yield per acre.	Beets used for sugar: Quantity worked.	Average extraction of sugar: Percentage of weight of beets used.	Average extraction of sugar: Per short ton of beets used.
	Number.	*Refined.*	*Area cultivated.*	*Short tons.*	*Worked*	*P.c. of wt. of beets used.*	*Per ton of beets used.*
Italy:							
1910–11	35	190,901	124,044	14.92	1,698,551	11.24	225
1911–12	37	174,894	131,260	13.30	1,621,760	10.78	216
1912–13	37	218,628	133,434	14.40	1,879,328	11.63	233
1913–14	37	336,823	152,700	19.70	2,994,816	11.25	225
Netherlands:							
1910–11	27	219,947	138,554	12.94	1,678,803	13.10	262
1911–12	27	265,401	137,388	16.06	1,896,187	14.00	280
1912–13	27	315,775	160,180	14.99	2,228,851	14.17	283
1913–14	27	231,073	149,001	12.27	1,705,878	13.55	271
1914–15	27	316,346	156,251	14.06	2,193,577	14.42	288
1915–16 (prelim.)	23	240,828	139,644	13.52	1,755,964	13.71	274
Russia:		*Raw.*					
1910–11	276	2,074,410	1,631,188	8.9	14,437,305	14.61	292
1911–12	281	2,036,990	1,923,539	7.8	14,754,312	13.84	277
1912–13	287	1,361,842	1,847,313	6.4	11,538,078	11.73	235
1913–14	293	1,680,893	1,756,160	7.7	13,436,058	12.51	250
1914–15	265	1,958,975	1,941,122	7.4	13,979,662	14.01	280
1915–16	235	1,697,356	1,748,466	7.0	12,324,612	13.77	275
Spain:							
1910–11	33	68,743	(1)		532,882	12.90	258
1911–12	32	102,859	90,787		872,834	11.78	236
1912–13	33	171,839	105,213		1,302,871	11.33	264
1913–14	31	186,680	146,745	(1)	1,478,114	12.62	252
1914–15	(2)	112,231	78,642		813,790	....	....
1915–16	31	117,334	(1)		921,013	....	....
Sweden:							
1910–11	24	191,713	86,816	13.56	1,218,166	15.53	315
1911–12	24	140,409	71,790	14.83	908,372	15.27	309
1912–13	24	145,462	66,900	13.95	922,083	15.59	316
United States:		*Refined.*	*Area harvested.*				
1910–11	61	510,172	398,029	10.17	4,047,292	12.61	252
1911–12	66	599,500	473,877	10.68	5,062,333	11.84	237
1912–13	73	692,556	555,300	9.41	5,224,377	13.26	265
1913–14	71	733,401	580,006	9.76	5,659,462	12.96	259
1914–15	60	722,054	483,400	10.9	5,288,500	13.65	273
1915–16	67	874,220	611,301	10.1	6,150,293	14.21	267
1916–17	74	820,657	665,308	8.90	5,919,673	13.86	277

[1] No data.

SUGAR—Continued.

TABLE 138.—*Cane and sugar production of undermentioned countries.*

Country and year.	Factories in operation.	Sugar made.	Cane used for sugar. Area harvested.	Cane used for sugar. Average per acre.	Cane used for sugar. Quantity worked.	Average extraction of sugar. Per ton [1] of cane used.
Argentina:	*Number.*	*Short tons.*	*Acres cultivated.*	*Short tons.*	*Short tons.*	*Pounds.*
1910-11	(1)	163,701	178,060	(1)	(1)	(1)
1911-12	(1)	198,515	230,866	(1)	(1)	(1)
1912-13	39	162,313	232,850	(1)	2,338,594	139
1913-14	38	304,389	263,656	(1)	3,451,321	176
1914-15	37	370,324	269,833	(1)	4,027,067	184
Australia:			*Harvested.*		*Produced.*	
1910-11	53	253,131	100,237	22.36	2,240,849	226
1911-12	53	210,292	101,010	18.65	1,884,120	223
1912-13	50	144,776	84,279	15.09	1,271,358	228
Cuba:			*Cultivated.*			
1910-11	171	1,670,151	(2)	(2)	14,736,981	227
1911-12	172	2,142,420	(2)	(2)	20,679,593	207
1912-13	171	2,737,264	1,340,139	(2)	25,137,684	218
1913-14	170	2,891,281	1,334,070	(2)	25,644,949	226
Hawaii:			*Harvested.*			
1911-12	(1)	595,038	113,000	42.0	4,774,000	249
1912-13	(1)	546,524	114,600	39.0	4,476,000	244
1913-14	46	612,000	112,700	45.0	5,094,000	240
1914-15	45	646,000	113,200	46.0	5,185,000	249
1915-16	(1)	592,763	115,419	42.0	4,859,424	244
Japan:			*Cultivated.*			
1910-11	13	72,454	49,166	18.49	892,662	162
1911-12	14	75,797	52,153	18.16	941,550	161
1912-13	17	68,867	51,293	17.15	879,624	157
1913-14	16	72,613	53,300	17.91	954,758	152
Java (factory plantations):			*Harvested.*			
1910-11	189	1,583,178	321,720	46.43	14,936,035	212
1911-12	193	1,424,657	336,021	40.71	13,679,962	208
1912-13	191	1,527,584	340,739	45.11	15,370,765	199
Spain:			*Cultivated.*			
1910-11	27	22,371	11,666	21.9	258,138	173
1911-12	23	17,831	9,983	16.5	167,092	213
1912-13	21	14,585	9,844	15,6	153,707	190
1913-14	22	8,131	4,581	17.4	79,719	204
1914-15	(1)	6,168	(1)	(1)	....	(1)
1915-16	16	4,700	2,950	16.59	48,937	194
United States (Louisiana):			*Harvested for sugar.*			
1911-12	188	352,874	310,000	19.0	5,887,292	120
1912-13	126	153,573	197,000	11.0	2,162,574	142
1913-14	153	292,698	218,000	17.0	4,214,000	139
1914-15	149	242,700	213,000	15.0	3,199,000	152
1915-16	136	137,500	183,000	11.0	2,018,000	135
1916-17	150	303,900	221,000	18.0	4,072,000	149

[1] No data.

SUGAR—Continued.

TABLE 139.—*Sugar beets: Area and production of undermentioned countries, 1914–1916.*

Country.	Area.			Production.		
	1914	1915	1916	1914	1915	1916
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Short tons.*	*Short tons.*	*Short tons.*
United States	483,000	611,000	665,308	5,585,000	6,511,000	6,228,000
Canada	12,000	18,000	15,000	109,000	141,000	71,000
Total	495,000	629,000	680,308	5,694,000	6,652,000	6,299,000
EUROPE.						
Austria-Hungary:						
Austria	[1] 600,000	[1] 435,000	(2)	[1] 7,468,000	(2)	(2)
Hungary	439,000	266,000	(2)	4,425,000	2,743,000	(2)
Croatia-Slavonia	(2)	(2)	(2)	(2)	(2)	(2)
Bosnia-Herzegovina	(2)	(2)	(2)	(2)	(2)	(2)
Total Austria-Hungary			(2)			(2)
Belgium	130,000	109,000	(2)	(2)	(2)	(2)
Bulgaria	(2)	(2)	(2)	(2)	(2)	(2)
Denmark	(2)	79,000	77,782	1,066,000	910,000	(2)
England	2,000	2,000	151	(2)	(2)	(2)
France	[3] 331,000	[3] 208,000	[3] 188,876.	[3] 4,135,000	[3] 1,663,000	[3] 2,105,283
Germany	1,406,000	917,000	(2)	18,650,000	(2)	(2)
Italy	101,000	123,000	123,056	1,488,000	1,639,000	1,486,231
Netherlands	156,000	140,000	157,262	2,198,000	1,889,000	2,115,093
Roumania	37,000	34,000	30,411	248,000	204,000	(2)
Russia:						
Russia proper	1,873,000	1,871,000	(2)	13,716,000	(2)	(2)
Poland	(2)	(2)	(2)	(2)	(2)	(2)
Northern Caucasia (Kuban)	10,000	11,000	(2)	72,000	(2)	(2)
Total Russia, European	1,883,000	1,882,000	1,635,000	13,788,000	(2)	(2)
Spain	79,000	(2)	134,212	[4] 709,000	(2)	829,912
Sweden	80,000	79,000	(2)	967,000	856,000	(2)
Switzerland	2,000	2,000	1,977	30,000	28,000	22,046
Total						
Grand total						

[1] Galicia and Bukowina not included.
[2] No official statistics.
[3] Exclusive of invaded area, in which 115,900 acres were under sugar beets in 1914.
[4] Beets entered in factories up to December 31, 1914, for sugar campaign of 1914–15.

TEA.

TABLE 140.—*Tea: International trade, calendar years 1909–1916.*

["Tea" includes tea leaves only and excludes dust, sweepings, and *yerba maté*. See "General note," Table 85.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913.	1915 (Prelim.).	1916 (prelim.).	Country.	Aver. 1909–1913.	1915 (prelim.).	1916 (prelim.).
From—	*Pounds.*	*Pounds.*	*Pounds.*	*From—*	*Pounds.*	*Pounds.*	*Pounds.*
British India	267,887	319,864		Japan	35,823	41,441	46,273
Ceylon	189,016			Singapore	2,575		
China	197,997	233,474	204,672	Other countries	6,991	5,174	
Dutch East Indies	46,675	105,305		Total	770,604	728,074	
Formosa	23,640	22,816					

TEA—Continued.

TABLE 140.—*Tea: International trade, calendar years 1909-1916*—Continued.

IMPORTS.

Country.	Average, 1909-1813.	1915 (prelim.).	1916 (prelim.).	Country.	Average, 1909-1913.	1915 (prelim.).	1916 (prelim.).
Into	*Pounds.*	*Pounds.*	*Pounds.*	*Into*	*Pounds.*	*Pounds.*	*Pounds.*
Argentina	3,890	3,012	3,349	Germany	8,964	....	....
Australia	35,442	44,295	....	Netherlands	11,3[illegible]3	15,678	18,045
Austria-Hungary	3,424	....	....	New Zealand	7,542	9,150	....
British India	8,002	12,101	....	Persia	9,446	....	....
British South Africa	5,544	6,664	6,479	Russia	157,701	184,708	172,843
Canada	37,927	42,855	36,678	Singapore	6,009	....	....
Chile	3,505	3,017	....	United Kingdom	293,045	317,429	302,416
China	18,890	24,337	30,944	United States	98,897	106,106	101,767
Dutch East Indies	6,742	[1] 6,441	....	Other countries	34,294	19,789	....
France	2,806	6,260	5,830				
French Indo-China	3,295	2,148	....	Total	756,751	803,990	....

[1] Imports from Java and Madura only.

TABLE 141.—*Tea: Wholesale price per pound, on New York market, 1912–1917.*

Date.	Foochow, fair to fine.		Formosa, fine to choice.		Japan, pan-fired.		India orange pekoe.		Ceylon orange pekoe.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Jan.–June	11½	22¾	20	39	15	21	18	25	20	26
July–Dec	11	21	23	39	15	18	18	25	20	26
1913.										
Jan.–June	12	22	24	39	13½	35	18½	24	18½	24
July–Dec	12	22	24	39	13½	28	18½	21	18½	24
1914.										
Jan.–June	12	22	24	39	12½	30	18½	21	18½	24
July–Dec	12½	22	23	39	12½	38	18½	27	18½	26
1915.										
Jan.–June	15	22	23	39	18	35	....	....	21	30
July–Dec	17	22	23	39	18	40	24	32	24	31
1916.										
January	18	21	23	39	18	18	24	26	24	26
February	18	21	23	39	18	18	26	28	26	28
March	18	21	23	39	16½	35½	26	30	27	30
April	18	21	23	39	16	35	27	30	27	30
May	18½	21	23	39	16	35	27	30	27	30
June	17½	21	23	39	16	35	28	30	28	30
Jan.–June	17½	21	23	39	16	35½	24	30	21	30
July	17½	21	23	39	16	35	28	30	28	30
August	17½	21	23	39	16	35	28	30	28	30
September	17½	21	23	39	16	35	28	30	28	30
October	17½	21	23	39	16	35	28	30	28	30
November	17½	21	23	39	16	35	28	30	28	30
December	17½	21	23	39	16	35	28	30	28	30
July–Dec	17½	21	23	39	16	35	28	30	28	30
1917.										
January	17½	21	23	39	16	35	28	30½	28	30
February	18½	21	23	39	16	40	29½	35	29½	35
March	18½	21	23	39	17	40	34	42	34	42
April	19	26	23	39	18	40	39	47	39	53
May	23½	26	28	39	22	40	46	47	51	53
June	22½	26	25½	60	21	40	42	47	46	43
Jan.–June	17½	26	23	60	16	40	28	47	28	53
July	22½	27	40	60	21	35	40	43	41	50
August	25	27	40	60	23	40	39	45	43	50
September	25	27	40	60	24	40	41	45	43	50
October	25	27	40	60	24	40	40	45	40	50
November	25	27	40	60	24	40	40	45	40	50
December	26½	27	40	60	24	40	40	45	40	50
July–Dec	22½	27	40	60	21	40	39	45	40	50

COFFEE.

TABLE 142.—*Coffee: International trade, calendar years 1909–1916.*

[The item of coffee comprises unhulled and hulled, roasted, ground, or otherwise prepared, but imitation or "surrogate" coffee and chicory are excluded. See "General note," Table 85.]

EXPORTS.

[000 omitted.]

Country.	Average 1909–1913	1915 (prelim).	1916 (prelim).	Country.	Average 1909–1913	1915 (prelim).	1916 (prelim).
From—	*Pounds.*	*Pounds.*	*Pounds.*	*From—*	*Pounds.*	*Pounds.*	
Belgium	33,626	....	....	Netherlands	189,288	371,777	147,748
Brazil	1,672,282	2,256,818	172,474	Nicaragua	19,033	20,134	23,044
British India	27,780	22,441	....	Salvador	62,830	67,162	78,829
Colombia	104,398	149,423	....	Singapore	4,700	....	....
Costa Rica	27,515	26,918	....	United States[1]	44,251	47,226	38,279
Dutch East Indies	54,148	117,494	....	Venezuela	111,326	137,967	....
Guatemala	85,951	80,655	....	Other countries	52,022	30,595	....
Haiti	61,943	....	....				
Jamaica	8,263	....	....	Total	2,608,317	3,328,610	....
Mexico	48,991	....	....				

IMPORTS.

Country.	Average 1909–1913	1915 (prelim).	1916 (prelim).	Country.	Average 1909–1913	1915 (prelim).	1916 (prelim).
Into—				*Into—*			
Argentina	28,125	36,142	32,836	Norway	29,309	53,219	51,063
Austria-Hungary	128,304	....	....	Russia	26,073	21,012	9,801
Belgium	111,738	....	....	Singapore	6,000	....	....
British South Africa	26,445	32,275	28,905	Spain	29,316	35,219	36,120
Cuba	24,906	21,215	....	Sweden	74,486	....	....
Denmark	33,102	....	....	Switzerland	25,029	29,092	43,883
Egypt	15,654	18,701	16,640	United Kingdom	28,581	32,723	29,021
Finland	28,624	28,820	15,388	United States	907,899	1,228,762	1,166,888
France	245,752	305,409	337,308	Other countries	103,377	121,190	....
Germany	399,965	....	....				
Italy	58,278	88,119	107,948	Total	2,614,596	2,493,300	....
Netherlands	283,633	441,402	196,238				

[1] Chiefly from Porto Rico.

COFFEE—Continued.

TABLE 143.—*Coffee: Wholesale price per pound, on the New York and New Orleans markets, 1912–1917.*

Date.	New York.												New Orleans.			
	Rio No. 7.		Santos No. 7.		Mocha.		Padang.		Cucuta, washed.		Mexican Cordoba, washed.		Rio No. 7.		Santos No. 7.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Jan.-June	13⅞	15	14¼	15½	18½	19½	20	22	15½	18½	17½	18½	13⅞	15	14¼	15⅝
July-Dec	14	15¼	14½	16¼	18½	21	19½	22	15⅛	18½	15¾	18½	13⅞	15¼	14¾	16⅜
1913.																
Jan.-June	9½	14	10⅞	15⅝	18	21	19	22	12	17¾	15	18	9⅝	14	11⅛	15
July-Dec	8⅞	11⅛	10⅜	13¼	18	20	21	23	11¾	17¾	15	16½	9	11½	10½	12⅞
1914.																
Jan.-June	8½	9⅝	10¼	11¾	17½	21	21	23	14¼	18	15¼	16½	8⅝	9¾	10½	11¾
July-Dec	6¼	9⅞	8¼	12¾	19½	30	21	24	11	18¼	12	17¼	6⅜	10⅜	8¾	13½
1915.																
Jan.-June	7	8¼	8⅜	9¼	21½	30	21	23½	11¼	15¾	11	14½	7	8⅝	8¾	9⅝
July-Dec	6⅝	7⅞	7¾	9	23	30	21	23	11	15¼	10½	13½	6⅞	8	7⅝	9
1916.																
January	7⅝	8¼	7⅞	8½	25	27	22½	23	11½	15½	11½	13¾	7⅝	8½	8⅛	8⅞
February	8¼	9⅜	8⅜	9⅜	19	27	22½	23	12	16	12	14	8⅜	9½	8⅜	9½
March	9¼	9⅝	9	9⅜	19	22½	22¾	26	12½	16½	12¼	14½	9⅛	9¾	9⅛	9⅝
April	9½	9¾	9	9⅝	19½	22½	25	26½	13	16¼	13	14½	9½	9⅞	9⅜	9⅞
May	9¾	9⅞	9½	9⅞	19½	22	26	26½	13	16¼	12½	14½	9¾	10⅛	9¾	10
June	9	9⅞	9½	9⅞	19	22	26	26½	12	16¼	12	14	8⅛	9⅞	9⅛	9⅞
Jan.-June	7⅝	9⅞	7⅞	9⅞	19	27	22½	26½	11½	16½	11½	14½	7⅝	10⅛	8⅛	10
July	9	9½	9½	9¾	19	20½	25	26½	12	14¾	11¾	13½	8⅞	9⅝	9¼	10
August	9⅜	9⅞	9½	10⅜	18¾	20½	25	26	12	14½	11¾	13¼	9½	10⅛	9⅝	10½
September	9½	10⅛	10¼	11	18¾	20	25	26	12	14½	11¾	13¼	9⅝	10½	10¼	10⅞
October	9⅜	9⅝	9⅞	10½	18¾	20	25	26	12¼	14½	11½	13¼	9⅝	10	10⅛	10⅝
November	9¼	9½	9¾	10½	18¾	20	25	26	12¼	14½	11½	13	9⅜	9¾	9⅞	10½
December	9¼	9¾	9¾	10¼	18¾	20	25	26	12¼	14¾	11½	13	9¾	9¼	9¾	10⅜
July-Dec	9	10⅛	9½	11	18¾	20½	25	26½	12	14¾	11½	13½	8⅞	10½	9¼	10⅞
1917.																
January	9¾	10	10	10¼	18¾	20	25	26	12½	14⅞	12¼	13⅛	10	10⅛	10⅜	10⅝
February	9⅞	10	10	10½	18¾	20	25	26	12⅜	14⅞	12¼	14⅞	9⅝	10	9⅞	10⅜
March	9½	9⅞	9½	10½	18¾	20	24	26	11½	14⅝	11	13¼	9⅜	9¾	9⅝	9⅞
April	9⅜	10⅛	9½	10½	18¾	20	24	26	11½	14	11	12	9½	10⅜	9½	10½
May	10⅛	10⅜	9⅞	10⅛	18¾	22	24	26	11½	14½	11	12	10⅜	10⅝	10⅜	10⅝
June	9½	10⅜	9⅝	10	19	22	26	26	11¼	14½	11	12	9¾	10½	9¾	10½
Jan.-June	9⅜	10⅜	9½	10½	18¾	22	24	26	11¼	14⅞	11	14⅞	9⅜	10⅝	9½	10⅝
July	9⅛	9½	9½	9¾	19	22	26	26	11¼	14	11	13	9½	9¾	9¾	10⅛
August	9⅛	9⅛	9½	9⅝	19	22	24	26	11¼	14	10¾	13	9¼	9½	9⅝	10
September	8⅝	9⅛	9⅜	9⅝	19	22½	24	26	10¾	13¼	10¼	11¾	8¾	9⅜	9¼	9⅝
October	7⅞	8⅝	9	9½	21½	22½	25	26	10¾	12¾	10¼	11¼	8⅛	8⅝	9⅛	9¼
November	7¼	8⅜	8¾	9½	21½	22½	25	26	10¾	12¾	10¼	11¾	7⅞	8⅛	9	9¼
December	7½	8	8¾	9⅛	21½	22½	25	26	10¾	13	10¾	11¾	7⅞	8½	9¼	9⅞
July-Dec	7¼	9½	8¾	9¾	19	22½	24	26	10¾	14	10¼	13	7⅞	9¾	9	10⅛

OIL CAKE AND OIL-CAKE MEAL.

TABLE 144.—*Oil cake and oil-cake meal: International trade, calendar years 1909–1916.*

[The class called here "oil cake and oil-cake meal" includes the edible cake and meal remaining after making oil from such products as cotton seed, flaxseed, peanuts, corn, etc. See "General note," Table 85.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.)	Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).
From—	*Pounds.*	*Pounds.*	*Pounds.*	*From—*	*Pounds.*	*Pounds.*	*Pounds.*
Argentina	42,587	46,215	39,912	Italy	55,115	12,660	32,453
Austria-Hungary	124,873	....	....	Mexico	33,764	....	....
Belgium	155,373	....	....	Netherlands	219,819	32,903	....
British India	268,648	335,901	....	Russia	1,453,413	176,460	160,630
Canada	51,370	32,730	31,707	United Kingdom	161,798	25,829	3,857
China	147,468	164,212	113,330	United States	1,704,124	1,458,452	1951,141
Denmark	15,777	....	....	Other countries	83,814	67,112	....
Egypt	161,624	246,183	185,731				
France	476,863	244,888	248,495	Total	5,681,538	2,843,545	....
Germany	525,108	....	....				

IMPORTS.

Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.)	Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).
Into—				*Into—*			
Austria-Hungary	53,673	....	....	Japan	189,868	197,822	....
Belgium	543,648	....	....	Netherlands	707,116	598,236	461,341
Canada	7,752	22,215	14,730	Norway	55,112	71,160	72,100
Denmark	1,002,329	....	....	Sweden	346,754	....	....
Dutch East Indies	2,509	[1] 636	....	Switzerland	69,352	38,226	58,447
Finland	25,333	88,810	127,177	United Kingdom	790,865	936,681	636,126
France	288,968	8,344	4,150	Other countries	31,757	19,373	....
Germany	1,686,416	....	....				
Italy	10,550	5,998	885	Total	5,812,002	1,987,501	....

[1] Java-Madura only.

ROSIN.

TABLE 145.—*Rosin: International trade, calendar years 1909–1916.*

[For rosin, only the resinous substance known as "rosin" in the exports of the United States, is taken. See "General note," Table 85.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).	Country.	Average, 1909–1913.	1915 (prelim.)	1916 (prelim.)
From—	*Pounds.*	*Pounds.*	*Pounds.*	*From—*	*Pounds.*	*Pounds.*	*Pounds.*
Austria-Hungary	2,205	....	....	Spain	20,073	29,366	22,822
Belgium	32,830	....	....	United States	655,520	387,194	515,848
France	118,286	118,667	71,777	Other countries	1,568	7,616	....
Germany	59,110	....	....				
Greece	10,423	7,308	....	Total	950,381	554,475	....
Netherlands	59,366	4,324	....				

IMPORTS.

Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).	Country.	Average, 1909–1913.	1915 (prelim.)	1916 (prelim.)
Into—				*Into—*			
Argentina	32,719	45,487	35,998	Italy	34,171	54,541	43,915
Australia	13,724	20,709	....	Japan	10,073	17,809	30,182
Austria-Hungary	75,705	....	....	Netherlands	73,991	18,471	....
Belgium	47,163	....	....	Norway	6,732	13,395	11,074
Brazil	36,905	40,682	40,714	Roumania	5,004	....	....
British India	6,171	3,914	....	Russia	68,429	23,628	58,109
Canada	25,506	27,314	28,882	Serbia	1,162	....	....
Chile	7,410	4,200	....	Spain	1,827	422	356
Cuba	4,123	5,391	....	Switzerland	4,983	7,723	7,852
Denmark	3,236	....	....	United Kingdom	166,075	176,360	184,985
Dutch East Indies	15,039	[1] 15,104	....	Other countries	18,734	14,266	....
Finland	6,027	5,103	9,630				
France	2,432	569	707	Total	900,441	495,088	....
Germany	233,100	....	....				

[1] Imports from Java-Madura only.

TURPENTINE.

TABLE 146.—*Turpentine (spirits): International trade, calendar years 1909–1916.*

["Spirits of turpentine" includes only "spirits" or "oil" of turpentine and, for Russia, *skipidar;* it excludes crude turpentine, pitch, and, for Russia, *terpentin.* See "General note," Table 85.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).	Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.)
From—	*Gallons.*	*Gallons.*	*Gallons.*		*Gallons.*	*Gallons.*	*Gallons.*
Belgium	1,144	....	....	Spain	1,156	922	1,114
France	2,594	1,466	991	United States	17,868	10,624	9,544
Germany	460	....	....	Other countries	649	376	....
Netherlands	2,750	38	4				
Russia	2,322	95	5	Total	28,943	13,521	....

IMPORTS.

Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).	Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.)
Into—				*Into—*			
Argentina	554	524	500	New Zealand	178	130	....
Australia	564	791	....	Russia	273	192	160
Austria-Hungary	2,581	....	....	Sweden	134	....	....
Belgium	1,932	....	....	Switzerland	466	395	455
Canada	1,175	1,113	1,135	United Kingdom	7,782	7,446	5,937
Chile	198	114	....	Other countries	1,057	911	....
Germany	9,368	....	....				
Italy	940	968	754	Total	31,200	13,739	....
Netherlands	3,998	1,155	6				

INDIA RUBBER.

TABLE 147.—*India rubber: International trade, calendar years 1909–1916.*

[Figures for india rubber include "india rubber," so called, and *caoutchouc, caucho, jebe* (Peru), *hule* (*Mexico*), *borracha, massaranduba, mangabeira, manicoba, sorva* and *seringa* (Brazil), *gomelastick* (Dutch East Indies), *caura, ser nambi* (Venezuela). See "General note," Table 85.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913.	1915 (prelim.)	1916 (prelim.)	Country.	Average, 1909–1913.	1915 (prelim.)	1916 (prelim.)
From—	*Pounds.*	*Pounds.*	*Pounds.*	*From—*	*Pounds.*	*Pounds.*	*Pounds.*
Angola	5,620	....	....	Kameran	6,409	....	....
Belgium Kongo	7,755	....	....	Mexico	14,262	....	....
Belgium	20,749	....	....	Netherlands	7,172	414	....
Bolivia	8,395	11,144	....	Peru	5,030	7,493	....
Brazil	84,938	77,525	69,433	Senegal	1,087	....	....
Ceylon	10,953	....	....	Singapore	5,843	....	....
Dutch East Indies	7,679	44,348	....	Nigeria	3,054	....	....
Ecuador	1,040	561	837	Negri Sembilan	3,995	18,316	....
France	21,615	5,148	6,357	Perak	7,313	37,325	....
French Guiana	3,937	....	....	Selangor	13,736	43,053	....
French Kongo	3,797	....	....	Venezuela	772	310	....
Germany	9,844	....	....	Other countries	28,936	10,418	....
Gold Coast	2,393	648	....				
Ivory coast	2,740	....	....	Total	289,064	256,708	....

IMPORTS.

Country.	Average, 1909–1913.	1915 (prelim.)	1916 (prelim.)	Country.	Average, 1909–1913.	1915 (prelim.)	1916 (prelim.)
Into—				*Into—*			
Austria-Hungary	6,696	....	....	Russia	19,131	29,761	17,804
Belgium	25,891	....	....	United Kingdom	43,141	33,760	59,941
Canada	3,945	9,731	986,797	United States	100,180	221,482	270,090
France	32,704	29,317	39,122	Other countries	12,424	6,940	....
Germany	42,004	....	....				
Italy	5,381	11,833	11,728	Total	302,319	349,733	....
Netherlands	10,822	6,909	....				

SILK

TABLE 148.—*Production of raw silk in undermentioned countries, 1912–1916.*

[Estimates of the Silk Merchants' Union of Lyons, France.]

Country.	1912	1913	1914	1915	1916
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Western Europe:					
Italy	9,050,000	7,804,000	8,950,000	6,349,000	7,963,000
France	1,113,000	772,000	893,000	287,000	485,000
Spain	172,000	181,000	161,000	121,000	198,000
Austria	410,000	331,000	388,000	187,000	187,000
Hungary	238,000	271,000	278,000	143,000	143,000
Total	10,983,000	9,359,000	10,670,000	7,087,000	8,976,000
Levant and Central Asia:					
Broussa and Anatolia	844,000	1,025,000	761,000	386,000	386,000
Syria and Cyprus	882,000	1,080,000	948,000	772,000	772,000
Other Provinces of Asiatic Turkey	254,000	298,000	242,000	143,000	143,000
Turkey in Europe [1]	....	187,000	132,000	66,000	66,000
Saloniki and Adrianople	573,000	....	....	....	....
Balkan States (Bulgaria, Serbia, and Roumania)	320,000	298,000	386,000	220,000	220,000
Greece, Saloniki,[1] and Crete	110,000	408,000	309,000	243,000	243,000
Caucasus	871,000	849,000	794,000	276,000	276,000
Persia (exports)	500,000	463,000	176,000	77,000	77,000
Turkestan (exports)	569,000	496,000	187,000	110,000	110,000
Total	4,923,000	5,104,000	3,935,000	2,293,000	2,293,000
Far East:					
China—					
Exports from Shanghai	14,198,000	12,709,000	9,116,000	12,037,000	10,340,000
Exports from Canton	4,983,000	6,063,000	4,233,000	4,068,000	5,346,000
Japan—					
Exports from Yokohama	23,957,000	26,720,000	20,922,000	26,466,000	29,431,000
British India—					
Exports from Bengal and Cashmere	370,000	249,000	75,000	192,000	254,000
Indo-China—					
Exports from Saigon, Haiphong, etc.	33,000	26,000	35,000	29,000	7,000
Total	43,541,000	45,767,000	34,381,000	42,792,000	45,378,000
Grand total	59,447,000	60,230,000	48,986,000	52,172,000	56,647,000

[1] Prior to 1913 Turkey in Europe included the Vilayet of Saloniki, which now belongs to Greece.

TABLE 149.—*Total production of raw silk in countries mentioned in Table 148, 1900–1916.*

Year.	Production.	Year.	Production.	Year.	Production.
	Pounds.		*Pounds.*		*Pounds.*
1900	40,724,000	1906	46,106,000	1912	59,447,000
1901	42,393,000	1907	48,634,000	1913	60,230,000
1902	41,368,000	1908	53,087,000	1914	48,986,000
1903	39,981,000	1909	54,035,000	1915	52,172,000
1904	45,195,000	1910	54,002,000	1916 (preliminary)	56,647,000
1905	41,513,000	1911	54,167,000		

WOOD PULP.

TABLE 150.—*Wood pulp: International trade, calendar years 1909–1916.*

[All kinds of pulp from wood have been taken for this item, but no pulp made from other fibrous substances. See "General note," Table 85.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).
From—	*Pounds.*	*Pounds.*	*Pounds.*
Austria-Hungary	205,364	....	....
Belgium	80,647	....	....
Canada	606,203	728,341	1,117,796
Finland	236,881	221,420	223,139
Germany	384,709	....	....
Norway	1,437,078	1,618,363	1,522,991
Russia	52,735	14	....
Sweden	1,822,023	....	....
Switzerland	13,072	22,877	14,671
United States	24,309	40,575	80,046
Other countries	75,486	52,697	....
Total	4,938,507	2,684,287	....

IMPORTS.

Country.	Average, 1909–1913.	1915 (prelim.).	1916 (prelim.).
Into—			
Argentina	52,016	33,679	49,128
Austria-Hungary	13,366	....	....
Belgium	291,254	....	....
Denmark	110,866	....	....
France	836,899	623,620	798,674
Germany	112,660	....	....
Italy	179,267	135,084	144,333
Japan	79,260	119,307	128,271
Portugal	18,662	16,942	....
Russia	56,072	176,830	234,553
Spain	92,770	114,325	150,495
Sweden	9,515	....	....
Switzerland	21,059	21,839	25,704
United Kingdom	1,891,006	2,131,945	1,474,054
United States	1,007,239	1,145,717	1,367,529
Other countries	85,052	170,133	....
Total	4,856,963	4,689,421	....

LIVE STOCK, 1917, AND MISCELLANEOUS DATA.

FARM ANIMALS AND THEIR PRODUCTS.

TABLE 151.—*Live stock in principal and other countries.*

[Latest census or other official figures available, with comparison for earlier years. Census returns are in italics; other official figures are in roman type.]

PRINCIPAL COUNTRIES.

Country.	Date.	Cattle.	Buffaloes.	Swine.	Sheep.	Goats.	Horses.	Mules.	Asses.
		Thousand.	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand-*	*Thousand.*
United States:									
On farms	Jan. 1, 1918	....	....	....	....	(1)	....	....	(1)
	Jan. 1, 1917	63,617	....	67,453	48,483	(1)	21,126	4,639	(1)
	Jan. 1, 1916	61,920	....	67,766	48,625	(1)	21,159	4,593	(1)
	Jan. 1, 1915	58,329	....	64,618	49,956	(1)	21,195	4,479	(1)
	Apr. 15, 1910	*61,804*	....	*58,186*	*52,448*	*2,915*	*19,833*	*4,210*	*106*
Not on farms	*Apr. 15, 1910*	*1,879*	....	*1,288*	*391*	*115*	*3,183*	*270*	*17*
Alaska (on farms and not on farms)	*Jan. 1, 1910*	*1*	[2] *22*	(3)	(3)	(3)	*2*	(3)	(3)
Hawaii (on farms and not on farms)	*Apr. 15, 1910*	*149*	....	*31*	*77*	*5*	*28*	*9*	*3*
Porto Rico (on farms and not on farms)	*Apr. 15, 1910*	*316*	....	*106*	*6*	*49*	*58*	*5*	*1*
Algeria	Dec. 31, 1912	1,107	....	114	8,338	3,772	221	192	271
	Sept., 1910	1,128	....	109	9,042	3,990	230	192	276
	Sept., 1905	1,067	....	91	9,063	4,030	221	174	278
	Sept., 1900	993	....	82	6,724	3,563	202	147	263
	Sept., 1895	1,121	....	84	7,892	3,545	217	142	287
Argentina	*June 1, 1914*	*25,867*	....	*2,901*	*43,225*	*4,325*	*8,324*	*565*	*260*
	Dec. 31, 1913	30,796	....	3,197	81,485	4,564	9,366	584	345
	May 1, 1908	*29,124*	....	*1,404*	*67,384*	*3,947*	*7,538*	*465*	*285*
	May, 1895	*21,702*	....	*653*	*74,380*	*2,749*	*4,447*	*285*	*198*
	1888	*21,962*	....	*394*	*66,706*	*1,894*	*4,234*	*417*	
Australia	Dec. 31, 1916	....	....	....	....	....	....	....	....
	Dec. 31, 1915	9,924	....	760	69,706	[4] 262	2,395	[4] 8	
	Dec. 31, 1914	11,051	....	862	78,600	....	2,521	(1)	(1)
	Dec. 31, 1910	11,745	....	1,026	92,047	314	2,166	5	
	Dec. 31, 1905	8,528	....	1,015	74,541	(1)	1,675	(1)	(1)
	Dec. 31, 1900	8,640	....	950	70,603	(1)	1,610	(1)	(1)
	Dec. 31, 1895	11,767	....	823	90,690	(1)	1,680	(1)	(1)
	1890	10,300	....	891	97,881	(1)	1,522	(1)	(1)
Austria-Hungary:									
Austria	*Dec. 31, 1910*	*9,159*	*1*	*6,432*	*2,428*	*1,257*	*1,803*	*21*	*53*
	Dec. 31, 1900	*9,511*	(1)	*4,683*	*2,621*	*1,020*	*1,716*	*20*	*46*
	Dec. 31, 1890	*8,644*	(1)	*3,550*	*3,187*	*1,036*	*1,548*	*17*	*41*
	Dec. 31, 1880	*8,584*	(1)	*2,722*	*3,841*	*1,007*	*1,463*	*50*	
Hungary	Apr., 1913	*6,045*	162	6,825	6,560	269	2,005	1	16
	Feb. 28, 1911	*6,184*		*6,416*	*7,698*	*331*	*2,001*	*1*	*18*
	Nov. 20, 1895	*5,830*		*6,447*	*7,527*	*237*	*1,997*	*22*	
	1884	*4,879*		*4,804*	*10,595*	*270*	*1,749*	*23*	
Croatia-Slavonia	*Mar. 24, 1911*	*1,135*		*1,164*	*850*	*96*	*350*	*3*	
	Dec. 31, 1895	*909*		*883*	*596*	*22*	*311*	*1*	*2*
Bosnia-Herzegovina.	*Oct. 10 – Nov. 10, 1910*	*1,309*	*1*	*527*	*2,499*	*1,393*	*222*	(3)	*6*
	Apr. 22 – May 22, 1895	*1,416*	*1*	*662*	*3,231*	*1,447*	*231*	*1*	*5*
Belgium	Dec. 31, 1913	1,849	....	1,412	(1)	(1)	267	(1)	....
	Dec. 31, 1910	*1,880*	....	*1,494*	*185*	*218*	*317*	*11*	
	Dec. 31, 1895	*1,421*	....	*1,163*	*236*	*241*	*272*	*7*	
	Dec. 31, 1880	*1,383*	....	*646*	*365*	(1)	*272*	(1)	(1)
Brazil	1916	28,962		17,329	7,205	6,920	6,065	3,222	
	1912–13	*30,705*		*18,399*	*10,653*	*10,049*	*7,289*	*3,208*	
Bulgaria	*Dec. 31, 1910*	*1,603*	*415*	*527*	*8,632*	*1,459*	*478*	*12*	*117*
	Dec. 31, 1905	*1,696*	*477*	*465*	*8,131*	*1,384*	*538*	*12*	*128*
	Dec. 31, 1900	*1,596*	*431*	*368*	*7,015*	*1,405*	*495*	*9*	*104*
	Dec. 31, 1892	*1,426*	*342*	*462*	*6,868*	*1,264*	*344*	*8*	*82*

[1] No official statistics. [2] Reindeer. [3] Less than 500. [4] Dec. 31, 1913.

TABLE 151.—*Live stock in principal and other countries*—Continued.

PRINCIPAL COUNTRIES—Continued.

Country.	Date.	Cattle.	Buffaloes.	Swine.	Sheep.	Goats.	Horses.	Mules.	Asses.
		Thousand.	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*
Canada	June 30, 1917	5,968	....	2,514	2,009	(1)	3,035	(1)	(1)
	June 30, 1916	5,917	....	2,815	1,965	(1)	2,991	(1)	(1)
	June 30, 1915	6,066	....	3,112	2,039	(1)	2,996	(1)	(1)
	June 1, 1911	*6,533*	....	*3,610*	*2,175*	(1)	*2,596*	(1)	(1)
	June 31, 1901	*5,576*	....	*2,354*	*2,510*	(1)	*1,577*	(1)	(1)
	1891	*4,121*	....	*1,734*	*2,564*	(1)	*1,471*	(1)	(1)
	1881	*3,515*	....	*1,208*	*3,049*	(1)	*1,059*	(1)	(1)
Denmark	*Feb. 1, 1917*	*2,[illegible]3*	....	*1,981*	*2[illegible]0*	(1)	*538*	(1)	(1)
	Feb. 29, 1916	*2,[illegible]90*	....	*1,933*	*255*	(1)	*515*	(1)	(1)
	May 15, 1915	*2,417*	....	*1,919*	*533*	(1)	*526*	(1)	(1)
	July 15, 1914	*2,463*	....	*2,497*	*515*	*41*	*568*	(1)	(1)
	July 15, 1909	*2,254*	....	*1,468*	*727*	*40*	*535*	(1)	(1)
	July 15, 1903	*1,840*	....	*1,457*	*877*	*39*	*487*	(1)	(1)
	July 15, 1898	*1,745*	....	*1,168*	*1,074*	*32*	*449*	(1)	(1)
Finland	1910	1,573	[2] 120	418	1,309	13	361	(1)	(1)
	1905	1,481	[2] 142	220	938	6	324	(1)	(1)
	1900	1,428	[2] 119	211	985	8	311	(1)	(1)
	1890	1,305	[2] 86	194	1,054	15	293	(1)	(1)
France	[3] July 1, 1917	12,443	....	4,200	10,587	....	2,283	150	325
	[3] Dec. 31, 1916	12,342	....	4,362	10,845	1,177	2,246	148	327
	[3] Dec. 31, 1915	12,514	....	4,916	12,379	1,230	2,156	144	324
	[3] Dec. 31, 1914	12,668	....	5,926	14,038	1,317	2,105	152	337
	Dec. 31, 1913	14,807	....	7,048	16,213	1,453	3,231	193	360
	Dec. 31, 1910	14,533	....	6,900	17,111	1,418	3,198	193	361
	Dec. 31, 1900	14,521	....	6,740	20,180	1,558	2,903	205	356
	Nov. 30, 1892	*13,709*	....	*7,421*	*21,116*	*1,845*	*2,795*	*217*	*369*
	1882	*12,997*	....	*7,147*	*23,809*	*1,851*	*2,838*	*251*	*296*
	1862	*12,812*	....	*6,038*	*29,530*	*1,726*	*2,914*	(1)	(1)
Germany	*Dec. 1, 1915*	*20,317*	....	*17,287*	*5,073*	*3,438*	[4] *3,342*	(1)	(1)
	Dec. 1, 1914	*21,829*	....	*25,341*	*5,471*	*3,538*	[4] *3,435*	(1)	(1)
	Dec. 1, 1913	*20,994*	....	*25,659*	*5,521*	*3,548*	*3,227*	(1)	(1)
	Dec. 2, 1912	*20,182*	....	*21,924*	*5,803*	*3,410*	*4,523*	*13*	
	Dec. 2, 1907	*20,631*	....	*22,147*	*7,704*	*3,534*	*4,345*	*11*	
	Dec. 1, 1904	*19,332*	....	*18,921*	*7,907*	*3,330*	*4,267*	(1)	(1)
	Dec. 1, 1900	*18,940*	....	*16,807*	*9,693*	*3,267*	*4,195*	*8*	
	Dec. 1, 1897	*18,491*	....	*14,275*	*10,867*	(1)	*4,038*	(1)	(1)
	Dec. 1, 1892	*17,556*	....	*12,174*	*13,590*	*3,092*	*3,836*	*7*	
	Jan. 10, 1883	*15,787*	....	*9,206*	*19,190*	*3,641*	*3,523*	*10*	(1)
Greece	1914	300	(1)	227	3,547	2,638	149	80	133
India:									
British	1914–15	[5] 128,310	[6] 19,025	(1)	23,016	33,338	1,653	71	1,512
	1913–14	[5] 125,042	[6] 18,235	(1)	23,092	30,673	1,643	86	1,501
	1910–11	[5] 94,664	[6] 16,628	(1)	22,922	28,518	1,524	110	1,342
	1904–5	[5] 77,111	[6] 12,871	(1)	17,562	24,803	1,278	54	1,177
	1899–1900	[5] 72,666	[6] 12,120	(1)	17,805	19,005	1,308	1,227	
	1894–95	[5] 67,045	[6] 11,826	(1)	17,260	15,272	1,134	1,102	
Native States [9]	1913–14	[5] 12,236	[6] 1,765	(1)	8,306		175	181	
	1909–10	[5] 10,391	[6] 1,559	(1)	7,129		141	155	
	1904–5	[6] 8,178	[6] 1,347	(1)	6,318		92	129	
	1900–1	[5] 7,397	[6] 1,228	(1)	4,538		85	115	
Italy	1914	6,646		2,722	13,824			2,235	
	Mar. 10, 1908	*6,199*	*19*	*2,508*	*11,163*	*2,715*	*956*	*388*	*850*
	Feb. 13, 1881	*4,772*	*11*	*1,164*	*8,596*	*2,016*	*658*	*294*	*674*
Japanese Empire:									
Japan	Dec. 31, 1915	1,388	(1)	333	3	97	1,580	(1)	(1)
	Dec. 31, 1914	1,387	(1)	332	3	95	1,579	(1)	(1)
	Dec. 31, 1913	1,389	(1)	310	3	89	1,582	(1)	(1)
	Dec. 31, 1910	1,384	(1)	279	3	92	1,565	(1)	(1)
	Dec. 31, 1905	1,168	(1)	228	4	72	1,368	(1)	(1)
	Dec. 31. 1900	1,261	(1)	181	2	60	1,542	(1)	(1)
Chosen (Korea)	Dec. 31, 1914	1,338	(1)	758	....	12	53	14	1
	Dec. 31, 1913	1,211	(1)	761	....	10	51	14	
	Dec. 31, 1910	704	(1)	566	....	7	40	(1)	(1)
Formosa (Taiwan)	Dec. 31, 1915	397		1,319	(7)	117	(7)	....	....
	Dec. 31, 1914	2	398	1,313	(7)	125	(7)	....	....
	Dec. 31, 1905	(3)	341	1,018	(7)	108	(7)	....	....
Mexico	*June 30, 1902*	*5,142*	....	*616*	*3,424*	*4,206*	*859*	*334*	*288*

[1] No official statistics.
[2] Reindeer.
[3] Excludes invaded area.
[4] Including army horses.
[5] Including young buffaloes.
[6] Not including young buffaloes.
[7] Less than 500.

TABLE 151.—*Live stock in principal and other countries*—Continued.

PRINCIPAL COUNTRIES—Continued.

Country.	Date.	Cattle.	Buffaloes.	Swine.	Sheep.	Goats.	Horses.	Mules.	Asses.
		Thousand.	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*
Netherlands	Mar. Apr. 1917	2,304	....	1,185	521	(1)	(1)	(1)	(1)
	May, 1915	2,390	....	1,487	(1)	(1)	(1)	(1)	(1)
	June, 1913	2,097	....	1,350	842	232	334	(1)	(1)
	May 20 June 20 1910	*2,027*	....	*1,260*	*889*	*224*	*227*	(1)	(1)
	Dec. 31, 1904	1,691	....	862	607	166	295	(1)	(1)
	Dec. 31, 1900	1,656	....	747	771	180	295	(1)	(1)
	Dec. 31, 1890	1,533	....	579	819	165	273	(1)	(1)
New Zealand	Jan. 31, 1917	2,503	....	278	[2] 24,753	....	367	....	....
	Jan. 31, 1916	2,417	....	298	[2] 24,788	17	371	(3)	(3)
	Apr. 1, 1911	*2,020*	....	*349*	....	*6*	*404*	(3)	(3)
	Apr. 30, 1911	....	....	....	*23,996*	....	....	....	....
	Apr. 30, 1905	....	....	....	19,131	....	....	....	....
	Oct. 1905	1,811	....	250	....	....	327	(3)	(3)
	Apr. 30, 1900	....	....	....	19,355	(1)	....	....	....
	Oct., 1900	1,257	....	251	....	(1)	266	(3)	(3)
	Apr., 1895	....	....	....	19,827	(1)	....	....	....
	1895	1,048	....	240	....	(1)	237	(3)	(3)
	1891	*832*	....	*309*	*18,128*	*9*	*211*	(3)	(3)
Norway	Sept. 30, 1916	1,119	(1)	221	1,281	230	189	(1)	(1)
	Sept. 30, 1915	1,121	(1)	209	1,330	240	186	(1)	(1)
	Sept. 30, 1914	1,146	(1)	228	1,327	237	182	(1)	(1)
	Sept. 30, 1910	1,134	(1)	334	1,398	288	168	(1)	(1)
	Sept. 30, 1907	*1,089*	*[4] 143*	*307*	*1,391*	*296*	*164*	(1)	(1)
	1900	950	[4] 109	165	999	215	173	(1)	(1)
	1890	1,006	[4] 170	121	1,418	272	151	(1)	(1)
Paraguay	1915	5,249	....	61	600	87	478	17	18
	1902	*2,161*	....	*37*	*222*	*50*	*218*	*9*	*5*
	1889	*2,283*	....	*24*	*214*	*32*	*183*	*3*	*4*
	1886	*730*	....	*12*	*32*	*11*	*62*	*2*	*2*
	1877	*201*	....	*3*	*7*	....	*21*	*1*	*2*
Philippine Islands	Dec. 31, 1916								
	Dec. 31, 1915	534.	1,222	2,521	129	644	223	(1)	(1)
	Dec. 31, 1910	270	757	1,682	94	441	143	(1)	(1)
	Dec. 31, 1902	*128*	*641*	*1,179*	*30*	*124*	*144*	(1)	(1)
Portugal	*Oct., 1906*	*703*	(1)	*1,111*	*3 073*	*1,034*	*88*	*58*	*144*
	1870	*625*	(1)	*971*	*2,977*	*937*	*87*	*51*	*138*
Roumania	April, 1916	2,938		1,382	7,811	301	1,219	(3)	12
	1911	2,667		1,021	5,269	187	825	4	
	1907	2,585		1,124	5,105	191	808	5	
	Dec., 1900	*2,545*	*44*	*1,709*	*5,655*	*233*	*864*	*1*	*7*
	1890	2,520		926	5,002	210	595	6	
	1884	2,376		886	4,655	245	533	2	
Russian Empire:									
Russia, European	In summer. 1914	32,704	(1)	11,581	37,240	(1)	22,529	(1)	(1)
	1913	31,974	[4] 605	13,458	41,426	873	22,771	6	7
	1910	31,315	[4] 462	12,049	40,734	857	21,868	5	2
	1900	31,661	[4] 350	11,761	47,628	1,017	19,744	1	2
	1890	25,528	(1)	9,554	46,052	(1)	19,779	(3)	(3)
	1881	22,122	(1)	9,265	45,522	1,157	15,584	(3)	(3)
Poland	1914	2,014	(1)	452	565	(1)	1,098	(1)	(1)
	1913	2,011	(3)	491	683	9	1,116	(3)	(3)
	1910	2,301	(3)	612	1,050	9	1,222	(3)	(3)
	1900	2,823	(3)	1,402	2,829	11	1,392	(3)	1
	1890	3,013	(3)	1,499	3,755	(1)	1,207	(3)	(1)
	1881	5,055	(3)	706	3,375	10	1,037	(1)	(1)
Russia, Asiatic (33 governments of the Caucasus, Central Asia, and Siberia)	1914	17,334	(1)	2,962	34,468	(1)	11,346	(1)	(1)
	1913	18,404	(1)	2,895	38,096	4,791	11,959	(1)	(1)
Serbia	*Dec. 31, 1910*	*957*	*7*	*866*	*3,819*	*631*	*153*	*1*	*1*
	Dec. 31, 1905	*963*	*7*	*908*	*3,160*	*510*	*174*	*1*	*1*
Spain	1916	3,071	....	2,814	16,012	3,207	489	913	839
	1914	2,743	....	2,810	16,128	3,265	525	984	841
	1913	*2,879*	....	*2,710*	*16,441*	*3,394*	*542*	*948*	*849*
	Dec. 31, 1910	2,369	....	2,424	15,117	3,216	520	886	868
	Dec. 31, 1906	2,497	....	2,080	13,481	2,440	440	802	744
	1891	2,218	....	1,928	13,359	2,534	397	768	754

[1] No official statistics.
[2] Reindeer.
[3] Less than 500.
[4] Dec. 31, 1913.

TABLE 151.—*Live stock in principal and other countries*—Continued.

PRINCIPAL COUNTRIES—Continued.

Country.	Date.	Cattle.	Buffaloes.	Swine.	Sheep.	Goats.	Horses.	Mules.	Asses.
		Thousand.	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*
Sweden	June 1, 1916	2,913	....	1,065	1,198	132	701	(1)	(1)
	Dec. 31, 1914	2,761	....	1,015	993	77	603	(1)	(1)
	Dec. 31, 1913	2,721	....	968	988	71	596	(1)	(1)
	Dec. 31, 1910	2,748	[2] 273	957	1,004	69	587	(1)	(1)
	Dec. 31, 1905	2,550	[2] 226	830	1,074	67	555	(1)	(1)
	1900	2,583	[2] 232	806	1,261	80	533	(1)	(1)
	1890	2,399	[2] 288	645	1,351	87	487	(1)	(1)
Switzerland	*Apr. 19, 1916*	*1,616*	....	*544*	*172*	*358*	*137*	*3*	*1*
	Apr. 21, 1911	*1,443*	....	*570*	*161*	*341*	*144*	*3*	*2*
	Apr. 20, 1906	*1,498*	....	*549*	*210*	*362*	*135*	*3*	*2*
	Apr. 19, 1901	*1,340*	....	*555*	*219*	*355*	*125*	*3*	*2*
Turkey, European and Asiatic	1913	2,398	164	31	(1)	(1)	(1)	(1)	(1)
	1912	(1)	(1)	73	27,095	20,269	(1)	(1)	(1)
	1910	(1)	(1)	175	27,662	21,283	(1)	(1)	(1)
	1905	(1)	(1)	196	23,614	16,411	(1)	(1)	(1)
Union of South Africa	Dec. 31, 1915	(1)	(1)	(1)	31,434	8,918	(1)	(1)	(1)
	Dec. 31, 1913	(1)	(1)	(1)	35,711	11,521	(1)	(1)	(1)
	May 7, 1911	*5,797*	(1)	*1,082*	*30,657*	*11,763*	*719*	*94*	*337*
	1904	*3,500*	(1)	*679*	*16,323*	*9,771*	*450*	*135*	*142*
United Kingdom:									
Great Britain	June 4, 1917	7,435	....	2,051	24,026	(1)	1,583	(1)	(1)
	June 5, 1916	7,442	....	2,315	24,990	(1)	1,567	(1)	(1)
	June 4, 1915	7,288	....	2,579	24,598	(1)	1,213	(1)	(1)
	June 4, 1914	7,093	....	2,634	24,286	(1)	1,296	(1)	(1)
	June 4, 1913	6,964	....	2,234	23,931	(1)	1,324	(1)	(1)
	June 4, 1910	7,037	....	2,350	27,103	(1)	1,545	(1)	(1)
	June 4, 1900	6,805	....	2,382	26,592	(1)	1,500	(1)	(1)
	June 4, 1890	6,509	....	2,744	27,272	(1)	1,432	(1)	(1)
	June 4, 1880	5,912	....	2,001	26,619	(1)	1,421	(1)	(1)
Ireland	June 1, 1917	4,907	....	948	3,744	269	598	25	229
	June 1, 1916	4,970	....	1,290	3,764	293	599	28	230
	June 1, 1915	4,844	....	1,205	3,600	243	561	29	227
	June 1, 1914	5,052	....	1,306	3,601	242	619	31	245
	June 1, 1913	4,933	....	1,060	3,621	246	614	30	243
	June 1, 1910	4,689	....	1,200	3,980	243	613	31	211
	June 1, 1900	4,609	....	1,269	4,387	306	567	31	242
	June 1, 1890	4,241	....	1,570	4,324	327	585	30	213
	June 1, 1880	3,921	....	850	3,561	266	557	25	186
Isle of Man and Channel Islands	June 5, 1916	40	....	11	78	(1)	10	(1)	(1)
Uruguay	1916	7,803	....	....	....	....	....	....	....
	1908	*8,193*	....	*180*	*26,286*	*20*	*556*	*18*	....
	1900	*6,827*	....	*94*	*18,609*	*20*	*561*	*23*	
	1860	*3,632*	....	*6*	*1,990*	*5*	*518*	*8*	

[1] No official statistics [2] Reindeer.

TABLE 151.—*Live stock in principal and other countries.*—Continued.

OTHER COUNTRIES.

Country.	Date.	Cattle.	Buffaloes.	Swine.	Sheep.	Goats.	Horses.	Mules.	Asses.
		Thousand.	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*	*Thousand.*
Azores and Madeira Islands	1900	89	....	93	87	38	2	3	9
Basutoland	*1911*	*487*		(1)	*1,369*	(1)	*88*	(1)	(1)
Bechuanaland Protectorate	*1911*	*324*		(1)	*358*		*4*		
Bolivia	1913	....	....	....	1,750		....	....	....
British Guiana	Mar. 31,1916	98	....	14	22	15	1	2	6
Ceylon	1915	1,501		70	90	183	4	(1)	(1)
Chile	Dec. 31,1914	1,944	....	229	4,545	....	458	42	....
Colombia	1915	3,035	....	711	164		526	201	139
Costa Rica	1915	333	....	63	(3)	(3)	52	(3)	(3)
Cuba	Dec. 31,1916	3,962	....	(1)	(1)	(1)	750	58	3
Cyprus	Mar. 31,1916	63	....	35	282	228	70	....	....
Dutch East Indies:									
Java and Madura	1913	4,786		(1)	(1)	(1)	274	(1)	(1)
Other Possessions	1905	449	447	(1)	(1)	(1)	119	(1)	(1)
Dutch Guiana	....	....	....	....	....	....	....	....	....
East Africa Protectorate	Mar. 31,1915	900	(1)	4	6,555	4,020	2	(1)	(1)
Egypt	1916	493	515	9	688	263	34	17	526
Falkland Islands	1915	8	....	(1)	691	(1)	4	(1)	(1)
Faroe Islands	1914	4	....	(1)	112	(1)	1	....	....
Fiji	1915	59	....	....	2	12	7	....	....
French Guiana	1914	400	....	(1)	150	140	3	(1)	(1)
French Indo-China:									
Annam	1914	215	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Cochin-China	1914	109	242	709	3		(1)	(1)	(1)
Gambia	1907	83		(1)	(1)	(1)	4	(1)	(1)
Guam	1913	6		(1)	(1)	(1)	(1)	(1)	(1)
Guatemala	Dec. 31,1915	620	....	103	383	57	116	....	....
German East Africa	1913	3,994		6	6,440	25	(3)	(3)	25
German S. W. Africa	1913	206		8	555	517	16	14	
Honduras	1914	489	....	180	6	23	68	25	
Iceland	1914	25	....	....	585	1	47	....	....
Jamaica	1916	115	....	....	11	250	47		21
Luxemburg	*Dec. 31,1913*	*102*	....	*137*	*5*	*10*	*19*	(1)	(1)
Madagascar	Dec. 31,1915	....	[11] 6,606	666	299	174	3	1	
Malta	Mar. 31,1916	5		4	19	20	9		
Mauritius	*1913*	*41*	....	*17*	*2*	*37*	*2*	*1*	(1)
Morocco:									
Western	1915–16	856	....	29	4,051	1,226	97	42	251
Eastern	1915–16	22	....	(1)	664	285	(1)	(1)	(1)
Newfoundland	*1911*	*39*	....	*27*	*98*	*17*	*14*	(1)	(1)
Nicaragua	*1908*	*252*	....	*12*	(3)	*1*	*28*	*6*	*1*
Nyasaland Protectorate	1916	82		24	30	131	(3)	(3)	(3)
Panama	1916	200	....	30	....	5	15	2	....
Rhodesia	*1911*	*500*		*2*	*300*	*602*	*20*		
Salvador	1906	284	....	423	21	(1)	74	(1)	(1)
Siam	Jan. 1,1916	2,337	2,120	(1)	....	....	105	(1)	(1)
Straits Settlements	1914	40	....	113	35	18	2	(1)	(1)
Swaziland	Mar. 31,1916	100		9	250		1	2	
Togo[9]	1913	65	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Trinidad and Tobago	1914	13	....	9	2	6	5	5	(1)
Tunis	*Apr. 30,1916*	*240*	....	*10*	*1,148*	*522*	*31*	*15*	*84*
Uganda Protectorate[9]	1914	845		1	678		(3)	(3)	(3)
Venezuela	1912	2,004	....	1,618	177	1,667	191	89	313

[1] No official statistics. [2] Less than 500.

TABLE 152.—*Hides and skins: International trade, calendar years 1909–1916.*

[This table gives the classification as found in the original returns, and the summary statements for "All countries" represent the total for each class only so far as it is disclosed in the original returns. The following kinds are included: Alligator, buffalo, calf, camel, cattle, deer, goat and kid, horse and colt, kangaroo, mule and ass, sheep and lamb, and all other kinds except furs, bird skins, sheepskins with wool on, skins of rabbits and hares, and tanned or partly tanned hides and skins. Number of pounds computed from stated number of hides and skins.]

GENERAL NOTE.—Substantially the international trade of the world. It should not be expected that the world export and import totals for any year will agree. Among sources of disagreement are these: (1) Different periods of time covered in the "year" of the various countries; (2) imports received in year subsequent to year of export; (3) want of uniformity in classification of goods among countries; (4) different practices and varying degrees of failure in recording countries of origin and ultimate destination; (5) different practices of recording reexported goods; (6) opposite methods of treating free ports; (7) clerical errors, which, it may be assumed, are not infrequent.

The exports given are domestic exports, and the imports given are imports for consumption as far as it is feasible and consistent so to express the facts. While there are some inevitable omissions, on the other hand there are some duplications because of reshipments that do not appear as such in official reports. For the United Kingdom, import figures refer to imports for consumption, when available, otherwise total imports, less exports, of "foreign and colonial merchandise." Figures for the United States include Alaska, Porto Rico, and Hawaii.

EXPORTS.

[000 omitted.]

Exporting country and classification.	Average, 1909–1913.	1915 (Prelim.)	1916 (Prelim.)
	Pounds.	*Pounds.*	*Pounds.*
Argentina:			
Cattle, dried	66,957	56,391	47,507
Cattle, salted	145,901	141,641	171,608
Deer	3	6	3
Goat	4,577	5,203	5,639
Horse, dried	3,921	4,782	7,221
Horse, salted	411	835	1,487
Kid	1,052	342	1,443
Sheep and lamb	71,129	50,705	36,908
Austria-Hungary:			
Calf, dried	3,373	....	....
Calf, green	20,823	....	....
Cattle, dried	7,318	....	....
Cattle, green	30,639	....	....
Goat	2,166	....	....
Horse, dried	1,306	....	....
Horse, green	3,838	....	....
Kid	1,189	....	....
Lamb	3,537	....	....
Sheep	3,825	....	....
Unclassified	1,252	....	....
Belgium:			
Unclassified	117,213	....	....
Brazil:			
Cattle, dried	10,667	34,595	33,732
Cattle, green	34,817	47,153	66,692
Deer	218	305	386
Goat	5,471	6,873	5,318
Sheep	1,213	2,796	2,394
Unclassified	30,835	109	241
British India:			
Cattle	....	89,443	....
Goat	57,603	42,477	....
Unclassified	112,254	5,496	....
British South Africa:			
Cattle	16,116	15,415	19,458
Goat	8,029	8,324	8,514
Sheep	26,792	37,282	30,415
Canada:			
Sheep	149	....	....
Unclassified	45,320	42,000	36,000
China:			
Buffalo	48,120	58,319	62,061
Horse	514	1,851	3,461
Goat	23,186	22,652	30,654
Sheep	931	1,325	2,516
Chosen (Korea):			
Cattle	4,944	....	....
Cuba:			
Cattle	14,054	16,539	....
Unclassified	238	....	....
Denmark:			
Unclassified	21,998	....	....
Dutch East Indies:			
Unclassified	16,708	[1] 12,030	....
Egypt:			
Cattle and camel	7,799	5,100	4,667
Sheep and goat	2,955	2,573	2,887
France:			
Calf	30,608	10,050	6,905
Goat	5,614	900	618
Kid	2,062	166	11
Lamb	1,815	1,284	593
Sheep	14,574	1,437	1,697
Unclassified	76,339	30,180	15,205
Germany:			
Calf	23,208	....	....
Cattle	105,306	....	....
Goat	2,787	....	....
Horse	16,364	....	....
Sheep	3,948	....	....
Unclassified	760	....	....
Italy:			
Calf	5,739	423	49
Cattle	36,561	16,570	3,623
Goat	854	192	1,580
Kid	800	62	1,373
Lamb	2,288	9	254
Sheep	873	1	1
Unclassified	1,312	1,324	130
Mexico:			
Alligator	202	....	....
Cattle	33,753	....	....
Deer	707	....	....
Goat	6,351	....	....
Netherlands:			
Hides, dried	22,251	1,404	772
Hides, fresh	216	66	....
Hides, salted	43,553	10,264	22,352
Sheep	1,586	2,746	....
New Zealand:			
Sheep	18,989	24,974	....
Unclassified	6,588	6,010	....
Peru:			
Cattle	5,107	....	....
Goat	965	853	....
Sheep	122	226	....
Unclassified	....	5,224	....
Russia:			
Hides, large	33,761	14,365	9,859
Hides, small	40,677	18	....
Sheep and goat	21,913	312	....
Singapore:			
Unclassified	6,435	....	....
Spain:			
Goat	1,969	2,475	3,253
Sheep	7,954	5,096	12,069
Unclassified	7,534	617	295
Sweden:			
Cattle, dried	446	....	....
Cattle, green	22,287	....	....

[1] Java and Madura only.

TABLE 152.—*Hides and skins: international trade, calendar years 1909–1916*—Contd.

EXPORTS—Continued.

Exporting country and classification.	Average, 1909–1913.	1915 (Prelim.).	1916 (Prelim.).
	Pounds.	*Pounds.*	*Pounds.*
Sweden—Contd.			
Horse, dried	1	....	....
Horse, green	703	....	....
Goat, kid, lamb, and sheep, dried	121	....	....
Goat, kid, lamb, and sheep, green	498	....	....
Unclassified, dried	7	....	....
Unclassified, green	67	....	....
Switzerland:			
Unclassified	22,866	14,671	6,076
United Kingdom:			
Sheep	16,960	9,566	14,162
Unclassified	21,140	11,034	19,409
United States:			
Calf	315	830	2,232
Cattle	8,297	19,401	10,677
Unclassified	16,820	2,196	2,124
Uruguay:			
Calf	392	3,451	....
Cattle, dried	17,239	2,178	....
Cattle, salted	27,934	1,664	....
Horse, dried	475	46	....
Horse, salted	75	....	....
Lamb	556	421	....
Sheep	21,252	16,432	....
Yearling, dried	3,003	....	....
Yearling, salted	181	....	....
Venezuela:			
Cattle	7,080	7,644	....
Deer	383	200	....
Goat	2,301	1,612	....

Exporting country and classification.	Average, 1909–1913.	1915 (Prelim.).	1916 (Prelim.).
	Pounds.	*Pounds.*	*Pounds.*
Other countries:			
Hides—			
Cattle and buffalo	86,829	60,363	....
Horse	586	31	....
Skins—			
Alligator	63	13	....
Calf	4,594	3,449	....
Deer	1,272	955	....
Goat and kid	31,274	8,148	....
Sheep and lamb	21,032	7,249	....
Sheep and goat, mixed	12,784	13,278	....
Unclassified	67,404	22,842	....
Total	1,991,133	1,057,490	....
All countries:			
Hides—			
Cattle and buffalo	738,171	572,419	....
Horse	28,194	7,545	....
Skins—			
Alligator	265	13	....
Calf	89,052	18,203	....
Deer	2,583	1,466	....
Goat and kid	158,280	100,279	....
Sheep and lamb	219,555	161,552	....
Sheep and goat, mixed	38,271	16,163	....
Unclassified	716,762	179,850	....
Total	1,991,133	1,057,490	....

IMPORTS.

Importing country and classification.	Average, 1909–1913.	1915 (Prelim.).	1916 (Prelim.).
Austria-Hungary:			
Calf, dried	1,022	....	....
Calf, green	1,576	....	....
Cattle, dried	36,587	....	....
Cattle, green	31,649	....	....
Goat	1,350	....	....
Horse, dried	120	....	....
Horse, green	223	....	....
Kid	461	....	....
Lamb	10,389	....	....
Sheep	3,503	....	....
Unclassified	688	....	....
Belgium:			
Hides, green	180,930	....	....
British India:			
Cattle	15,473	8,477	....
Unclassified	4,904	5,544	....
Canada:			
Unclassified	46,820	....	47,135
Denmark:			
Unclassified	9,842	....	....
Finland:			
Hides, dried	4,088	646	553
Hides, green	6,335	11,063	7,571
Sheep	294	91	130
France:			
Calf	6,658	1,022	1,513
Goat	20,826	5,093	10,200
Kid	4,466	1,094	3,717
Lamb	300	79	442
Sheep	4,670	376	621
Unclassified	118,588	43,345	61,438
Germany:			
Calf, dried	13,345	....	....
Calf, green	63,797	....	....
Cattle, dried	94,148	....	....
Cattle, green	215,792	....	....
Goat, with hair on	20,754	....	....
Horse, dried	5,172	....	....
Horse, green	23,222	....	....

Importing country and classification.	Average, 1909–1913.	1915 (Prelim.).	1916 (Prelim.).
Germany—Contd.			
Sheep and lamb	2,038	....	....
Unclassified	1,931	....	....
Greece:			
Unclassified	5,770	2,151	....
Italy:			
Calf	1,609	2,142	1,259
Cattle	47,240	72,754	70,447
Sheep	3,735	4,080	4,517
Goat	125	288	283
Kid	70	17	112
Lamb	536	2,139	489
Unclassified	208	871	902
Japan:			
Cattle	5,760	15,053	18,814
Deer	561	483	640
Netherlands:			
Hides, dried	34,879	13,688	7,306
Hides, fresh	20	....	....
Hides, salted	34,439	6,433	5,769
Sheep	4,353	3,260	....
Norway:			
Hides, dry	3,398	2,930	2,970
Hides, green	10,266	8,246	6,782
Hides, salted	250	158	....
Unclassified	64	25	....
Portugal:			
Hides, dried	6,596	7,353	....
Hides, green	207	464	....
Roumania:			
Buffalo and cattle	6,557	....	....
Horse and swine	5	....	....
Sheep, lamb, and goat	661	....	....
Russia:			
Hides, dried	13,015	4,574	94
Hides, green	84,125	532	184
Goat and kid	3,588	691	76
Sheep	9,414	7,847	76

TABLE 152.—*Hides and skins: International trade, calendar years 1909–1916.*—Contd.

IMPORTS.—Continued.

Exporting country and classification.	Average, 1909–1913.	1915 (Prelim.).	1916 (Prelim.).
	Pounds.	*Pounds.*	*Pounds.*
Singapore:			
Unclassified	9,332	....	....
Spain:			
Unclassified	19,119	28,193	21,516
Sweden:			
Cattle, dried	6,009	....	....
Cattle, green	18,863	....	....
Horse, green	49	....	....
Goat, lamb, and sheep, dried	395	....	....
Goat, kid, lamb, and sheep, green	310		....
Unclassified	36	....	....
United Kingdom:			
Calf, dried	48	....	....
Calf, green	712	1,094	410
Goat	7,215	13,287	8,167
Hides, dried and green	97,631	164,881	124,338
Sheep	1,744	2,426	....
United States:			
Calf, dried	42,625	22,703	34,066
Calf, green or pickled	32,208	26,211	28,591
Cattle and buffalo, dried	49,484	140,944	175,404
Cattle and buffalo, green or pickled	196,137	281,141	248,824
Goat, dried	82,996	62,721	91,542
Goat, green or pickled	15,394	16,566	12,684
Horse, dried	4,871	5,452	9,307
Horse, green or pickled	8,762	4,475	14,226
Kangaroo	353	963	1,229
United States—Con.			
Sheep, dried	15,898	36,801	56,268
Sheep, green or pickled	47,564	38,286	45,263
Unclassified	17,956	9,991	9,607
Other countries:			
Hides—			
Cattle and buffalo	15,407	3,339	....
Horse	44	8	....
Skins—			
Calf	....	4	....
Deer	5	1	....
Goat and kid	476	(1)	....
Sheep and lamb	1,271	....	....
Sheep and goat, mixed	459	613	....
Unclassified	36,736	14,994	....
Total	1,959,521	1,108,103	....
All countries:			
Hides—			
Cattle and buffalo	739,106	521,708	....
Horse	42,468	9,935	....
Skins—			
Calf	163,600	53,176	....
Deer	506	484	....
Goat and kid	157,721	99,757	....
Kangaroo	353	963	....
Sheep and lamb	105,709	95,385	....
Sheep and goat, mixed	1,826	613	....
Unclassified	748,172	326,082	....
Total	1,959,521	1,108,103	....

[1] Less than 500

HORSES AND MULES.

TABLE 153.—*Horses and mules: Number and value on farms in the United States, 1867–1918.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of numbers are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available. It should also be observed that the census of 1910, giving numbers as of Apr. 15, is not strictly comparable with former censuses, which related to numbers June 1.

Jan. 1—	Horses.			Mules.		
	Number.	Price per head Jan. 1.	Farm value Jan. 1.	Number.	Price per head Jan. 1.	Farm value Jan. 1.
1867	5,401,000	$59.05	$318,924,000	822,000	$66.94	$55,048,000
1868	5,757,000	54.27	312,416,000	856,000	56.04	47,954,000
1869	6,333,000	62.57	396,222,000	922,000	79.23	73,027,000
1870	8,249,000	67.43	556,251,000	1,180,000	90.42	106,654,000
1870, census, June 1	*7,345,370*			*1,125,415*		
1871	8,702,000	71.14	619,039,000	1,242,000	91.98	114,272,000
1872	8,991,000	67.41	606,111,000	1,276,000	87.14	111,222,000
1873	9,222,000	66.39	612,273,000	1,310,000	85.15	111,546,000
1874	9,334,000	65.15	608,073,000	1,339,000	81.35	108,953,000
1875	9,504,000	61.10	580,708,000	1,394,000	71.89	100,197,000
1876	9,735,000	57.29	557,747,000	1,414,000	66.46	94,001,000
1877	10,155,000	55.83	567,017,000	1,444,000	64.07	92,482,000
1878	10,330,000	56.63	584,999,000	1,638,000	62.03	101,579,000
1879	10,939,000	52.36	572,712,000	1,713,000	56.00	95,942,000
1880	11,202,000	54.75	613,297,000	1,730,000	61.26	105,948,000
1880, census, June 1	*10,357,488*			*1,812,808*		
1881	11,430,000	58.44	667,954,000	1,721,000	69.79	120,096,000
1882	10,522,000	58.53	615,825,000	1,835,000	71.35	130,945,000
1883	10,838,000	70.59	765,041,000	1,871,000	79.49	148,732,000
1884	11,170,000	74.64	833,734,000	1,914,000	84.22	161,215,000
1885	11,565,000	73.70	852,283,000	1,973,000	82.38	162,497,000
1886	12,078,000	71.27	860,823,000	2,053,000	79.60	163,381,000
1887	12,497,000	72.15	901,686,000	2,117,000	78.91	167,058,000
1888	13,173,000	71.82	946,096,000	2,192,000	79.78	174,854,000
1889	13,663,000	71.89	982,195,000	2,258,000	79.49	179,444,000
1890	14,214,000	68.84	978,517,000	2,331,000	78.25	182,394,000
1890, census, June 1	*14,969,467*			*2,295,532*		
1891	14,057,000	67.00	941,823,000	2,297,000	77.88	178,847,000
1892	15,498,000	65.01	1,007,594,000	2,315,000	75.55	174,882,000
1893	16,207,000	61.22	992,225,000	2,331,000	70.68	164,764,000
1894	16,081,000	47.83	769,225,000	2,352,000	62.17	146,233,000
1895	15,893,000	36.29	576,731,000	2,333,000	47.55	110,928,000
1896	15,124,000	33.07	500,140,000	2,279,000	45.29	103,204,000
1897	14,365,000	31.51	452,649,000	2,216,000	41.66	92,302,000
1898	13,961,000	34.26	478,362,000	2,190,000	43.88	96,110,000
1899	13,665,000	37.40	511,075,000	2,134,000	44.96	95,963,000
1900	13,538,000	44.61	603,969,000	2,086,000	53.55	111,717,000
1900, census, June 1	*18,267,020*			*3,264,615*		
1901 [1]	16,745,000	52.86	885,200,000	2,864,000	63.97	183,232,000
1902	16,531,000	58.61	968,935,000	2,757,000	67.61	186,412,000
1903	16,557,000	62.25	1,030,706,000	2,728,000	72.49	197,753,000
1904	16,736,000	67.93	1,136,940,000	2,758,000	78.88	217,533,000
1905	17,058,000	70.37	1,200,310,000	2,889,000	87.18	251,840,000
1906	18,719,000	80.72	1,510,890,000	3,404,000	98.31	334,681,000
1907	19,747,000	93.51	1,846,578,000	3,817,000	112.16	428,064,000
1908	19,992,000	93.41	1,867,530,000	3,869,000	107.76	416,939,000
1909	20,640,000	95.64	1,974,052,000	4,053,000	107.84	437,082,000
1910	21,040,000			4,123,000		
1910, census, Apr. 15	*19,833,113*	108.03	2,142,524,000	*4,209,769*	120.20	506,049,000
1911 [1]	20,277,000	111.46	2,259,981,000	4,323,000	125.92	544,359,000
1912	20,509,000	105.94	2,172,694,000	4,362,000	120.51	525,657,000
1913	20,567,000	110.77	2,278,222,000	4,386,000	124.31	545,245,000
1914	20,962,000	109.32	2,291,638,000	4,449,000	123.85	551,017,000
1915	21,195,000	103.33	2,190,102,000	4,479,000	112.36	503,271,000
1916	21,159,000	101.60	2,149,786,000	4,593,000	113.83	522,834,000
1917	21,210,000	102.89	2,182,307,000	4,723,000	118.15	558,006,000
1918	21,563,000	104.28	2,248,626,000	4,824,000	128.74	621,064,000

[1] Estimates of numbers revised, based on census data.

HORSES AND MULES—Continued.

TABLE 154.—*Horses and mules: Number and value on farms Jan. 1, 1917 and 1918, by States.*

State.	Horses.						Mules.					
	Number (thousands) Jan. 1—		Average price per head Jan. 1—		Farm value (thousands of dollars) Jan. 1—		Number (thousands) Jan. 1—		Average price per head Jan. 1—		Farm value (thousands of dollars) Jan. 1—	
	1918	1917	1918	1917	1918	1917	1918	1917	1918	1917	1918	1917
Me....	109	109	$163.00	$152.00	$17,767	$16,568	......	......	....	....	....	....
N. H..	45	44	151.00	135.00	6,795	5,940	......	......	....	....	....	....
Vt....	89	89	144.00	134.00	12,816	11,926	......	......	....	....	....	....
Mass..	57	59	163.00	156.00	9,291	9,204	......	......	....	....	....	....
R. I...	8	8	155.00	155.00	1,240	1,240	......	......	....	....	....	....
Conn..	45	46	161.00	147.00	7,245	6,762	......	......	....	....	....	....
N. Y..	597	609	145.00	139.00	86,565	84,651	5	5	$159.00	$155.00	$795	$775
N. J...	90	92	153.00	149.00	13,770	13,708	4	4	174.00	169.00	696	676
Pa....	590	596	126.00	126.00	74,340	75,096	48	48	138.00	137.00	6,624	6,576
Del...	36	36	87.00	90.00	3,132	3,240	6	6	115.00	116.00	690	696
Md....	171	169	102.00	105.00	17,442	17,745	25	25	124.00	127.00	3,100	3,175
Va....	365	361	104.00	100.00	37,960	36,100	65	64	128.00	122.00	8,320	7,808
W.Va.	196	196	106.00	107.00	20,776	20,972	12	12	116.00	117.00	1,392	1,404
N. C..	187	185	140.00	125.00	26,180	23,125	207	205	167.00	150.00	34,569	30,750
S. C...	85	85	156.00	136.00	13,260	11,560	179	174	192.00	162.00	34,368	28,188
Ga....	130	127	145.00	129.00	18,850	16,383	334	324	181.00	163.00	60,454	52,812
Fla...	62	60	127.00	120.00	7,874	7,200	33	31	172.00	166.00	5,676	5,146
Ohio..	883	892	112.00	119.00	98,896	106,148	26	26	118.00	120.00	3,068	3,120
Ind...	837	845	105.00	108.00	87,885	91,260	95	95	119.00	114.00	11,305	10,830
Ill.....	1,467	1,452	103.00	106.00	151,101	153,912	150	150	120.00	115.00	18,000	17,250
Mich..	680	680	118.00	121.00	80,240	82,280	4	4	119.00	122.00	476	488
Wis...	708	715	117.00	120.00	82,836	85,800	3	3	117.00	117.00	351	351
Minn .	944	925	105.00	109.00	99,120	100,825	6	6	111.00	110.00	666	660
Iowa..	1,583	1,552	104.00	107.00	164,632	166,064	69	68	116.00	116.00	8,004	7,888
Mo....	1,040	1,020	97.00	92.00	100,880	93,840	367	360	113.00	104.00	41,471	37,440
N.Dak	842	825	102.00	106.00	85,884	87,450	9	9	121.00	122.00	1,089	1,098
S. Dak	811	780	95.00	93.00	77,045	72,540	16	15	109.00	108.00	1,744	1,620
Nebr..	1,049	1,018	101.00	95.00	105,949	96,710	118	112	113.00	106.00	13,334	11,872
Kans..	1,142	1,120	104.00	99.00	118,768	110,880	280	275	118.00	108.00	33,040	29,700
Ky....	443	434	101.00	93.00	44,743	40,362	224	224	122.00	112.00	27,328	25,088
Tenn..	350	350	109.00	105.00	38,150	36,750	273	270	131.00	120.00	35,763	32,400
Ala...	153	150	116.00	99.00	17,748	14,850	289	278	141.00	118.00	40,749	32,804
Miss ..	253	243	100.00	87.00	25,300	21,141	307	292	124.00	109.00	38,068	31,828
La....	207	195	93.00	86.00	19,251	16,770	156	139	135.00	125.00	21,060	17,375
Tex...	1,212	1,200	77.00	78.00	93,324	93,600	808	800	107.00	103.00	86,456	82,400
Okla..	737	730	94.00	86.00	69,278	62,780	276	276	114.00	104.00	31,464	28,704
Ark...	275	270	97.00	87.00	26,675	23,490	263	255	125.00	114.00	32,875	29,070
Mont..	506	460	98.00	92.00	49,588	42,320	5	5	105.00	107.00	525	535
Wyo..	209	195	82.00	80.00	17,138	15,600	4	4	104.00	97.00	416	388
Colo...	399	380	97.00	93.00	38,703	35,340	26	24	108.00	104.00	2,808	2,496
N.Mex	272	250	62.00	62.00	16,864	15,500	19	19	89.00	89.00	1,691	1,691
Ariz...	135	129	71.00	75.00	9,585	9,675	9	8	108.00	104.00	972	832
Utah..	145	138	89.00	87.00	12,905	12,006	2	2	82.00	79.00	164	158
Nev...	75	73	77.00	76.00	5,775	5,548	3	3	80.00	85.00	240	255
Idaho.	258	250	99.00	93.00	25,542	23,250	4	4	105.00	100.00	420	400
Wash.	309	300	108.00	98.00	33,372	29,400	19	19	117.00	111.00	2,223	2,109
Oreg..	309	300	98.00	98.00	30,282	29,400	10	10	102.00	103.00	1,020	1,030
Cal....	468	468	98.00	97.00	45,864	45,396	66	70	115.00	116.00	7,590	8,120
U. S	21,563	21,210	104.28	102.89	2,248,626	2,182,307	4,824	4,723	128.74	118.15	621,064	558,006

HORSES AND MULES—Continued.

TABLE 155.—*Prices of horses and mules at St. Louis, 1900–1917.*

Year and month.	Range of prices.				Year and month.	Range of prices.				Year and month.	Range of prices.			
	Horses, good to choice draft.		Mules, 16 to 16½ hands.			Horses, good to choice draft.		Mules, 16 to 16½ hands.			Horses, good to choice draft.		Mules, 16 to 16½ hands.	
	L.	H.	L.	H.		L.	H.	L.	H.		L.	H.	L.	H.
1900	$140	$190	$90	$150	1916.					1917.				
1901	150	175	110	165	January	$150	$185	$135	$270	January	$150	$240	$150	$275
1902	160	185	120	160	February	150	185	135	275	February	160	250	150	270
1903	160	185	120	175	March	150	185	150	275	March	160	260	150	270
1904	175	200	135	200	April	150	190	150	275	April	190	270	150	270
1905	175	225	120	210	May	160	200	150	275	May	190	285	150	270
1906	175	225	125	215	June	160	200	150	275	June	175	265	175	275
1907	175	225	125	250	July	175	225	150	270	July	160	250	175	275
1908	175	250	125	200	August	175	225	140	250	August	150	235	175	275
1909	140	225	130	225	September	175	225	150	250	September	160	220	200	275
1910	165	240	150	275	October	160	220	140	235	October	160	220	200	280
1911	165	235	150	275	November	150	220	140	235	November	160	220	190	260
1912	165	240	160	285	December	150	220	150	275	December	160	220	200	265
1913	200	250	160	280										
1914	175	220	120	250	Year, 1916	150	225	135	275	Year, 1917	165	245	172	272
1915	160	225	120	275										

TABLE 156.—*Average price per head for horses on the Chicago horse market, 1901–1917.*

Date.	Drafters.	Carriage teams.	Drivers.	General.	Bussers, trammers.	Sadlers.[1]	Southern chunks.
1901	$157.00	$400.00	$137.00	$102.00	$121.00	$147.00	$52.00
1902	166.00	450.00	145.00	117.00	135.00	151.00	57.00
1903	171.00	455.00	150.00	122.00	140.00	156.00	62.00
1904	177.00	475.00	150.00	140.00	140.00	160.00	64.00
1905	186.00	486.00	156.00	132.00	145.00	172.00	70.00
1906	188.00	486.00	158.00	154.00	147.00	174.00	72.50
1907	194.00	482.00	165.00	137.00	152.00	172.00	77.50
1908	180.00	450.00	156.00	129.00	138.00	164.00	69.00
1909	194.00	482.00	165.00	137.00	152.00	172.00	77.00
1910	200.00	473.00	172.00	144.00	161.00	177.00	87.00
1911	205.00	483.00	182.00	155.00	170.00	190.00	92.00
1912	210.00	473.00	177.00	160.00	175.00	195.00	97.00
1913	213.00	493.00	174.00	165.00	176.00	189.00	98.00
1914	208.00	483.00	169.00	160.00	171.00	184.00	93.00
1915	205.00	473.00	164.00	155.00	166.00	179.00	88.00
1916.							
January	225.00	No sales.	150.00	160.00	165.00	125.00	110.00
February	250.00		200.00	160.00	165.00	125.00	110.00
March	275.00		150.00	160.00	165.00	125.00	110.00
April	275.00		150.00	160.00	165.00	125.00	110.00
May	250.00		200.00	160.00	165.00	125.00	110.00
June	225.00		150.00	160.00	165.00	125.00	110.00
July	225.00		150.00	160.00	165.00	115.00	110.00
August	250.00		175.00	160.00	165.00	115.00	110.00
September	250.00		175.00	160.00	165.00	115.00	110.00
October	275.00		200.00	160.00	165.00	115.00	110.00
November [2]	262.00		145.00	162.00	175.00	142.00	102.00
December [2]	263.00		145.00	162.00	175.00	142.00	102.00
Year, 1916	252.00		166.00	160.00	167.00	121.00	109.00
1917.							
January	205.00	430.00	160.00	150.00	165.00	180.00	90.00
February	215.00	475.00	170.00	145.00	170.00	195.00	90.00
March	225.00	490.00	170.00	155.00	175.00	200.00	100.00
April	220.00	485.00	175.00	160.00	180.00	200.00	105.00
May	225.00	490.00	170.00	155.00	180.00	195.00	95.00
June	220.00	495.00	165.00	150.00	175.00	195.00	100.00
July	210.00	490.00	165.00	150.00	170.00	190.00	95.00
August	210.00	480.00	165.00	145.00	170.00	190.00	90.00
September	205.00	460.00	160.00	140.00	165.00	185.00	90.00
October	200.00	450.00	155.00	145.00	170.00	175.00	90.00
November	200.00	445.00	150.00	140.00	165.00	175.00	85.00
December	205.00	450.00	150.00	140.00	160.00	170.00	90.00
Year, 1917	212.00	470.00	162.00	148.00	170.00	188.00	93.00

[1] Cavalry horses, 1916.   [2] Mean of low and high quotations.

HORSES AND MULES—Continued.

TABLE 157.—*Number of horses and mules received at principal live-stock markets, 1900–1917.*

[From reports of stock yards companies.]

Year and month.	Horses.		Horses and mules.						Total, 8 cities.
	Chicago.	St. Paul.	Denver.	Fort Worth.	Kansas City.	Omaha.	St. Joseph.	St. Louis National Stock Yards, Ill.	
1900	99,010	26,778	22,691	....	103,308	59,645	13,497	144,921	469,850
1901	109,353	15,123	16,545	....	96,657	36,391	22,521	128,880	425,470
1902	102,100	8,162	24,428	4,872	76,844	42,079	19,909	109,295	387,689
1903	100,603	7,823	19,040	10,094	67,274	52,829	20,483	128,615	406,761
1904	105,949	6,438	13,437	17,895	67,562	46,845	28,704	181,341	468,171
1905	127,250	5,561	16,046	18,033	65,582	45,422	31,565	178,257	487,716
1906	126,979	9,299	16,571	21,303	69,629	42,269	28,480	166,393	480,923
1907	102,055	14,557	11,059	18,507	62,341	44,020	26,894	117,379	396,812
1908	92,138	7,125	11,158	12,435	56,335	39.998	22,875	109,293	351,457
1909	91,411	5,632	15,348	20,732	67,796	31,711	23,132	122,471	378,233
1910	83,439	5,482	15,554	34,445	69,628	29,734	27,583	130,271	396,136
1911	104,545	7,709	18,022	37,361	84,861	31,771	42,023	170,379	496,671
1912	92,977	5,314	14,918	49,025	73,445	32,520	38,661	163,973	470,833
1913	90,615	5,203	16,274	56,724	82,110	31,580	32,418	156,825	471,749
1914	106,282	5,683	16,957	47,712	87,155	30,688	25,424	148,128	468,029
1915	165,253	10,091	71,870	53,640	102,153	41,679	41,254	270,612	756,552
1916.									
January	12,986	377	7,912	4,915	7,886	1,443	2,456	25,809	63,784
February	15,913	1,010	6,101	3,132	4,735	2,135	2,313	20,114	55,453
March	17,469	1,131	3,546	4,980	5,012	2,952	1,515	17,599	54,204
April	14,882	1,092	2,679	3,518	7,073	1,695	1,682	14,881	47,502
May	18,240	821	4,704	6,466	8,171	3,036	2,143	20,695	64,276
June	17,557	1,571	4,517	4,073	7,156	2,338	2,124	15,785	55,121
July	18,990	1,510	4,872	12,967	11,027	2,177	1,934	26,574	80,051
August	23,896	1,003	3,476	7,261	13,414	3,152	1,660	23,292	77,154
September	21,132	1,195	5,444	4,590	13,349	3,332	2,599	26,655	78,296
October	18,952	835	5,299	11,686	17,145	2,042	3,920	31,147	91,026
November	14,342	910	1,441	8,351	13,093	1,731	2,892	22,244	65,004
December	11,090	322	2,809	7,270	15,089	1,453	1,968	22,023	62,015
Total, 1916	205,449	11,777	52,809	79,209	123,141	27,486	27,206	266,818	793,886
1917.									
January	10,788	496	2,095	7,322	15,144	1,724	2,625	24,957	65,151
February	6,413	544	1,701	2,763	14,402	2,108	1,978	15,068	44,977
March	11,111	895	1,143	4,293	14,275	3,229	2,958	16,874	54,648
April	7,691	598	1,154	4,429	13,263	2,641	1,862	13,370	44,909
May	7,559	465	1,755	1,742	5,379	1,275	733	8,198	27,057
June	7,258	476	2,137	3,793	2,578	1,044	462	6,852	24,600
July	8,361	553	1,305	9,156	4,171	1,889	821	15,659	41,915
August	4,628	405	849	9,312	3,776	1,424	1,301	13,963	35,658
September	7,274	1,261	1,035	14,523	10,313	5,465	3,428	31,267	71,576
October	11,329	1,158	2,551	30,647	13,926	6,341	5,908	51,291	121,161
November	15,823	1,704	2,014	18,322	17,861	3,892	6,367	47,743	113,726
December	9,175	1,404	2,019	9,020	12,765	1.789	5,131	34,595	75,898
Total, 1917	107,311	9,959	19,758	115,233	127,823	32,781	33,584	279,837	726,286

HORSES AND MULES—Continued.

TABLE 158.—*Horses and mules: Imports, exports, and prices, 1893–1917.*

Year ending June 30—	Imports of horses.			Exports of horses.			Exports of mules.		
	Number.	Value.	Average import price.	Number.	Value.	Average export price.	Number.	Value.	Average export price.
1893	15,451	$2,388,267	$154.57	2,967	$718,607	$242.20	1,634	$210,278	$128.69
1894	6,166	1,319,572	214.01	5,246	1,108,995	211.40	2,063	240,961	116.80
1895	13,098	1,055,191	80.56	13,984	2,209,298	157.99	2,515	186,452	74.14
1896	9,991	662,591	66.32	25,126	3,530,703	140.52	5,918	406,161	68.63
1897	6,998	464,808	66.42	39,532	4,769,265	120.64	7,473	545,331	72.97
1898	3,085	414,899	134.49	51,150	6,176,569	120.75	8,098	664,789	82.09
1899	3,042	551,050	181.15	45,778	5,444,342	118.93	6,755	516,908	76.52
1900	3,102	596,592	192.32	64,722	7,612,616	117.62	43,369	3,919,478	90.38
1901	3,785	985,738	260.43	82,250	8,873,845	107.89	34,405	3,210,267	93.31
1902	4,832	1,577,234	326.41	103,020	10,048,046	97.53	27,586	2,692,298	97.60
1903	4,999	1,536,296	307.32	34,007	3,152,159	92.69	4,294	521,725	121.47
1904	4,726	1,460,287	308.99	42,001	3,189,100	75.93	3,658	412,971	112.90
1905	5,180	1,591,083	307.16	34,822	3,175,259	91.19	5,826	645,464	110.79
1906	6,021	1,716,675	285.11	40,087	4,365,981	108.91	7,167	989,639	138.08
1907	6,080	1,978,105	325.35	33,882	4,359,957	131.99	6,781	850,901	125.48
1908	5,487	1,604,392	292.40	19,000	2,612,587	137.50	6,609	990,667	149.90
1909	7,084	2,007,276	283.35	21,616	3,386,617	156.67	3,432	472,017	137.53
1910	11,620	3,296,022	283.65	28,910	4,081,157	141.17	4,512	614,094	136.18
1911	9,593	2,692,074	280.63	25,145	3,845,253	152.92	6,585	1,070,051	162.50
1912	6,607	1,923,025	291.06	34,828	4,764,815	136.81	4,901	732,095	149.30
1913	10,008	2,125,875	212.42	28,707	3,960,102	137.95	4,744	733,795	154.68
1914	33,019	2,605,029	78.89	22,776	3,388,819	148.79	4,883	690,974	141.51
1915	12,652	977,380	77.25	289,340	64,046,534	221.35	65,788	12,726,143	193.44
1916	15,556	1,618,245	104.03	357,553	73,531,146	205.65	111,915	22,946,312	205.03
1917	12,584	1,888,303	150.06	278,674	59,525,329	213.60	136,689	27,800,854	203.39

CATTLE.

TABLE 159.—*Cattle (live): Imports, exports, and prices, 1893–1917.*

Year ending June 30—	Imports.			Exports.		
	Number.	Value.	Average import price.	Number.	Value.	Average export price.
1893	3,293	$45,682	$13.87	287,094	$26,032,428	$90.68
1894	1,592	18,704	11.75	359,278	33,461,922	93.14
1895	149,781	765,853	5.11	331,722	30,603,796	92.26
1896	217,826	1,509,856	6.93	372,461	34,560,672	92.79
1897	328,977	2,589,857	7.87	392,190	36,357,451	92.70
1898	291,589	2,913,223	9.99	439,255	37,827,500	86.12
1899	199,752	2,320,362	11.62	389,490	30,516,833	78.35
1900	181,006	2,257,694	12.47	397,286	30,635,153	77.11
1901	146,022	1,931,433	13.23	459,218	37,566,980	81.81
1902	96,027	1,608,722	16.75	392,884	29,902,212	76.11
1908	66,175	1,161,548	17.55	402,178	29,848,936	74.22
1904	16,056	310,737	19.35	593,409	42,256,291	71.21
1905	27,855	458,572	16.46	567,806	40,598,048	71.50
1906	29,019	548,430	18.90	584,239	42,081,170	72.03
1907	32,402	565,122	17.44	423,051	34,577,392	81.73
1908	92,356	1,507,310	16.32	349,210	29,339,134	84.02
1909	139,184	1,999,422	14.37	207,542	18,046,976	86.96
1910	195,938	2,999,824	15.37	139,430	12,200,154	87.50
1911	182,923	2,953,077	16.14	150,100	13,163,920	87.70
1912	318,372	4,805,574	15.09	105,506	8,870,075	84.07
1913	421,649	6,640,668	15.75	24,714	1,177,199	47.63
1914	868,368	18,6[illegible]6,718	21.53	18,376	647,288	35.22
1915	538,167	17,513,175	32.54	5,484	702,847	128.16
1916	439,185	15,187,593	34.58	21,666	2,383,765	110.02
1917	374,826	13,021,259	34.74	13,387	949,503	70.93

CATTLE—Continued.

TABLE 160.—*Cattle: Number and value on farms in the United States, 1867–1918.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of numbers are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available. It should also be observed that the census of 1910, giving numbers as of April 15, is not strictly comparable with former censuses, which related to numbers June 1.

Jan. 1—	Milch cows.			Other cattle.		
	Number.	Price per head Jan. 1.	Farm value Jan. 1.	Number.	Price per head Jan. 1.	Farm value Jan. 1.
1867	8,349,000	$28.74	$239,947,000	11,731,000	$15.79	$185,254,000
1868	8,692,000	26.56	230,817,000	11,942,000	15.06	179,888,000
1869	9,248,000	29.15	269,610,000	12,185,000	18.73	228,183,000
1870	10,096,000	32.70	330,175,000	15,388,000	18.87	290,401,000
1870, census June 1	*8,935,332*			*13,566,005*		
1871	10,023,000	33.89	339,701,000	16,212,000	20.78	336,860,000
1872	10,304,000	29.45	303,438,000	16,390,000	18.12	296,932,000
1873	10,576,000	26.72	282,559,000	16,414,000	18.06	296,448,000
1874	10,705,000	25.63	271,326,000	16,218,000	17.55	284,706,000
1875	10,907,000	25.74	280,701,000	16,313,000	16.91	275,872,000
1876	11,085,000	25.61	283,879,000	16,785,000	17.00	285,387,000
1877	11,261,000	25.47	286,778,000	17,956,000	15.09	287,156,000
1878	11,300,000	25.74	290,898,000	19,223,000	16.72	321,346,000
1879	11,826,000	21.71	256,721,000	21,408,000	15.38	329,251,000
1880	12,027,000	23.27	279,899,000	21,231,000	16.10	341,761,000
1880, census June 1	*12,443,120*			*22,488,550*		
1881	12,369,000	23.95	296,277,000	20,939,000	17.33	362,862,000
1882	12,612,000	25.89	326,489,000	23,280,000	19.89	463,070,000
1883	13,126,000	30.21	396,575,000	28,046,000	21.81	611,549,000
1884	13,501,000	31.37	423,487,000	29,046,000	23.52	683,229,000
1885	13,905,000	29.70	412,903,000	29,867,000	23.25	694,383,000
1886	14,235,000	27.40	389,986,000	31,275,000	21.17	661,956,000
1887	14,522,000	26.08	378,790,000	33,512,000	19.79	663,138,000
1888	14,856,000	24.65	366,252,000	34,378,000	17.79	611,751,000
1889	15,299,000	23.94	366,226,000	35,032,000	17.05	597,237,000
1890	15,953,000	22.14	353,152,000	36,849,000	15.21	560,625,000
1890, census June 1	*16,511,950*			*33,734,128*		
1891	16,020,000	21.62	346,398,000	36,876,000	14.76	544,128,000
1892	16,416,000	21.40	351,378,000	37,651,000	15.16	570,749,000
1893	16,424,000	21.75	357,300,000	35,954,000	15.24	547,882,000
1894	16,487,000	21.77	358,999,000	36,608,000	14.66	536,790,000
1895	16,505,000	21.97	362,602,000	34,364,000	14.06	482,999,000
1896	16,138,000	22.55	363,956,000	32,085,000	15.86	508,928,000
1897	15,942,000	23.16	369,240,000	30,508,000	16.65	507,929,000
1898	15,841,000	27.45	434,814,000	29,264,000	20.92	612,297,000
1899	15,990,000	29.66	474,234,000	27,994,000	22.79	637,931,000
1900	16,292,000	31.60	514,812,000	27,610,000	24.97	689,486,000
1900, census June 1	*17,135,633*			*50,585,777*		
1901 [1]	16,834,000	30.00	505,093,000	45,500,000	19.93	906,644,000
1902	16,697,000	29.23	488,130,000	44,728,000	18.76	839,126,000
1903	17,105,000	30.21	516,712,000	44,659,000	18.45	824,055,000
1904	17,420,000	29.21	508,841,000	43,629,000	16.32	712,178,000
1905	17,572,000	27.44	482,272,000	43,669,000	15.15	661,571,000
1906	19,794,000	29.44	582,789,000	47,068,000	15.85	746,172,000
1907	20,968,000	31.09	645,497,000	51,566,000	17.10	[illegible]1,557,000
1908	21,194,000	30.67	650,057,000	50,073,000	16.89	845,938,000
1909	21,720,000	32.36	702,945,000	49,379,000	17.49	863,754,000
1910	21,801,000			47,279,000		
1910, census Apr. 15	*20,625,432*	35.29	727,802,000	*41,178,434*	19.07	785,261,000
1911 [1]	20,823,000	39.97	832,209,000	39,679,000	20.54	815,184,000
1912	20,699,000	39.39	815,414,000	37,260,000	21.20	790,064,000
1913	20,497,000	45.02	922,783,000	36,030,000	26.36	949,645,000
1914	20,737,000	53.94	1,118,487,000	35,855,000	31.13	1,116,333,000
1915	21,262,000	55.33	1,176,338,000	37,067,000	33.38	1,237,376,000
1916	22,108,000	53.92	1,191,955,000	39,812,000	33.53	1,334,928,000
1917	22,894,000	59.63	1,365,251,000	41,689,000	35.92	1,497,621,000
1918	23,284,000	70.59	1,643,639,000	43,546,000	40.88	,780,052,000

[1] Estimates of numbers revised, based on census data.

CATTLE—Continued.

TABLE 161.—*Cattle: Number and value on farms Jan. 1, 1917 and 1918, by States.*

State.	Milch cows.						Other cattle.					
	Number (thousands) Jan. 1—		Average price per head Jan. 1—		Farm value (thousands of dollars) Jan. 1—		Number (thousands) Jan. 1—		Average price per head Jan. 1—		Farm value (thousands of dollars) Jan. 1—	
	1918	1917	1918	1917	1918	1917	1918	1917	1918	1917	1918	1917
Maine	170	163	$75.00	$58.00	$12,750	$9,454	127	112	$37.60	$27.90	$4,775	$3,125
New Hampshire	102	98	85.00	66.50	8,670	6,517	71	63	40.00	31.60	2,840	1,991
Vermont	295	281	76.00	62.50	22,420	17,562	189	172	33.40	25.70	6,313	4,420
Massachusetts	154	160	90.00	75.00	13,860	12,000	97	88	37.30	29.60	3,618	2,605
Rhode Island	21	22	90.00	77.00	1,890	1,691	12	11	39.70	31.30	476	344
Connecticut	116	121	85.00	73.50	9,860	8,894	78	73	41.00	30.80	3,198	2,248
New York	1,524	1,539	85.00	66.00	129,540	101,574	1,005	939	38.30	31.00	38,492	29,109
New Jersey	152	155	90.00	76.00	13,680	11,780	74	74	41.60	34.00	3,078	2,516
Pennsylvania	960	980	75.00	62.50	72,000	61,250	717	664	36.80	30.80	26,386	20,451
Delaware	43	43	64.00	56.00	2,752	2,408	23	21	35.80	31.90	823	670
Maryland	181	183	69.50	58.00	12,580	10,614	134	125	38.90	32.20	5,213	4,025
Virginia	377	373	57.00	46.50	21,489	17,344	510	486	37.70	31.80	19,227	15,455
West Virginia	245	245	61.50	53.50	15,068	13,108	373	369	44.80	38.70	16,710	14,280
North Carolina	309	315	51.00	39.00	15,759	12,285	375	364	24.80	19.40	9,300	7,062
South Carolina	193	189	57.50	40.00	11,098	7,560	232	215	25.60	18.30	5,939	3,934
Georgia	435	418	51.80	37.00	22,533	15,466	755	686	22.20	16.20	16,761	11,113
Florida	145	141	53.00	43.00	7,685	6,063	891	865	22.20	16.50	19,780	14,272
Ohio	940	950	74.00	60.00	69,560	57,000	954	900	43.70	36.40	41,690	32,760
Indiana	713	706	70.00	58.50	49,910	41,301	757	735	45.00	39.00	34,065	28,665
Illinois	1,057	1,057	80.50	68.00	85,088	71,876	1,314	1,251	49.70	43.30	65,306	54,168
Michigan	874	865	74.00	61.50	64,676	53,198	752	730	35.90	30.20	26,997	22,046
Wisconsin	1,785	1,750	75.00	65.00	133,875	113,750	1,394	1,340	33.30	29.80	46,420	39,932
Minnesota	1,328	1,302	70.00	58.00	92,960	75,516	1,540	1,400	31.40	26.50	48,356	37,100
Iowa	1,405	1,405	76.70	66.50	107,764	93,432	2,919	2,751	47.90	43.20	139,820	118,973
Missouri	910	875	69.70	58.50	63,427	51,188	1,782	1,650	47.60	40.90	84,823	67,485
North Dakota	434	425	69.00	61.50	29,946	26,138	650	650	41.60	38.20	27,040	24,830
South Dakota	555	524	75.00	67.00	41,625	35,108	1,438	1,250	49.80	43.70	71,612	54,625
Nebraska	703	676	78.50	68.00	55,186	45,968	2,803	2,525	49.30	44.30	138,188	111,858
Kansas	945	900	75.40	64.50	71,253	58,050	2,354	2,200	49.30	43.10	116,052	94,820
Kentucky	435	418	61.00	49.50	26,535	20,691	581	570	39.00	33.70	22,659	19,209
Tennessee	373	366	55.00	43.00	20,515	15,738	554	528	30.10	25.50	16,675	13,464
Alabama	433	405	47.50	36.50	20,568	14,782	668	531	20.40	14.70	13,627	7,850
Mississippi	508	475	47.50	38.00	24,130	18,050	644	575	21.90	16.40	14,104	9,430
Louisiana	324	300	49.50	42.00	16,038	12,600	578	525	24.20	20.00	13,988	10,500
Texas	1,128	1,175	57.50	54.50	64,860	64,038	4,660	5,482	34.40	32.60	160,304	178,713
Oklahoma	562	535	67.70	60.00	38,047	32,100	1,404	1,300	43.90	38.90	61,636	50,570
Arkansas	425	405	56.00	44.00	23,800	17,820	638	560	24.90	19.20	15,886	10,752
Montana	179	160	83.50	79.00	14,946	12,640	980	1,000	56.10	53.10	54,978	53,100
Wyoming	64	60	88.00	81.50	5,632	4,890	891	825	59.10	52.70	52,658	43,478
Colorado	254	237	82.00	73.50	20,828	17,420	1,272	1,200	50.20	44.70	63,854	53,640
New Mexico	88	85	72.00	68.00	6,336	5,780	1,179	1,145	41.90	39.70	49,400	45,456
Arizona	87	81	85.00	85.00	7,395	6,885	1,037	864	40.50	37.30	41,998	32,227
Utah	96	91	73.50	61.00	7,056	5,551	457	408	43.90	34.90	20,062	14,239
Nevada	28	26	85.00	76.00	2,380	1,976	517	470	46.30	39.50	23,937	18,565
Idaho	139	135	73.00	63.50	10,147	8,572	488	465	44.70	38.60	21,814	17,949
Washington	266	263	70.00	59.50	18,620	15,648	294	280	36.00	30.40	10,584	8,512
Oregon	227	225	60.00	55.00	13,620	12,375	683	610	39.50	37.30	26,978	22,753
California	597	591	72.50	67.00	43,282	39,597	1,701	1,636	42.10	38.10	71,612	62,332
United States	23,284	22,894	70.59	59.63	1,643,639	1,365,251	43,546	41,689	40.88	35.92	1,780,052	1,497,621

CATTLE—Continued.

TABLE 162.—*Cattle: Wholesale price per 100 pounds, 1912–1917.*

Date.	Chicago. Inferior to prime.		Cincinnati. Medium to heavy butcher steers.		St. Louis. Good to choice native steers.		Kansas City. Common to prime.		Omaha. Native beeves.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.										
January-June.....	$1.75	$9.60	$4.10	$6.25	$7.35	$9.50	$4.60	$9.50	....	....
July-December...	2.25	11.25	4.05	6.75	8.30	11.00	5.50	12.40	....	....
1913.										
January-June.....	3.00	9.50	4.65	7.65	8.00	9.25	4.75	9.00	$3.25	$8.80
July-December...	3.00	10.25	4.50	7.00	8.50	10.00	4.50	10.00	3.00	9.60
1914.										
January-June.....	6.60	9.75	5.35	7.25	8.00	9.00	5.20	9.40	6.50	9.25
July-December...	4.85	11.25	4.65	7.25	8.00	9.50	4.50	11.35	6.00	10.75
1915.										
January-June.....	4.25	9.95	4.85	7.00	7.35	9.40	6.00	9.75	8.30	9.35
July-December...	4.00	13.60	4.15	7.00	8.80	10.40	5.50	10.35	9.85	10.10
1916.										
January...........	5.50	9.85	5.00	6.25	8.40	9.60	7.15	9.75	6.00	8.75
February..........	5.70	9.75	5.00	6.40	8.50	9.00	6.90	9.75	6.25	8.65
March.............	6.75	10.05	5.50	7.40	9.00	10.00	7.10	10.05	7.00	9.40
April..............	7.25	10.00	6.00	7.75	9.25	10.00	7.50	10.00	7.25	9.50
May...............	7.50	10.90	6.25	9.25	9.55	10.35	7.50	11.05	7.65	10.65
June...............	7.15	11.50	6.25	8.50	10.60	11.35	8.00	11.50	7.25	11.00
Jan.-June...	5.50	11.50	5.00	9.25	8.40	11.35	6.90	11.50	6.00	11.00
July...............	6.00	11.30	6.00	8.00	9.60	11.00	7.75	11.30	6.75	10.40
August............	6.00	11.50	6.00	7.50	9.20	10.50	7.75	11.35	6.50	10.60
September........	5.60	11.50	5.75	7.25	10.35	10.85	9.50	11.25	6.50	10.85
October...........	5.50	11.65	5.50	7.00	10.60	11.15	7.75	10.50	6.50	11.10
November........	5.65	12.40	5.50	7.35	9.00	9.85	6.00	11.75	6.50	11.10
December.........	6.25	13.00	6.00	7.75	8.00	11.50	6.00	12.00	7.00	11.50
July-Dec...	5.50	13.00	5.50	8.00	8.00	11.50	6.00	12.00	6.50	11.50
1917.										
January...........	5.75	11.95	6.00	10.25	10.00	10.75	6.50	11.25	10.00	11.50
February.........	6.60	12.25	6.00	11.25	10.00	11.00	6.50	12.00	10.25	11.50
March.............	6.25	12.90	6.50	11.25	10.25	11.25	6.50	11.50	10.25	12.50
April..............	7.65	13.40	7.00	11.75	10.25	11.50	6.50	12.00	11.35	13.05
May...............	8.25	13.70	7.50	12.50	10.25	12.25	9.00	13.40	11.25	13.35
June...............	7.90	13.90	7.50	12.85	11.00	12.25	9.00	13.75	12.25	13.85
Jan.-June..	5.75	13.90	6.00	12.85	10.00	12.25	6.50	13.75	10.00	13.85
July...............	6.50	14.15	6.50	12.25	11.25	13.75	9.75	13.90	12.25	14.00
August............	6.15	16.50	6.50	13.00	11.25	14.00	9.75	16.00	12.50	15.55
September........	6.25	17.90	6.50	14.50	11.75	15.50	10.00	17.00	13.00	17.00
October...........	6.50	17.60	6.00	14.00	12.75	15.50	10.00	16.50	15.00	16.50
November.........	6.50	17.60	6.00	13.35	10.50	16.50	10.00	16.50	14.00	16.75
December.........	6.65	16.00	5.00	13.50	10.00	16.00	9.25	14.75	11.50	15.00
July-Dec...	6.15	17.90	5.00	14.50	10.00	16.50	9.25	17.00	11.50	17.00

BUTTER AND EGGS.

TABLE 163.—*Butter: Wholesale price per pound, 1912–1917.*

Date.	Elgin.		Chicago.		Cincinnati.		Milwaukee.		New York.		Boston.	
	Creamery, extra.		Creamery, extra.		Creamery, extra.		Creamery, fancy.		Creamery, extra.		Creamery extra.	
	Low.	High	Low.	High	Low.	High	Low.	High	Low.	High.	Low.	High.
1912.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January-June	25	40	25	40	27½	42½	25	40	26	41	27½	38
July-December	25	35½	24	37	27½	39	25	35½	26	38	27	34
1913.												
January-June	26½	35	25	36	31	40	27	35	26½	42	28	36½
July-December	26	35½	24	36	30	39½	26	35½	26	37½	27	35
1914.												
January-June	23½	35½	24	35½	27½	39½	23½	35½	24½	50	25	34½
July-December	26	34	26	34	30	38	26	34	26¾	36½	27½	33½
1915.												
January-June	25½	34	26	34	29½	38	25½	34	24	36	27	33½
July-December	24	34	24	34	28	38	24	34	25	36½	26	32
1916.												
January	30	31½	30	32	35	35½	30	31½	31	33½	32	32
February	30	34	30	33½	34	37	30	34	30½	36	32	32
March	34	36	34	36½	38	40	34	36	36	38	33	35½
April	32	36	32½	36	37	40	33	36	33½	37¾	36	36½
May	28	32	28½	32	32	37	28	32	30	34	30½	34
June	28	29	27½	29	32	33	28	29	29	30½	29½	30
January-June	28	36	27½	36½	32	40	28	36	29	38	29½	35½
July	27½	28	27½	28	31½	32	27½	28	28½	30	29	29
August	28	31	28½	31½	32	35	28	31	30	33½	30	32½
September	31½	34	31½	34	35	37	31	33	33	34	33	34½
October	34	35	34	35	37	39	34	35	35½	36½	35	35½
November	35	42	35	42	39	46	35	42	36	42½	36	39
December	37	42	37	40	41	46	37	42	37	41½	38	39
July-December	27½	42	27½	42	31½	46	27½	42	28½	42½	29	39
1917.												
January	36½	39	36½	39	40½	43	36½	39	39	42½	38	39
February	39	42	38	42	43	46	39	42	40½	46	39	40
March	40	43	40	42½	......	44	40	42	40½	44½	39	41
April	37	46	37½	46	44	50	38	46	39	46¾	43½	47
May	37	43	37	43	41	45	37	43	38	43½	39½	43
June	36½	43	36	41	39	45	36	42	37½	42	38	41½
January-June	36½	46	36	46	39	50	36	46	37½	46¾	38	47
July	36½	38	36½	38½	39	40½	38½	42	37½	40	38½	39
August	38	41	38	41½	40½	43½	38½	42	39½	43¼	39½	43
September	41½	43½	41½	43½	43½	45½	42	43½	43¼	45	43½	45
October	42	43½	42	43½	44½	46	42½	44	43½	46	43½	45
November	43	45½	43	46½	45½	47½	43½	46	44	48	43½	44
December	46½	49	46½	49	47½	53	46	48	47	51½	44½	46
July-December	36½	49	36½	49	39	53	38½	48	37½	51½	39½	46

BUTTER AND EGGS—Continued.

TABLE 164.—*Butter: International trade, calendar years 1909–1916.*

[Butter includes all butter made from milk, melted and renovated butter, but does not include margarine, cocoa butter, or ghee. See "General note," Table 152.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913.	1915 (prelim.)	1916 (prelim.)
From—	*Pounds.*	*Pounds.*	*Pounds.*
Argentina	6,934	10,192	12,502
Australia	77,859	16,722	....
Austria-Hungary	4,267	....	....
Belgium	3,125	....	....
Canada	3,973	3,593	7,787
Denmark	195,530	....	....
Finland	26,337	20,015	8,960
France	40,769	50,381	21,046
Germany	498	....	....
Italy	7,870	7,488	792
Netherlands	75,133	93,352	78,997
New Zealand	38,761	47,056	....
Norway	3,137	3,607	1,022
Russia	150,294	119,359	22
Sweden	45,870	....	....
United States	4,125	17,941	26,561
Other countries	4,811	4,651	....
Total	689,293	394,357	....

IMPORTS.

Country.	Average, 1909–1913.	1915 (prelim.)	1916 (prelim.)
Into—			
Austria-Hungary	6,281	....	....
Belgium	14,024	....	....
Brazil	4,551	732	140
British South Africa	4,234	2,030	273
Canada	3,388	5,661	2,092
Denmark	6,241	....	....
Dutch East Indies	4,152	[1] 3,547	....
Egypt	2,350	1,194	705
Finland	2,370	4,916	3
France	13,713	1,711	761
Germany	111,441	....	....
Netherlands	4,987	905	992
Russia	2,202	2,615	5,922
Sweden	330	....	....
Switzerland	11,106	5,700	946
United Kingdom	455,489	426,355	240,270
Other countries	27,364	15,704	....
Total	671,223	471,070	....

[1] Java and Madura only.

BUTTER AND EGGS—Continued.

TABLE 165.—*Butter: Average price received by farmers on first of each month, by States, 1917.*

State and division.	Butter, cents per pound.											
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Maine	37	38	39	39	39	41	39	38	42	47	47	47
New Hampshire	40	37	40	39	44	44	44	43	44	48	48	49
Vermont	40	40	41	40	45	43	40	41	41	47	50	48
Massachusetts	42	39	41	41	47	46	46	47	46	48	49	49
Rhode Island	42	41	40	43	50	46	47	47	46	50	50	49
Connecticut	40	39	39	39	47	46	45	46	47	47	50	49
New York	39	39	41	41	42	42	40	40	43	47	47	48
New Jersey	41	41	44	44	46	46	44	44	46	47	49	49
Pennsylvania	39	39	39	38	40	40	38	38	42	44	47	48
Delaware	40	38	......	35	45	45	40	42	48	47	45	50
Maryland	34	35	37	33	36	34	33	34	36	37	40	42
Virginia	31	31	32	32	34	32	31	31	32	35	37	39
West Virginia	32	32	32	30	33	32	31	32	33	37	39	41
North Carolina	30	30	30	30	30	30	31	31	31	35	36	39
South Carolina	32	32	33	32	39	35	35	35	37	39	40	41
Georgia	31	29	30	29	33	33	33	31	33	35	38	40
Florida	41	39	41	42	45	44	40	42	41	43	47	45
Ohio	34	33	34	32	36	34	32	33	35	38	40	42
Indiana	32	31	31	31	33	32	32	31	33	37	39	40
Illinois	34	32	33	32	35	34	33	34	35	38	40	40
Michigan	36	35	35	35	37	36	33	34	38	40	42	44
Wisconsin	38	38	40	39	41	40	37	38	40	43	43	44
Minnesota	36	38	38	37	40	38	35	37	39	41	44	43
Iowa	35	35	36	35	38	37	34	35	37	40	43	44
Missouri	30	30	30	30	33	31	29	30	31	34	36	37
North Dakota	36	35	34	31	36	35	34	33	35	37	39	40
South Dakota	36	34	34	33	38	35	34	33	37	40	42	43
Nebraska	33	30	31	30	35	34	31	32	34	38	40	40
Kansas	32	31	31	31	34	33	31	32	34	37	39	40
Kentucky	26	27	28	27	29	27	27	27	28	31	32	33
Tennessee	26	25	26	26	27	26	26	25	27	30	31	33
Alabama	27	25	26	27	29	28	29	28	29	30	32	34
Mississippi	29	28	28	28	30	29	29	29	28	31	32	36
Louisiana	33	33	33	33	35	34	34	34	34	35	37	39
Texas	30	28	28	28	31	29	29	30	31	34	36	37
Oklahoma	30	30	29	30	32	29	30	31	31	33	37	39
Arkansas	30	28	28	28	30	29	28	27	28	30	34	35
Montana	40	38	38	37	43	43	36	36	41	42	45	45
Wyoming	40	39	38	38	42	42	38	40	43	46	51	50
Colorado	37	34	34	33	38	37	35	36	40	42	44	45
New Mexico	38	37	39	38	42	40	39	43	40	44	46	47
Arizona	41	42	45	39	43	45	46	42	......	45	48	49
Utah	35	35	35	36	38	37	36	36	42	41	45	45
Nevada	38	42	42	39	44	44	46	44	50	46	49	51
Idaho	37	36	37	38	40	38	36	38	43	46	46	49
Washington	39	39	39	40	44	39	39	40	44	48	49	50
Oregon	38	36	37	36	39	38	37	39	43	45	49	48
California	35	38	40	36	37	36	38	42	43	46	47	47
United States	34.0	33.5	34.1	33.5	36.1	35.0	33.5	34.0	36.1	38.9	40.9	41.9
North Atlantic	39.1	39.0	40.1	39.6	41.7	41.7	39.7	39.7	42.9	46.0	47.5	48.0
South Atlantic	31.6	31.3	32.0	31.0	33.8	32.6	32.1	32.1	33.3	36.2	38.2	40.2
N. Central E. Miss. R	34.7	33.7	34.4	33.5	36.3	35.0	33.2	33.8	36.0	39.0	40.7	42.0
N. Central W. Miss. R	33.6	33.2	33.5	32.8	36.3	34.8	32.4	33.3	35.3	38.2	40.6	41.1
South Central	28.4	27.4	27.7	27.7	29.8	28.3	28.3	28.3	29.1	31.7	33.6	35.3
Far Western	36.8	37.2	38.2	36.5	39.1	37.6	37.6	39.8	42.8	45.2	47.2	47.5

BUTTER AND EGGS—Continued.

TABLE 166.—*Butter: Receipts at seven leading markets in the United States, 1891–1917.*

[From Board of Trade, Chamber of Commerce, and Merchants' Exchange reports.]

[000 omitted.]

Year.	Boston.	Chicago.	Milwaukee.	St. Louis.	San Francisco.	Total 5 cities.	Cincinnati.	New York.
Averages:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Packages.*	*Packages.*
1891–1895	40,955	145,225	3,996	13,944	15,240	219,360	88	1,741
1896–1900	50,790	232,289	5,096	14,582	14,476	317,233	157	2,010
1901–1905	57,716	245,203	7,164	14,685	15,026	339,794	177	2,122
1906–1910	66,612	286,518	8,001	17,903	13,581	392,615	169	2,207
1901	57,500	253,809	5,590	13,477	14,972	345,348	238	2,040
1902	54,574	219,233	7,290	14,573	14,801	310,471	223	1,933
1903	54,347	232,032	6,857	14,080	13,570	320,886	121	2,113
1904	55,435	249,024	7,993	15,727	14,336	342,515	147	2,170
1905	66,725	271,915	8,091	15,566	17,450	379,747	155	2,355
1906	65,152	248,648	8,209	13,198	9,282	366,635	205	2,242
1907	63,589	263,715	8,219	13,453	17,359	341,489	187	2,113
1908	69,843	316,095	8,798	18,614	13,833	427,783	166	2,175
1909	65,054	284,547	7,458	21,086	14,486	392,631	150	2,250
1910	69,421	318,986	7,319	23,163	13,994	432,883	135	2,257
1911	63,874	334,932	8,632	24,839	21,118	453,395	162	2,405
1912	71,609	287,799	6,927	20,399	24,887	411,621	120	2,433
1913	71,703	286,220	9,415	24,686	23,027	415,051	102	2,522
1914	73,028	311,557	9,716	24,614	22,421	441,336	72	2,505
1915	82,082	344,879	8,679	21,264	28,349	485,253	129	2,741
1916	79,305	359,195	7,976	16,445	28,029	490,950	151	2,918
1917	69,168	323,100	6,116	16,996	25,032	440,412	63	2,575
1917.[1]								
January	2,835	18,803	305	1,335	1,388	24,667	[2] 10	170
February	3,808	16,593	399	1,251	1,668	23,719	3	162
March	3,543	17,999	465	1,474	2,378	25,859	13	160
April	4,516	17,994	431	1,377	3,045	27,364	7	169
May	5,512	25,049	528	1,718	3,355	36,160	4	223
June	11,753	43,863	740	2,371	2,685	61,413	3	328
July	12,041	53,034	679	1,298	1,857	68,910	4	323
August	7,891	39,337	601	1,152	1,731	50,713	1	294
September	5,560	29,232	592	1,196	1,626	38,206	3	240
October	5,531	26,889	514	1,538	1,729	36,200	6	225
November	3,263	17,537	440	1,443	2,011	24,694	4	143
December	2,914	16,770	422	845	1,557	22,507	6	140

[1] Figures for 1917 were furnished by the Bureau of Markets.
[2] Cincinnati, 1917, excludes "through" movement.

BUTTER AND EGGS—Continued.

TABLE 167.—*Eggs: Average price received by farmers on first of each month, by States, 1917.*

State and division.	Eggs, cents per dozen.											
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Maine	46	43	43	31	34	37	35	38	46	50	51	56
New Hampshire	49	46	42	31	39	39	39	43	49	51	52	60
Vermont	45	42	44	29	33	36	36	37	44	46	48	49
Massachusetts	58	49	47	34	40	43	43	47	55	58	65	65
Rhode Island	56	49	47	33	41	42	41	42	48	58	61	60
Connecticut	52	51	45	30	36	42	39	45	54	56	62	70
New York	48	45	43	31	34	36	36	38	46	50	50	56
New Jersey	49	50	46	32	35	37	29	42	47	50	55	60
Pennsylvania	44	42	40	28	33	34	34	36	40	44	47	51
Delaware	43	35	......	30	32	37	32	38	38	45	50	55
Maryland	41	38	35	27	30	32	30	32	35	39	40	48
Virginia	37	35	33	24	29	30	30	29	32	38	40	44
West Virginia	41	37	36	24	31	31	32	33	33	38	42	44
North Carolina	32	31	29	21	25	27	28	26	29	35	38	40
South Carolina	34	31	29	22	25	28	29	27	30	35	41	44
Georgia	34	29	30	21	26	28	27	27	31	36	41	43
Florida	40	35	35	25	30	29	30	33	34	40	44	46
Ohio	40	38	36	26	31	33	30	33	36	39	41	46
Indiana	38	34	33	25	30	33	28	30	33	37	38	43
Illinois	38	36	35	26	31	31	28	30	32	37	38	42
Michigan	38	38	37	37	31	33	29	32	36	38	40	43
Wisconsin	36	37	36	26	30	31	28	31	33	37	37	40
Minnesota	35	35	34	26	29	31	28	29	32	35	36	38
Iowa	35	36	33	25	30	31	27	28	32	34	35	39
Missouri	34	34	31	25	30	30	26	26	29	34	34	39
North Dakota	37	37	36	27	27	29	27	26	29	32	35	39
South Dakota	36	34	32	24	29	29	27	28	31	34	36	37
Nebraska	33	32	31	24	29	30	25	26	29	33	34	37
Kansas	33	32	29	25	29	30	26	25	29	34	35	38
Kentucky	35	34	32	23	28	29	26	27	27	33	35	39
Tennessee	35	32	30	22	27	28	25	24	27	33	34	39
Alabama	32	28	27	21	25	25	25	24	27	31	35	37
Mississippi	33	30	29	21	27	26	25	24	26	31	34	37
Louisiana	33	29	28	23	25	27	25	26	28	31	37	41
Texas	32	28	26	21	27	25	24	23	25	32	37	40
Oklahoma	34	31	28	22	27	27	26	23	26	31	34	39
Arkansas	33	28	28	22	26	25	25	22	25	31	35	37
Montana	50	47	41	31	29	31	34	34	39	41	45	52
Wyoming	50	48	41	32	33	33	34	37	40	42	48	53
Colorado	44	39	32	25	32	32	31	33	38	42	42	46
New Mexico	43	37	35	28	31	32	33	37	38	38	41	48
Arizona	53	43	35	32	34	38	42	41	......	52	50	54
Utah	42	41	34	25	29	30	30	30	36	38	43	45
Nevada	43	44	42	30	31	36	39	41	48	41	55	58
Idaho	46	43	38	30	32	31	31	33	36	41	43	50
Washington	44	41	33	28	33	32	33	36	41	43	50	53
Oregon	40	37	31	27	31	30	29	33	34	39	45	50
California	41	38	31	27	30	32	32	34	40	45	50	53
United States	37.7	35.8	33.8	25.9	30.0	31.1	28.3	29.8	33.2	37.4	39.4	43.3
North Atlantic	47.4	41.6	42.5	30.1	34.4	36.3	36.2	38.6	41.9	48.7	51.0	55.6
South Atlantic	36.9	33.8	32.3	23.5	28.1	29.3	24.6	29.5	32.0	37.4	40.7	44.1
N. Central E. Miss. R	38.2	36.6	35.3	27.5	30.7	32.2	28.7	31.2	34.0	37.7	39.0	43.1
N. Central W. Miss. R	34.2	34.1	31.6	25.0	29.5	30.3	26.5	26.8	30.3	34.0	34.8	38.4
South Central	33.3	30.0	28.4	21.8	26.8	26.4	25.0	24.0	26.1	31.9	35.3	38.8
Far Western	42.8	39.5	32.8	27.4	30.9	31.7	31.9	34.0	38.7	42.9	47.4	51.2

BUTTER AND EGGS—Continued.

TABLE 168.—*Eggs: Receipts at seven leading markets in the United States, 1891–1917.*

[From Board of Trade, Chamber of Commerce, and Merchants' Exchange reports.]

Year.	Boston.	Chicago.	Cincinnati.	Milwaukee.	New York.	St. Louis.	San Francisco.	Total.
Averages:	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
1891-1895	722,363	1,879,065	288,518	90,943	2,113,946	557,320	166,059	5,818,244
1896-1900	912,807	2,196,631	362,262	113,327	2,664,074	852,457	194,087	7,295,645
1901-1905	1,155,310	2,990,675	418,812	139,718	3,057,298	1,009,935	301,933	9,067,741
1906-1910	1,517,995	4,467,010	509,017	180,362	4,016,360	1,304,719	334,766	12,360,259
1901	1,010,555	2,783,709	493,218	128,179	2,909,194	1,022,646	277,500	8,655,001
1902	1,053,165	2,659,340	464,799	114,732	2,713,612	825,999	285,058	8,116,735
1903	1,164,777	3,279,248	338,327	129,278	2,940,091	959,618	335,228	9,146,597
1904	1,122,819	3,113,858	377,263	166,409	3,215,924	1,216,124	319,637	9,532,034
1905	1,395,385	3,117,221	420,604	159,990	3,477,638	980,257	307,243	9,858,338
1906	1,709,531	3,583,878	484,208	187,561	3,981,013	1,023,125	137,074	11,106,390
1907	1,594,576	4,780,356	588,636	176,826	4,262,153	1,288,977	379,439	13,070,963
1908	1,436,786	4,569,011	441,072	207,558	3,703,990	1,439,868	347,436	12,145,724
1909	1,417,397	4,557,906	519,652	160,418	3,903,867	1,395,987	340,185	12,295,412
1910	1,431,686	4,844,045	511,519	179,448	4,380,777	1,375,638	469,698	13,192,811
1911	1,441,768	4,707,335	605,131	175,270	5,021,757	1,736,915	587,687	14,275,863
1912	1,580,106	4,556,643	668,942	136,896	4,723,520	1,394,534	638,890	13,699,531
1913	1,589,400	4,593,800	594,951	191,059	4,713,555	1,398,065	573,042	13,653,875
1914	1,531,329	4,083,163	461,927	224,797	4,882,222	1,474,212	619,500	13,277,150
1915	1,757,594	4,896,246	812,371	192,743	5,585,329	1,492,729	629,577	15,366,589
1916	1,649,828	5,452,737	853,910	208,924	4,858,274	1,521,506	575,014	15,120,193
1917	1,501,956	5,678,679	184,022	131,625	4,357,061	1,373,120	715,768	13,945,231
1917.[1]								
January	55,734	117,951	[2] 8,757	2,787	143,005	43,676	50,019	421,929
February	74,816	85,940	13,489	5,341	139,166	73,237	75,900	468,190
March	170,737	376,361	11,268	9,495	405,330	253,992	93,961	1,321,144
April	252,047	926,647	2,708	25,387	746,808	260,433	91,211	2,305,241
May	318,421	1,200,041	35,681	24,059	737,689	253,800	91,838	2,661,529
June	193,613	896,403	25,019	15,332	564,515	128,373	78,853	1,902,108
July	112,856	626,283	18,995	8,032	394,625	92,375	51,516	1,304,682
August	86,634	449,968	14,695	10,354	337,144	91,537	45,017	1,035,349
September	84,008	361,159	17,315	10,329	332,515	74,663	35,305	915,294
October	79,856	295,082	11,134	11,624	284,398	44,794	37,019	763,907
November	43,613	192,537	15,731	8,582	169,079	35,199	28,240	492,981
December	29,621	150,307	9,230	3,303	102,487	21,041	36,888	352,877

[1] Figures for 1917 were furnished by the Bureau of Markets.
[2] Cincinnati, 1917, excludes "through" shipments.

BUTTER AND EGGS.—Continued.

TABLE 169.—*Eggs: Wholesale price per dozen, 1912–1917.*

Date.	Chicago. Fresh.		Cincinnati.		St. Louis. Average best, fresh.		Milwaukee. Fresh.		New York. Average best, fresh.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Jan.-June	17	40	17	40	16	39	15	38	20½	48
July-Dec	17½	27½	18	36	14½	27	16	30	23	60
1913.										
Jan.-June	16½	27½	15½	27½	14¼	25	14	25	20	40
July-Dec	16	37	18½	42	12	35	13	35	25	65
1914.										
Jan.-June	17	32½	16½	36	14	31	15	30	20	50
July-Dec	18	36	18½	38½	18	35	16	32	24	62
1915.										
Jan.-June	16	38	12½	40½	15¼	37½	15½	34	18	44
July-Dec	16	30½	10	36	14½	30	15½	32	18	40
1916.										
January	27	32¼	18	34½	24½	31	25	31	26	35
February	20¾	29½	18½	28½	19	30	20½	28	22	30½
March	18½	22	17½	23	17	20½	17	21	21¾	28½
April	19¼	21	17	21	18½	20	17½	19	20½	22½
May	20½	21¾	17½	21½	19	20½	18½	20	21¼	23¾
June	20½	22¼	18	22½	19	20	19	20	22	24½
Jan.-June	18½	32¼	17	34½	17	31	17	31	20½	35
July	21¾	23	17½	24	....	....	19	22	23¾	27½
August	23	26	18½	30	22	26	19	25	26½	34
September	25½	30½	21	31½	24	28	21	27	31	35
October	30	32½	25½	35½	28	31	22	30	32½	37
November	31½	39½	28	43	31	39	27	38	35½	46
December	37	41	31	47	36	38	33	38	41½	47
July-Dec	21¾	41	17½	47	22	39	19	38	23¾	47
1917.										
January	36½	49	30	53	36	42	33	44	39	53
February	29	45	29	50	28	42	29	42	33	49
March	26	31	22	31	25½	29½	25½	31	28¼	35
April	29½	36	27½	34	28½	35	30	35½	32	36½
May	31	35½	28	34½	30½	33½	31	35	33½	37½
June	28½	35	26	35	27½	33	28	35	30	37½
Jan.-June	26	49	22	53	25½	42	25½	44	28¼	53
July	30¼	33½	20	35	26	29½	30¼	38	34	36
August	30¼	37½	20	39	26	35	30¼	38	34	42
September	36	39	30	41	34	37	36½	38	39	42
October	36	39	33	50	34	37	36	38	39	43
November	38	49	36	50	38	43½	38	45	41	56
December	46	57	37	57	42½	51	44	55	51½	62
July-Dec	30¼	57	20	57	26	51	30¼	55	34	62

CHEESE.

TABLE 170.—*Cheese: International trade, calendar years 1909–1916.*

[Cheese includes all cheese made from milk; "cottage cheese," of course, is included. See "General note," Table 152.]

EXPORTS.

[000 omitted.]

Country.	Average, 1909–1913.	1915 (Prelim.)	1916 (Prelim.)	Country.	Average, 1909–1913.	1915 (Prelim.)	1916 (Prelim.)
From—	*Pounds.*	*Pounds.*	*Pounds.*	*From—*	*Pounds.*	*Pounds.*	*Pounds.*
Bulgaria	5,584	....	....	Russia	7,011	995	105
Canada	167,260	160,660	170,248	Switzerland	70,075	74,775	47,215
France	26,880	16,242	13,934	United States	5,142	63,227	54,093
Germany	1,967	....	....	Other countries	10,705	8,343	....
Italy	60,560	65,762	39,323				
Netherlands	127,379	190,334	199,108	Total	538,124	671,871	....
New Zealand	55,561	91,533	....				

IMPORTS.

Country.	Average, 1909–1913.	1915 (Prelim.)	1916 (Prelim.)	Country.	Average, 1909–1913.	1915 (Prelim.)	1916 (Prelim.)
Into—				*Into—*			
Algeria	6,592	4,614	....	France	49,056	46,744	24,140
Argentina	10,447	7,306	3,133	Germany	48,687	....	....
Australia	360	1,532	....	Italy	13,308	3,472	252
Austria-Hungary	12,298	....	....	Russia	3,911	3,738	2,066
Belgium	31,771	....	....	Spain	5,032	3,202	1,453
Brazil	4,178	2,300	1,423	Switzerland	7,150	3,410	427
British South Africa	5,006	4,012	2,037	United Kingdom	257,407	299,920	287,115
				United States	46,346	38,919	28,516
Cuba	4,520	2,839	....	Other countries	19,590	7,681	....
Denmark	1,414	....	....				
Egypt	8,182	5,785	1,865	Total	535,255	435,474	....

CHICKENS.

TABLE 171.—*Chickens: Average price received by farmers on first of each month, by States, 1917.*

State and division.	Chickens, cents per pound.											
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Maine	16.2	17.0	18.0	18.0	19.4	19.1	21.0	21.2	21.6	20.9	20.2	19.5
New Hampshire	19.5	20.0	19.0	20.4	20.0	20.8	21.0	21.0	21.4	21.0	21.5	22.5
Vermont	15.2	17.4	15.6	17.5	17.5	19.0	17.9	19.3	18.6	20.3	20.0	19.5
Massachusetts	21.0	21.0	23.0	24.0	25.0	23.0	21.4	26.0	24.6	26.0	24.0	22.2
Rhode Island	21.0	20.5	22.0	23.0	29.5	26.0	29.0	24.0	......	25.3	26.0	21.5
Connecticut	20.2	20.8	20.5	20.7	24.0	23.6	23.6	24.0	24.0	24.2	25.1	25.0
New York	17.2	18.8	19.0	19.3	20.3	21.0	21.1	22.0	22.7	21.9	22.7	23.0
New Jersey	19.6	21.0	21.4	21.3	22.2	23.0	23.0	21.0	25.0	25.6	25.1	21.7
Pennsylvania	15.9	16.4	17.9	18.8	20.2	20.0	19.9	20.7	21.2	21.0	22.3	21.0
Delaware	16.0	17.0	......	20.0	25.0	22.0	18.0	25.0	23.0	23.0	25.0	22.5
Maryland	17.3	18.4	18.8	19.5	22.2	22.0	24.0	21.2	21.8	24.7	22.1	21.5
Virginia	15.8	16.5	17.4	16.9	19.2	18.7	19.0	20.1	19.2	20.5	21.5	21.0
West Virginia	14.5	14.8	16.0	15.8	18.1	17.8	18.3	19.8	19.4	19.5	20.2	19.5
North Carolina	13.8	13.9	14.6	15.2	16.0	17.0	18.2	17.2	17.6	18.5	18.6	19.4
South Carolina	14.5	14.4	14.7	15.3	15.0	17.4	16.9	17.6	16.6	17.0	19.0	19.5
Georgia	14.0	14.1	15.0	15.5	17.3	17.1	17.7	17.2	18.0	18.0	20.5	20.0
Florida	18.5	19.3	19.4	19.6	20.4	20.2	19.3	21.0	19.8	22.0	22.5	23.0
Ohio	14.2	15.5	16.5	17.7	18.7	18.6	17.7	18.0	18.2	19.8	18.0	18.0
Indiana	14.1	15.0	16.2	16.8	18.5	18.1	17.5	17.0	17.5	18.5	17.6	16.5
Illinois	13.6	14.7	15.8	16.8	18.1	17.5	17.6	17.1	17.4	18.2	17.0	16.6
Michigan	13.6	14.8	15.9	15.9	18.1	18.1	18.1	17.0	17.8	18.2	17.4	16.5
Wisconsin	13.1	13.5	15.1	15.8	17.0	17.5	17.5	16.5	17.0	18.1	16.2	15.5
Minnesota	12.2	12.7	13.4	13.5	15.2	15.2	14.8	14.3	14.9	15.6	14.1	14.2
Iowa	13.9	14.2	14.9	15.2	16.2	16.2	15.5	15.7	15.9	17.0	15.9	15.6
Missouri	13.1	14.1	15.2	16.0	17.7	17.1	16.6	16.3	16.3	17.7	16.5	16.2
North Dakota	10.5	12.2	11.4	12.7	13.6	14.3	13.9	13.2	13.8	14.5	13.0	12.0
South Dakota	12.0	12.8	12.2	13.8	14.5	14.5	13.7	13.7	15.7	14.6	14.0	14.5
Nebraska	12.1	13.0	13.8	14.4	15.9	15.7	14.8	15.3	15.0	17.3	14.8	14.9
Kansas	12.1	13.9	14.1	14.9	16.1	16.2	15.5	14.7	14.9	16.6	15.7	15.5
Kentucky	13.1	14.3	15.5	16.4	17.8	17.3	17.0	17.5	16.5	17.8	17.2	16.8
Tennessee	12.8	13.9	15.1	16.7	17.7	17.8	18.1	15.8	16.0	16.6	16.8	16.6
Alabama	13.4	13.2	13.7	13.3	15.5	15.5	15.6	15.5	14.7	16.7	17.4	18.2
Mississippi	12.8	13.4	13.9	15.1	15.9	16.4	16.3	16.0	15.3	16.2	17.1	17.5
Louisiana	17.0	16.1	15.7	16.8	17.7	18.9	19.8	19.0	19.0	19.3	20.6	20.0
Texas	12.4	12.2	12.8	13.2	15.1	15.2	15.0	14.0	14.2	14.9	15.5	15.7
Oklahoma	12.3	12.6	13.7	14.4	15.9	16.0	16.1	15.4	14.4	15.2	15.9	15.3
Arkansas	11.8	11.5	12.6	13.9	15.3	16.2	15.5	15.4	14.9	15.0	15.6	17.0
Montana	14.5	15.1	16.5	16.4	18.0	19.0	20.0	18.1	21.1	19.1	18.4	18.0
Wyoming	16.0	15.5	17.4	19.4	18.8	20.0	17.6	18.8	17.6	21.3	18.9	18.0
Colorado	13.4	13.9	14.4	14.9	17.5	18.6	17.8	16.8	17.8	17.8	18.2	17.2
New Mexico	13.1	15.2	15.4	15.6	15.4	15.7	17.1	19.5	18.0	23.0	20.4	19.0
Arizona	19.5	21.1	18.8	21.0	20.8	22.0	24.6	24.0	......	23.5	22.0	19.5
Utah	13.4	14.1	15.6	15.1	15.4	16.6	17.6	16.5	16.9	17.7	18.0	17.5
Nevada	20.0	22.5	21.4	23.2	22.0	26.0	24.0	22.0	21.0	22.0	24.2	24.0
Idaho	13.0	12.3	13.0	14.4	16.0	16.0	15.6	15.6	16.0	16.5	15.5	16.0
Washington	14.4	14.3	15.2	17.0	18.4	18.0	17.8	16.8	17.5	17.3	18.5	17.5
Oregon	13.5	13.5	15.0	15.8	17.6	16.3	16.0	16.1	15.8	17.0	17.8	17.0
California	16.8	18.3	17.5	18.7	19.1	17.9	18.6	18.9	19.4	19.3	20.0	22.2
United States	13.9	14.7	15.5	16.1	17.5	17.5	17.3	17.1	17.2	18.1	17.7	17.5
North Atlantic	17.3	18.2	19.0	19.6	20.9	20.9	21.1	21.9	22.3	22.1	22.7	22.1
South Atlantic	15.1	15.5	16.1	16.5	18.2	18.3	18.7	19.0	18.8	19.7	20.6	20.4
N. Central E. Miss. R.	13.8	14.8	16.0	16.8	18.2	18.0	17.7	17.2	17.6	18.6	17.3	16.8
N. Central W. Miss. R.	12.8	13.7	14.3	14.9	16.2	16.1	15.5	15.3	15.5	16.8	15.5	15.3
South Central	13.0	13.2	13.9	14.7	16.2	16.4	16.4	15.7	15.4	16.2	16.7	16.8
Far Western	15.2	16.0	16.2	17.2	18.2	17.7	18.0	17.8	18.2	18.6	19.0	19.4

SHEEP AND WOOL.

TABLE 172.—*Sheep: Number and value on farms in the United States, 1867–1918.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of numbers are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceeding year, except that a revised base is used for applying percentage estimates whenever new census data are available. It should also be observed that the census of 1910 giving numbers as of Apr. 15, is not strictly comparable with former censuses, which related to numbers June 1.

Year.	Number.	Price per head Jan. 1.	Farm value Jan. 1.
1867	39,385,000	$2.50	$98,614,000
1868	38,992,000	1.82	71,053,000
1869	37,724,000	1.64	62,037,000
1870	40,853,000	1.96	79,876,000
1870, census, June 1	*28,477,951*		
1871	31,851,000	2.14	68,310,000
1872	31,679,000	2.61	82,768,000
1873	33,002,000	2.71	89,427,000
1874	33,938,000	2.43	82,353,000
1875	33,784,000	2.55	86,278,000
1876	35,935,000	2.37	85,121,000
1877	35,804,000	2.13	76,362,000
1878	35,740,000	2.21	78,898,000
1879	38,124,000	2.07	78,965,000
1880	40,766,000	2.21	90,231,000
1880, census, June 1	*35,192,074*		
1881	43,570,000	2.39	104,071,000
1882	45,016,000	2.37	106,596,000
1883	49,237,000	2.53	124,366,000
1884	50,627,000	2.37	119,903,000
1885	50,360,000	2.14	107,961,000
1886	48,322,000	1.91	92,444,000
1887	44,759,000	2.01	89,873,000
1888	43,545,000	2.05	89,280,000
1889	42,599,000	2.13	90,640,000
1890	44,336,000	2.27	100,660,000
1890, census, June 1	*35,935,364*		
1891	43,431,000	2.50	108,397,000

Year.	Number.	Price per head Jan. 1.	Farm value Jan. 1.
1892	44,938,000	$2.58	$116,121,000
1893	47,274,000	2.66	125,909,000
1894	45,048,000	1.98	89,186,000
1895	42,294,000	1.58	66,686,000
1896	38,299,000	1.70	65,168,000
1897	36,819,000	1.82	67,021,000
1898	37,657,000	2.46	92,721,000
1899	39,114,000	2.75	107,698,000
1900	41,883,000	2.93	122,666,000
1900, census, June 1	*61,503,713*		
1901 [1]	59,757,000	2.98	178,072,000
1902	62,039,000	2.65	164,446,000
1903	63,965,000	2.63	168,316,000
1904	51,630,000	2.59	133,530,000
1905	45,170,000	2.82	127,332,000
1906	50,632,000	3.54	179,056,000
1907	53,240,000	3.84	204,210,000
1908	54,631,000	3.88	211,736,000
1909	56,084,000	3.43	192,632,000
1910	57,216,000		
1910, census, Apr. 15	*52,447,861*	4.12	216,030,000
1911 [1]	53,633,000	3.91	209,535,000
1912	52,362,000	3.46	181,170,000
1913	51,482,000	3.94	202,779,000
1914	49,719,000	4.02	200,045,000
1915	49,956,000	4.50	224,687,000
1916	48,625,000	5.17	251,594,000
1917	47,616,000	7.13	339,529,000
1918	48,900,000	11.82	577,867,000

[1] Estimates of numbers revised based on census data.

SHEEP AND WOOL—Continued.

TABLE 173.—*Sheep: Number and value on farms Jan. 1, 1917 and 1918, by States.*

State.	Number (thousands) Jan. 1—		Average price per head Jan. 1—		Farm value (thousands of dollars) Jan. 1—	
	1918	1917	1918	1917	1918	1917
Maine	163	157	$9.40	$6.30	$1,532	$989
New Hampshire	37	35	10.60	6.70	392	234
Vermont	106	100	11.60	7.30	1,230	730
Massachusetts	28	25	10.30	6.70	288	168
Rhode Island	6	5	9.50	7.20	57	36
Connecticut	20	18	11.40	7.60	228	137
New York	840	800	13.20	8.40	11,088	6,720
New Jersey	26	29	10.90	7.20	283	209
Pennsylvania	913	830	11.70	7.10	10,682	5,893
Delaware	10	8	9.00	5.90	90	47
Maryland	234	223	9.80	6.60	2,293	1,472
Virginia	686	686	10.50	6.50	7,203	4,459
West Virginia	751	715	11.20	6.60	8,411	4,719
North Carolina	137	140	6.60	3.90	904	546
South Carolina	31	30	4.60	3.20	143	96
Georgia	144	150	4.20	2.80	605	420
Florida	120	119	3.40	2.70	408	321
Ohio	3,091	2,944	11.60	7.20	35,856	21,197
Indiana	998	950	12.80	8.20	12,774	7,790
Illinois	988	898	12.90	8.20	12,745	7,364
Michigan	1,926	1,834	12.60	7.80	24,268	14,305
Wisconsin	651	645	11.90	7.50	7,747	4,838
Minnesota	568	541	11.80	7.60	6,702	4,112
Iowa	1,224	1,200	13.80	8.80	16,891	10,560
Missouri	1,466	1,370	12.90	7.70	18,911	10,549
North Dakota	252	240	11.80	7.40	2,974	1,776
South Dakota	750	625	11.60	7.40	8,700	4,625
Nebraska	408	381	11.00	7.50	4,488	2,858
Kansas	418	348	12.00	7.60	5,016	2,645
Kentucky	1,270	1,155	11.20	7.10	14,224	8,200
Tennessee	606	600	8.60	5.80	5,212	3,480
Alabama	131	121	4.50	3.20	590	387
Mississippi	174	193	4.50	3.00	783	579
Louisiana	209	240	4.10	2.90	857	696
Texas	2,188	2,328	7.50	4.40	16,410	10,243
Oklahoma	208	104	11.30	6.30	2,350	655
Arkansas	149	124	7.10	3.90	1,058	484
Montana	3,045	3,500	12.60	7.10	38,367	24,850
Wyoming	4,100	4,100	13.60	7.60	55,760	31,160
Colorado	2,086	1,950	12.60	7.50	26,284	14,625
New Mexico	3,135	3,300	10.00	5.80	31,350	19,140
Arizona	1,550	1,632	10.40	6.30	16,120	10,282
Utah	2,340	2,089	13.60	7.90	31,824	16,503
Nevada	1,630	1,455	13.90	8.20	22,657	11,931
Idaho	3,202	3,170	13.30	8.20	42,587	25,994
Washington	661	585	11.40	7.10	7,535	4,154
Oregon	2,448	2,400	12.10	8.10	29,621	19,440
California	2,776	2,524	11.30	6.70	31,369	16,911
United States	48,900	47,616	11.82	7.13	577,867	339,529

SHEEP AND WOOL—Continued.

TABLE 174.—*Sheep: Imports, exports, and prices, 1893–1917.*

Year ending June 30—	Imports.			Exports.		
	Number.	Value.	Average import price.	Number.	Value.	Average export price.
1893	459,484	$1,682,977	$3.66	37,260	$126,394	$3.39
1894	242,568	788,181	3.25	132,370	832,763	6.29
1895	291,461	682,618	2.34	405,748	2,630,686	6.48
1896	322,692	853,530	2.65	491,565	3,076,384	6.26
1897	405,633	1,019,668	2.51	244,120	1,531,645	6.27
1898	392,314	1,106,322	2.82	199,690	1,213,886	6.08
1899	345,911	1,200,081	3.47	143,286	853,555	5.96
1900	381,792	1,365,026	3.58	125,772	733,477	5.83
1901	331,488	1,236,277	3.73	297,925	1,933,000	6.49
1902	266,953	956,710	3.58	358,720	1,940,060	5.41
1903	301,623	1,036,934	3.44	176,961	1,067,860	6.03
1904	238,094	815,289	3.42	301,313	1,954,604	6.49
1905	186,942	704,721	3.77	268,365	1,687,321	6.29
1906	240,747	1,020,359	4.24	142,690	804,090	5.64
1907	224,798	1,120,425	4.98	135,344	750,242	5.54
1908	224,765	1,082,606	4.82	101,000	589,285	5.83
1909	102,663	502,640	4.90	67,656	365,155	5.40
1910	126,152	696,879	5.52	44,517	209,000	4.69
1911	53,455	377,625	7.06	121,491	636,272	5.24
1912	23,588	157,257	6.67	157,263	626,985	3.99
1913	15,428	90,021	5.83	187,132	605,725	3.24
1914	223,719	532,404	2.38	152,600	534,543	3.50
1915	153,317	533,967	3.48	47,213	182,278	3.86
1916	235,659	917,502	3.89	52,278	231,535	4.43
1917	160,422	856,645	5.34	58,752	367,477	6.25

SHEEP AND WOOL—Continued.

TABLE 175.—*Sheep: Wholesale price per 100 pounds, 1912-1917.*

Date.	Chicago.		Cincinnati.		St. Louis.		Kansas City.		Omaha.	
	Native.		Good to extra.		Good to choice natives.		Native.[1]		Western.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.										
Jan.-June	$2.50	$7.50	$3.00	$5.50	$4.00	$7.00	$3.30	$8.00	....	....
July-Dec	2.00	5.65	2.85	4.00	3.75	5.00	3.35	7.35	....	....
1913.										
Jan.-June	2.50	7.90	3.60	7.00	4.75	7.25	2.75	7.50	$3.75	$8.15
July-Dec	2.00	6.00	3.25	4.50	4.00	5.00	2.00	7.00	2.75	6.75
1914.										
Jan.-June	2.00	7.00	4.10	6.15	5.00	6.50	2.50	7.25	5.00	7.50
July-Dec	2.00	6.50	4.00	5.35	4.50	5.75	2.25	7.50	4.80	8.00
1915.										
Jan.-June	2.50	10.65	4.10	8.75	5.25	8.50	4.50	10.00	4.00	7.00
July-Dec	2.00	8.75	4.50	8.75	5.25	6.00	4.00	8.25	4.00	4.50
1916.										
January	3.00	8.25	5.50	6.85	6.50	7.50	5.00	9.50	6.25	9.15
February	4.00	8.75	5.75	7.75	7.50	8.00	6.50	10.00	7.00	9.85
March	4.00	9.00	6.50	8.00	8.00	8.50	6.50	10.90	7.50	10.50
April	3.50	9.25	6.50	8.00	8.50	8.85	7.00	11.00	8.00	10.25
May	2.50	10.00	6.50	8.50	8.35	8.75	7.00	11.50	6.50	11.00
June	2.50	9.00	6.00	7.25	7.25	7.75	6.35	10.50	6.75	8.75
Jan.-June	2.50	10.00	5.50	8.50	6.50	8.85	5.00	11.50	6.25	11.00
July	3.00	8.50	5.50	7.00	7.25	7.25	6.75	10.00	6.50	8.25
August	2.50	8.25	5.00	7.00	7.25	7.25	6.50	10.35	6.25	8.25
September	3.00	8.50	5.00	6.75	7.00	7.25	6.00	8.75	6.25	8.50
October	3.00	8.50	5.50	6.75	7.00	7.25	6.00	8.75	6.50	8.50
November	3.25	9.00	5.50	7.00	5.50	9.00	6.00	9.75	6.25	10.00
December	3.50	10.25	6.00	8.50	6.75	9.25	7.25	11.75	6.75	11.75
July-Dec	2.50	10.25	5.00	8.50	5.50	9.25	6.00	11.75	6.25	11.75
1917.										
January	7.00	13.50	7.50	8.40	9.00	10.25	7.75	12.50	7.50	13.00
February	9.00	13.85	8.00	9.00	10.50	11.25	7.75	13.50	8.75	13.50
March	8.50	14.35	9.00	11.00	11.50	12.00	10.00	12.60	10.00	13.75
April	8.50	15.50	10.00	11.75	12.00	12.00	10.00	15.00	10.00	14.50
May	11.75	19.00	8.50	12.00	13.50	14.00	12.00	18.00	11.50	16.00
June	8.00	17.50	7.50	9.50	9.75	13.50	9.00	12.50	16.00	13.75
Jan.-June	7.00	19.00	7.50	12.00	9.00	14.00	7.75	18.00	7.50	16.00
July	7.75	14.00	6.50	8.25	8.50	9.25	8.00	11.25	8.00	13.75
August	7.75	13.50	7.50	9.00	8.50	9.50	8.00	15.00	9.00	12.50
September	8.90	14.25	9.50	10.00	10.00	11.00	9.00	15.50	10.50	13.85
October	9.00	14.35	9.50	10.50	11.00	11.50	9.50	14.75	9.50	13.75
November	9.00	14.65	9.50	10.00	11.00	12.00	10.00	14.10	10.50	14.25
December	9.00	14.50	9.50	10.50	11.00	11.50	10.50	14.75	10.50	14.25
July-Dec	7.75	14.65	6.50	10.50	8.50	12.00	8.00	15.5	80.00	14.25

[1] Not including lambs for 1912 and 1917.

SHEEP AND WOOL—Continued.

TABLE 176.—*Wool: Product by States, 1916 and 1917.*

[Estimate of U. S. Department of Agriculture.]

State.	Fleeces (000 omitted).		Weight per fleece.		Wool production (000 omitted.)		Price per pound.			
							1917		1916	
	1917	1916	1917	1916	1917	1916	Apr. 15.	Oct. 15.	Apr. 15.	Oct. 15.
	Number	*Number*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Maine	126	131	6.6	6.5	833	850	42	66	33	37
New Hampshire	27	28	6.7	6.6	183	185	47	64	28	....
Vermont	82	77	7.3	7.5	597	580	45	65	31	36
Massachusetts	18	18	6.5	7.0	119	125	....	....	....	....
Rhode Island	4	5	6.2	5.0	24	25	....	....	29	....
Connecticut	14	14	5.5	5.5	75	75	....	....	....	....
New York	517	530	6.8	6.7	3,514	3,550	45	65	32	35
New Jersey	15	16	5.2	5.0	80	80	....	....	....	....
Pennsylvania	650	650	6.5	6.5	4,225	4,225	42	62	28	33
Delaware	5	5	5.8	5.8	31	30	28	....	....	....
Maryland	126	129	6.0	5.8	758	750	40	65	29	36
West Virginia	539	530	5.0	5.0	2,695	2,750	37	68	30	35
Kentucky	619	625	4.8	5.0	2,969	3,125	37	59	31	33
Ohio	1,881	1,950	7.4	7.0	13,923	13,650	46	67	31	34
Michigan	1,107	1,134	7.4	7.3	8,192	8,275	47	65	31	34
Indiana	619	650	7.0	6.8	4,332	4,420	42	61	30	34
Illinois	488	514	7.9	7.5	3,855	3,855	37	58	27	32
Wisconsin	334	330	7.9	7.6	2,636	2,510	41	62	28	32
Minnesota	380	385	7.8	7.0	2,964	2,695	37	50	27	28
Iowa	633	641	7.7	7.6	4,875	4,875	39	56	28	30
Missouri	687	680	7.0	6.8	4,810	4,625	37	60	28	31
Total	8,871	9,042	6.95	6.77	61,690	61,255	42.1	62.4	29.7	33.0
Virginia	405	380	4.6	5.0	1,862	1,900	42	65	29	35
North Carolina	146	133	3.8	4.3	553	570	36	55	26	29
South Carolina	24	25	4.0	3.8	95	95	29	46	22	28
Georgia	157	165	2.9	3.0	455	495	28	49	25	27
Florida	127	111	2.8	3.1	355	345	....	62	....	27
Alabama	106	100	3.3	3.5	350	350	26	38	21	24
Mississippi	149	135	3.3	4.0	491	540	27	37	21	24
Louisiana	156	159	3.6	3.7	560	590	27	36	16	18
Arkansas	78	80	4.5	4.4	350	350	28	43	22	21
Tennessee	423	425	4.2	4.4	1,776	1,870	35	50	26	28
Total	1,771	1,713	3.87	4.15	6,847	7,105	34.4	51.9	25.0	28.2
Kansas	191	185	7.6	7.2	1,450	1,330	....	....	22	....
Nebraska	256	229	7.5	8.0	1,922	1,830	43	....	27	28
South Dakota	512	475	7.3	7.5	3,738	3,560	38	54	23	29
North Dakota	192	180	7.4	7.5	1,418	1,350	33	50	24	29
Montana	3,071	3,150	7.6	7.8	23,342	24,570	42	50	30	29
Wyoming	3,705	3,647	8.2	8.5	30,380	31,000	41	55	23	28
Idaho	1,974	2,055	7.6	7.3	15,000	15,000	41	60	27	28
Washington	594	594	8.4	8.0	4,988	4,750	38	56	24	27
Oregon	1,610	1,630	8.2	8.1	13,200	13,200	40	54	27	....
California	1,740	1,812	7.0	6.4	12,180	11,600	38	53	22	20
Nevada	1,397	1,333	7.3	7.5	10,200	10,000	37	50	22	....
Utah	2,053	2,083	7.6	7.2	15,600	15,000	36	47	26	24
Colorado	1,378	1,400	6.4	6.0	8,820	8,400	38	....	26	26
Arizona	897	915	6.5	6.5	5,831	5,950	37	....	25	....
New Mexico	3,176	3,200	5.8	5.7	18,422	18,240	33	49	22	24
Texas	1,435	1,464	7.0	7.0	10,045	10,250	27	47	21	25
Oklahoma	77	75	6.5	6.7	500	500	36	44	22	25
Total	24,258	24,427	7.30	7.23	177,036	176,530	38.0	52.1	24.8	26.3
United States	34,900	35,182	7.04	6.96	245,573	244,890	39.0	54.9	26.0	28.3
Pulled wool	....	....	....	....	40,000	43,600	....	....	....	....
Total product	....	....	....	....	285,573	288,490	....	....	....	....

SHEEP AND WOOL—Continued.

TABLE 177.—*Wool: Wholesale price per pound in Boston, 1912–1917.*

Date.	Ohio fine, unwashed.		Kentucky, quarter blood, unwashed.[1]		Ohio XX, washed.		Ohio half blood combing, washed.		Ohio Delaine, washed.		Michigan fine, unwashed.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January-June	21	23	22½	29	28	30	26	30	30	35	19	22
July-December	22	25	27½	33	30	33	28½	31	33	35	21	23
1913.												
January-June	20	24	24	32	27	32	23	29	27	34	19	23
July-December	20	21	23½	26	25	30	23	25	26	28	19	20
1914.												
January-June	20	25	23½	27	25½	29	23	28	26	32	19	23
July-December	23	25	26	29	27	31½	27	30	28	32	22	23
1915.												
January-June	23	29	29	39	29	34	29	38	30	37	22	26
July-December	25	27½	36	39½	32	32½	32½	36	33½	36	23	27½
1916.												
January	26	29	38	39	32½	33	32	35	35½	36	25	26½
February	28	30	39	40	33	33	34	36	36	36	26	27
March	29	31	39	40	33	33	36	37	36	40	26	28
April	30	31	39	40	34	35	36	37	37	40	27	28
May	30	31	39	40	34	35	36	37	37	38	27	28
June	30	31	39	41	34	35	36	38	37	38	27	28
January-June	26	31	38	41	32½	35	32	38	35½	40	25	28
July	30	31	41	44	35	36	37	39	38	40	27	28
August	30	31	44	44	35	37	39	39	39	40	27	28
September	30	31	43	44	36	37	39	40	39	41	27	28
October	31	34	43	44	36	36	39½	42	40	42	29	31
November	34	35	44	46	37	40	42	44	40	45	31	33
December	35	38	45	50	40	47	43	46	45	52	32	37
July-December	30	38	41	50	35	47	37	46	38	52	27	37
1917.												
January	38	40	50	52	46	50	45	48	52	53	37	39
February	42	44	51	56	50	55	47	54	54	60	39	42
March	44	46	57	58	53	55	53	53	58	60	41	44
April	45	48	58	60	53	57	53	58½	54	62	43	45
May	48	51	60	65	56	58	57	63	62	66	45	48
June	53	58	65	76	60	68	62	71	67	82	49	57
January-June	38	58	50	76	46	68	45	71	52	82	37	57
July	57	58	75	76	67	70	71	72	80	82	56	57
August	57	64	75	77	68	77	71	76	80	83	56	62
September	62	66	76	77	75	77	76	77	82	83	60	62
October	65	66	76	77	75	80	76	77	82	85	60	62
November	65	67	76	77	76	77	76	78	82	85	60	62
December	65	67	76	77	76	77	75	78	82	85	61	64
July-December	57	67	75	77	67	80	71	78	80	85	56	64

[1] Indiana quarter blood unwashed, 1912 and 1913.

SHEEP AND WOOL—Continued.

TABLE 177.—*Wool: Wholesale price per pound in Boston, 1912-1917*—Continued.

Date.	Fine Territory, staple scoured.		Fine medium Territory, clothing scoured.		Texas, 12 months, scoured.		Fine fall, Texas scoured.		Pulled, A super, scoured.		Pulled, B super, scoured.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January-June	60	65	48	55	52	56	42	45	45	53	41	54
July-December	63	67	53	59	54	63	43	48	52	58	48	54
1913.												
January-June	55	67	49	59	52	65	45	50	48	58	43	54
July-December	51	56	46	50	50	53	41	46	42	52	36	45
1914.												
January-June	51	63	46	55	50	62	41	50	43	53	36	43
July-December	60	65	55	57	55	62	42	50	50	55	40	56
1915.												
January-June	62	75	55	68	56	75	42	60	56	68	57	74
July-December	70	75	63	68	65	70	54	57	60	66	55	65
1916.												
January	73	77	65	69	67	70	53	55	63	66	59	65
February	77	80	70	71	68	75	53	55	65	68	60	65
March	80	80	70	71	72	75	54	55	65	68	60	65
April	80	80	70	71	72	75	54	55	65	68	60	65
May	80	82	72	75	72	75	54	55	65	68	60	65
June	82	85	73	75	72	77	54	55	65	68	60	66
January-June	73	85	65	75	67	77	53	55	63	68	59	66
July	82	88	75	77	77	83	55	58	65	72	60	68
August	82	88	75	77	80	83	57	58	66	72	63	68
September	85	92	75	78	80	85	57	58	66	72	63	68
October	88	95	75	80	80	85	57	58	66	72	63	71
November	95	105	77	87	85	90	63	65	66	73	60	73
December	100	112	85	87	87	100	63	78	72	85	70	80
July-December	82	112	75	87	77	100	55	78	65	85	60	80
1917.												
January	110	120	85	95	100	105	75	78	83	85	75	80
February	120	125	92	105	105	120	75	82	83	100	75	90
March	125	135	100	110	120	125	82	84	100	105	90	95
April	130	140	110	115	120	130	82	95	107	130	98	125
May	135	150	110	120	130	145	90	105	140	150	120	135
June	145	175	120	135	145	175	100	120	145	150	130	140
January-June	110	175	85	135	100	175	75	120	83	150	75	140
July	172	177	135	150	165	175	115	120	145	150	130	140
August	175	180	140	155	165	170	115	120	145	150	130	140
September	180	182	155	160	165	170	140	145	160	165	140	143
October	180	182	155	160	168	172	140	145	160	165	145	150
November	180	185	155	160	168	172	140	145	160	165	145	150
December	180	185	155	160	168	172	145	150	160	165	150	150
July-December	172	185	135	160	165	175	115	150	145	165	130	150

SHEEP AND WOOL—Continued.

TABLE 178.—*Wool: Wholesale price per pound, 1912–1917.*

Date.	Boston. Ohio XX, washed. Low.	Boston. Ohio XX, washed. High.	Philadelphia. Ohio XX, washed.[1] Low.	Philadelphia. Ohio XX, washed.[1] High.	St. Louis. Best tub, washed. Low.	St. Louis. Best tub, washed. High.
1912.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
January-June	28	30	25	30	27	35
July-December	30	33	28	31	35	38
1913.						
January-June	27	32	24	31	28	37
July-December	25	30	22	25	28	35
1914.						
January-June	25½	29	22	28	28	33
July-December	27	31½	25	29	31	33
1915.						
January-June	29	34	29	34	31	41
July-December	32	32½	28	33½	40	44
1916.						
January	32½	33	32½	33½	42	44
February	33	33	32½	33	42	44
March	33	33	32½	33	43	44
April	34	35	32½	35	43	44
May	34	35	34	37	43	47
June	34	35	34	35	46	48
January-June	32½	35	32½	37	42	48
July	35	36	34	36	47	48
August	35	37	35	39	47	48
September	36	37	35	37	47	48
October	36	36	35	36	47	49
November	34	35	35	40	48	49
December	40	47	39	44	48	49
July-December	34	47	34	44	47	49
1917.						
January	46	50	46	47	48	49
February	50	55	48	55	48	49
March	53	55	53	55	48	54
April	53	57	53	56	52	57
May	56	58	56	57	55	72
June	60	68	58	68	72	75
January-June	46	68	46	68	48	75
July	67	70	65	70	75	80
August	68	77	68	77	80	80
September	75	77	75	77	80	83
October	75	80	75	80	83	85
November	76	77	75	80	83	85
December	76	77	75	77	83	85
July-December	67	80	65	80	75	85

[1] One-fourth to three-eighths unwashed, 1912–1914.

SHEEP AND WOOL—Continued.

TABLE 179.—*Wool: International trade, calendar years 1909–1916.*

["Wool" in this table includes: Washed, unwashed, scoured, and pulled wool; slipe, sheep's wool on skins (total weight of wool and skins taken); and all other animal fibers included in United States classification of wool. The following items have been considered as not within this classification: Corded, combed, and dyed wool; flocks, goatskins with hair on, mill waste, noils, and tops. See "General note," Table 152.]

EXPORTS.

[000 omitted.]

County.	Average, 1909–1913.	1915 (prelim.)	1916 (prelim.)	County.	Average, 1909–1913.	1915 (prelim.)	1916 (prelim.)
From—	*Pounds.*	*Pounds.*	*Pounds.*	*From—*	*Pounds.*	*Pounds.*	*Pounds.*
Algeria	19,871	24,828	....	New Zealand	194,801	200,102	....
Argentina	328,204	259,415	259,387	Persia	10,023	6,157	7,403
Australia	676,679	408,631	....	Peru	9,333	13,007	....
Belgium	196,440	....	....	Russia	32,406	....	....
British India	56,496	59,694	....	Spain	28,505	12,220	11,669
British South Africa	164,644	186,331	153,772	United Kingdom	42,027	32,151	13,403
Chile	28,223	31,315	....	Uruguay	139,178	83,563	....
China	42,684	55,868	44,980	Other countries	67,233	18,695	....
France	84,973	11,755	22,157				
Germany	42,817	....	....	Total	2,190,899	1,403,829	....
Netherlands	26,362	97	154				

IMPORTS.

Into—				*Into—*			
Austria-Hungary	63,942	....	....	Russia	106,184	46,109	19,609
Belgium	300,367	....	....	Sweden	7,267	....	....
British India	23,721	39,286	....	Switzerland	11,211	17,414	29,121
Canada	7,794	16,611	19,918	United Kingdom	550,931	889,133	634,640
France	601,628	144,631	172,314	United States	203,298	412,721	449,190
Germany	481,988	....	....	Other countries	58,275	156,186	....
Japan	10 223	52,771	40,758				
Netherlands	31,991	15,715	12,698	Total	2,458,820	1,790,577	....

SWINE.

TABLE 180.—*Swine: Number and value on farms in the United States, 1867–1918.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of members are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available. It should also be observed that the census of 1910, giving numbers as of Apr. 15, is not strictly comparable with former censuses, which related to numbers June 1.

Jan. 1—	Number.	Price per head Jan. 1.	Farm value Jan. 1.	Jan. 1—	Number.	Price per head Jan. 1.	Farm value Jan. 1.
1867	24,691,000	$4.03	$99,637,000	1892	52,398,000	$4.60	$241,031,000
1868	24,317,000	3.29	79,976,000	1893	46,095,000	6.41	295,426,000
1869	23,316,000	4.65	108,431,000	1894	45,206,000	5.98	270,385,000
1870	26,751,000	5.80	155,108,000	1895	44,166,000	4.97	219,501,000
1870, census, June 1	*25,134,569*	...	...	1896	42,843,000	4.35	186,530,000
1871	29,458,000	5.61	165,312,000	1897	40,600,000	4.10	166,273,000
1872	31,796,000	4.01	127,453,000	1898	39,760,000	4.39	174,351,000
1873	32,632,000	3.67	119,632,000	1899	38,652,000	4.40	170,110,000
1874	30,861,000	3.98	122,695,000	1900	37,079,000	5.00	185,472,000
1875	28,062,000	4.80	134,581,000	*1900, census, June 1*	*62,868,041*	...	...
1876	25,727,000	6.00	154,251,000	1901 [1]	56,982,000	6.20	353,012,000
1877	28,077,000	5.66	158,873,000	1902	48,699,000	7.03	342,121,000
1878	32,262,000	4.85	156,577,000	1903	46,923,000	7.78	364,974,000
1879	34,766,000	3.18	110,508,000	1904	47,009,000	6.15	289,225,000
1880	34,034,000	4.28	145,782,000	1905	47,321,000	5.99	283,255,000
1880, census, June 1	*47,681,700*	...	...	1906	52,103,000	6.18	321,803,000
1881	36,248,000	4.70	170,535,000	1907	54,794,000	7.62	417,791,000
1882	44,122,000	5.97	263,543,000	1908	56,084,000	6.05	339,030,000
1883	43,270,000	6.75	291,951,000	1909	54,147,000	6.55	354,791,000
1884	44,201,000	5.57	246,301,000	1910	47,782,000	...	...
1885	45,143,000	5.02	226,402,000	*1910, census, Apr. 15*	*58,185,676*	9.17	533,309,000
1886	46,092,000	4.26	196,570,000	1911 [1]	65,620,000	9.37	615,170,000
1887	44,613,000	4.48	200,043,000	1912	65,410,000	8.00	523,328,000
1888	44,347,000	4.98	220,811,000	1913	61,178,000	9.86	603,109,000
1889	50,302,000	5.79	291,307,000	1914	58,933,000	10.40	612,951,000
1890	51,603,000	4.72	243,418,000	1915	64,618,000	9.87	637,479,000
1890, census, June 1	*57,409,583*	...	...	1916	67,766,000	8.40	569,573,000
1891	50,625,000	4.15	210,194,000	1917	67,503,000	11.75	792,898,000
				1918	71,374,000	19.51	1,392,276,000

[1] Estimates of numbers revised, based on census data.

SWINE—Continued.

TABLE 181.—*Swine: Number and value on farms Jan. 1, 1917 and 1918, by States.*

State.	Number (thousands) Jan. 1—		Average price per head Jan. 1—		Farm value (thousands of dollars). Jan. 1—	
	1918	1917	1918	1917	1918	1917
Maine	100	100	$23.00	$16.60	$2,300	$1,660
New Hampshire	56	53	25.00	15.60	1,400	827
Vermont	120	113	22.20	13.00	2,664	1,469
Massachusetts	113	112	23.00	15.00	2,599	1,680
Rhode Island	16	14	25.00	14.50	400	203
Connecticut	64	58	26.00	17.50	1,664	1,015
New York	842	759	23.60	14.70	19,871	11,157
New Jersey	174	163	26.20	17.00	4,559	2,771
Pennsylvania	1,291	1,174	22.30	13.90	28,789	16,319
Delaware	64	58	17.00	11.60	1,088	673
Maryland	388	359	16.00	11.50	6,208	4,128
Virginia	1,105	1,023	13.90	9.20	15,360	9,412
West Virginia	422	380	16.00	10.00	6,752	3,800
North Carolina	1,464	1,450	17.10	9.70	25,034	14,065
South Carolina	966	920	15.50	9.50	14,973	8,740
Georgia	2,766	2,585	14.50	9.00	40,107	23,265
Florida	1,375	1,100	10.60	6.50	14,575	7,150
Ohio	3,774	3,527	20.50	12.20	77,367	43,029
Indiana	4,168	3,970	20.20	11.50	84,194	45,655
Illinois	5,111	4,444	22.00	13.70	112,442	60,883
Michigan	1,372	1,345	19.80	12.40	27,166	16,678
Wisconsin	2,019	2,060	22.30	14.30	45,024	29,458
Minnesota	2,241	2,075	23.50	14.50	52,664	30,088
Iowa	10,307	9,370	24.20	14.70	249,429	137,739
Missouri	4,708	4,280	18.50	10.00	87,098	42,800
North Dakota	507	650	20.80	13.00	10,546	8,450
South Dakota	1,504	1,432	23.50	15.50	35,344	22,196
Nebraska	4,200	4,200	24.40	14.00	102,480	58,800
Kansas	2,560	2,535	21.00	12.30	53,760	31,180
Kentucky	1,716	1,589	14.50	8.90	24,882	14,142
Tennessee	1,634	1,485	15.00	8.40	24,510	12,474
Alabama	2,128	1,850	14.50	8.50	30,856	15,725
Mississippi	1,902	1,698	15.00	7.50	28,530	12,735
Louisiana	1,568	1,584	13.60	9.20	21,325	14,573
Texas	3,068	3,229	14.10	9.50	43,259	30,676
Oklahoma	1,219	1,325	17.00	10.20	20,723	13,515
Arkansas	1,643	1,550	13.50	8.20	22,180	12,710
Montana	215	269	20.50	12.00	4,408	3,228
Wyoming	54	60	20.50	11.20	1,107	672
Colorado	356	352	20.00	12.00	7,120	4,224
New Mexico	86	101	15.70	10.50	1,350	1,060
Arizona	64	80	18.00	13.00	1,152	1,040
Utah	102	101	20.00	10.50	2,040	1,060
Nevada	37	37	19.00	11.00	703	407
Idaho	219	292	19.00	10.40	4,161	3,037
Washington	283	283	20.00	11.10	5,660	3,141
Oregon	309	315	17.50	10.00	5,408	3,150
California	974	994	17.50	10.10	17,045	10,039
United States	71,374	67,503	19.51	11.75	1,392,276	792,898

SWINE—Continued.

TABLE 182.—*Hogs (live): Wholesale price per 100 pounds, 1912–1917.*

Date.	Cincinnati. Packing, fair to good.		St. Louis. Mixed packers.		Chicago. Mixed and packers.		Kansas City.		Omaha	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1912.										
Jan.-June	$6.10	$8.25	$5.75	$8.05	$5.55.	$8.17½	$5.65	$8.05	....	....
July-Dec	7.10	9.35	7.15	9.25	6.80	9.40	6.90	9.05	....	....
1913.										
Jan.-June	7.35	10.00	7.20	9.50	6.85	9.70	6.95	9.25	$7.02	$9.05
July-Dec	7.40	9.60	7.25	9.50	7.00	9.65	7.20	9.25	7.34	9.15
1914.										
Jan.-June	8.00	9.15	7.65	9.00	7.60	9.00	7.55	8.80	7.50	8.72
July-Dec	6.40	9.90	6.80	10.00	6.00	10.20	6.65	9.75	6.50	9.35
1915.										
Jan.-June	6.50	8.00	6.55	7.97½	6.15	7.95	6.35	7.90	6.00	7.95
July-Dec	6.25	8.40	6.15	8.75	5.80	8.95	6.00	8.65	4.00	8.95
1916.										
January	6.75	8.10	6.00	8.25	6.50	8.10	6.25	8.00	6.00	7.80
February	8.00	8.95	7.50	8.92½	7.50	8.90	7.40	8.50	7.20	8.55
March	8.70	10.20	7.90	10.10	8.65	10.10	8.40	9.80	8.00	9.65
April	9.45	9.95	9.15	10.00	9.10	10.10	9.05	9.90	8.90	9.85
May	9.15	10.15	9.00	10.25	9.30	10.30	9.15	10.05	9.00	9.90
June	9.00	9.80	9.00	10.10	8.70	10.15	8.90	10.00	8.80	9.80
Jan.-June	6.75	10.20	6.00	10.25	6.50	10.30	6.25	10.05	6.00	9.90
July	9.55	9.95	9.35	10.25	9.00	10.25	9.10	10.10	9.00	10.00
August	9.85	11.30	9.25	11.50	8.85	11.55	9.30	11.00	8.50	10.85
September	10.15	11.50	9.50	11.50	9.25	11.60	7.75	10.50	9.25	11.10
October	9.00	10.35	8,90	10.50	8.50	10.55	8.75	10.40	8.50	10.15
November	9.25	10.05	9.35	10.95	8.75	10.25	9.00	10.15	9.00	10.15
December	9.50	10.75	9.35	10.80	8.90	10.80	9.35	10.60	9.00	10.35
June-Dec	9.00	11.50	8.90	11.50	8.50	11.60	7.75	11.00	8.50	11.10
1917.										
January	10.60	11.35	9.90	12.00	9.75	12.00	9.80	11.80	9.40	11.65
February	11.85	12.75	11.75	13.70	11.25	13.55	11.40	13.25	11.00	13.30
March	13.20	15.25	10.30	15.50	12.85	15.50	12.75	15.15	12.85	15.05
April	15.25	16.10	14.65	16.40	14.65	16.45	14.50	16.30	14.45	16.20
May	15.35	16.25	15.25	16.55	15.00	16.60	14.50	16.45	14.40	16.00
June	15.30	15.75	15.20	16.05	14.15	16.15	14.50	15.95	14.40	15.75
Jan.-June	10.60	16.25	9.90	16.55	9.75	16.60	9.80	16.45	9.40	16.20
July	15.40	15.65	15.00	16.12½	14.00	16.30	14.50	16.60	14.00	15.65
August	16.00	19.00	15.50	19.80	14.50	20.00	14.50	19.35	14.60	19.60
September	18.00	18.75	16.00	19.35	16.50	19.70	17.00	19.50	16.25	19.45
October	15.40	19.15	15.50	19.75	14.25	19.65	15.00	19.65	15.30	19.50
November	15.50	17.25	16.25	18.00	15.75	18.10	14.75	17.85	16.20	17.90
December	16.25	17.40	15.85	17.80	15.40	17.75	15.00	17.70	15.75	17.45
July-Dec	15.40	19.15	15.00	19.80	14.00	20.00	14.50	19.65	14.00	19.69

THE FEDERAL MEAT INSPECTION.

Some of the principal facts connected with the Federal meat inspection as administered by the Bureau of Animal Industry are shown in the following tables. The figures cover the annual totals for the fiscal years 1907 to 1917, inclusive, the former being the first year of operations under the meat-inspection law now in force. The data given comprise the number of establishments at which inspection is conducted; the number of animals of each species inspected at slaughter; the number of each species condemned, both wholly and in part, and the percentage condemned of each species and of all animals; the quantity of meat products prepared or processed under Federal supervision, and the quantity and percentage of the latter condemned.

Further details of the Federal meat inspection are published each year in the Annual Report of the Chief of the Bureau of Animal Industry.

TABLE 183.—*Number of establishments and total number of animals inspected at slaughter under Federal inspection annually, 1907 to 1917.*

Fiscal year.	Establishments	Cattle.	Calves.	Swine.	Sheep.	Goats.	All animals.
1907	708	7,621,717	1,763,574	31,815,900	9,681,876	52,149	50,935,216
1908	787	7,116,275	1,995,487	35,113,077	9,702,545	45,953	53,973,337
1909	876	7,325,337	2,046,711	35,427,931	10,802,903	69,193	55,672,075
1910	919	7,962,189	2,295,099	27,656,021	11,149,937	115,811	49,179,057
1911	936	7,781,030	2,219,908	29,916,363	13,005,502	54,145	52,976,948
1912	940	7,532,005	2,242,929	34,966,378	14,208,721	63,983	59,014,019
1913	910	7,155,816	2,098,484	32,287,538	14,724,465	56,556	56,322,859
1914	893	6,724,117	1,814,904	33,289,705	14,958,834	121,827	56,909,387
1915	896	6,964,402	1,735,902	36,247,958	12,909,089	165,533	58,022,884
1916	875	7,404,288	2,048,022	40,482,799	11,985,926	180,356	62,101,391
1917	883	9,299,489	2,679,745	40,210,847	11,343,418	174,649	63,708,148

TABLE 184.—*Condemnations of animals at slaughter, 1907–1917.*

Fiscal year.	Cattle.			Calves.			Swine.		
	Whole.	Part.	Per cent.[1]	Whole.	Part.	Per cent.[1]	Whole.	Part.	Per cent.[1]
1907	27,933	93,174	1.58	6,414	245	0.38	105,879	436,161	1.70
1908	33,216	67,482	1.41	5,854	396	.31	127,933	636,589	2.18
1909	35,103	99,739	1.84	8,213	409	.42	86,912	799,300	2.50
1910	42,426	122,167	2.07	7,524	500	.35	52,439	726,829	2.82
1911	39,402	123,969	2.10	7,654	781	.38	59,477	877,528	3.13
1912	50,363	134,783	2.46	8,927	1,212	.45	129,002	323,992	1.30
1913	50,775	130,139	2.53	9,216	1,377	.50	173,937	373,993	1.70
1914	48,356	138,085	2.77	6,696	1,234	.44	204,942	422,275	1.88
1915	52,496	178,409	3.32	5,941	1,750	.44	213,905	464,217	1.87
1916	57,579	188,915	3.33	6,681	1,988	.42	195,107	546,290	1.83
1917	78,706	249,637	3.53	10,112	2,927	.49	158,480	528,288	1.71

Fiscal year.	Sheep.			Goats.			All animals.		
	Whole.	Part.	Per cent.[1]	Whole.	Part.	Per cent.[1]	Whole.	Part.	Per cent.[1]
1907	9,524	296	0.10	42	....	0.08	149,792	529,876	1.33
1908	8,090	198	.09	33	1	.07	175,126	704,666	1.63
1909	10,747	179	.10	82	1	.12	141,057	899,628	1.87
1910	11,127	24,714	.32	226	1	.19	113,742	874,211	2.01
1911	10,789	7,394	.14	61	....	.11	117,383	1,009,672	2.13
1912	15,402	3,871	.13	84	1	.13	203,778	463,859	1.13
1913	16,657	939	.12	76	1	.14	250,661	506,449	1.34
1914	20,563	1,564	.15	746	8	.62	281,303	563,166	1.48
1915	17,611	298	.14	653	14	.40	290,606	644,688	1.61
1916	15,057	1,007	.13	663	161	.46	275,087	738,361	1.63
1917	16,749	437	.15	1,349	42	.80	265,396	781,331	1.64

[1] Includes both whole and parts. It should be understood that the parts here recorded are primal parts; a much larger number of less important parts, especially in swine, are condemned in addition.

TABLE 185.—*Quantity of meat and meat food products prepared, and quantity and percentage condemned, under Federal supervision annually, 1907 to 1917.*

Fiscal year.	Prepared or processed.	Condemned.	Percentage condemned.	Fiscal year.	Prepared or processed.	Condemned.	Percentage condemned.
	Pounds.	*Pounds.*			*Pounds.*	*Pounds.*	
1907	4,464,213,208	14,874,587	0.33	1913	7,094,809,809	18,851,930	.27
1908	5,958,298,364	43,344,206	.73	1914	7,033,295,975	19,135,469	.27
1909	6,791,437,032	24,679,754	.36	1915	7,533,070,002	18,780,122	.25
1910	6,223,964,593	19,031,808	.31	1916	7,474,242,192	17,897,367	.24
1911	6,931,233,214	21,073,577	.31	1917	7,663,633,957	19,857,270	.26
1912	7,279,558,956	18,096,587	.25				

The principal items in Table 185, in the order of magnitude, are: Cured pork, lard, lard substitute, sausage, and oleo products. The list includes a large number of less important items.

It should be understood that the above products are entirely separate and additional to the carcass inspection at time of slaughter. They are, in fact, reinspections of such portions of the carcass as have subsequently undergone some process of manufacture.

TABLE 186.—*Quantity of meat and meat food products imported, and quantity and percentage condemned or refused entry, 1914 to 1917.*

Fiscal year.	Total imported.	Condemned.	Refused entry.	Percentage condemned or refused entry.
	Pounds.	*Pounds.*	*Pounds.*	*Per cent.*
1914 (9 months)	197,389,348	551,859	....	0.28
1915	245,023,437	2,020,291	70,454	.85
1916	110,514,476	298,276	113,907	.37
1917	29,138,996	382,160	14,611	1.36

MISCELLANEOUS DATA.

TABLE 187.—*Estimated value of farm products, 1879–1917.*

[Based on prices at the farm.]

Year.	Total, gross.	Crops.		Animals and animal products.	
		Value.	Percentage of total.	Value.	Percentage of total.
1879 (census)	*$2,212,540,927*	....	....	....	....
1889 (census)	*2,460,107,454*	....	....	....	....
1897	3,960,821,685	$2,519,082,592	63.6	$1,441,739,093	36.4
1898	4,338,945,829	2,759,569,547	63.6	1,579,376,282	36.4
1899 (census)	*4,717,069,973*	*2,998,704,412*	*63.6*	*1,718,365,561*	*36.4*
1900	5,009,595,006	3,191,941,763	63.7	1,817,653,243	36.3
1901	5,302,120,039	3,385,179,114	63.8	1,916,940,925	36.2
1902	5,594,645,072	3,578,416,465	64.0	2,016,228,607	36.0
1903	5,887,170,104	3,771,653,816	64.1	2,115,516,288	35.9
1904	6,121,778,001	3,981,675,866	65.0	2,140,102,135	35.0
1905	6,273,997,362	4,012,652,758	64.0	2,261,344,604	36.0
1906	6,764,210,423	4,263,134,353	63.0	2,501,076,070	37.0
1907	7,487,988,622	4,761,111,839	63.6	2,726,876,783	36.4
1908	7,890,625,522	5,098,292,549	64.6	2,792,332,973	35.4
1909 (census)	*8,558,161,223*	*5,487,161,223*	*64.1*	*3,071,000,000*	*35.9*
1910	9,037,390,744	5,486,373,550	60.7	3,551,017,194	39.3
1911	8,819,174,959	5,562,058,150	63.1	3,257,116,809	36.9
1912	9,342,790,149	5,842,220,449	62.5	3,500,569,700	37.5
1913	9,849,512,511	6,132,758,962	62.3	3,716,753,549	37.7
1914	9,894,960,531	6,111,684,020	61.8	3,783,276,511	38.2
1915	10,775,490,412	6,907,186,742	64.1	3,868,303,670	35.9
1916	13,406,364,011	9,054,458,922	67.5	4,351,905,089	32.5
1917 (preliminary)	19,443,849,381	13,610,462,782	70.0	5,833,386,599	30.0

TABLE 188.—*Tonnage carried on railways in the United States, 1914–1916.*[1]

Product.	Year ending June 30—		
	1914	1915	1916
FARM PRODUCTS.			
Animal matter:	*Short tons.*	*Short tons.*	*Short tons.*
Animals, live	14,811,000	15,021,432	16,963,922
Packing-house products—			
Dressed meats	2,283,000	2,503,317	2,656,235
Hides (including leather)	1,081,000	1,149,930	1,400,858
Other packing-house products	2,375,000	2,540,376	2,774,708
Total packing-house products	5,739,000	6,193,623	6,831,801
Poultry (including game and fish)	915,000	861,670	1,016,484
Wool	409,000	370,426	503,248
Other animal matter	5,264,000	4,212,584	4,629,143
Total animal matter	27,138,000	26,659,735	29,944,598
Vegetable matter:			
Cotton	4,141,000	5,012,705	4,052,241
Fruit and vegetables	16,795,000	17,898,288	18,192,063
Grain and grain products—			
Grain	46,015,000	53,446,686	57,686,165
Grain products—			
Flour	9,697,000	9,596,763	10,472,225
Other grain products	7,824,000	8,036,745	7,992,496
Total grain and grain products	63,536,000	71,080,194	76,150,886
Hay	7,319,000	7,649,093	7,312,879
Sugar	3,926,000	3,727,194	3,917,381
Tobacco	1,071,000	1,051,648	1,085,843
Other vegetable matter	9,338,000	10,347,913	8,988,002
Total vegetable matter	106,126,000	116,767,035	119,699,295
Total farm products	133,264,000	143,426,770	149,643,893
OTHER FREIGHT.			
Products of mines	626,076,000	556,581,950	706,029,210
Products of forests	110,878,000	93,971,282	106,856,873
Manufactures	145,257,000	132,410,447	182,916,449
All other (including all freight in less than carload lots)	78,649,000	76,013,494	92,776,482
Total tonnage	1,094,124,000	1,002,403,943	1,238,222,907

[1] Compiled from reports of the Interstate Commerce Commission. Original shipments only, excluding reight received by each railway from connecting railways and other carriers. Figures exclude the relatively small tonnage originating on railroads of Class III (roads having operating revenues of less than $100,000 a year).

TABLE 189.—*Rural and agricultural population in various countries.*

Country.	Rural population.			Population dependent upon agriculture.		
	Year.	Number.	Per cent of total population.	Year.	Number.	Per cent of total population.
United States	1910	49,348,883	53.7			
Austro-Hungary:						
Austria				1900	13,447,362	51.4
Hungary				1900	13,061,118	67.8
Total Austro-Hungary				1900	26,508,480	58.4
Belgium	1910	1,654,277	22.3			
British India				1901	191,691,731	65.1
Bulgaria				1905	3,089,301	76.6
Denmark	1911	1,647,350	59.7	1911	1,023,962	37.1
Finland				1900	1,555,357	57.3
France	1906	22,715,011	57.9	1891	17,435,888	45.7
Germany				1907	17,089,496	27.7
Norway				1900	854,787	38.5
Portugal	1890	3,458,996	68.5	1900	3,367,199	62.1
Roumania	1900	4,836,904	81.2			
Russia:						
Caucasus				1897	7,266,428	78.2
Central Asia				1897	6,361,466	82.1
Poland				1897	5,302,850	56.4
Russia proper				1897	69,470,360	74.3
Siberia				1897	4,448,456	77.2
Total Russia				1897	92,849,560	73.9
Serbia				1900	2,097,988	84.2
Sweden				1900	2,344,612	45.6
Switzerland	1900	1,047,795	31.6	1900	1,067,905	32.2
United Kingdom:						
England and Wales	1911	7,907,556	21.9			

TABLE 190.—*Number of persons engaged in agriculture in various countries.*

Country.	Year.	Males.		Females.		Total persons engaged in agriculture.	
		Number.	Per cent of males in all occupations.	Number.	Per cent of females in all occupations.	Number.	Per cent of persons in all occupations.
United States	1910	10,582,039	35.2	1,806,584	22.4	12,388,623	32.5
Algeria	1881	636,078	74.8	91,602	53.7	727,680	71.3
Argentina	1895	318,149	28.0	67,174	13.4	385,323	23.6
Australia	1901	377,626	29.5	39,029	11.1	416,655	25.6
Austria-Hungary	1900	8,185,250	58.5	5,935,805	70.3	14,121,055	63.0
Belgium	1900	533,665	23.6	163,707	17.6	697,372	21.9
Bolivia	1900	....	....	....	....	564,009	43.5
British India	1901	63,026,365	67.3	27,867,210	66.5	90,893,575	67.1
British North Borneo	1901	....	....	....	....	32,892	64.2
Bulgaria	1905	895,206	73.3	837,406	94.9	1,732,612	82.4
Canada	1901	707,997	45.4	8,940	3.7	716,937	39.9
Ceylon	1901	745,074	65.0	318,551	65.4	1,063,625	65.1
Chile	1907	448,546	50.3	21,877	6.2	470,423	37.7
Cuba	1907	364,821	52.2	3,110	4.2	367,921	47.6
Cyprus	1901	33,611	62.8	2,757	20.8	36,368	54.5
Denmark	1911	386,016	45.7	110,169	28.5	496,185	40.3
Egypt	1907	2,258,005	67.2	57,144	33.3	2,315,149	65.6
Federated Malay States	1901	115,027	28.2	52,324	82.7	167,351	35.5
Finland	1900	321,538	51.4	102,008	39.6	423,546	48.0
Formosa	1905	763,456	70.6	263,664	82.4	1,027,120	73.3
France	1906	5,452,392	41.9	3,324,661	43.2	8,777,053	42.4
Germany	1907	5,146,723	27.7	4,585,749	48.3	9,732,472	34.6
Greece	1907	321,120	47.3	6,972	12.2	328,092	44.6
Grenada	1901	8,816	57.1	7,722	49.7	16,538	53.4
Italy	1901	6,370,277	57.9	3,196,063	60.5	9,566,340	58.8
Jamaica	1911	....	....	....	....	271,493	66.1
Malta and Gozo	1901	10,235	13.3	3,613	15.8	13,848	13.9
Mauritius	1901	72,493	57.1	5,989	38.0	78,482	55.0
Netherlands	1899	490,694	32.9	79,584	18.4	570,278	29.6
New Zealand	1911	103,644	28.5	7,472	8.3	111,116	24.5
Norway	1910	....	....	....	....	307,528	33.4
Philippine Islands	1903	1,163,777	57.8	90,286	8.8	1,254,063	41.3
Porto Rico	1899	196,893	73.3	1,868	3.9	198,761	62.8
Portugal	1900	1,127,268	65.3	380,293	52.0	1,507,561	61.4
Russia:							
In Europe	1897	13,808,505	59.6	1,974,164	38.0	15,782,669	55.6
In Asia	1897	2,092,965	69.2	105,137	30.5	2,198,102	65.3
Total	1897	15,901,470	60.7	2,079,301	37.5	17,980,771	56.7
St. Lucia	1901	....	....	....	....	15,796	54.1
Serbia	1900	311,700	65.5	13,524	50.5	325,224	64.7
Sierra Leone	1901	8,705	28.7	4,544	21.7	13,249	25.9
Spain	1900	3,741,730	58.1	775,270	51.8	4,517,000	56.9
Sweden	1900	761,016	52.4	333,264	53.8	1,094,280	52.8
Switzerland	1900	392,971	37.1	80,326	16.1	473,297	30.4
Trinidad and Tobago	1901	51,744	54.7	25,765	39.3	77,509	48.4
Union of South Africa	1904	863,223	56.3	847,057	77.5	1,710,280	65.1
United Kingdom	1901	2,109,812	16.3	152,642	2.9	2,262,454	12.4

TABLE 191.—*Total area and agricultural land in various countries.*

[As classified and reported by the International Institute of Agriculture.]

Country.	Year.	Total area.	Productive land.[1] Amount.	Productive land.[1] Per cent of total area.	Cultivated land.[2] Amount.	Cultivated land.[2] Per cent of total area.
NORTH AMERICA.		*Acres.*	*Acres.*	*Per cent.*	*Acres.*	*Per cent.*
United States	1910	1,903,269,000	878,789,000	46.2	293,794,000	15.4
Canada	1901	2,397,082,000	63,420,000	2.6	19,880,000	.8
Costa Rica	1909-10	13,343,000	3,090,000	23.2	442,000	3.3
Cuba	1899	28,299,000	8,717,000	30.8	778,000	2.7
SOUTH AMERICA.						
Argentina	1909-10	729,575,000	537,805,000	73.7	44,446,000	6.1
Chile[3]	1910-11	187,145,000	15,144,000	8.1	2,557,000	1.4
Uruguay	1908	46,189,000	40,875,000	88.5	1,962,000	4.2
EUROPE.						
Austria-Hungary:						
Austria	1911	74,132,000	69,939,000	94.3	26,272,000	35.4
Hungary	1910	80,272,000	77,225,000	96.2	35,178,000	43.8
Total Austria-Hungary	....	154,404,000	147,164,000	95.3	61,450,000	39.8
Belgium	1895	7,278,000	6,443,000	88.5	3,582,000	49.2
Bulgaria	1910	23,807,000	18,959,000	79.6	8,574,000	36.0
Denmark	1907	9,629,000	9,078,000	94.3	6,376,000	66.2
Finland	1901	82,113,000	....	....	3,875,000	4.7
France	1910	130,851,000	123,642,000	94.5	59,124,000	45.2
Germany	1900	133,594,000	126,401,000	94.6	63,689,000	47.7
Italy	1911	70,839,000	65,164,000	92.0	33,815,000	47.7
Luxemburg	1911	639,000	616,000	96.4	300,000	46.9
Netherlands	1911	8,057,000	7,258,000	90.1	2,210,000	27.4
Norway	1907	79,810,000	22,942,000	28.7	1,830,000	2.3
Portugal	1912	22,018,000	17,281,000	78.5	5,777,000	26.2
Roumania	1905	32,167,000	24,645,000	76.6	14,829,000	46.1
Russia, European	1911	1,278,203,000	698,902,000	54.7	245,755,000	19.2
Serbia	1897	11,936,000	6,246,000	52.3	2,534,000	21.2
Spain	1908-11	124,666,000	112,665,000	90.4	41,264,000	33.1
Sweden	1911	110,667,000	65,196,000	58.9	9,144,000	8.3
Switzerland[4]	1905	10,211,000	7,635,000	74.8	605,000	5.9
United Kingdom:						
Great Britain	1911	56,802,000	47,737,000	84.0	14,587,000	25.7
Ireland	1911	20,350,000	18,789,000	92.3	3,275,000	16.1
Total United Kingdom	....	77,152,000	66,526,000	86.2	17,862,000	23.2
ASIA.						
British India	1910-11	615,695,000	465,706,000	75.6	264,858,000	43.0
Formosa	1911	8,858,000	1,972,000	22.3	1,884,000	21.3
Japan	1911	94,495,000	74,180,000	78.5	17,639,000	18.7
Russia, Asiatic	1911	4,028,001,000	715,838,000	17.8	33,860,000	.8
AFRICA.						
Algeria	1910	124,976,000	50,846,000	40.7	11,434,000	9.1
Egypt	1912	222,390,000	5,486,000	2.5	5,457,000	2.5
Tunis	1912	30,888,000	22,239,000	72.0	6,919,000	22.4
Union of South Africa	1909-10	302,827,000	3,569,000	1.2	3,385,000	1.1
OCEANIA.						
Australia	1910-11	1,903,664,000	119,942,000	6.3	14,987,000	.8
New Zealand	1910	66,469,000	57,310,000	86.2	6,955,000	10.5
Total, 36 countries	....	15,071,209,000	4,591,691,000	30.5	1,313,832,000	8.7

[1] Includes besides cultivated land, also natural meadows and pastures, forests, woodlots, and lands devoted to cultivated trees and shrubs.
[2] Includes fallow lands; also artificial grass lands.
[3] The figure for "productive land" in Chile excludes marshes, heaths, and productive but uncared-for lands.
[4] The figure for "cultivated land" in Switzerland excludes artificial meadows and pastures.

NATIONAL FORESTS.

TABLE 192.—*National forests: Timber disposed of, quantity, price, and number of users, revenue under specified heads, and details of grazing privileges, years ended June 30, 1912 to 1917.*

[Reported by the Forest Service.]

Item.	Year ended June 30—					
	1912	1913	1914	1915	1916	1917
Free timber given:						
Number of users	38 749	38,264	39,466	40,040	42,055	41,427
Timber cut ... M ft.	123,233	121,750	120,575	123,259	119,483	113,073
Value ... dolls.	196,335	191,825	183,223	206,597	184,715	149,802
Timber sales:						
Number	5,772	6,182	8,303	10,905	10,840	11,608
Quantity ... M ft.	799,417	2,137,311	1,540,084	1,093,589	906,906	2,008,087
Price per thousand board feet (average) ... dolls.	2.00	2.01	2.30	2.44	1.98	1.85
Grazing:						
Number of permits	26,501	27,466	28,945	30,610	33,328	36,638
Kinds of stock—						
Cattle ... No.	1,403,025	1,455,922	1,508,639	1,627,321	1,758,764	1,953,198
Goats ... No.	83,849	76,898	58,616	51,409	43,268	49,939
Hogs ... No.	4,330	3,277	3,381	2,792	2,968	2,306
Horses ... No.	95,343	97,919	108,241	96,933	98,903	98,880
Sheep ... No.	7,467,890	7,790,953	7,560,186	7,232,276	7,843,205	7,586,034
Total ... No.	9,054,437	9,424,969	9,239,063	9,010,731	9,747,108	9,690,357
Special use and water-power permits ... No.	4,967	5,245	5,089	5,657	5,251	6,087
Revenue:						
From—						
Timber sales ... dolls.	994,314	1,282,647	1,243,195	1,211,985	1,367,111	1,595,873
Timber settlements,[1] dollars	33,287	36,105	39,927	3,181	2,299	17,102
Penalties for timber trespass ... dolls.	40,291	17,558	12,981	7,284	37,712	18,870
Turpentine sales,[2] dollars	...	...	15,372	8,915	14,402	8,156
Fire trespass ... dolls.	21,810	5,028	7,950	661	5,471	52,514
Special uses[3] ... dolls.	48,249	67,278	68,773	78,691	85,235	108,329
Grazing fees ... dolls.	962,175	1,001,156	997,583	1,130,175	1,202,405	1,544,714
Grazing trespass, dollars	6,667	6,583	4,765	5,818	7,810	5,081
Water power ... dolls.	50,563	51,235	47,164	89,104	101,096	106,389
Total revenue. dolls.	2,157,356	2,467,590	2,437,710	[4]2,535,814	2,823,541	3,457,028

[1] Includes timber taken in the exercise of permits for rights of way, development of power, etc.
[2] Prior to 1914 receipts from sale of turpentine were included with timber sales.
[3] Including under "Special use" prior to 1912.
[4] Refunds during year, $54,575.

TABLE 193.—*Area of national forest lands, June 30, 1917.*

[Reported by Forest Service.]

State and forest.	Net area.
	Acres.
Alaska:	
Chugach	5,418,753
Tongass	15,451,716
Total	20,870,469
Arizona:	
Apache	1,182,782
Chiricahua [1]	348,157
Coconino	1,601,598
Coronado	959,304
Crook	870,130
Dixie [1]	17,680
Kaibab	1,072,375
Manzano [1]	27,708
Prescott	1,433,366
Sitgreaves	659,337
Tonto	1,994,239
Tusayan	1,602,750
Total	11,769,426
Arkansas:	
Arkansas	626,746
Ozark	291,840
Total	918,586
California:	
Angeles	820,980
California	807,444
Cleveland	547,981
Crater [1]	46,977
Eldorado [1]	549,392
Inyo [1]	1,269,980
Klamath [1]	1,470,841
Lassen	936,877
Modoc	1,182,986
Mono [1]	784,620
Monterey	316,058
Plumas	1,144,835
Santa Barbara	1,688,571
Sequoia	2,194,926
Shasta	803,448
Sierra	1,489,934
Siskiyou [1]	349,069
Stanislaus	810,399
Tahoe [1]	542,226
Trinity	1,430,547
Total	19,188,091
Colorado:	
Arapahoe	634,903
Battlement	651,227
Cochetopa	905,723
Colorado	847,328
Durango	614,129
Gunnison	908,055
Hayden [1]	65,598
Holy Cross	576,905
La Sal [1]	27,444
Leadville	934,017
Montezuma	700,082
Pike	1,080,381
Rio Grande	1,136,884
Routt	833,459
San Isabel	598,912
San Juan	617,995
Sopris	596,986
Uncompahgre	790,349
White River	848,018
Total	13,368,395
Florida:	
Florida	308,268
Idaho:	
Boise	1,058,941
Cache [1]	513,617
Caribou [1]	681,540
Challis	1,259,237
Clearwater	785,103
Coeur d'Alene	662,611
Idaho	1,193,439
Kaniksu [1]	198,757
Lemhi	1,095,924
Minidoka [1]	509,536
Nez Perce	1,624,582
Palisade [1]	283,495
Payette	831,926
Pend Oreille	676,014
St. Joe	493,925
Salmon	1,621,707
Sawtooth	1,203,387
Selway	1,693,711
Targhee [1]	694,352
Weiser	562,609
Total	17,644,413
Michigan:	
Michigan	89,466
Minnesota:	
Minnesota	190,602
Superior	857,255
Total	1,047,857
Montana:	
Absaroka	842,467
Beartooth	662,537
Beaverhead	1,337,223
Bitterroot	1,047,012
Blackfeet	865,077
Cabinet	830,676
Custer	428,922
Deerlodge	833,178
Flathead	1,802,905
Gallatin	564,855
Helena	687,983
Jefferson	1,039,766
Kootenai	1,336,061
Lewis and Clark	811,161
Lolo	850,677
Madison	958,691
Missoula	1,031,529
Sioux [1]	96,743
Total	16,027,463
Nebraska:	
Nebraska	206,074
Nevada:	
Dixie [1]	282,543
Eldorado [1]	400
Humboldt	690,562
Inyo [1]	72,817
Mono [1]	464,315
Nevada	1,220,929
Ruby	342,405
Santa Rosa	269,658
Tahoe [1]	14,853
Toiyabe	1,907,286
Total	5,265,768
New Mexico:	
Alamo	603,779
Carson	856,647
Chiricahua [1]	126,478
Datil	2,670,412
Gila	1,463,708

[1] For total area, see "National Forests extending into two States."

TABLE 193.—*Area of national forest lands, June 30, 1917*—Continued.

State and forest.	Net area.
New Mexico—Continued.	*Acres.*
Lincoln	551,427
Manzano [1]	754,772
Santa Fe	1,354,545
Total	8,381,768
North Dakota:	
Dakota	6,054
Oklahoma:	
Wichita	61,480
Oregon:	
Cascade	1,021,461
Crater [1]	793,044
Deschutes	1,292,423
Fremont	884,494
Klamath [1]	4,401
Malheur	1,057,682
Minam	439,757
Ochoco	716,564
Oregon	1,031,926
Santiam	607,099
Siskiyou [1]	998,044
Siuslaw	544,178
Umatilla	485,786
Umpqua	1,011,097
Wallowa	964,601
Wenaha [1]	425,504
Whitman	884,485
Total	13,153,546
Porto Rico:	
Luquillo	12,443
South Dakota:	
Black Hills [1]	483,403
Harney	548,854
Sioux [1]	75,524
Total	1,107,781
Utah:	
Ashley [1]	982,493
Cache [1]	265,594
Dixie [1]	432,784
Fillmore	699,579
Fishlake	661,245
Utah—Continued.	*Acres.*
La Sal [1]	519,384
Manti	781,800
Minidoka [1]	72,123
Powell	689,927
Sevier	729,061
Uinta	988,602
Wasatch	607,492
Total	7,430,084
Washington:	
Chelan	677,429
Columbia	784,498
Colville	754,886
Kaniksu [1]	257,859
Okanogan	1,488,325
Olympic	1,534,689
Rainier	1,315,891
Snoqualmie	698,043
Washington	1,454,214
Wenaha [1]	313,434
Wenatchee	665,276
Total	9,942,544
Wyoming:	
Ashley [1]	5,987
Bighorn	1,119,725
Black Hills [1]	144,759
Bridger	710,570
Caribou [1]	6,547
Hayden [1]	322,175
Medicine Bow	469,786
Palisade [1]	250,501
Shoshone	1,576,043
Targhee [1]	84,970
Teton	1,922,947
Washakie	852,653
Wyoming	899,980
Total	8,366,643
Total, National Forests	155,166,619
White Mountain and Appalachian area	947,198
Grand total	156,113,817

[1] For total area, see "National Forests extending into two or more States."

NATIONAL FORESTS EXTENDING INTO TWO OR MORE STATES.

Forest.	States.	Net area.
		Acres.
Chiricahua	Arizona-New Mexico	474,635
Dixie	Arizona-Nevada-Utah	733,007
Manzano	Arizona-New Mexico	782,480
Crater	California-Oregon	840,021
Eldorado	California-Nevada	549,792
Inyo	California-Nevada	1,342,797
Klamath	California-Oregon	1,475,242
Mono	California-Nevada	1,248,935
Siskiyou	California-Oregon	1,347,113
Tahoe	California-Nevada	557,079
Hayden	Colorado-Wyoming	387,773
La Sal	Colorado-Utah	546,828
Cache	Idaho-Utah	779,211
Caribou	Idaho-Wyoming	688,087
Kaniksu	Idaho-Washington	456,616
Minidoka	Idaho-Utah	581,659
Palisade	Idaho-Wyoming	533,996
Targhee	Idaho-Wyoming	779,322
Sioux	Montana-South Dakota	172,267
Wenaha	Oregon-Washington	738,938
Black Hills	South Dakota-Wyoming	628,162
Ashley	Utha-Wyoming	988,480

TABLE 194.—*Grazing allowances for national forests, 1917.*

Forest.	Number of stock authorized.			Yearlong rates (cents).			
	Cattle and horses.	Swine.	Sheep and goats.	Cattle.	Horses.	Swine.	Sheep and goats.
District 1:							
Absaroka	+ 6,950	......	− 95,800	68	85	51	17
Beartooth	+ 5,000	300	+ 50,000	......	......	......	......
Beaverhead	24,500	......	+ 115,500	......	......	......	......
Bitterroot	− 3,500	......	+ 42,000	......	......	......	......
Blackfeet	2,000	......	10,000	60	75	45	15
Cabinet	− 2,400	......	+ 25,000	68	85	51	17
Clearwater	+ 2,400	......	− 25,000	60	75	45	15
Coeur d'Alene	500	......	25,000	68	85	51	17
Custer	− 18,800	......	+ 8,500	......	......	......	......
Deerlodge	+ 15,700	......	+ 61,600	......	......	......	......
Flathead	+ 3,650	......	5,000	60	75	45	15
Gallatin	8,500	......	+ 60,500	68	85	51	17
Helena	− 17,750	......	− 76,000	......	......	......	......
Jefferson	+ 20,500	......	+ 131,750	......	......	......	......
Kaniksu	1,000	......	11,500	60	75	45	15
Kootenai	+ 2,300	......	− 19,000	......	......	......	......
Lewis and Clark	+ 8,700	......	− 31,000	68	85	51	17
Lolo	− 500	......	+ 35,000	......	......	......	......
Madison [1]	+ 28,600	......	− 133,100	75	94	56.25	18.7
Missoula	+ 9,100	......	+ 22,000	68	85	51	17
Nez Perce	+ 15,300	......	+ 60,500	......	......	......	......
Pend Oreille	+ 1,500	......	− 31,500	60	75	45	15
Selway	5,250	......	10,000	......	......	......	......
Sioux	6,500	......	2,800	68	85	51	17
St. Joe	− 400	......	− 41,650	60	75	45	15
	+211,300	300	−1,129,700	......	......	......	......
District 2:							
Arapaho	− 12,150	......	− 18,000	68	85	51	17
Battlement [1]	+ 44,700	......	......	......	......	......	......
Bighorn	+ 39,100	......	− 102,300	75	94	56.25	18.75
Black Hills	+ 21,100	2,500	......	68	85	51	17
Bridger [1]	+ 18,450	......	+ 63,800	......	......	......	......
Cochetopa	− 17,700	......	− 59,500	......	......	......	......
Colorado	+ 9,500	......	......	......	......	......	......
Durango	+ 12,100	......	+ 95,900	......	......	......	......
Gunnison	− 30,800	......	10,000	......	......	......	......
Harney	+ 10,500	......	......	......	......	......	......
Hayden	7,400	......	120,000	......	......	......	......
Holy Cross	11,000	......	31,000	......	......	......	......
Leadville	− 11,400	......	+ 82,000	......	......	......	......
Medicine Bow	+ 10,100	......	− 57,000	......	......	......	......
Michigan	− 750	......	− 200	......	......	......	......
Minnesota	2,000	......	......	......	......	......	......
Montezuma	+ 34,900	......	+ 50,000	......	......	......	......
Nebraska [1]	13,000	......	......	90	113	67.5	22.5
Pike	+ 17,800	......	+ 20.500	68	85	51	17
Rio Grande	+ 23,000	......	− 257,000	......	......	......	......
Routt	− 26,300	......	+ 105,000	......	......	......	......
San Isabel	+ 15,000	......	+ 15,700	......	......	......	......
San Juan	− 12,275	......	+ 98,000	......	......	......	......
Shoshone [1]	+ 13,700	......	+ 72,450	......	......	......	......
Sopris	− 12,800	......	− 43,000	......	......	......	......
Uncompahgre	+ 28,850	......	+ 59,700	......	......	......	......
Washakie [1]	− 12,100	......	+ 43,200	......	......	......	......
White River	− 37,500	......	+ 35,000	......	......	......	......
	+505,975	2,500	+1,439,250	......	......	......	......
District 3:							
Alamo	+ 15,500	+ 200	− 9,000	60	75	45	15
Apache	+ 40,500	100	62,000	......	......	......	......
Carson	+ 8,300	+ 100	− 157,500	......	......	......	......
Chiricahua	12.000	− 200	2,000	......	......	......	......
Coconino [1]	+ 45,000	250	− 90,000	......	......	......	......
Coronado	+ 26,700	......	− 4,000	......	......	......	......
Crook	+ 19,500	100	1,350	......	......	......	......
Datil	+ 48,500	− 225	+ 144,000	......	......	......	......
Gila	+ 59,000	+ 400	12,500	......	......	......	......
Lincoln	+ 10,000	500	13,000	......	......	......	......
Manzano	9,300	......	− 70,300	......	......	......	......

[1] Term applications previously approved effective till expiration of period.

TABLE 194.—*Grazing allowances for national forests, 1917*—Continued.

Forest.	Number of stock authorized.			Yearlong rates (cents).			
	Cattle and horses.	Swine.	Sheep and goats.	Cattle.	Horses.	Swine.	Sheep and goats.
District 3:—Continued.							
Prescott	+ 56,350	50	+ 71,500				
Santa Fe	+ 18,000	− 500	+ 103,500				
Sitgreaves	− 9,600		− 74,500				
Tonto	− 61,700		100				
Tusayan	+ 22,300	50	− 70,700				
	+465,250	−2,675	− 885,950				
District 4:							
Ashley	+ 10,300		− 96,000	75	94	56.25	18.75
Boise[1]	+ 4,500	100	+ 148,000	68	85	51	17
Cache	+ 33,100		− 136,000				
Caribou	+ 16,300		288,000				
Challis	+ 8,900		+ 92,000				
Dixie	− 8,800	400	1,000	60	75	45	15
Fillmore	+ 20,400	500	− 38,650	75	94	56.25	18.75
Fishlake	− 18,400		− 69,000				
Humboldt	28,600		+ 297,000	68	85	51	17
Idaho[1]	+ 2,650		− 108,000				
Kaibab	+ 10,700		5,000	60	75	45	15
La Sal	+ 28,100	100	+ 39,000	68	85	51	17
Lemhi	+ 16,200		+ 78,000	68	85	51	17
Manti	+ 27,400		150,400	75	94	56.25	18.75
Minidoka	+ 25,700		+ 77,000	68	85	51	17
Nevada	− 5,500		− 52,000				
Palisade	+ 9,900		− 93,000				
Payette[1]	+ 7,550		− 88,000				
Powell	− 13,200		+ 74,000				
Ruby	+ 16,500		+ 36,000				
Salmon	14,700		+ 125,000				
Santa Rosa	14,500		− 43,000				
Sawtooth[1]	+ 9,500		− 302,000				
Sevier	+ 11,500	100	− 113,000				
Targhee[1]	+ 14,700		+ 134,000				
Teton	+ 17,200		20,000				
Toiyabe	+ 22,500		− 21,000				
Uinta[1]	+ 33,800		− 198,400	75	94	56.25	18.75
Wasatch	+ 13,000		61,100				
Weiser	+ 12,600	600	− 68,000	68	85	51	17
Wyoming	+ 11,500		+ 197,000				
	+488,200	+1,800	+3,248,550				
District 5:							
Angeles[1]	4,100			75	94	56.25	18.75
California	+ 7,900	1,000	− 51,300				
Cleveland	2,000		− 1,300				
Eldorado	+ 10,500	50	+ 20,500	90	113	67.5	22.5
Inyo	+ 6,200		+ 39,200				
Klamath	+ 10,250	+ 700	5,600	70	88	52.5	17.5
Lassen	− 12,600	− 300	− 31,200	80	100	60	20
Modoc	+ 42,800		+ 65,000	75	94	56.25	18.75
Mono	+ 4,700		+ 70,000	90	113	67.5	22.5
Monterey	− 1,300	− 400	2,000	80	100	60	20
Plumas	+ 13,300		+ 78,500	85	106	63.75	21.25
Santa Barbara[1]	+ 9,100	300	+ 4,000	80	100	60	20
Sequoia[1]	− 30,300	2,300	− 8,750	90	113	67.5	22.5
Shasta	+ 10,500	− 360	24,700	75	94	56.25	18.75
Sierra[1]	+ 16,000	500	+ 26,000	90	113	67.5	22.5
Stanislaus	+ 19,000	− 250	− 9,800				
Tahoe	+ 8,100	− 50	59,500				
Trinity	+ 13,050	415	+ 24,100	70	88	52.5	17.5
	+221,700	−6,625	+ 521,450				
District 6:							
Cascade	1,000		− 25,700	80	100	60	20
Chelan	+ 700		− 15,000	75	94	56.25	18.75
Columbia	+ 1,600		− 18,500	80	100	60	20
Colville	6,000		60,000	75	94	56.25	18.75
Crater	+ 13,700		+ 13,300				
Deschutes	+ 6,800		− 40,200				
Fremont	15,000		− 95,000				
Malheur	− 25,000	50	− 120,200				
Minam	+ 13,300		+ 69,400				

[1] Term applications previously approved effective until expiration of period.

TABLE 191.—*Grazing allowances for national forests, 1917*—Continued.

Forest.	Number of stock authorized.			Yearlong rates (cents).			
	Cattle and horses.	Swine.	Sheep and goats.	Cattle.	Horses.	Swine.	Sheep and goats.
District 6—Continued.							
Ochoco	+ 14,700		− 82,000				
Okanogan	+ 13,300		90,000				
Olympic	2,500						
Oregon	− 3,300		− 26,400	80	100	60	20
Rainier	+ 6,900		+ 52,000				
Santiam	+ 340		+ 20,000				
Siskiyou	4,100	1,000	4,200	70	88	52.5	17.5
Siuslaw	− 1,400		+ 7,000				
Snoqualmie			6,000	80	100	60	20
Umatilla	− 10,000		59,400	75	94	56.25	18.75
Umpqua	+ 1,400		− 10,000	80	100	60	20
Wallowa	+ 21,000		− 80,000	75	94	56.25	18.75
Washington	250		5,000	80	100	60	20
Wenaha	+ 12,100		− 100,600	75	94	56.25	18.75
Wenatchee	+ 950		− 57,000	80	100	60	20
Whitman	+ 10,800		− 105,700	75	94	56.25	18.75
	+ 186,140	− 1,050	−1,162,600				
District 7:							
Arkansas	15,000	22,000	2,000	60	75	45	15
Florida	6,000	3,000	7,000				
Ozark	8,500	12,800	1,400				
Wichita	4,630			125	156	93.75	31.25
	34,130	37,800	10,400				
Purchase areas:							
Cherokee	− 500	400	200	150	200	90	45
Georgia	860	430	500	100	140	64	32
Massanutten	+ 330		100	150	200	90	45
Monongahela	400	40	100				
Mount Mitchell	600	100	50				
Nantahala	− 400	200	150				
Natural Bridge	400						
Pisgah	300						
Potomac	+ 250		500				
Savannah	310	360	280				
Shenandoah	+ 2,200	100	150				
Unaka	500	150	75				
White Mountain	100						
White Top	+ 300	150	150				
	7,450	− 1,930	2,255				
Totals, 1913	1,852,999	59,535	8,521,308				
Totals, 1914	1,891,119	65,645	8,867,906				
Totals, 1915	1,983,775	64,040	8,747,025				
Totals, 1916	2,008,675	58,990	8,597,689				
Totals, 1917	2,120,145	54,680	8,400,155				
Increase or decrease in 1917 over 1916	+ 111,470	− 4,310	− 197,534				

NOTE.—The symbols (+) or (−) indicate, respectively, that there was an increase or decrease in 1917 compared with 1916. The figures themselves refer to actual numbers of stock authorized in 1917.

IMPORTS AND EXPORTS OF AGRICULTURAL PRODUCTS.[1]

TABLE 195.—*Agricultural imports of the United States during the 3 years ending June 30, 1917.*

[Compiled from reports of the foreign commerce and navigation of the United States, U. S. Department of Commerce.]

Article imported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.*	Value.	Quantity.	Value.	Quantity.	Value.
ANIMAL MATTER.						
Animals, live:						
Cattle—						
For breeding purposes, ...number..	538,167	$17,513,175	439,185	$15,187,593	374,826	$13,021,259
Total cattle...do....	538,167	17,513,175	439,185	15,187,593	374,826	13,021,259
Horses—						
For breeding purposes, ...number..	1,849	$473,138	1,536	$659,022	2,654	$1,056,033
Other..........do....	10,803	504,242	14,020	959,223	9,930	832,270
Total horses...do....	12,652	977,380	15,556	1,618,245	12,584	1,888,303
Sheep—						
For breeding purposes, ...number..	153,317	533,967	235,659	917,502	160,422	856,645
Total sheep....do....	153,317	533,967	235,659	917,502	160,422	856,645
Swine.............do....	(2)	(2)	4,626	42,615	5,669	113,457
All other, including fowls.	....	3,254,559	....	553,124	....	723,195
Total live animals....	....	22,279,081	....	18,649,079	....	16,602,859
Beeswax..........pounds..	1,564,506	439,541	2,146,380	594,209	2,685,982	801,118
Dairy products:						
Butter.............do....	3,828,227	977,262	712,908	212,370	523,573	192,767
Cheese.............do....	50,138,520	9,370,048	30,087,889	7,058,420	14,481,514	4,465,633
Cream...........gallons..	2,077,384	1,800,180	1,193,745	1,042,775	745,819	666,267
Milk......................	....	2,556,787	....	1,515,354	....	1,746,446
Total dairy products.	....	14,704,277	....	9,828,919	....	7,071,113
Eggs..............dozens..	3,046,631	438,760	732,566	110,658	1,110,522	268,286
Egg yolks or frozen eggs, ...pounds..	8,571,758	705,129	6,021,672	921,502	10,317,774	1,732,948
Feathers and downs, crude:						
Ostrich...................	....	2,183,171	....	2,105,497	....	534,921
Other.....................	....	319,452	....	525,654	....	944,295
Fibers, animal:						
Silk—						
Cocoons.......pounds..	51,495	35,114	197,073	142,743	62,056	54,995
Raw, or as reeled from the cocoon..pounds..	26,030,925	80,531,785	33,070,902	119,484,223	33,868,885	156,085,649
Waste...........do....	4,970,254	2,563,658	8,657,322	4,706,684	6,420,482	4,431,164
Total silk......do....	31,052,674	83,130,557	41,925,297	124,333,655	40,351,423	160,571,808

[1] Forest products come within the scope of the Department of Agriculture and are therefore included in alphabetical order in these tables.
[2] Included in "All other, including fowls."

TABLE 195.—*Agricultural imports of the United States during the 3 years ending June 30, 1917*—Continued.

Article imported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
ANIMAL MATTER—contd.						
Fibers, animal—Contd.						
Wool, and hair of the camel, goat, alpaca, and like animals—						
Class 1, clothing, ...pounds..	222,017,420	$52,008,509	403,121,585	$112,145,657	279,481,501	$101,502,941
Class 2, combing .do....	15,054,694	3,735,158	13,292,160	3,916,708	17,055,953	6,723,737
Class 3, carpet....do....	65,709,752	10,865,475	109,268,999	23,955,236	67,672,671	19,814,386
Hair of the Angora goat, alpaca, etc..pounds..	5,301,563	1,633,426	9,145,278	2,403,133	8,162,093	3,096,106
Total wool.....do....	308,083,429	68,242,568	534,828,022	142,420,734	372,372,218	131,137,170
Total animal fibers, ...pounds..	339,136,103	151,373,125	576,753,319	266,754,389	412,723,641	291,708,978
Gelatin...........pounds..	2,714,229	816,521	1,600,235	501,509	1,114,667	359,076
Glue..................do....	8,705,147	824,136	3,008,485	217,033	6,265,597	928,000
Honey............gallons..	303,965	124,843	221,224	97,461	427,650	289,317
Packing-house products:						
Blood, dried.............	....	227,198	....	196,600	....	389,455
Bones, cleaned...........	....	69	....	....	....	....
Bones, hoofs, and horns...	....	911,473	....	867,242	....	987,544
Bristles—						
Crude, unsorted, ...pounds..	45,466	3,336	86,374	14,990	129,460	52,536
Sorted, bunched, or prepared...pounds..	4,016,594	3,609,748	3,850,087	3,612,052	4,026,539	4,381,411
Total bristles...do....	4,062,060	3,613,084	3,936,461	3,627,042	4,155,999	4,433,947
Grease.................	....	1,146,721	....	930,635	....	861,973
Hair—						
Horse.........pounds..	3,541,903	1,500,666	6,198,938	2,071,429	6,337,754	2,224,576
Other animal.....do....	8,148,570	744,187	9,692,037	988,342	6,771,033	818,298
Hide cuttings and other glue stock.....pounds..	(1)	1,510,608	(1)	972,106	33,639,707	1,452,273
Hides and skins, other than furs—						
Buffalo hides, dry, ...pounds..	12,422,803	2,325,243	13,003,888	2,463,270	27,095,228	6,125,219
Calfskins—						
Dry...........do....	15,678,046	4,166,617	26,913,217	7,835,605	33,936,381	11,062,856
Green or pickled, ...pounds..	30,288,655	6,552,157	37,222,276	9,071,349	12,399,814	4,530,193
Cattle hides—						
Dry...........do....	93,001,127	21,424,552	153,339,079	37,453,897	161,236,620	48,714,500
Green or pickled, ...pounds..	241,340,290	39,753,213	280,838,692	50,596,221	225,363,408	51,236,153
Goatskins—						
Dry...........do....	50,713,062	13,925,565	85,505,514	25,198,246	92,425,345	51,777.399
Green or pickled, ...pounds..	15,834,101	2,263,984	15,151,507	2,207,658	13,214,962	3,642,410
Horse and ass skins—						
Dry.......pounds..	5,425,173	1,253,001	6,779,725	1,236,440	12,185,138	3,731,858
Green or pickled, ...pounds..	3,800,451	399,682	11,346,910	1,079,284	15,485,233	2,459,969
Kangaroo........do....	769,125	427,127	1,219,129	722,300	958,629	721,754
Sheepskins—[2]						
Dry...........do....	20,886,018	3,963,438	54,599,884	11,330,341	55,283,868	17,954,483
Green or pickled, ...pounds..	37,833,520	6,021,432	46,859,397	7,509,009	40,446,730	11,626,832
Other...........do....	10,225,362	1,701,095	10,890,642	2,157,756	10,176,141	2,779,983
Total hides and skins, ...pounds..	538,217,733	104,177,106	743,669,860	158,861,376	700,207,497	216,363,609

[1] Not stated.

[2] Except sheepskins with the wool on.

TABLE 195.—*Agricultural imports of the United States during the 3 years ending June 30, 1916*—Continued.

Article imported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
ANIMAL MATTER—contd.						
Packing-house products—Continued.						
Meat—						
Cured—						
Bacon and hams, ...pounds..	7,542,446	$1,161,090	667,667	$111,486	190,293	$46,394
Meat prepared or preserved..........	....	1,193,268	....	325,381	....	981,212
Sausage, bologna, ...pounds..	209,484	53,660	47,287	12,322	682	274
Fresh—						
Beef and veal, ...pounds..	184,490,759	16,942,661	71,101,756	7,107,949	15,217,118	1,613,090
Mutton and lamb, ...pounds..	15,528,855	1,474,422	20,257,999	1,784,310	4,684,131	555,646
Pork..........do....	16,250,514	2,011,065	2,169,084	234,873	1,651,227	280,795
Other, including meat extracts..........	....	2,561,906	....	1,486,395	....	3,773,082
Total meat..........	....	25,398,072	....	11,062,716	....	7,250,493
Oleo stearin.....pounds..	2,424,009	209,545	910,478	81,280	1,113,277	114,640
Rennets..........	....	101,017	....	86,706	....	13,154
Sausage casings..........	....	2,944,501	....	3,865,877	....	4,219,235
Total packing-house products..........	....	142,484,247	....	183,611,351	....	239,129,197
Total animal matter..	....	336,785,283	....	484,007,241	....	560,463,308
VEGETABLE MATTER.						
Argols, or wine lees, pounds..	28,624,554	3,094,380	34,721,043	5,306,246	23,925,808	3,824,882
Breadstuffs. (*See* Grain and grain products.)						
Broom corn.....long tons..	129	15,912	158	24,643	30	4,743
Cocoa and chocolate:						
Cocoa—						
Crude, leaves and shells of..........pounds...	192,306,634	22,893,241	243,231,939	35,143,865	338,653,876	39,834,279
Chocolate..........do....	2,427,561	584,915	2,347,162	660,377	1,829,521	553,139
Total cocoa and chocolate.......pounds..	194,734,195	23,478,156	245,579,101	35,804,242	340,483,397	40,387,418
Coffee..............do....	1,118,690,524	106,765,644	1,201,104,485	115,485,970	1,319,870,802	133,181,000
Coffee substitutes:						
Chicory root—						
Roasted, ground, or otherwise prepared, pounds..............	755,680	17,389	448	48	353,271	37,383
Total coffee substitutes.....pounds..	755,680	17,389	448	48	353,271	37,383
Fibers, vegetable:						
Cotton..........pounds..	185,204,579	23,208,960	232,801,062	40,159,342	147,061,635	40,429,526
Flax.........long tons...	4,694	1,875,701	6,939	3,508,295	7,918	4,236,232
Hemp............do....	5,310	1,156,129	6,506	1,642,418	9,635	2,487,477
Istle, or Tampico fiber, long tons..............	12,300	1,216,466	30,812	2,905,194	32,680	2,913,414
Jute and jute butts.do....	83,140	4,677,334	108,322	7,914,782	112,695	9,855,196
Kapoc.............do....	3,860	767,509	5,642	1,139,648	6,861	1,671,245
Manila.............do....	51,081	9,200,793	78,892	14,066,838	76,765	17,274,455
New Zealand flax..do....	2,944	319,936	7,180	1,130,995	7,910	1,718,740
Sisal grass.........do....	185,764	20,572,347	228,610	25,803,433	143,407	25,931,525
Other.............do....	6,697	633,802	9,313	1,348,159	10,747	1,621,474
Total vegetable fibers.	....	63,628,977	....	99,610,404	....	108,139,284

TABLE 195.—*Agricultural imports of the United States during the 3 years ending June 30, 1917*—Continued.

Article imported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—con.						
Forest products:						
Cinchona bark..pounds..	3,944,549	$561,106	3,947,320	$777,637	2,531,397	$685,936
Cork wood or cork bark...	....	2,762,895	....	3,134,884	....	3,870,389
Dyewoods, and extracts of—						
Dyewoods—						
Logwood...long tons.	55,059	742,234	134,629	3,437,698	122,794	4,137,400
Other..........do....	13,361	197,122	24,592	468,669	8,895	189,176
Total dyewoods.do..	68,420	939,356	159,221	3,906,367	131,689	4,326,576
Extracts and decoctions of...........pounds..	6,191,232	202,675	5,471,251	382,880	2,500,854	152,619
Total dyewoods, and extracts of.........	....	1,142,031	....	4,289,247	....	4,479,195
Gums—						
Camphor—						
Crude.......pounds..	3,729,207	1,003,261	4,574,430	1,236,172	6,884,950	2,101,239
Refined........do....	1,170,666	417,861	1,866,154	619,320	4,263,815	1,972,351
Chicle............do....	6,499,664	2,459,810	7,346,969	2,829,184	7,440,022	3,538,353
Copal, kauri, and damar pounds...............	27,450,545	2,821,346	44,528,856	3,587,020	41,443,760	3,402,403
Gambier, or terra japonica,.....pounds..	14,169,490	542,200	12,819,859	928,924	10,133,625	859,873
India rubber, gutta percha, etc—						
Balata......pounds..	2,472,224	963,384	2,544,405	996,102	3,287,445	1,649,452
Guayule gum..do....	5,111,849	1,441,367	2,816,068	880,813	2,854,372	764,484
Gutta-joolatong, or East Indian gum, pounds.............	14,851,264	731,995	27,858,335	1,322,262	23,376,389	1,044,022
Gutta-percha..do....	1,618,214	230,750	3,188,449	342,226	2,021,794	332,223
India-rubber...do....	172,068,428	83,030,269	267,775,557	155,044,790	333,373,711	189,328,674
Total india rubber, etc......pounds..	196,121,979	86,397,765	304,182,814	158,586,193	364,913,711	193,118,855
Shellac...........do....	24,153,363	3,016,472	25,817,509	3,302,825	32,539,522	7,623,647
Other..................	....	1,581,704	....	2,324,092	....	2,012,417
Total gums........	....	98,240,419	....	173,413,730	....	214,629,138
Ivory, vegetable,pounds..	21,059,746	510,677	32,942,115	840,464	51,699,719	1,427,780
Naval stores:						
Turpentine, spirits of, gallons...............	13,750	5,102	19,035	8,189	18,661	8,691
Tanning materials:						
Mangrove bark, long tons............	8,096	218,952	21,186	582,922	10,565	299,897
Quebracho, extract of pounds............	120,450,283	3,676,749	81,501,952	5,432,468	59,808,734	5,198,904
Quebracho wood, long tons..............	54,955	753,981	106,864	1,598,465	73,367	1,274,660
Sumac ground, pounds..............	13,165,182	323,448	21,542,390	555,276	1,637,023	365,173
Other..................	....	370,133	....	668,166	....	792,064
Total tanning materials............	....	5,343,263	....	8,837,297	....	7,930,698
Wood, not elsewhere specified—						
Brier root or brierwood and ivy or laurel root.	....	334,552	....	457,537	....	589,607
Chair cane or reed.......	....	169,181	....	265,305	....	235,400

TABLE 195.—*Agricultural imports of the United States during the 3 years ending June 30, 1917*—Continued.

Article imported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—con.						
Forest products—Con.						
Wood, not elsewhere specified—Con.						
Cabinet woods, unsawed—						
Cedar........M feet..	15,875	$947,313	14,369	$740,488	12,582	$693,673
Mahogany.....do....	42,325	2,640,705	39,855	2,781,372	42,780	2,888,615
Other...............	....	683,757	....	489,247	....	684,562
Total cabinet woods.	....	4,271,775	....	4,011,107	....	4,266,850
Logs and round timber, M feet...............	131,544	1,263,641	150,401	1,417,859	134,841	1,270,348
Lumber—						
Boards, deals, planks, and other sawed lumber.........M feet..	940,687	17,865,582	1,218,416	23,131,327	1,175,180	24,509,908
Laths...............M..	672,023	1,916,214	771,823	2,207,223	766,286	2,280,656
Shingles.............M..	1,487,116	3,104,698	1,769,333	3,593,696	1,924,139	4,568,340
Other...............	....	621,097	....	709,696	....	730,158
Total lumber.........	....	23,507,591	....	29,641,942	....	32,089,062
Pulp wood—						
Peeled............cords..	551,239	3,516,460	627,290	3,959,732	639,816	4,285,282
Rossed............do....	187,047	1,597,750	164,714	1,282,658	162,818	1,295,957
Rough.............do....	247,400	1,458,629	187,006	1,131,359	214,180	1,307,884
Rattan and reeds..........	....	771,628	....	1,720,816	....	1,171,052
All other...............	....	511,682	....	793,692	....	689,234
Total wood, n.e.s....	....	37,402,889	....	44,682,007	....	47,200,676
Wood pulp—						
Chemical—						
Bleached.long tons..	100,555	5,256,724	55,760	3,025,941	47,767	4,723,371
Unbleached .do....	300,114	11,483,268	264,882	10,693,736	381,601	30,720,219
Mechanical.....do....	187,253	3,141,119	186,406	3,148,173	270,107	7,018,404
Total wood pulp, long tons.........	587,922	19,881,111	507,048	16,867,850	699,475	42,461,994
Total forest products.............	....	165,849,493	....	252,851,305	....	322,694,497
Fruits:						
Fresh or dried—						
Bananas.....bunches..	41,091,585	13,512,960	36,754,704	12,106,158	34,661,179	12,724,198
Currants......pounds..	30,350,527	1,209,273	25,373,029	1,382,839	10,476,534	1,056,525
Dates............do....	24,949,374	420,203	31,075,424	547,433	25,485,361	622,934
Figs.............do....	20,779,730	1,024,495	7,153,250	315,831	16,479,733	704,164
Grapes.....cubic feet..	1,323,928	1,523,547	623,856	703,274	1,402,446	1,656,609
Lemons.......pounds..	....	3,730,075	....	2,062,030	....	2,163,583
Olives........gallons..	3,622,275	1,607,903	5,938,446	2,433,304	5,641,759	2,338,615
Oranges.......pounds..	....	50,022	....	89,464	....	160,710
Pineapples..............	....	1,309,750	....	964,623	....	935,906
Raisins.......pounds..	2,808,806	238,958	1,024,296	143,750	1,850,219	234,560
Other................	....	1,431,242	....	1,582,600	....	1,936,561
Total fresh or dried...	....	26,058,428	....	22,331,306	....	24,534,365
Prepared or preserved....	....	1,022,971	....	954,523	....	781,578
Total fruits.........	....	27,081,399	....	23,285,829	....	25,315,913
Grain and grain products:						
Grain—						
Corn..........bushels..	9,897,939	6,083,385	5,208,497	2,865,003	2,267,299	1,488,529
Oats.............do....	630,722	290,180	665,314	302,547	761,644	473,476
Wheat...........do....	426,469	469,847	5,703,078	5,789,321	24,138,817	41,900,498
Total grain....do....	10,955,130	6,843,412	11,576,889	8,956,871	27,167,760	43,862,503

TABLE 195.—*Agricultural imports of the United States during the 3 years ending June 30, 1917*—Continued.

Article imported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—con.						
Grain and grain products—con.						
Grain products—						
Bread and biscuit		$266,079		$213,400		$148,401
Macaroni, vermicelli, etc. ... pounds	56,542,480	3,061,337	21,789,602	1,525,695	3,472,503	262,909
Meal and flour—						
Wheat flour, barrels	64,200	309,742	329,905	1,689,418	174,704	1,458,279
Other		2,037,786		3,251,976		3,664,279
Total grain products		5,674,944		6,680,489		5,533,868
Total grain and grain products		12,518,356		15,637,360		49,396,371
Hay ... long tons	20,187	228,906	43,184	679,412	58,147	628,021
Hops ... pounds	11,651,332	2,778,735	675,704	144,627	236,849	59,291
Indigo ... do	7,975,709	1,596,978	6,599,583	8,235,670	1,776,105	3,419,873
Licorice root ... do	65,958,501	1,252,989	41,003,295	1,609,571	59,400,224	2,190,822
Liquors, alcoholic:						
Distilled spirits—						
Brandy ... proof galls	400,203	1,035,562	536,342	1,576,481	420,567	1,502,845
Cordials, liqueurs, etc., proof galls	408,090	858,599	330,452	794,553	357,311	902,696
Gin ... proof galls	742,439	717,131	805,749	749,775	263,520	439,244
Whisky ... do	1,327,759	2,641,617	1,742,197	3,677,662	1,676,151	4,404,486
Other ... do	411,236	317,413	538,759	433,098	397,934	543,620
Total distilled spirits, proof galls	3,289,727	5,570,322	3,953,499	7,231,569	3,115,483	7,792,891
Malt liquors—						
Bottled ... gallons	799,946	768,893	872,402	850,913	632,064	717,653
Unbottled ... do	2,551,158	818,505	1,740,333	605,980	1,608,113	682,843
Total malt liquors, gallons	3,351,104	1,587,398	2,612,735	1,456,893	2,240,177	1,400,496
Wines—						
Champagne and other sparkling ... doz. qts	114,630	2,004,680	206,210	3,532,022	195,714	3,442,645
Still wines—						
Bottled . doz. quarts	626,865	2,273,916	546,119	2,197,311	534,402	2,485,014
Unbottled .. gallons	3,860,273	1,968,587	3,455,756	2,267,561	3,167,400	2,558,086
Total still wines		4,242,503		4,464,872		5,043,100
Total wines		6,247,183		7,996,894		8,485,745
Total alcoholic liquors		13,404,903		16,685,356		17,679,132
Malt, barley. (*See* Grain and grain products).						
Malt liquors. (*See* Liquors, alcoholic.)						
Nursery stock:						
Plants, trees, shrubs, and vines—						
Bulbs, bulbous roots or corms, cultivated for their flowers or foliage ... M	255,700	2,375,316	231,733	2,180,687	293,318	2,886,189
Other		1,376,234		1,508,677		1,069,520
Total nursery stock		3,751,550		3,689,364		3,955,709

TABLE 195.—*Agricultural imports of the United States during the 3 years ending June 30, 1917*—Continued.

Article imported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—con.						
Nuts:						
Almonds—						
Shelled........pounds..	12,208,551	$3,100,428	13,667,766	$3,700,298	18,413,225	$4,621,100
Unshelled........do....	4,902,713	499,151	2,929,155	272,815	5,010,833	548,826
Coconuts, unshelled......	....	1,593,517	....	1,876,966	....	2,587,535
Coconut meat, broken, or copra—						
Not shredded, desiccated, or prepared, pounds..............	90,548,715	3,397,657	110,077,844	4,551,427	247,036,099	12,515,712
Shredded, desiccated, or prepared.pounds..	5,936,212	432,993	8,535,725	698,357	9,743,024	727,424
Cream and Brazil, pounds..............	16,172,581	878,272	14,798,912	917,613	14,627,742	712,433
Filberts—						
Shelled.......pounds..	1,973,192	275,026	1,133,915	230,854	2,058,732	487,021
Unshelled.......do....	11,717,370	949,099	9,785,545	819,508	11,181,301	1,354,257
Peanuts—						
Shelled..........do....	9,643,691	333,980	19,392,832	722,939	27,180,748	1,193,364
Unshelled.......do....	14,540,982	490,779	9,020,848	328,099	7,806,012	339,811
Walnuts—						
Shelled..........do....	11,107,490	2,322,754	14,228,714	3,157,933	13,058,518	3,713,340
Unshelled.......do....	22,338,348	1,661,473	22,630,220	1,899,012	25,666,844	2,497,454
Other..................	....	895,803	....	1,996,596	....	1,566,737
Total nuts...........	....	16,830,932	....	21,172,417	....	32,865,014
Oil cake..........pounds..	21,188,658	219,635	37,645,777	408,808	52,671,866	554,871
Oils, vegetable:						
Fixed or expressed—						
Cocoa butter or butterine..........pounds..	150,378	42,185	400,371	129,654	166,172	55,564
Coconut oil...pounds..	63,135,428	5,430,581	66,007,560	6,047,183	79,223,398	9,132,095
Cottonseed......do....	15,162,361	728,961	17,180,542	915,972	13,703,126	1,039,080
Flaxseed or linseed, gallons...............	535,291	248,403	50,148	33,295	110,808	76,530
Nut oil, or oil of nuts, n.e.s.—						
Chinese nut .gallons..	4,940,330	1,733,264	4,968,262	1,977,823	6,864,116	4,046,132
Peanut..........do....	852,905	581,150	1,475,123	818,283	3,026,188	2,036,592
Olive for mechanical purposes....gallons..	653,064	450,001	884,944	684,896	651,018	615,350
Olive, salad ......do....	6,710,967	8,225,485	7,224,431	9,746,672	7,533,149	10,502,671
Palm oil......pounds..	31,485,661	2,025,060	40,496,731	2,885,595	36,074,059	3,316,417
Palm kernel.....do....	4,905,852	446,763	6,760,928	512,666	1,857,038	197,237
Rapeseed.......gallons..	1,498,642	786,485	2,561,244	1,426,659	1,084,905	645,090
Soya bean....pounds..	19,206,521	899,819	98,119,695	5,128,200	162,690,235	11,410,606
Other..................	....	212,116	....	516,500	....	474,390
Total fixed or expressed............	....	21,810,273	....	30,823,398	....	43,547,754
Volatile or essential—						
Birch and cajeput......	....	(1)	....	22,175	....	33,302
Lemon........pounds..	577,595	600,642	543,857	441,910	449,735	373,933
Other..................	....	2,370,364	....	2,645,571	....	3,038,177
Total volatile or essential............	....	2,971,006	....	3,109,656	....	3,445,412
Total vegetable oils...	....	24,781,279	....	33,933,054	....	46,993,166
Opium, crude.....pounds..	484,027	2,445,005	146,658	879,699	86,812	843,418

TABLE 195.—*Agricultural imports of the United States during the 3 years ending June 30, 1917*—Continued.

Article imported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—con.						
Rice, rice meal, etc.:						
Rice—						
Cleaned.......pounds..	112,118,326	$2,655,739	121,023,906	$2,867,453	97,453,036	$2,735,702
Uncleaned, including paddy......pounds..	90,241,834	2,340,968	87,671,332	2,215,273	80,865,798	2,290,173
Rice flour, rice meal, and broken rice, pounds..........	74,831,312	1,307,509	55,628,767	1,010,885	37,730,024	747,922
Total rice, etc., pounds.........	277,191,472	6,304,216	264,324,005	6,093,611	216,048,858	5,773,797
Sago, tapioca, etc..........	....	1,434,219	....	2,226,697	....	3,712,956
Seeds:						
Castor beans or seeds, bushels..........	924,604	993,577	1,071,963	1,555,899	766,857	1,184,985
Clover—						
Red..........pounds..	8,749,757	1,072,468	33,476,401	4,918,171	5,971,267	936,092
Other............do....	15,406,954	1,162,810	8,363,360	822,572	12,200,892	1,569,782
Flaxseed or linseed, bushels..........	10,666,215	13,374,536	14,679,233	20,220,921	12,393,988	25,149,669
Grass seed, n.e.s. pounds..	34,690,259	1,384,372	8,790,920	698,630	9,187,613	849,630
Sugar beet.........do....	15,882,661	1,409,973	9,042,490	1,030,788	14,469,774	1,684,867
Other..........	....	3,657,084	....	4,324,779	....	4,501,640
Total seeds..........	....	23,054,820	....	33,571,760	....	35,879,665
Spices:						
Unground—						
Cassia, or cassia vera, pounds..........	5,786,324	357,071	9,707,982	623,478	8,744,044	740,846
Ginger root, not preserved......pounds..	3,127,722	150,515	7,322,399	540,007	2,590,279	243,962
Pepper, black or white, pounds..........	30,267,384	3,086,782	37,389,324	4,505,380	23,961,966	3,636,049
Other.........pounds..	6,438	387	....	....	....	....
Total unground, pounds..........	39,187,868	3,594,755	54,419,705	5,668,865	35,296,289	4,620,857
Ground.........pounds..	20,902,214	2,332,604	28,098,084	3,279,864	23,220,288	3,123,286
Total spices....do....	60,090,082	5,927,359	82,517,789	8,948,729	58,516,577	7,744,143
Spirits, distilled. (*See* Liquors, alcoholic.)						
Starch............pounds..	13,233,383	343,805	2,467,038	123,838	20,647,893	973,530
Sugar and molasses:						
Molasses.........gallons..	70,839,623	1,963,505	85,716,673	3,775,894	110,237,888	10,946,571
Sugar—						
Raw—						
Beet........pounds..	877,623	29,386	2,050	174	28,847	1,443
Cane...........do....	5,418,630,482	173,837,646	5,631,272,766	208,572,890	5,329,587,360	230,574,221
Maple sugar and sirup......pounds..	1,473,762	125,571	1,886,933	196,335	3,129,647	370,030
Total raw..do....	5,420,981,867	173,992,603	5,633,161,749	208,769,399	5,332,745,854	230,945,694
Total sugar and molasses.......	....	175,956,108	....	212,545,293	....	241,892,265
Tea..............pounds..	96,987,942	17,512,619	109,865,935	20,599,857	103,364,410	19,265,264
Tea, waste., etc., for manufacturing........pounds..	4,230,456	137,155	4,794,542	200,115	7,975,343	494,280

TABLE 195.—*Agricultural imports of the United States during the 3 years ending June 30, 1917*—Continued.

Article imported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—con.						
Tobacco:						
Leaf—						
Wrapper......pounds..	7,241,178	$9,267,044	5,070,308	$7,246,942	3,941,936	$5,298,995
Filler and other leaf, pounds..............	38,568,035	17,893,526	43,007,648	17,382,253	42,194,411	20,182,984
Total tobacco, pounds.........	45,809,213	27,160,570	48,077,956	24,629,195	46,136,347	25,481,979
Vanilla beans.....pounds..	888,569	1,863,515	914,386	1,697,543	799,893	1,662,578
Vegetables:						
Fresh and dried—						
Beans.........bushels..	905,647	1,461,917	662,759	1,288,034	3,747,993	12,137,048
Onions..........do....	829,177	657,374	815,872	749,150	1,757,918	1,820,396
Peas, dried......do....	546,903	1,305,633	940,321	2,868,683	1,163,021	3,035,052
Potatoes.........do....	270,942	274,915	209,532	331,814	3,079,025	4,705,812
Other..................	....	1,350,101	....	1,907,879	....	2,668,321
Total fresh and dried.	....	5,049,940	....	7,145,560	....	24,366,629
Prepared or preserved—						
Mushrooms...pounds..	6,195,819	885,653	4,313,095	985,408	4,384,788	1,463,164
Pickles and sauces.....	....	839,916	....	515,048	....	1,179,959
Other..................	....	2,554,223	....	2,165,377	....	2,141,137
Total prepared or preserved.............	....	4,279,792	....	3,665,833	....	4,784,260
Total vegetables......	....	9,329,732	....	10,811,393	....	29,150,889
Vinegar...........gallons..	249,645	73,361	234,396	76,308	203,504	88,037
Wax, vegetable...pounds..	5,634,809	1,012,402	9,727,312	1,580,530	7,216,103	1,739,199
Wines. (*See* Liquors, alcoholic.)						
Total vegetable matter, including forest products..........	....	739,850,499	....	958,548,891	....	1,166,032,420
Total vegetable matter, excluding forest products...........	....	574,001,006	....	705,697,589	....	843,337,923
Total agricultural imports, including forest products........	....	1,076,635,782	....	1,442,556,135	....	1,726,495,728
Total agricultural imports, excluding forest products........	....	910,786,289	....	1,189,704,830	....	1,403,801,231

TABLE 196.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1917.*

Article exported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
ANIMAL MATTER.						
Animals, live:						
Cattle..........number..	5,484	$702,847	21,287	$2,378,248	13,387	$949,503
Horses............do....	289,340	64,046,534	357,553	73,531,146	278,674	59,525,329
Mules.............do....	65,788	12,726,143	111,915	22,960,312	136,689	27,800,854
Sheep.............do....	47,213	182,278	52,278	231,535	58,752	367,477
Swine.............do....	7,799	93,067	22,048	238,718	21,936	347,951
Others (including fowls)..	....	202,817	....	331,337	....	391,840
Total live animals....	....	77,953,686	....	99,671,296	....	89,382,954
Beeswax..........pounds..	181,328	57,971	147,772	48,252	383,722	131,698
Dairy products:						
Butter............do....	9,850,704	2,392,480	13,487,481	3,590,105	26,835,092	8,749,170
Cheese............do....	55,362,917	8,463,174	44,394,301	7,430,089	66,087,213	15,244,364
Milk—						
Condensed.......do....	37,235,627	3,066,642	159,577,620	12,712,952	259,102,213	25,129,983
Other, including cream.	....	343,583	....	524,426	....	283,467
Total dairy products, pounds...........	....	14,265,879	....	24,257,572	....	49,406,984
Eggs.............dozens..	20,784,424	5,003,764	26,396,206	6,134,441	24,946,424	7,570,411
Egg yolks................	....	88,865	....	210,255	....	72,491
Feathers.................	....	281,806	....	312,113	....	368,862
Fibers, animal:						
Silk waste......pounds..	32,285	8,403	76,596	54,017	21,782	13,418
Wool..............do....	8,158,300	2,216,187	4,418,915	2,264,320	2,148,350	1,230,296
Total animal fibers...	8,190,585	2,224,590	4,495,511	2,318,337	2,170,132	1,243,714
Glue.............pounds..	2,874,225	298,136	4,946,228	531,329	4,048,104	515,320
Honey....................	....	114,038	....	252,487	....	736,139
Packing-house products:						
Beef—						
Canned.......pounds..	75,243,261	11,973,530	50,803,765	9,439,066	67,576,725	16,966,030
Cured or pickled.do....	31,874,743	3,382,670	38,114,682	4,034,195	58,693,667	6,728,359
Fresh............do....	170,440,934	21,731,633	231,214,000	28,885,999	197,181,101	26,277,271
Oils—oleo oil....do....	80,481,946	9,341,188	102,645,914	12,469,115	67,113,421	11,067,505
Oleomargarine...do....	5,252,183	617,035	5,426,221	640,480	5,651,267	901,659
Tallow..........do....	20,239,988	1,386,445	16,288,743	1,326,472	15,256,844	1,805,743
Total beef.....do....	383,533,055	48,432,501	444,493,325	56,795,327	411,473,025	63,746,567
Bones, and manufactures of......................	....	34,796	....	67,536	....	103,477
Grease, grease scraps, and all soap stock—						
Lubricating............	....	2,384,395	....	3,994,436	....	2,811,998
Soap stock.............	....	4,266,097	....	3,156,568	....	3,405,152
Hair.....................	....	1,402,189	....	2,038,838	....	1,451,354
Hides and skins, other than furs—						
Calfskins.....pounds..	1,074,529	248,547	1,574,369	469,632	1,374,038	549,459
Cattle hides.....do....	21,135,730	4,013,172	13,284,190	2,938,925	7,434,961	2,066,357
Horse...........do....	605,054	67,798	266,743	34,481	179,704	32,900
Other...........do....	2,117,867	356,207	1,966,717	432,208	1,077,332	366,002
Total.........do....	24,933,180	4,685,724	17,092,019	3,875,251	10,066,035	3,014,718
Hoofs, horns, and horn tips, strips, and waste..	....	16,182	....	37,558	....	39,804
Lard compounds, pounds................	69,980,614	6,045,752	52,843,311	5,147,434	56,279,393	8,269,844
Meat, canned, n. e. s.....	....	2,192,464	....	2,835,005	....	4,322,280
Mutton.........pounds..	3,877,413	448,221	5,552,918	696,882	3,195,576	481,526
Oils, animal, n. e. s., gallons................	559,197	405,635	655,587	492,964	430,566	398,114
Pork—						
Canned.......pounds..	4,644,418	745,928	9,610,732	1,815,586	5,898,126	1,645,605

TABLE 196.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1917*—Continued.

Article exported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
ANIMAL MATTER—contd.						
Packing-house products—Continued.						
Pork—Continued.						
Cured—						
Bacon........pounds..	346,718,227	47,326,129	579,808,786	78,615,616	667,156,061	117,2[illegible]1,683
Hams and shoulders, pounds............	203,701,114	29,049,931	282,208,611	40,303,022	266,655,5[illegible]1	50,474,041
Salted or pickled, pounds............	45,655,574	4,911,307	63,460,713	6,752,356	47,0[illegible]1,[illegible]21	6,942,186
Total cured, pounds........	596,0[illegible]4,915	81,287,367	925,478,110	126,170,9[illegible]4	980,81[illegible],263	174,6[illegible]7,910
Fresh............do....	3,908,193	473,801	63,005,524	7,523,408	50,429,275	8,875,013
Lard............do....	475,531,908	52,440,133	427,011,338	47,634,[illegible]76	444,78[illegible],[illegible]21	77,012,830
Lard, neutral....do....	26,021,054	3,022,321	34,426,590	4,046,397	17,548,[illegible]59	3,164,172
Oils—lard oil..gallons..	184,019	111,637	421,969	309,836	331,269	322,813
Total pork...........	....	138,081,187	....	187,500,597	....	265,658,343
Sausage and sausage meats—						
Canned.......pounds..	1,821,958	307,726	6,823,085	1,269,866	6,294,950	1,311,320
Other............do....	5,183,525	845,661	8,590,236	1,732,231	9,134,471	2,441,510
Sausage casings....do....	30,818,551	4,859,815	14,708,893	2,867,681	6,117,560	1,741,959
Stearin............do....	11,457,907	1,083,665	13,062,247	1,461,661	12,936,35[illegible]	1,798,317
All other................	....	2,412,842	....	5,083,862	....	3,960,566
Total packing-house products..........	....	217,904,852	....	279,053,697	....	364,956,849
Poultry and game..........	....	1,187,771	....	1,561,398	....	1,327,348
Silk waste. (*See* Fibers, animal.)						
Wool. (*See* Fibers, animal.)						
Total animal matter..	....	319,381,358	....	414,351,177	....	515,712,770
VEGETABLE MATTER.						
Breadstuffs. (*See* Grain and grain products.)						
Broom corn.....long tons..	3,764	368,051	3,698	454,749	3,218	684,673
Cocoa, ground or prepared, and chocolate...........	....	1,934,166	....	1,668,657	....	3,451,518
Coffee:						
Green or raw...pounds..	49,177,146	6,841,575	35,333,483	5,361,055	42,970,581	6,412,486
Roasted or prepared, pounds............	2,421,664	461,030	1,860,800	378,268	2,151,226	436,519
Total coffee....do....	51,598,810	7,302,605	37,194,283	5,739,323	45,121,807	6,849,005
Cotton:						
Sea Island.....bales....	6,158	484,465	4,247	483,184	2,311	458,728
Sea Island.....pounds..	2,437,602		1,731,796		943,864	
Upland........bales....	8,201,189	372,068,490	5,698,960	364,710,378	5,470,150	518,530,999
Upland........pounds..	4,288,295,926		2,956,810,277		2,850,149,189	
Linters........bales....	218,950	3,665,017	252,627	8,992,685	474,704	24,110,815
Linters........pounds..	112,844,971		125,528,052		236,974,152	
Total cotton...do......	4,403,578,499	376,217,972	3,084,070,125	374,186,247	3,088,067,205	543,100,542
Flavoring extracts and fruit juices....................	....	136,742	....	466,914	....	581,573
Flowers, cut..................	....	56,698	....	86,407	....	105,592
Forest products:						
Bark, and extract of, for tanning—						
Bark.......long tons..	825	21,424	5,226	123,675	1,850	49,907
Bark, extracts of.......	....	2,226,457	....	5,902,799	....	3,908,573
Total bark, etc.......	....	2,247,881	....	6,026,474	....	3,958,480

TABLE 196.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1917*—Continued.

Article exported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—con.						
Forest products—Contd.						
Charcoal		$105,009		$94,096		$155,470
Moss		36,738		54,720		82,881
Naval stores—						
Rosin.........barrels..	1,372,316	6,220,321	1,571,279	8,874,313	1,634,430	10,731,972
Tar, turpentine, and pitch........barrels..	239,661	430,612	67,963	291,731	103,655	566,896
Turpentine, spirits of, gallons	9,464,120	4,476,306	9,310,268	4,337,563	8,833,972	4,308,443
Total naval stores..		11,127,239		13,503,607		15,607,311
Wood—						
Logs—						
Hickory......M feet..	2,020	73,786	2,294	75,888	257	13,334
Oak............do....	226	10,563	2,019	53,668	842	27,814
Walnut.........do....	1,090	78,338	1,083	88,255	1,604	167,350
Other..........do....	41,175	720,836	38,996	757,761	48,533	784,151
Total........do....	44,511	883,523	44,392	975,572	51,236	992,649
Lumber—						
Boards, deals, and planks—						
Cyprus.....M feet..	10,078	319,065	10,521	366,510	8,589	284,241
Fir...........do....	368,886	4,251,620	268,455	2,964,948	291,137	3,771,887
Gum.........do....	24,588	715,756	32,185	969,338	19,295	548,622
Oak..........do....	97,397	4,870,864	98,990	4,665,527	54,183	2,335,789
Pine—						
White.....do....	18,398	662,786	34,267	1,140,247	25,623	957,902
Yellow—						
Pitch pine, M feet........	403,254	7,565,272	504,926	9,149,824	403,186	8,332,957
Short-leaf pine, M feet........	5,261	160,219	2,185	79,147	3,042	66,028
Other pine, M feet........	49,716	1,123,212	47,276	1,156,439	64,915	1,539,668
Poplar.....M feet..	19,891	962,248	23,356	1,044,883	7,339	324,666
Redwood....do....	36,419	1,102,532	38,739	1,169,975	23,398	736,643
Spruce........do....	15,610	462,087	37,332	1,612,892	57,895	3,154,836
Other.........do....	79,707	2,925,984	79,099	3,649,360	86,397	5,056,343
Total......do....	1,129,205	25,121,645	1,177,331	27,969,090	1,044,999	27,109,582
Joists and scantling, M feet	6,007	103,456				
Railroad ties, number	3,874,298	2,036,200	4,094,265	2,439,094	3,936,107	2,369,834
Shingles...........M..	11,291	30,578	20,590	55,604	26,212	94,456
Shooks—						
Box......number..	11,682,495	1,303,127	[1]	1,908,643	[1]	2,029,323
Other.........do....	620,043	1,024,093	611,556	1,125,689	10,070,343	2,304,347
Total shooks, ...number..	12,302,538	2,327,220	[1]	3,034,332	[1]	4,333,670
Staves and heading—						
Heading		258,670		288,587		287,174
Staves....number..	39,297,268	2,481,592	57,537,610	3,529,181	61,455,882	3,919,562
Total staves and heading........		2,740,262		3,817,768		4,206,736
Other		1,650,760		3,393,448		2,896,375
Total number....		34,010,121		40,709,336		41,010,653

[1] Not stated.

TABLE 196.—*Agricultural exports of the United States during the 3 years ending June 30, 1917*—Continued.

Article exported.	Year ending June 30— 1915 Quantity.	1915 Value.	1916 Quantity.	1916 Value.	1917 (preliminary). Quantity.	1917 (preliminary). Value.
VEGETABLE MATTER—con.						
Forest products—Contd.						
Wood—Continued.						
Timber—						
Hewn........M feet..	6,118	163,106	9,628	252,576	7,615	214,267
Sawed—						
Pitch pine...do....	159,064	2,785,379	175,763	3,473,686	149,529	3,369,566
Other........do....	8,607	229,491	15,814	340,345	27,545	628,762
Total timber, M feet..........	173,789	3,177,976	201,205	4,066,607	184,689	4,212,595
All other, including firewood............	....	156,234	....	164,532	....	203,532
Total wood.......	....	38,227,854	....	45,916,047	....	46,419,429
Wood alcohol....gallons..	944,374	438,846	1,472,258	857,161	825,394	646,939
Wood pulp.....pounds..	18,838,400	369,969	[1] 35,994	1,703,374	[1] 26,056	2,018,974
Total forest products.	....	52,553,536	....	68,155,479	....	68,889,484
Fruits:						
Fresh or dried—						
Apples, dried.pounds..	42,589,169	3,270,658	16,219,174	1,304,224	10,530,474	803,617
Apples, fresh..barrels..	2,351,501	8,087,466	1,466,321	5,518,772	1,739,997	7,978,536
Apricots, dried, pounds..............	23,764,342	2,241,061	23,939,790	2,168,808	9,843,719	1,298,176
Berries................	....	535,479	....	639,476	....	823,974
Lemons.........boxes..	122,914	372,781	175,070	493,919	174,938	626,270
Oranges..........do....	1,759,405	3,851,013	1,575,042	3,690,080	1,850,692	4,397,120
Peaches, dried, pounds..............	14,464,655	834,813	13,739,342	893,587	8,187,588	603,620
Pears, fresh............	....	992,497	....	691,732	....	1,356,259
Prunes........pounds..	43,478,892	3,274,197	57,422,827	3,975,396	59,645,141	4,934,329
Raisins..........do....	24,845,414	1,718,547	75,014,753	5,407,219	51,992,514	4,409,639
Other..................	....	2,717,449	....	3,261,109	....	3,610,365
Total fresh or dried...	....	27,895,961	....	28,044,322	....	30,841,905
Preserved—						
Canned..................	....	6,064,765	....	7,050,061	....	6,137,695
Other...................	....	269,180	....	978,568	....	673,560
Total preserved......	....	6,333,945	....	8,028,629	....	6,811,255
Total fruits..........	....	34,229,906	....	36,072,951	....	37,653,160
Ginseng...........pounds..	103,184	919,931	256,082	1,597,508	198,483	1,386,208
Glucose and grape sugar:						
Glucose.........pounds..	125,434,878	3,103,561	148,523,098	3,772,860	170,025,606	5,960,586
Grape sugar.......do....	33,027,630	781,672	37,883,084	962,101	44,997,709	1,400,645
Grain and grain products:						
Grain—						
Barley........bushels..	26,754,522	18,184,079	27,473,160	20,663,533	16,381,077	19,027,032
Buckwheat......do....	413,643	396,987	515,304	481,014	260,098	350,587
Corn.............do....	48,786,291	39,339,064	38,217,012	30,780,887	64,720,742	72,497,204
Oats.............do....	96,809,551	57,469,964	95,918,884	47,985,790	88,944,401	55,034,981
Rye..............do....	12,544,888	14,733,409	14,532,437	15,374,499	13,260,043	21,694,666
Wheat...........do....	259,642,533	333,552,226	173,274,015	215,532,681	149,837,427	298,179,725
Total grain.....do....	444,951,428	463,675,729	349,930,812	330,818,404	333,403,788	466,784,195
Grain products—						
Bran and middlings, long tons............	11,426	329,425	14,613	432,288	7,427	279,617

[1] Long tons (2,240 pounds).

TABLE 196.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1917*—Continued.

Article exported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—con.						
Grain and grain products—Continued.						
Grain products—Cont'd.						
Breadstuff preparations—						
Bread and biscuit, pounds	11,687,452	$702,509	11,403,079	$787,685	11,743,095	$1,115,359
Other		4,306,899		5,074,983		7,702,668
Total breadstuff preparations		5,009,408		5,862,668		8,818,027
Distillers' and brewers' grains and malt sprouts....long tons..	7,590	177,987	1,633	47,448	1,505	47,809
Malt..........bushels..	2,153,060	2,301,535	3,682,248	3,881,760	4,330,297	5,868,787
Meal and flour—						
Corn meal...barrels..	470,503	1,923,214	419,979	1,601,258	508,113	2,757,326
Oatmeal....pounds..	68,394,979	2,416,068	54,748,747	1,885,622	110,911,469	4,491,303
Rye flour....barrels..	80,315	416,182	119,619	646,941	73,914	525,347
Wheat flour...do....	16,182,765	94,869,343	15,520,669	87,337,805	11,942,505	93,202,069
Total meal and flour		99,624,807		91,471,626		100,976,045
Mill feed....long tons..	25,459	787,048	25,602	801,054	46,115	1,693,842
All other		1,015,396		1,293,091		1,133,586
Total grain products.		109,275,606		103,789,875		118,817,713
Total grain and grain products		572,951,335		434,608,279		585,601,908
Hay............long tons..	105,508	1,980,297	178,336	3,267,028	85,529	1,685,836
Hops.............pounds..	16,210,443	3,948,020	22,409,818	4,386,929	4,874,876	775,621
Lard compounds. (*See* Meat and meat products.)						
Liquors, alcoholic:						
Distilled spirits—						
Alcohol, including cologne spirits, proof gallons	200,455	108,985	24,433,243	8,784,742	51,944,062	16,027,867
Rum....proof gallons..	1,240,804	1,588,552	1,586,900	1,887,307	1,371,228	1,521,559
Whisky—						
Bourbon........do....	34,823	69,497	88,802	113,863	59,611	73,942
Rye............do....	86,564	168,386	124,700	208,879	139,619	249,550
Total whisky.do....	121,387	237,883	213,502	322,742	199,230	323,492
Other............do....	30,152	46,599	50,259	67,595	515,113	627,575
Total distilled spirits, proof gallons	1,592,798	1,982,019	26,283,904	11,062,386	54,029,633	18,500,493
Malt liquors—						
Bottled..dozen quarts..	696,690	1,010,222	674,745	969,071	966,085	1,377,098
Unbottled.....gallons..	245,494	71,890	328,229	95,556	254,685	64,932
Total malt liquors....		1,082,112		1,064,627		1,442,030
Wines...........gallons..	819,310	332,369	1,133,274	450,598	2,250,037	933,427
Total alcoholic liquors		3,396,500		12,577,611		20,875,950
Malt. (*See* Grain and grain products.)						
Malt liquors. (*See* Liquors, alcoholic.)						

TABLE 196.—*Agricultural exports of the United States during the 3 years ending June 30, 1917*—Continued.

Article exported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—con.						
Malt sprouts. (*See* Grain and grain products.)						
Nursery stock		$170,218		$203,671		$219,618
Nuts:						
Peanuts........pounds..	5,875,076	325,725	8,669,430	450,765	22,413,297	1,336,638
Other		377,486		441,512		404,399
Total nuts		703,211		892,277		1,741,037
Oil cake and oil-cake meal:						
Corn............pounds..	45,026,125	798,206	18,996,490	297,041	15,739,812	289,793
Cottonseed:						
Cake.............do....	1,222,699,889	15,432,126	980,664,572	14,749,489	864,862,375	15,059,920
Meal.............do....	256,365,126	3,474,244	76,556,997	1,169,478	285,297,316	5,286,091
Flaxseed or linseed.do....	524,794,434	9,048,061	640,916,196	11,935,129	536,976,419	10,252,355
Other.............do....	9,900,878	126,414	28,876,367	410,166	21,558,676	398,681
Total..........do....	2,058,786,452	28,879,051	1,746,010,622	28,561,303	1,724,434,598	31,286,840
Oils, vegetable:						
Fixed or expressed—						
Corn..........pounds..	17,789,635	1,302,159	8,967,826	770,076	8,779,760	998,105
Cottonseed.......do....	318,366,525	21,872,948	266,512,057	22,658,610	158,985,642	19,878,658
Linseed.......gallons..	1,212,133	660,089	714,120	478,231	1,201,746	1,117,855
Other		1,198,852		2,230,002		3,003,875
Total fixed or expressed		25,034,048		26,136,919		24,998,493
Volatile, or essential—						
Peppermint..pounds..	184,981	384,593	154,096	323,070	100,332	218,627
Other		413,104		705,037		1,062,899
Total volatile, or essential		797,697		1,028,107		1,281,526
Total vegetable oils..		25,831,745		27,165,026		26,280,019
Rice, rice meal, etc.:						
Rice............pounds..	75,448,635	3,158,335	120,695,213	4,942,373	180,484,685	9,501,602
Rice bran, meal, and polish.........pounds..	2,031,430	15,541	1,272,252	10,371	750	14
Rice hulls		5,122		857		556
Total		3,178,998		4,953,601		9,502,172
Roots, herbs, and barks, n. e. s		470,090		768,977		852,251
Seeds:						
Cotton seed.....pounds..	6,314,439	94,237	2,475,907	37,811	1,001,369	35,434
Flaxseed, or linseed, bushels	4,145	9,748	2,614	6,501	1,020	3,684
Grass and clover seed—						
Clover..........pounds..	9,750,064	1,563,304	7,116,220	1,294,944	5,886,943	1,092,525
Timothy........do....	17,333,144	1,153,066	13,610,257	1,038,301	15,139,913	937,820
Other...........do....	4,342,926	451,595	3,613,026	401,925	5,665,547	701,101
Total grass and clover seed...pounds..	31,426,134	3,167,965	24,339,503	2,735,170	26,692,403	2,731,446
All other seeds		589,114		759,026		1,231,159
Total seeds		3,861,064		3,538,508		4,001,723
Spices		76,297		250,827		287,484
Spirits, distilled. (*See* Liquors, alcoholic.)						

TABLE 196.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1917*—Continued.

Article exported.	Year ending June 30—					
	1915		1916		1917 (preliminary).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—con.						
Starch............pounds..	107,036,638	$2,939,453	210,185,192	$5,576,914	146,424,342	$4,721,567
Stearin, vegetable....do....	1,824,011	144,850	1,455,341	158,481	1,321,773	179,092
Straw...........long tons..	260	4,911	980	10,989	1,098	12,951
Sugar, molasses, and sirup:						
Molasses.........gallons..	1,148,741	145,274	4,387,369	524,861	2,892,061	443,112
Sirup..............do....	11,439,133	1,653,495	10,031,693	2,107,068	10,328,023	4,090,150
Sugar—						
Refined.......pounds..	549,007,411	25,615,016	1,630,150,863	79,390,147	1,248,840,336	77,090,608
Total sugar, molasses, and sirup......	....	27,413,785	....	82,022,076	....	81,623,870
Tobacco:						
Leaf............pounds..	347,997,276	44,479,890	436,466,512	53,014,852	406,425,777	59,787,266
Stems and trimmings, pounds..................	348,815	13,939	6,826,644	350,343	5,172,639	166,973
Total.......pounds..	348,346,091	44,493,829	443,293,156	53,365,195	411,598,416	59,954,239
Vegetables:						
Fresh or dried—						
Beans and peas, bushels................	1,214,281	3,638,526	1,760,383	5,914,198	2,164,943	10,427,742
Onions.......bushels..	727,983	602,585	563,739	578,792	409,301	749,959
Potatoes.........do....	3,135,474	2,345,731	4,017,760	3,485,740	2,489,001	3,514,379
Total fresh or dried, bushels.............	5,077,738	6,586,842	6,341,882	9,978,730	5,063,245	14,692,080
Prepared or preserved—						
Canned.................	....	1,898,840	....	2,529,694	....	4,765,136
Pickles and sauces.....	....	959,016	....	1,166,811	....	821,151
Other..................	....	1,368,453	....	2,277,177	....	2,012,343
Total prepared or preserved..........	....	4,226,309	....	5,973,682	....	7,598,630
Total vegetables......	....	10,813,151	....	15,952,412	....	22,290,710
Vinegar...........gallons..	106,708	17,731	225,162	33,635	284,837	48,896
Wines. (*See* Liquors, alcoholic.)						
Yeast......................	....	230,409	....	418,817	....	1,021,651
Total vegetable matter, including forest products............	....	1,209,109,785	....	1,171,875,752	....	1,523,026,421
Total vegetable matter, excluding forest products............	....	1,156,556,249	....	1,103,720,273	....	1,454,136,937
Total agricultural exports, including forest products..........	....	1,528,491,143	....	1,586,226,929	....	2,038,739,191
Total agricultural exports, excluding forest products.....	....	1,475,937,607	....	1,518,071,450	....	1,969,849,707

TABLE 197.—*Foreign trade of the United States in agricultural products, 1852–1917.*

[Compiled from reports of Foreign Commerce and Navigation of the United States. All values are gold.]

Year ending June 30—	Agricultural exports.[1] Domestic. Total.	Agricultural exports.[1] Domestic. Percentage of all exports.	Agricultural exports.[1] Foreign.	Agricultural imports.[1] Total.	Agricultural imports.[1] Percentage of all imports.	Excess of agricultural exports (+) or of imports (−).
Average:						
1852–1856	$164,895,146	80.9	$8,059,875	$77,847,158	29.1	+$95,107,863
1857–1861	215,708,845	81.1	10,173,833	121,018,143	38.2	+104,864,535
1862–1866	148,865,540	75.7	9,287,669	122,221,547	43.0	+ 35,931,662
1867–1871	250,713,058	76.9	8,538,101	179,774,000	42.3	+ 79,477,159
1872–1876	396,666,397	78.5	8,853,247	263,155.573	46.5	+142,364,071
1877–1881	591,350,518	80.4	8,631,780	266,383,702	50.4	+333,598,596
1882–1886	557,472,922	76.3	9,340,463	311,707,564	46.8	+255,105,821
1887–1891	573,286,616	74.7	6,982,328	366,950,109	43.3	+213,318,835
1892–1896	638,748,318	73.0	8,446,491	398,332,043	51.6	+248,862,766
1897–1901	827,566,147	65.9	10,961,539	376,549,697	50.2	+461,977,989
1902–1906	879,541,247	59.5	11,922,292	487,881,038	46.3	+403,582,501
1907–1911	975,398,554	53.9	12,126,228	634,570,734	45.2	+352,954,048
1901	951,628,331	65.2	11,293,045	391,931,051	47.6	+570,990,325
1902	857,113,533	63.2	10,308,306	413,744,557	45.8	+453,677,282
1903	878,480,557	63.1	13,505,343	456,199,325	44.5	+435,786,575
1904	859,160,264	59.9	12,625,036	461,434,851	46.6	+410,350,439
1905	826,904,777	55.4	12,316,525	553,851,214	49.6	+285,370,088
1906	976,047,104	56.8	10,856,259	554,175,242	45.2	+432,728,121
1907	1,054,405,416	56.9	11,613,519	626,836,808	43.7	+439,182,127
1908	1,017,396,404	55.5	10,298,514	539,690,121	45.2	+488,004,797
1909	903,238,122	55.1	9,584,934	638,612,692	48.7	+274,210,364
1910	871,158,425	50.9	14,469,627	687,509,115	44.2	+198,118,937
1911	1,030,794,402	51.2	14,664,548	680,204,932	44.5	+365,254,018
1912	1,050,627,131	48.4	12,107,656	783,457,471	47.4	+279,277,316
1913	1,123,651,985	46.3	15,029,444	815,300,510	45.0	+323,380,919
1914	1,113,973,635	47.8	17,729,462	924,247,116	48.8	+207,456,481
1915	1,475,937,607	54.3	34,420,077	910,786,289	54.4	+599,571,395
1916	1,518,071,450	35.5	42,087,535	1,189,704,830	54.1	+370,454,155
1917 (preliminary)	1,969,849,707	31.6	11,171,518	1,403,801,231	52.8	+577,219,994

[1] Not including forest products.

TABLE 198.—*Value of principal groups of farm and forest products exported from and imported into the United States, 1915–1917.*

[Compiled from reports on the Foreign Commerce of the United States.]

Article.	Exports (domestic merchandise). Year ending June 30— 1915	Exports 1916	Exports 1917 (prel.).	Imports. Year ending June 30— 1915	Imports 1916	Imports 1917 (prel.).
FARM PRODUCTS.						
ANIMAL MATTER.						
Animals, live	$77,953,686	$99,671,296	$89,382,954	$22,279,081	$18,649,079	$16,602,859
Dairy products	14,265,879	24,257,572	49,406,984	14,704,277	9,828,919	7,071,113
Eggs	5,003,764	6,134,441	7,570,411	438,760	110,638	268,286
Feathers and downs, crude	281,806	312,113	368,862	2,502,623	2,721,151	1,479,216
Fibers, animal:						
Silk	8,403	54,017	13,418	83,130,557	124,333,655	160,571,808
Wool	2,216,187	2,264,320	1,230,296	68,242,568	142,420,734	131,137,170
Packing-house products	217,904,852	279,053,697	364,956,849	142,484,247	183,611,351	239,129,197
Other animal matter	1,746,781	2,603,721	2,782,996	3,003,170	2,331,714	4,203,659
Total animal matter	319,381,358	414,351,177	515,712,770	336,785,283	484,007,241	560,463,308

TABLE 198.—*Value of principal groups of farm and forest products exported from and imported into the United States, 1915–1917*—Continued.

[Compiled from reports on the Foreign Commerce of the United States.]

Article	Exports (domestic merchandise).			Imports.		
	Year ending June 30—					
	1915	1916	1917 (prel.).	1915	1916	1917 (prel.).
FARM PRODUCTS—Con.						
VEGETABLE MATTER.						
Argols or wine lees	....	....	....	$3,094,380	$5,306,246	$3,824,882
Cocoa and chocolate	$1,934,166	$1,668,657	$3,451,518	23,478,156	35,804,242	40,387,418
Coffee	7,302,605	5,739,323	6,849,005	106,765,644	115,485,970	133,184,000
Cotton	376,217,972	374,186,247	543,100,542	23,208,960	40,150,342	40,429,526
Fibers, vegetable, other	....	....	....	40,420,017	59,460,062	67,709,758
Fruits	34,229,906	36,072,951	37,653,160	27,081,399	23,285,829	25,315,943
Ginseng	919,931	1,597,508	1,386,208	....	....	....
Glucose and grape sugar	3,885,233	4,734,961	7,361,231	....	....	....
Grain and grain products	572,951,335	434,608,279	585,601,908	12,518,356	15,637,360	49,306,371
Hay	1,980,297	3,267,028	1,685,836	228,906	679,412	628,021
Hops	3,948,020	4,386,929	775,621	2,778,735	144,627	59,291
Indigo	....	....	....	1,596,978	8,235,670	3,419,873
Licorice root	....	....	....	1,252,989	1,609,571	2,190,822
Liquors, alcoholic	3,396,500	12,577,611	20,875,950	13,404,903	16,685,356	17,679,132
Nursery stock (plants, trees, etc.)	170,218	203,671	219,618	3,751,550	3,689,364	3,955,709
Nuts	703,211	892,277	1,741,037	16,830,932	21,172,417	32,865,014
Oil cake and oil cake meal	28,879,051	28,561,303	31,286,840	219,635	408,808	554,871
Oil, vegetable	25,831,745	27,165,026	26,280,019	24,781,279	33,933,054	46,993,166
Opium, crude	....	....	....	2,445,005	879,699	843,418
Rice, rice flour, meal, and broken rice	3,178,998	4,953,601	9,502,172	6,304,216	6,093,611	5,773,797
Sago, tapioca, etc	....	....	....	1,434,219	2,226,697	3,712,956
Seeds	3,861,064	3,538,508	4,001,723	23,054,820	33,571,760	35,879,665
Spices	76,297	250,827	287,484	5,927,359	8,948,729	7,744,143
Starch	2,939,453	5,576,914	4,721,567	343,805	123,838	973,530
Sugar, molasses, and sirup	27,413,785	82,022,076	81,623,870	175,956,108	212,545,293	241,892,265
Tea	....	....	....	17,512,619	20,599,857	19,265,264
Tobacco	44,493,829	53,365,195	59,954,239	27,160,570	24,629,195	25,481,979
Vanilla beans	....	....	....	1,863,515	1,697,543	1,662,578
Vegetables	10,813,151	15,952,412	22,290,710	9,329,732	10,811,393	29,150,889
Wax, vegetable	....	....	....	1,012,402	1,580,530	1,739,199
Other vegetable matter	1,429,482	2,398,969	3,486,679	243,817	301,114	624,443
Total vegetable matter	1,156,556,249	1,103,720,273	1,454,136,937	574,001,006	705,697,589	843,337,923
Total farm products	1,475,937,607	1,518,071,450	1,969,849,707	910,786,289	1,189,704,830	1,403,801,231
FARM PRODUCTS.						
Cork wood or cork bark	....	....	....	2,762,895	3,134,884	3,870,389
Dyewoods, and extracts of	....	....	....	1,142,031	4,289,247	4,479,195
India rubber	....	....	....	83,030,269	158,586,193	193,118,855
Gums, other than india rubber	....	....	....	15,210,150	14,827,537	21,510,283
Naval stores	11,127,239	13,503,607	15,607,311	5,102	8,189	8,6[illegible]1
Tanning materials, n.e.s.	2,247,881	6,026,474	3,958,480	5,343,263	8,837,297	7,930,698
Wood:						
Cabinet, unsawed	....	....	....	4,271,775	4,011,107	4,266,850
Lumber	31,010,121	40,709,336	41,010,653	23,507,591	29,641,942	32,089,062
Pulp wood	....	....	....	6,572,839	6,373,749	6,889,123
Timber and logs	4,061,499	5,042,179	5,205,244	1,263,641	1,417,859	1,270,348
Rattan and reeds	....	....	....	771,628	1,720,816	1,171,052
Wood pulp	369,969	1,703,374	2,018,974	19,881,111	16,867,850	42,461,994
Other forest products	736,827	1,170,509	1,088,822	2,087,198	3,134,635	3,627,957
Total forest products	52,553,536	68,155,479	68,889,484	165,849,493	252,851,305	322,694,497
Total farm and forest products	1,528,491,143	1,586,226,929	2,038,739,191	1,076,635,782	1,442,556,135	1,726,495,728

TABLE 199.—*Exports of selected domestic agricultural products, 1852–1917.*

[Compiled from reports of Foreign Commerce and Navigation of the United States. Where figures are lacking, either there were no exports or they were not separately classified for publication. "Beef salted or pickled," and "Pork, salted or pickled," barrels, 1851–1865, were reduced to pounds at the rate of 200 pounds per barrel, and tierces, 1855–1865, at the rate of 300 pounds per tierce; cottonseed oil, 1910, pounds reduced to gallons at the rate of 7.5 pounds per gallon. It is assumed that 1 barrel of corn meal is the product of 4 bushels of corn, and 1 barrel of wheat flour the product of 5 bushels of wheat prior to 1880 and 4½ bushels of wheat in 1880 and subsequently.]

Year ending June 30—	Cattle.	Cheese.	Packing-house products.				
			Beef, cured—salted or pickled.	Beef, fresh.	Beef oils—oleo oil.	Beef tallow.	Beef and its products—total, as far as ascertainable.[1]
Average:	*Number.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1852–1856	1,431	6,200,385	25,980,520			7,468,910	33,449,430
1857–1861	20,294	13,906,430	26,985,880			13,214,614	40,200,494
1862–1866	6,531	42,683,073	27,662,720			43,202,724	70,865,444
1867–1871		52,880,978	26,954,656			27,577,269	54,531,925
1872–1876	45,672	87,173,752	35,826,646			78,994,360	114,821,006
1877–1881	127,045	129,670,479	40,174,643	69,601,120		96,822,695	218,709,987
1882–1886	131,605	108,790,010	47,401,470	97,327,819	30,276,133	48,745,416	225,625,631
1887–1891	244,394	86,354,842	65,613,851	136,447,554	50,482,249	91,608,126	411,797,859
1892–1896	349,032	66,905,798	64,898,780	207,372,575	102,038,519	56,976,840	507,177,430
1897–1901	415,488	46,108,704	52,242,288	305,626,184	139,373,402	86,082,497	637,268,235
1902–1906	508,103	19,244,482	59,208,292	272,148,180	156,925,317	59,892,601	622,843,230
1907–1911	253,867	9,152,083	46,187,175	144,799,735	170,530,432	66,356,232	448,024,017
1901	459,218	39,813,517	55,312,632	351,748,333	161,651,413	77,166,889	705,104,772
1902	392,884	27,203,184	48,632,727	301,824,473	138,546,088	34,065,758	596,254,520
1903	402,178	18,987,178	52,801,220	251,795,963	126,010,339	27,368,924	546,055,244
1904	593,409	23,335,172	57,584,710	299,579,671	165,183,839	76,924,174	663,147,095
1905	567,806	10,134,424	55,934,705	236,486,568	145,228,245	63,536,992	575,874,718
1906	584,239	16,562,451	81,088,098	268,054,227	209,658,075	97,567,156	732,884,572
1907	423,051	17,285,230	62,645,281	281,651,502	195,337,176	127,857,739	689,752,420
1908	349,210	8,439,031	46,958,367	201,154,105	212,541,157	91,397,507	579,303,478
1909	207,542	6,822,842	44,494,210	122,952,671	179,985,246	53,332,767	418,844,332
1910	139,430	2,846,709	36,554,266	75,729,666	126,091,675	29,379,992	286,295,874
1911	150,100	10,366,605	40,283,749	42,510,731	138,696,906	29,813,154	265,923,983
1912	105,506	6,337,559	38,087,907	15,264,320	126,467,124	39,451,419	233,924,626
1913	24,714	2,599,058	25,856,919	7,362,388	92,849,757	30,586,350	170,208,320
1914	18,376	2,427,577	23,265,974	6,394,404	97,017,065	15,812,831	151,212,009
1915	5,484	55,362,917	31,874,743	170,440,934	80,481,946	20,239,988	394,980,962
1916	21,287	44,394,301	38,114,682	231,214,000	102,645,914	16,288,743	457,555,572
1917	13,387	66,087,213	58,693,667	197,181,101	67,113,421	15,256,844	424,409,382

[1] Includes canned, cured, and fresh beef, oleo oil, oleomargarine, tallow and stearin from animal fats.

TABLE 199.—*Exports of selected domestic agricultural products, 1852–1917*—Continued.

Year ending June 30—	Packing-house products.					Apples, fresh.	Corn and corn meal (in terms of grain).
	Pork, cured—bacon.	Pork, cured—hams and shoulders.	Pork, cured—salted or pickled.	Pork—lard.	Pork and its products—total, as far as ascertainable.[1]		
Average:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Barrels.*	*Bushels.*
1852–1856	30,005,479	....	40,542,600	33,354,976	103,903,056	37,412	7,123,286
1857–1861	30,583,297	....	34,854,400	37,965,993	103,403,690	57,045	6,557,610
1862–1866	10,796,961	....	52,550,758	89,138,251	252,485,970	119,433	12,059,794
1867–1871	45,790,113	....	28,879,085	53,579,373	128,248,571	....	9,924,235
1872–1876	313,402,401	....	60,429,361	194,197,714	568,029,477	132,756	38,560,557
1877–1881	643,633,709	....	85,968,138	331,457,591	1,075,793,475	509,735	88,190,030
1882–1886	355,905,444	47,634,675	72,354,682	263,425,058	739,455,913	401,886	49,992,203
1887–1891	419,935,416	60,697,365	73,984,682	381,388,854	936,247,966	522,511	54,606,273
1892–1896	438,847,549	96,107,152	64,827,470	451,547,135	1,052,133,760	520,810	63,979,898
1897–1901	536,287,266	200,853,226	112,788,498	652,418,143	1,528,138,779	779,980	192,531,378
1902–1906	292,721,953	206,902,427	116,823,284	592,130,894	1,242,136,649	1,368,608	74,615,465
1907–1911	209,005,144	189,603,211	90,809 879	519,746,378	1,028,996,659	1,225,655	56,568,030
1901	456,122,741	216,571,803	138,643,011	611,357,514	1,462,369,849	883,673	181,405,473
1902	383,150,624	227,653,232	115,896,275	556,840,222	1,337,315,909	459,719	28,028,688
1903	207,336,000	214,183,365	95,287,374	490,755,821	1,042,119,570	1,656,129	76,639,261
1904	249,665,941	194,948,864	112,224,861	561,302,643	1,146,255,441	2,018,262	58,222,061
1905	262,246,635	203,458,724	118,887,189	610,238,899	1,220,031,970	1,499,942	90,293,483
1906	361,210,563	194,210,949	141,820,720	741,516,886	1,464,960,356	1,208,989	119,893,833
1907	250,418,699	209,481,496	166,427,409	627,559,660	1,268,065,412	1,539,267	86,368,228
1908	241,189,929	221,769,634	149,505,937	603,413,770	1,237,210,760	1,049,545	55,063,860
1909	244,578,674	212,170,224	52,354,980	528,722,933	1,053,142,056	896,279	37,665,040
1910	152,163,107	146,885,385	40,031,599	362,927,671	707,110,062	922,078	38,128,498
1911	156,675,310	157,709,316	45,729,471	476,107,857	879,455,006	1,721,106	65,614,522
1912	208,574,208	204,044,491	56,321,469	532,255,865	1,071,951,724	1,456,381	41,797,291
1913	200,993,584	159,544,687	53,749,023	519,025,384	984,696,710	2,150,132	50,780,143
1914	193,964,252	165,881,791	45,543,085	481,457,792	921,913,029	1,506,569	10,725,819
1915	346,718,227	203,701,114	45,655,574	475,531,908	1,106,180,488	2,351,501	50,668,303
1916	579,808,786	282,208,611	63,460,713	427,011,338	1,462,697,062	1,466,321	39,896,928
1917	667,156,061	266,655,581	47,001,621	444,787,521	1,499,476,444	1,739,997	65,753,194

[1] Includes canned, fresh, salted or pickled pork, lard, neutral lard, bacon and hams.

TABLE 199.—*Exports of selected domestic agricultural products, 1852–1917*—Continued.

Year ending June 30—	Lard compounds.	Cotton.	Glucose and grape sugar.	Corn-oil cake and oil cake meal.	Cottonseed-oil cake and oil-cake meal.	Prunes.	Tobacco.
Average:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1852-1856	....	1,110,498,083	....	....	....	....	140,183,800
1857-1861	....	1,125,715,497	....	....	....	....	167,710,800
1862-1866	....	137,582,133	....	....	....	....	140,207,850
1867-1871	....	902,410,338	....	....	....	....	194,753,537
1872-1876	....	1,248,805,497	....	....	....	....	241,848,410
1877-1881	....	1,738,892,268	....	....	....	....	266,315,190
1882-1886	....	1,968,178,266	4,473,550	....	....	....	237,941,913
1887-1891	....	2,439,650,456	27,686,298	....	....	....	259,248,361
1892-1896	....	2,736,655,351	125,574,007	....	....	....	281,746,279
1897-1901	21,792,477	3,447,909,578	209,279,772	....	1,005,099,895	....	304,401,701
1902-1906	52,954,358	3,632,267,952	154,866,980	21,888,135	1,066,790,196	48,550,774	325,538,515
1907-1911	75,765,254	4,004,770,051	145,064,783	61,732,807	989,738,130	47,039,287	334,395,923
1901	23,359,966	3,359,062,360	204,209,974	12,703,209	1,258,687,317	10,021,564	315,787,782
1902	36,201,744	3,528,974,636	130,419,611	14,740,498	1,050,466,246	23,358,849	301,007,365
1903	46,130,004	3,569,141,969	126,239,981	8,093,222	1,100,392,988	66,385,215	368,184,084
1904	53,603,545	3,089,855,906	152,768,716	14,014,885	820,349,073	73,146,214	311,971,831
1905	61,215,187	4,339,322,077	175,250,580	24,171,127	1,251,907,996	54,993,849	334,302,091
1906	67,621,310	3,634,045,170	189,656,011	48,420,942	1,110,834,678	24,869,744	312,227,202
1907	80,148,861	4,518,217,220	151,629,441	56,808,972	1,340,967,136	44,400,104	340,742,864
1908	75,183,210	3,816,998,693	129,686,834	66,127,704	929,287,467	28,148,450	330,812,658
1909	75,183,196	4,447,985,202	112,224,504	53,233,890	1,233,750,327	22,602,288	287,900,946
1910	74,556,603	3,206,708,226	149,820,088	49,108,598	640,088,766	89,014,880	357,196,074
1911	73,754,400	4,033,940,915	181,963,046	83,384,870	804,596,955	51,030,711	355,327,072
1912	62,522,888	5,535,125,429	171,156,259	72,490,021	1,293,690,138	74,328,074	379,845,320
1913	67,456,832	4,562,295,675	200,149,246	76,262,845	1,128,092,367	117,950,875	418,796,906
1914	58,303,564	4,760,940,538	199,530,874	59,030,623	799,974,252	69,813,711	449,749,982
1915	69,980,614	4,403,578,499	158,462,508	45,026,125	1,479,065,015	43,478,892	348,346,091
1916	52,843,311	3,084,070,125	186,406,182	18,996,490	1,057,221,569	57,422,827	443,293,156
1917	56,279,393	3,088,067,205	215,023,315	15,739,812	1,150,159,691	59,645,141	411,598,416

Year ending June 30—	Hops.	Oils, vegetable—cottonseed oil.	Rice and rice bran, meal, and polish.	Sugar, raw and refined.	Wheat.	Wheat flour.	Wheat and wheat flour (in terms of grain).
Average:	*Pounds.*	*Gallons.*	*Pounds.*	*Pounds.*	*Bushels.*	*Barrels.*	*Bushels.*
1852-1856	1,162,802	....	56,514,840	7,730,322	4,715,021	2,891,562	19,172,830
1857-1861	2,216,095	....	65,732,080	6,015,058	12,378,351	3,318,280	28,969,749
1862-1866	4,719,330	....	2,257,860	3,007,777	22,529,735	3,530,757	40,183,518
1867-1871	6,486,616	....	1,856,948	4,356,900	22,106,833	2,585,115	35,032,409
1872-1876	3,446,466	547,450	391,344	20,142,169	48,957,518	3,415,871	66,036,873
1877-1881	10,445,654	4,498,436	602,442	41,718,443	107,780,556	5,375,583	133,262,753
1882-1886	9,584,437	3,467,905	561,406	107,129,770	82,883,913	8,620,199	121,674,809
1887-1891	7,184,147	7,120,796	3,209,653	75,073,838	64,739,011	11,286,568	115,528,568
1892-1896	15,146,667	15,782,647	10,277,947	13,999,349	99,913,895	15,713,279	170,623,652
1897-1901	15,467,314	42,863,203	18,407,139	11,213,664	120,247,430	17,151,070	197,427,246
1902-1906	11,476,272	38,605,737	45,977,670	14,807,014	70,527,077	15,444,100	140,025,529
1907-1911	14,774,185	38,783,550	27,194,549	61,429,802	62,854,580	11,840,699	116,137,728
1901	14,963,676	49,356,741	25,527,846	8,874,860	132,060,667	18,650,979	215,990,073
1902	10,715,151	33,042,848	29,591,274	7,572,452	154,856,102	17,759,203	234,772,516
1903	7,794,705	35,642,994	19,750,448	10,520,156	114,181,420	19,716,484	202,905,598
1904	10,985,988	29,013,743	29,121,763	15,418,537	44,230,169	16,999,432	120,727,613
1905	14,855,612	51,535,580	113,282,760	18,348,077	4,394,402	8,826,335	44,112,910
1906	13,026,904	43,793,519	38,142,103	22,175,846	34,973,291	13,919,048	97,609,007
1907	16,809,534	41,880,304	30,174,371	21,237,603	76,569,423	15,584,667	146,700,425
1908	22,920,480	41,019,991	28,444,415	25,510,643	100,371,057	13,927,247	163,043,669
1909	10,446,884	51,087,329	20,511,429	79,946,297	66,923,244	10,521,161	114,268,468
1910	10,589,254	29,860,667	26,779,188	125,507,022	46,679,876	9,040,987	87,364,318
1911	13,104,774	30,069,459	30,063,341	54,947,444	23,729,302	10,129,435	69,311,760
1912	12,190,663	53,262,796	39,446,571	79,594,034	30,160,212	11,006,487	79,689,404
1913	17,591,195	42,031,052	38,908,057	43,994,761	91,602,974	11,394,805	141,132,166
1914	24,262,896	25,728,411	22,414,326	50,895,726	92,393,775	11,821,461	145,590,349
1915	16,210,443	42,448,870	77,480,065	549,007,411	259,642,533	16,182,765	332,464,975
1916	22,409,818	35,534,941	121,967,465	1,630,150,863	173,274,015	15,520,669	243,117,025
1917	4,874,876	21,198,086	180,485,435	1,248,840,336	149,837,427	11,942,505	203,578,699

TABLE 200.—*Imports of selected agricultural products, 1852–1917.*

[Compiled from reports of Foreign Commerce and Navigation of the United States. Where figures are lacking, either there were no imports or they were not separately classified for publication. "Silk" includes, prior to 1881, only "Silk, raw or as reeled from the cocoon;" in 1881 and 1882 are included this item and "Silk waste;" after 1882, both these items and "Silk cocoons." From "Cocoa and chocolate" are omitted in 1860, 1861, and in 1872 to 1881, small quantities of chocolate, the official returns for which were given only in value. "Jute and jute butts" includes in 1858 and 1859 an unknown quantity of "Sisal grass, coir, etc.," and in 1865–1868 an unknown quantity of "Hemp." Cattle hides are included in "Hides and skins other than cattle and goat" in 1895–1897. Olive oil for table use includes in 1862–1864 and 1885–1905 all olive oil. Sisal grass includes in 1884–1890 "Other vegetable substances." Hemp includes in 1885–1888 all substitutes for hemp.]

Year ending June 30—	Cheese.	Silk.	Wool.	Almonds.	Argols or wine lees.	Cocoa and chocolate, total.	Coffee.
Average:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1852–1856	1,053,983		19,067,447	3,460,807		2,486,572	196,582,863
1857–1861	1,378,147			3,251,091		3,063,893	216,235,090
1862–1866				2,482,063	1,354,947	2,453,141	124,551,992
1867–1871		681,669			2,360,529	3,502,614	218,726,019
1872–1876		1,091,918			4,951,473	4,857,364	307,006,928
1877–1881		1,922,269	62,744,282		12,403,256	6,315,488	384,282,199
1882–1886		4,672,846	83,293,800		17,551,967	11,568,173	529,578,782
1887–1891	8,335,323	6,564,121	117,763,889	5,860,728	21,433,570	18,322,049	509,367,994
1892–1896	9,649,752	8,382,892	162,640,491	7,487,676	26,469,990	25,475,234	597,48[illegible],217
1897–1901	12,588,515	10,962,210	163,979,079	7,361,198	24,379,847	38,209,423	816,570,082
1902–1906	22,165,754	17,187,544	193,656,402	10,920,881	27,647,440	70,901,254	980,119,167
1907–1911	37,662,812	22,143,461	199,562,619	15,297,414	29,350,692	113,673,368	934,533,322
1901	15,329,099	10,405,555	103,583,505	5,140,232	28,598,781	47,620,204	854,871,310
1902	17,067,714	14,234,826	166,576,966	9,868,982	29,276,148	52,878,587	1,091,004,252
1903	20,671,384	15,270,859	177,137,796	8,142,164	29,966,557	65,046,884	915,086,380
1904	22,707,103	16,722,709	173,742,834	9,838,852	24,571,730	75,070,746	995,043,284
1905	23,095,705	22,357,307	249,135,746	11,745,081	26,281,931	77,383,024	1,047,792,984
1906	27,286,866	17,352,021	201,688,668	15,009,326	28,140,835	84,127,027	851,668,933
1907	33,848,766	18,743,904	203,847,545	14,233,613	30,540,893	97,059,513	985,321,473
1908	32,530,830	16,662,132	125,980,524	17,144,968	26,738,834	86,604,684	890,640,057
1909	35,548,143	25,187,957	266,409,304	11,029,421	32,115,646	132,660,931	1,049,868,768
1910	40,817,524	23,457,223	263,928,232	18,556,356	28,182,956	111,070,834	871,469,516
1911	45,568,797	26,666,091	137,647,641	15,522,712	29,175,133	140,970,877	875,366,797
1912	46,542,007	26,584,962	193,400,713	17,231,458	23,661,078	148,785,846	885,201,247
1913	49,387,944	32,101,555	195,293,255	15,670,558	29,479,119	143,509,852	863,130,757
1914	63,784,313	34,545,829	247,648,869	19,038,405	29,793,011	179,364,091	1,001,528,317
1915	50,138,520	31,052,674	308,083,429	17,111,264	28,624,554	194,734,195	1,118,690,524
1916	30,087,999	41,925,297	534,828,022	16,596,921	34,721,043	245,579,101	1,201,104,485
1917	14,481,514	40,351,423	372,372,218	23,424,058	23,925,808	340,483,397	1,319,870,802

TABLE 200.—*Imports of selected agricultural products, 1852-1917*—Continued.

Year ending June 30—	Flax.	Hemp.	Hops.	Jute and jute butts.	Licorice root.	Manila.	Molasses.
Average:	*Long tons.*	*Long tons.*	*Pounds.*	*Long tons.*	*Pounds.*	*Long tons.*	*Gallons.*
1852-1856	1,143	1,571	....	3,244	....	12,084	28,488,888
1857-1861	....	2,652	....	17,239	1,372,573	....	30,190,875
1862-1866	....	....	....	3,213	1,887,892	15,566	34,262,933
1867-1871	....	....	....	14,909	....	....	53,322,088
1872-1876	4,170	22,711	....	49,188	....	....	41,815,321
1877-1881	4,260	22,458	....	62,496	....	....	32,638,963
1882-1886	5,678	30,557	1,618,879	91,058	....	....	35,019,689
1887-1891	7,021	36,919	7,771,672	104,887	59,275,373	....	30,543,299
1892-1896	6,785	5,409	2,386,240	84,111	86,444,974	47,354	15,474,619
1897-1901	7,008	4,107	2,381,899	93,970	87,475,620	47,217	6,321,160
1902-1906	8,574	5,230	5,205,867	101,512	99,543,395	60,813	17,191,821
1907-1911	9,721	6,368	6,769,965	100,420	96,111,469	67,289	24,147,348
1901	6,878	4,057	2,606,708	103 140	100,105 654	43,735	11,453,156
1902	7,772	6,054	2,805,293	128,963	109,077,323	56,453	14,391,215
1903	8,155	4,919	6,012,510	79,703	88,580,611	61,648	17,240,399
1904	10,123	5,871	2,758.163	96,735	89,463,182	65,666	18,828,530
1905	8,089	3,987	4,339,379	98,215	108,443,892	61,562	19,477,885
1906	8,729	5.317	10,113,989	103,945	102,151,969	58,738	16,021,076
1907	8,656	8,718	6,211,893	104,489	66,115,863	54,513	24,630,935
1908	9.528	6,213	8,493,265	107,533	109,355,720	52,467	18,882,756
1909	9,870	5,208	7,386,574	156,685	97,742,776	61,902	22,092,696
1910	12,761	6,423	3,200,560	68,155	82,207,496	93,253	31,292,165
1911	7,792	5,278	8,557,531	65,238	125,135,490	74,308	23,838,190
1912	10,900	5,007	2,991,125	101,001	74,582,225	68,536	28,828,213
1913	12,421	7,663	8,494,144	125,389	105,116,227	73,823	33,926,521
1914	9,885	8,822	5,382,025	106,033	115,636,131	49,688	51,410,271
1915	4,694	5,310	11,651,332	83,140	65,958,501	51,081	70,839,623
1916	6,939	6,506	675,704	108,322	41,003,295	78,892	85,716,673
1917	7,918	9,635	236,849	112,695	59,400,224	76,765	110,237,888

Year ending June 30—	Olive oil, for table use.	Opium, crude.	Potatoes.	Rice, and rice flour, rice meal, and broken rice.	Sisal grass.	Sugar, raw and refined.	Tea.
Average:	*Gallons.*	*Pounds.*	*Bushels.*	*Pounds.*	*Long tons.*	*Pounds.*	*Pounds.*
1852-1856	....	110,143	406,611	....	....	479,373,648	24,959,922
1857-1861	....	113,594	....	....	....	691,323,833	28,149,643
1862-1866	177,947	128,590	251,637	70,893,331	615	672,637,141	30,869,450
1867-1871	152,827	209,096	216,077	52,953,577	....	1,138,464,815	44,052,805
1872-1876	174,555	365,071	254,615	72,536,435	....	1.614,055,119	62,436,359
1877-1881	218,507	407,656	1,850,106	62,614,706	....	1,760,508,290	67,583,083
1882-1886	....	391,946	2,834,736	99,870,675	....	2,458,490,409	74,781,418
1887-1891	758,352	475,299	3,878,580	156,868,635	40,274	3,003,283,854	84,275,049
1892-1896	773,692	528,785	1,804,649	160,807,652	50,129	3,827,799,481	92,782,175
1897-1901	909,249	567,681	495,150	165,231,669	70,297	3,916,433,945	86,809,270
1902-1906	1,783,425	537,576	2,662,121	150,913,684	96,832	3,721,782,404	98,677,584
1907-1911	3,897,224	489,513	1,907,405	215,892,467	102,440	3,997,156,461	96,742,977
1901	983,059	583,208	371,911	117,199,710	70,076	3,975,005,840	89,806,453
1902	1,339,097	534,189	7,656,162	157,658,894	89,583	3,031,915.875	75,579,125
1903	1,494,132	516,570	358,505	169,656,284	87,025	4,216,108,106	108,574,905
1904	1,713,590	573,055	3,166,581	154,221,772	109,214	3,700.623,613	112,905,541
1905	1,923,174	594,680	181,199	106,483,515	100,301	3,680,932,998	102,706,599
1906	2,447,131	469,387	1,948,160	166,547,957	98,037	3,979,331,430	93,621,750
1907	3,449,517	565,252	176,917	209,603,180	99,061	4,391,839,975	86,368,490
1908	3,799,112	285,845	403,952	212,783,392	103,994	3,371,997,112	94,149,564
1909	4,129,454	517,388	8,383,966	222,900,422	91,451	4,189,421,018	114,916,520
1910	3,702,210	449,239	353,208	225,400,545	99,966	4,094,545,936	85,626,370
1911	4,405,827	629,842	218,984	208,774,795	117,727	3,937,978,265	102,563,942
1912	4,836,515	399,837	13,734,695	190,063,331	114,467	4,104,618,393	101,406,816
1913	5,221,001	508,433	327,230	222,103,547	153,869	4,740,041,488	94,812,800
1914	6,217,560	455,200	3,645,993	300,194,917	215,547	5,066,821,873	91.130,815
1915	6,710,967	484,027	270,942	277,191,472	185,764	5,420,981,867	96,987,942
1916	7,224,431	146,658	209,532	264,324,005	228,610	5,633,161,749	109,865,935
1917	7,533,149	86,812	3,079,025	216,048,858	143,407	5,332,745,854	103,364,410

TABLE 200.—*Imports of selected agricultural products, 1852–1917*—Continued.

Year ending June 30—	Beeswax.	Onions.	Plums and prunes.	Raisins.	Currants.	Dates.	Figs.
Average:	*Pounds.*	*Bushels.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1887–1891	128,790	....	60,237,642	38,545,635	....	....	9,783,650
1892–1896	279,839	....	12,405,549	17,745,925	34,397,754	14,914,349	10,117,049
1897–1901	265,143	628,358	560,762	7,669,593	27,520,440	15,653,642	8,919,921
1902–1906	456,727	924,418	563,900	7,344,676	35,457,213	25,649,432	14,334,760
1907–1911	845,720	1,103,034	....	5,283,145	35,258,628	26,059,353	19,848,037
1901	213,773	774,042	745,974	3,860,836	16,049,198	20,013,681	9,933,871
1902	408,706	796,316	522,478	6,683,545	36,238,976	21,681,159	11,087,131
1903	488,576	925,599	633,819	6,715,675	33,878,209	43,814,917	16,482,142
1904	425,168	1,171,242	494,105	6,867,617	38,347,649	21,058,164	13,178,061
1905	373,569	856,366	671,604	4,041,689	31,742,919	19,257,250	13,364,107
1906	587,617	872,566	497,494	12,414,855	37,078,311	22,435,672	17,562,358
1907	917,088	1,126,114	323,377	3,967,151	38,392,779	31,270,899	24,346,173
1908	671,526	1,275,333	335,089	9,132,353	38,652,656	24,958,343	18,836,574
1909	764,937	574,530	296,123	5,794,320	32,482,111	21,869,218	15,235,513
1910	972,145	1,024,226	....	5,042,683	33,326,030	22,693,713	17,362,197
1911	902,904	1,514,967	....	2,479,220	33,439,565	29,504,592	23,459,728
1912	1,076,741	1,436,037	....	3,255,861	33,151,396	25,208,248	18,765,408
1913	828,793	789,458	....	2,579,705	30,843,735	34,304,951	16,837,819
1914	1,412,200	1,114,811	....	4,554,549	32,033,177	34,073,608	19,284,868
1915	1,564,506	829,177	....	2,808,806	30,350,527	24,949,374	20,779,730
1916	2,146,380	815,872	....	1,024,296	25,373,029	31,075,424	7,153,250
1917	2,685,982	1,757,948	....	1,850,219	10,476,534	25,485,361	16,479,733

Year ending June 30—	Hides and skins, other than furs.			Macaroni, vermicelli, and all similar preparations.	Lemons.	Oranges.	Walnuts.
	Cattle.	Goat.	Other than cattle and goat.				
Average:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1897–1901	....	68,052,973	91,173,311	....	....	....	....
1902–1906	126,995,011	93,674,819	115,952,418	....	153,160,863	41,104,544	....
1907–1911	178,681,537	94,329,840	143,351,321	99,724,072	153,343,434	12,089,790	30,980,661
1901	129,174,624	73,745,596	77,989,617	....	148,514,614	50,332,914	....
1902	148,627,907	88,038,516	89,457,680	....	161,075,309	52,742,476	....
1903	131,644,325	85,114,070	102,340,303	28,787,821	152,004,213	56,872,070	12,362,567
1904	85,370,168	86,338,547	103,024,752	40,224,202	171,923,221	35,893,260	23,670,761
1905	113,177,357	97,803,571	126,893,934	53,441,080	139,084,321	28,880,575	21,684,104
1906	156,155,300	111,079,391	158,045,419	77,926,029	138,717,252	31,134,341	24,917,028
1907	134,671,020	101,201,596	135,111,199	87,720,730	157,859,906	21,267,346	32,597,592
1908	98,353,249	63,640,758	120,770,918	97,233,708	178,490,003	18,397,429	28,887,110
1909	192,252,083	104,048,244	148,253,998	85,114,003	135,183,550	8,435,873	26,157,703
1910	318,003,538	115,844,758	174,770,732	113,772,801	160,214,785	4,676,118	33,641,466
1911	150,127,796	86,913,842	137,849,757	114,779,116	134,968,924	7,672,186	33,619,434
1912	251,012,513	95,340,703	191,414,882	108,231,028	145,639,396	7,628,662	37,213,674
1913	268,042,390	96,250,305	207,903,995	106,500,752	151,416,412	12,252,960	26,662,441
1914	279,963,488	84,759,428	196,347,770	126,128,621	....	....	37,195,728
1915	331,341,417	66,547,163	137,439,153	56,542,480	....	....	33,445,838
1916	434,177,771	100,657,021	208,835,068	21,789,602	....	....	36,858,934
1917	386,600,028	105,640,307	207,967,162	3,472,503	....	....	38,725,362

TABLE 201.—*Foreign trade of the United States in forest products, 1852–1917.*

[Compiled from reports of Foreign Commerce and Navigation of the United States. All values are gold.]

Year ending June 30—	Exports.		Imports.	Excess of exports (+) or of imports (−).
	Domestic.	Foreign.		
Average:				
1852–1856	$6,819,079	$694,037	$3,256,302	+ $4,256,814
1857–1861	9,994,808	962,112	6,942,211	+ 4,014,739
1862–1866	7,366,103	798,076	8,511,370	− 347,191
1867–1871	11,775,297	690,748	14,812,576	− 2,346,531
1872–1876	17,906,771	959,862	19,728,458	− 861,825
1877–1881	17,579,313	552,514	22,006,227	− 3,874,400
1882–1886	24,704,992	1,417,226	34,252,753	− 8,130,535
1887–1891	26,060,729	1,442,760	39,647,287	− 12,143,798
1892–1896	29,276,428	1,707,307	45,091,081	− 14,107,346
1897–1901	45,960,863	3,283,274	52,326,879	− 3,082,742
1902–1906	63,584,670	3,850,221	79,885,457	− 12,450,566
1907–1911	88,764,471	6,488,455	137,051,471	− 41,798,545
1901	55,369,161	3,599,192	57,143,650	+ 1,824,703
1902	48,928,764	3,609,071	59,187,049	− 6,649,214
1903	58,734,016	2,865,325	71,478,022	− 9,878,681
1904	70,085,789	4,177,352	79,619,296	− 5,356,155
1905	63,199,348	3,790,097	92,680,555	− 25,691,110
1906	76,975,431	4,809,261	96,462,364	− 14,677,672
1907	92,948,705	5,500,331	122,420,776	− 23,971,740
1908	90,362,073	4,570,397	97,733,092	− 2,800,622
1909	72,442,454	4,982,810	123,920,126	− 46,494,862
1910	85,030,230	9,801,881	178,871,797	− 84,039,686
1911	103,038,892	7,586,854	162,311,565	− 51,685,819
1912	108,122,254	6,413,343	172,523,465	− 57,987,868
1913	124,835,784	7,431,851	180,502,444	− 48,234,809
1914	106,978,554	4,517,766	155,261,300	− 43,764,980
1915	52,553,536	5,089,299	165,849,493	−108,206,658
1916	68,155,479	4,364,335	252,851,305	−180,331,491
1917 (preliminary)	68,889,484	11,171,518	322,694,497	−242,633,495

TABLE 202.—*Exports of selected domestic forest products, 1852–1917.*

[Compiled from reports of Foreign Commerce and Navigation of the United States. Where figures are lacking, either there were no exports or they were not separately classified for publication.]

Year ending June 30—	Lumber.			Rosin.	Spirits of turpentine.	Timber.	
	Boards, deals, and planks.[1]	Shooks, other than box.	Staves.			Hewn.	Sawed.
Average:	*M feet.*	*Number.*	*Number.*	*Barrels.*	*Gallons.*	*Cubic feet.*	*M feet.*
1852–1856	129,499			552,210	1,369,250		
1857–1861	205,476			664,206	2,735,104		
1862–1866	138,020			69,314	107,162		
1867–1871	138,720			491,774	2,693,412		
1872–1876	221,658			845,803		17,459,632	
1877–1881	303,114				7,138,556	18,316,876	
1882–1886	433,963			1,289,869	9,301,894	13,701,663	
1887–1891	531,755	593,054		1,533,834	10,794,025	6,401,543	218,796
1892–1896	616,090	435,581		2,006,427	14,258,928	6,062,418	263,641
1897–1901	957,218	668,797		2,477,696	18,319,386	5,146,927	428,755
1902–1906	212,476	765,215	51,234,056	2,453,280	16,927,090	3,968,469	508,212
1907–1911	1,649,203	925,828	56,181,900	2,355,560	16,658,955	3,406,245	479,776
1901	1,101,815	714,651	47,363,262	2,820,815	20,240,851	4,624,698	533,920
1902	942,814	788,241	46,998,512	2,535,962	19,177,788	5,388,439	412,750
1903	1,065,771	566,205	55,879,010	2,396,498	16,378,787	3,291,498	530,659
1904	1,426,784	533,182	47,420,095	2,585,108	17,202,808	3,788,740	558,690
1905	1,283,406	872,192	48,286,285	2,310,275	15,894,813	3,856,623	486,411
1906	1,343,607	1,066,253	57,586,378	2,438,556	15,981,253	3,517,046	552,548
1907	1,623,964	803,346	51,120,171	2,560,966	15,854,676	3,278,110	600,865
1908	1,548,130	900,812	61,696,949	2,712,732	19,532,583	4,883,506	463,440
1909	1,357,822	977,376	52,583,016	2,170,177	17,502,028	2,950,528	383,309
1910	1,684,489	928,197	49,783,771	2,144,318	15,587,737	3,245,196	451,721
1911	2,031,608	1,019,411	65,725,595	2,189,607	14,817,751	2,673,887	499,547
						M feet.	
1912	2,306,680	1,161,591	64,162,599	2,474,460	19,599,241	31,067	406,954
1913	2,550,308	1,710,095	89,005,624	2,806,046	21,093,597	34,502	477,135
1914	2,405,296	867,805	77,150,535	2,417,950	18,900,704	29,859	411,307
1915	1,129,205	620,043	39,297,268	1,372,316	9,464,120	6,118	167,671
1916	1,177,331	611,556	57,537,610	1,571,279	9,310,268	9,628	191,577
1917	1,044,999	10,070,343	61,455,882	1,634,430	8,833,972	7,615	177,074

[1]Including "Joists and scantling" prior to 1884.

TABLE 203.—*Imports of selected forest products, 1852–1917.*

Year ending June 30—	Camphor, crude.	India rubber.	Rubber gums, total.	Lumber.		Shellac.	Wood pulp.
				Boards, deals, planks, and other sawed.	Shingles.		
Average:	*Pounds.*	*Pounds.*	*Pounds.*	*M feet.*	*M.*	*Pounds.*	*Long tons.*
1852–1856	213,720	....	....	....	....	....	....
1857–1861	360,522	....	....	....	....	....	....
1862–1866	386,731	....	....	....	....	634,276	....
1867–1871	....	....	[1] 7,389,890	....	....	....	....
1872–1876	....	....	12,631,388	561,642	88,197	....	....
1877–1881	1,515,614	....	15,610,634	417,907	55,394	....	....
1882–1886	1,958,608	....	24,480,997	577,728	87,760	....	....
1887–1891	2,273,883	....	33,226,520	646,745	184,050	5,086,421	37,251
1892–1896	1,491,902	38,359,547	39,671,553	661,495	....	5,848,339	42,771
1897–1901	1,858,018	47,469,136	52,974,744	566,394	....	8,839,232	46,827
1902–1906	2,139,183	57,903,641	75,908,633	727,205	772,340	11,613,967	130,764
1907–1911	2,939,167	80,129,567	121,504,098	899,659	866,565	19,046,030	319,007
1901	2,175,784	55,275,529	64,927,176	490,820	555,853	9,608,715	46,757
1902	1,831,058	50,413,481	67,790,069	665,603	707,614	9,064,789	67,416
1903	2,472,440	55,010,571	69,311,678	720,937	724,131	11,590,725	116,881
1904	2,819,673	59,015,551	74,327,584	589,232	770,373	10,933,413	144,796
1905	1,904,002	67,234,256	87,004,384	710,538	758,725	10,700,817	167,504
1906	1,668,744	[1] 57,844,345	81,109,451	949,717	900,856	15,780,090	157,224
1907	3,138,070	[1] 76,963,838	106,747,589	934,195	881,003	17,785,960	213,110
1908	2,814,299	[1] 62,233,160	85,809,625	791,288	988,081	13,361,932	237,514
1909	1,990,499	[1] 88,359,895	114,598,768	846,024	1,058,363	19,185,137	274,217
1910	3,026,648	[1] 101,044,681	154,620,629	1,054,416	762,798	29,402,182	378,322
1911	3,726,319	72,046,260	145,743,880	872,374	642,582	15,494,940	491,873
1912	2,154,646	110,210,173	175,965,538	905,275	514,657	18,745,771	477,508
1913	3,709,264	113,384,359	170,747,339	1,090,628	560,297	21,912,015	502,913
1914	3,476,908	131,995,742	161,777,250	928,873	895,038	16,719,756	508,360
1915	3,729,207	172,068,428	196,121,979	939,322	1,487,116	24,153,363	587,922
1916	4,574,430	267,775,557	304,182,814	1,218,068	1,769,333	25,817,509	507,048
1917	6,884,950	333,373,711	364,913,711	1,175,180	1,924,139	32,539,522	699,475

[1] Includes "Gutta-percha" only for 1867.

TABLE 204.—*Principal farm products imported from specified countries into the United States, 1915–1917.*

Country from which consigned, and article.	Year ending June 30— 1915		1916		1917	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Brazil:						
Cocoa (crude), pounds	19,708,616	$2,017,224	45,657,401	$6,086,847	51,461,624	$4,959,964
Coffee.......pounds..	773,400,315	65,492,280	849,405,925	73,541,315	907,237,562	85,761,395
British West Indies:						
Bananas...bunches..	11,957,935	3,483,373	4,927,435	1,445,493	2,191,516	677,129
Cocoa.......pounds..	40,728,851	5,407,262	39,933,405	6,038,670	54,203,374	6,540,569
Canada: Tea.....do....	3,446,615	981,933	2,600,705	861,236	3,160,459	1,084,584
China: Tea......do....	23,100,548	3,149,308	20,422,700	2,990,751	19,810,428	3,109,912
Colombia: Coffee.do....	111,077,419	13,710,164	109,363,456	13,519,545	150,591,659	17,971,874
Cuba:						
Bananas...bunches..	2,708,624	929,761	2,859,021	1,072,035	2,184,110	837,251
Sugar (raw).pounds..	4,784,888,157	156,181,349	5,150,851,544	192,558,595	4,669,097,398	204,521,140
Dominican Republic:						
Cocoa.......pounds..	46,620,464	5,499,510	48,990,707	6,946,412	61,443,869	7,202,747
Ecuador: Cocoa..do....	33,418,752	3,351,797	31,913,350	4,198,249	67,227,698	8,178,778
France:						
Cheese.........do....	3,554,297	737,212	2,321,543	784,323	1,937,341	754,012
Olive oil (salad) gallons	802,092	1,215,632	891,769	1,397,850	726,771	1,211,731
Italy:						
Cheese......pounds..	25,662,362	5,108,850	16,084,058	3,855,856	8,482,290	2,545,286
Macaroni......do....	54,591,991	2,944,398	20,221,908	1,426,730	2,431,910	191,845
Olive oil (salad), gallons	4,864,388	6,089,646	4,700,412	6,730,646	2,882,535	4,770,320
Japan: Tea....pounds..	43,869,012	7,683,356	52,359,526	8,975,993	52,418,963	8,825,089
Mexico: Coffee...do....	52,706,120	6,898,161	49,832,801	6,222,326	54,908,223	6,382,845
Netherlands:						
Cheese.........do....	2,210,861	287,620	578,201	121,588	249,371	68,645
Coffee.........do....	1,583,672	253,731	50,896	10,884	150,000	18,090
Philippine Islands: Sugar.......pounds..	326,842,296	7,511,126	217,190,825	6,389,017	267,891,954	8,382,562
Portugal: Cocoa, pounds	3,516,655	512,270	7,531,924	1,368,032	16,191,624	2,148,191
Switzerland: Cheese, pounds	14,766,682	2,677,249	9,514,008	2,031,590	1,640,656	341,063
United Kingdom:						
Cocoa.......pounds..	21,062,767	2,578,996	13,408,058	2,186,624	11,650,811	1,560,314
Tea............do....	12,869,968	3,386,476	19,066,241	4,670,251	13,857,721	3,309,507

TABLE 205.—*Principal farm products exported to specified countries from the United States, 1915-1917.*

Country to which consigned, and article.	Year ending June 30—					
	1915		1916		1917	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Belgium:						
Corn..............bushels..	103,927	$82,324	4,550	$4,191	581,371	$590,771
Wheat..............do....	5,320,685	6,392,090	2,682,919	3,342,519	2,698,044	4,887,416
Bacon............pounds..	5,737,181	603,344	60,160,749	6,251,526	65,219,598	8,508,658
Hams and shoulders..do....	6,596,068	801,837	2,792,605	367,070	....	....
Lard...............do....	5,128,630	528,764	70,132,156	7,327,075	96,761,185	13,815,450
Brazil: Wheat flour...barrels..	707,705	3,972,690	734,726	4,216,205	301,614	2,743,818
Canada:						
Corn..............bushels..	8,283,156	6,154,904	6,568,407	4,969,459	15,724,738	16,158,665
Wheat..............do....	19,664,674	19,941,388	6,244,732	7,430,824	4,714,836	9,856,529
Wheat flour........barrels..	110,938	592,011	50,424	254,717	77,115	580,326
Bacon............pounds..	10,025,242	1,363,621	39,590,591	5,342,490	118,709,847	21,366,115
Hams and shoulders..do....	1,514,602	219,257	2,673,658	370,783	5,616,090	1,021,892
Lard...............do....	7,721,616	887,910	6,330,140	635,024	5,375,768	984,930
Pork, pickled.........do....	8,500,049	870,937	17,835,273	1,701,324	16,929,411	2,501,890
China: Wheat flour..barrels..	13,273	57,066	10,762	54,631	9,806	44,532
Cuba:						
Corn..............bushels..	2,267,305	1,896,907	3,231,323	2,587,501	2,819,278	2,948,100
Wheat flour........barrels..	924,989	5,379,266	1,124,562	6,468,442	1,016,675	8,661,925
Bacon............pounds..	13,360,139	1,616,045	13,543,082	1,685,946	14,914,902	2,533,943
Hams and shoulders..do....	6,842,425	1,127,283	11,493,464	1,875,091	9,867,826	1,880,230
Lard...............do....	45,349,283	5,011,657	53,811,784	5,930,069	48,732,924	8,819,512
Pork, pickled.........do....	3,874,892	428,050	7,846,918	888,699	7,700,521	1,145,958
Denmark: Corn.....bushels..	11,169,550	9,052,044	9,527,032	7,764,187	7,075,254	9,205,072
Finland: Wheat flour.barrels..	35,588	165,057	....	....	....	....
France:						
Wheat............bushels..	49,878,655	66,352,832	21,802,818	27,898,643	16,253,262	31,698,762
Bacon............pounds..	44,712,253	5,766,832	52,501,448	6,442,595	77,035,622	12,062,410
Lard...............do....	32,172,876	3,503,946	42,282,883	5,075,237	54,967,832	10,712,463
Germany:						
Corn..............bushels..	15,785	16,500	....	....	....	....
Wheat..............do....	2,652,128	2,487,115	....	....	....	....
Wheat flour........barrels..	8,240	42,841	....	....	....	....
Lard.............pounds..	3,878,433	412,751	....	....	....	....
Lard, neutral.........do....	312,933	44,176	....	....	....	....
Oleo oil..............do....	1,001,252	98,081	....	....	....	....
Hongkong: Wheat flour, barrels........................	626,978	2,840,779	356,263	1,620,227	61,800	306,756
Italy:						
Wheat............bushels..	47,122,740	66,538,785	31,441,667	38,191,428	13,746,512	26,743,498
Lard.............pounds..	4,123,209	451,326	3,487,719	390,806	4,981,846	1,058,998
Japan: Wheat flour...barrels..	68,542	279,315	54,475	269,609	4,083	35,652
Mexico:						
Corn..............bushels..	1,587,420	1,388,902	3,678,934	3,083,408	2,530,699	3,133,896
Wheat..............do....	296,581	380,697	17,624	22,982	54,597	83,555
Lard.............pounds..	3,191,515	365,024	8,736,712	966,395	13,261,559	2,270,025
Netherlands:						
Corn..............bushels..	15,875,674	12,969,747	5,705,625	4,699,487	7,923,706	8,237,912
Wheat..............do....	31,551,992	42,070,210	21,070,335	26,224,787	19,127,675	37,946,031
Wheat flour........barrels..	1,725,807	10,553,446	219,644	1,318,349	591,182	4,087,784
Bacon............pounds..	8,284,647	1,199,393	12,846,176	1,632,399	10,625,101	1,501,376
Lard...............do....	22,245,433	2,589,995	13,281,671	1,467,341	20,446,110	2,838,460
Lard, neutral.........do....	9,847,645	1,142,321	9,059,503	1,152,883	2,657,914	432,566
Oleo oil..............do....	32,767,906	3,637,839	29,762,451	3,558,189	8,081,795	1,201,373
Norway: Oleo oil.......do....	9,954,544	1,160,460	14,062,716	1,796,590	15,907,144	2,747,546
Philippine Islands: Wheat flour...............barrels..	303,792	1,647,098	385,371	1,989,941	76,089	420,480
United Kingdom:						
Corn..............bushels..	2,850,252	2,297,878	5,627,128	4,438,126	24,493,817	27,860,538
Wheat..............do....	65,911,501	80,039,502	53,550,376	67,388,601	67,982,120	139,429,196
Wheat flour........barrels..	4,156,097	23,668,245	3,145,030	17,532,505	3,015,882	21,935,981
Bacon............pounds..	201,042,923	28,388,432	339,341,069	48,740,987	346,684,804	65,174,365
Hams and shoulders..do....	179,376,833	25,440,034	251,025,755	35,899,072	217,434,561	41,701,138
Lard...............do....	189,349,874	20,650,513	192,075,591	21,640,498	178,428,614	32,620,101
Oleo oil..............do....	14,361,603	1,734,445	30,657,569	3,684,779	31,761,124	5,316,644
Pork, pickled.........do....	6,534,210	700,078	13,124,077	1,644,441	6,058,672	929,881

TABLE 206.—*Shipments of principal domestic farm and forest products from the United States to Hawaii and Porto Rico, 1915–1917.*

[These shipments are not included in the domestic exports from or imports into the United States.]

Possession and article.	Year ending June 30—					
	1915		1916		1917	
	Quantity.	Value.	Quantity.	Value.	Quantity	Value.
HAWAII.						
Dairy products.......pounds..	4,930,995	$584,141	4,819,844	$629,825	5,537,968	$878,816
Meat products		542,924		883,174		1,165,817
Grain and grain products		2,493,054		2,322,166		3,142,022
Rice.......pounds..	974,272	39,755	191,840	7,307	5,918,689	267,423
Lumber		1,139,434		1,002,976		1,638,887
PORTO RICO.						
Dairy products.......pounds..	2,496,076	267,491	3,861,569	496,177	4,346,394	652,888
Meat products		3,382,875		3,551,176		4,311,385
Beans and dried peas.bushels..	190,793	672,163	216,747	795,276	211,542	964,072
Grain and grain products		2,756,391		2,994,388		4,086,369
Rice.......pounds..	127,310,116	4,851,533	143,171,261	5,596,068	154,806,589	6,587,122
Sugar.......do....	12,329,041	648,414	10,265,579	612,041	9,331,896	670,530
Tobacco.......do....	1,106,120	178,924	1,764,344	285,041	2,376,479	432,453
Lumber		633,747		756,434		1,294,561

TABLE 207.—*Shipments of principal domestic farm products from Hawaii and Porto Rico to the United States, 1915–1917.*

Possession and article.	Year ending June 30—					
	1915		1916		1917	
	Quantity.	Value.	Quantity.	Value.	Quntity.	Value.
HAWAII.						
Coffee.......pounds..	3,191,274	$486,054	2,252,364	$343,829	1,987,035	$297,972
Pineapples, canned		5,986,190		6,547,055		7,970,522
Sugar.......pounds..	1,280,863,812	52,949,697	1,137,159,828	54,418,095	1,162,605,056	62,741,164
PORTO RICO.						
Grapefruit.......boxes..	276,550	834,356	296,613	836,932	435,890	939,677
Oranges.......do....	200,268	378,092	404,367	790,667	502,313	1,008,465
Pineapples		1,723,694		1,176,319		916,415
Molasses and sirup.gallons..	18,004,811	658,661	16,279,073	1,073,786	18,751,212	1,332,538
Sugar.......pounds..	588,922,493	27,277,839	849,763,491	45,799,299	977,377,996	53,987,767
Tobacco, leaf.......do....	7,035,777	2,954,804	6,705,823	2,857,036	7,958,439	3,583,052

TABLE 208.—*Destination of principal farm products exported from the United States, 1914–1917.*

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
ANIMAL MATTER.								
Cattle:	*Number.*	*Number.*	*Number.*	*Number.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Canada	8,957	751	4,511	6,382	48.7	13.7	21.2	47.7
United Kingdom	....	....	815	....	......	......	3.8	......
Other countries	9,419	4,733	15,961	7,005	51.3	86.3	75.0	52.3
Total	18,376	5,484	21,287	13,387	100.0	100.0	100.0	100.0
Horses:								
Canada	17,700	42,036	82,311	28,546	77.7	14.5	23.0	10.2
United Kingdom	609	92,737	49,412	100,110	2.7	32.1	13.8	35.9
Other countries	4,467	154,567	225,830	150,018	19.6	53.4	63.2	53.9
Total	22,776	289,340	357,553	278,674	100.0	100.0	100.0	100.0
Butter:								
Central American States and British Honduras	*Pounds.* 810,254	*Pounds.* 726,552	*Pounds.* 834,385	*Pounds.* 814,396	21.9	7.4	6.2	3.0
West Indies and Bermuda	1,158,111	1,143,822	1,614,695	1,829,040	31.4	11.6	12.0	6.8
Other countries	1,725,232	7,980,330	11,038,401	24,191,656	46.7	81.0	81.8	90.2
Total	3,693,597	9,850,704	13,487,481	26,835,092	100.0	100.0	100.0	100.0
Meat products:								
Beef products—								
Beef, canned—								
United Kingdom	1,157,104	64,700,738	38,205,216	40,257,790	33.4	86.0	75.2	59.6
Other countries	2,307,629	10,542,523	12,598,549	27,318,935	66.6	14.0	24.8	40.4
Total	3,464,733	75,243,261	50,803,765	67,576,725	100.0	100.0	100.0	100.0
Beef, fresh—								
Panama	5,534,391	3,706,596	1,504,583	235,034	86.6	2.2	.7	.1
United Kingdom	....	54,497,192	117,409,488	125,687,523	......	32.0	50.8	63.7
Other countries	860,013	112,237,146	112,299,929	71,258,544	13.4	65.8	48.5	36.2
Total	6,394,404	170,440,934	231,214,000	197,181,101	100.0	100.0	100.0	100.0
Beef, pickled, and other cured—								
Canada	1,331,150	1,659,165	5,101,349	9,394,612	5.7	5.2	13.4	16.0
Germany	1,757,786	378,548	400	....	7.6	1.2	0.0	......
Newfoundland and Labrador	4,935,657	4,331,261	5,027,163	6,802,524	21.2	13.6	13.2	11.6
West Indies and Bermuda	3,900,281	2,697,974	3,089,623	2,613,776	16.8	8.5	8.1	4.5
United Kingdom	4,113,347	10,994,101	12,003,390	7,489,665	17.7	31.5	31.5	12.8
Other countries	7,227,753	11,813,694	12,892,757	32,393,090	31.0	37.0	33.8	55.1
Total	23,265,974	31,874,743	38,114,682	58,693,667	100.0	100.0	100.0	100.0
Oleo oil—								
Germany	16,180,268	1,001,252	....	....	16.7	1.2	......	......
Netherlands	47,414,421	32,767,906	29,762,451	8,081,795	48.9	40.7	29.0	12.0
Norway	7,285,043	9,954,544	14,062,716	15,907,144	7.5	12.4	13.7	23.7
United Kingdom	9,243,952	14,361,603	30,657,569	31,761,124	9.5	17.8	29.9	47.3
Other countries	16,893,381	22,396,641	28,163,178	11,363,358	17.4	27.9	27.4	17.0
Total	97,017,065	80,481,946	102,645,914	67,113,421	100.0	100.0	100.0	100.0
Lard compounds—								
Cuba	14,673,201	19,046,472	11,895,200	14,164,676	25.2	27.2	22.5	25.2
Mexico	3,119,285	3,772,943	4,597,585	6,863,487	5.4	5.4	8.7	12.2
United Kingdom	19,929,949	26,357,467	18,486,477	13,407,936	34.2	37.7	35.0	23.8
Other countries	20,581,129	20,803,732	17,861,049	21,843,294	35.2	29.7	33.8	38.8
Total	58,303,564	69,980,614	52,843,311	56,279,393	100.0	100.0	100.0	100.0

TABLE 208.—*Destination of principal farm products exported from the United States, 1914–1917*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
ANIMAL MATTER—con.								
Meat products—Con.								
Pork products—								
Bacon—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Belgium	5,110,170	5,737,181	60,160,749	65,219,598	2.6	1.7	10.4	9.8
Canada	11,082,930	10,025,242	39,590,591	118,709,847	5.7	2.9	6.8	17.8
Cuba	13,733,773	13,360,139	13,543,082	14,914,902	7.1	3.9	2.3	2.3
France	197,353	44,712,253	52,501,448	77,035,622	.1	12.9	9.1	11.5
Netherlands	1,718,481	8,284,647	12,846,176	10,625,101	.9	2.4	2.2	1.6
United Kingdom	132,819,680	201,042,923	339,341,069	346,684,804	68.5	58.0	58.5	52.0
Other countries	29,301,865	63,555,842	61,825,671	33,966,187	15.1	18.2	10.7	5.1
Total	193,964,252	346,718,227	579,808,786	667,156,061	100.0	100.0	100.0	100.0
Hams and shoulders, cured—								
Belgium	4,080,669	6,596,068	2,792,605	....	2.5	3.2	1.0	......
Canada	4,006,649	1,514,602	2,673,658	5,616,090	2.4	.7	.9	2.1
Cuba	5,637,829	6,842,425	11,493,464	9,867,826	3.4	3.4	4.1	3.7
United Kingdom	146,007,141	179,376,833	251,025,755	217,434,561	88.0	88.1	89.0	81.5
Other countries	6,149,503	9,371,186	14,223,129	33,737,104	3.7	4.6	5.0	12.7
Total	165,881,791	203,701,114	282,208,611	266,655,581	100.0	100.0	100.0	100.0
Lard—								
Belgium	15,915,380	5,128,630	70,132,156	96,761,185	3.3	1.1	16.4	21.8
Canada	15,995,669	7,721,616	6,330,140	5,375,768	3.3	1.6	1.5	1.2
Cuba	49,609,751	45,349,283	53,811,784	48,732,924	10.3	9.5	12.6	11.0
France	5,307,986	32,172,876	42,282,883	54,967,832	1.1	6.8	9.9	12.4
Germany	146,208,598	3,878,433	....	....	30.4	.8	......	......
Italy	5,958,983	4,123,209	3,487,719	4,981,846	1.2	.9	.8	1.1
Mexico	3,294,437	3,191,515	8,736,712	13,261,559	.7	.7	2.0	3.0
Netherlands	43,469,536	22,245,433	13,281,671	20,446,110	9.0	4.7	3.1	4.6
United Kingdom	164,632,676	189,349,874	192,075,591	178,128,614	34.2	39.8	45.0	40.0
Other countries	31,064,776	162,371,039	36,872,682	22,131,683	6.5	34.1	8.7	4.9
Total	481,457,792	475,531,908	427,011,338	444,787,521	100.0	100.0	100.0	100.0
Lard, neutral—								
Germany	6,309,792	312,933	....	....	21.5	1.2	......	......
Netherlands	13,174,294	9,847,645	9,059,503	2,657,914	44.9	37.8	26.3	15.1
Other countries	9,839,700	15,860,476	25,367,087	14,890,345	33.6	61.0	73.7	84.9
Total	29,323,786	26,021,054	34,426,590	17,548,259	100.0	100.0	100.0	100.0
Pork, pickled—								
Canada	12,825,741	8,500,049	17,835,273	16,929,411	28.2	18.6	28.1	36.0
Cuba	4,090,780	3,874,892	7,846,918	7,700,421	9.0	8.5	12.4	16.4
Newfoundland and Labrador	7,911,743	5,244,462	7,070,090	6,262,085	17.4	11.5	11.1	13.3
United Kingdom	5,571,720	6,534,240	13,124,077	6,058,672	12.2	14.3	20.7	12.9
Other countries	15,143,101	21,501,931	17,584,355	10,051,632	33.2	47.1	27.7	21.4
Total	45,543,085	45,655,574	63,460,713	47,001,621	100.0	100.0	100.0	100.0
VEGETABLE MATTER.								
Cotton:								
Austria-Hungary	53,255,407	227,373	....	....	1.1	......	......	......
Belgium	113,736,761	2,528,388	....	....	2.4	.1	......	......
Canada	75,496,339	91,395,082	98,829,599	93,600,456	1.6	2.1	3.2	3.0
France	569,699,520	346,349,629	445,187,759	527,864,661	12.0	7.9	14.4	17.1
Germany	1,442,161,777	147,096,823	....	....	30.3	3.3	......	......
Italy	268,678,515	563,700,142	418,457,552	343,579,007	5.6	12.8	13.6	11.1
Japan	176,720,027	214,403,032	251,538,465	265,446,488	3.7	4.9	8.2	8.6
Mexico	17,335,397	19,863,621	11,847,741	2,648,957	.4	.5	.4	.1
Russia, European	49,538,075	41,062,654	86,724,722	24,594,286	1.0	.9	2.8	.8
Spain	148,669,641	232,251,950	170,122,980	197,046,594	3.1	5.3	5.5	6.4
United Kingdom	1,790,750,498	1,959,874,664	1,380,444,961	1,447,707,351	37.6	44.5	44.8	46.9
Other countries	54,898,581	784,825,141	220,916,346	185,579,405	1.2	17.7	7.1	6.0
Total	4,760,940,538	4,403,578,499	3,084,070,125	3,088,067,205	100.0	100.0	100.0	100.0

TABLE 208.—*Destination of principal farm products exported from the United States, 1914–1917*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
VEGETABLE MATTER—continued.								
Fruits:								
Apples, dried—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Germany	17,645,697	108,434	......	......	52.6	.3	......	......
Netherlands	9,147,104	5,200,178	1,878,251	187,286	27.3	12.2	11.6	1.8
Other countries	6,773,359	37,280,557	14,340,923	10,343,188	20.1	87.5	88.4	98.2
Total	33,566,160	42,589,169	16,219,174	10,530,474	100.0	100.0	100.0	100.0
Apples, fresh—	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*				
Germany	168,792	......	......	......	11.2	......	......	......
United Kingdom	827,028	1,747,396	874,587	1,147,412	54.9	74.3	59.6	65.9
Other countries	510,749	604,105	591,734	592,585	33.9	25.7	40.4	34.1
Total	1,506,569	2,351,501	1,466,321	1,739,997	100.0	100.0	100.0	100.0
Apricots, dried—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
France	3,074,146	1,911,296	2,570,491	5,754,643	17.7	8.0	10.7	58.5
Germany	3,841,032	289,850	......	......	22.1	1.2	......	......
Netherlands	2,064,471	1,285,632	2,526,953	345,031	11.9	5.4	10.6	3.5
United Kingdom	4,473,534	9,017,358	5,783,717	614,139	25.7	37.9	24.2	6.2
Other countries	3,948,509	11,260,206	13,058,629	3,129,906	22.6	47.5	54.5	31.8
Total	17,401,692	23,764,342	23,939,790	9,843,719	100.0	100.0	100.0	100.0
Oranges—	*Boxes.*	*Boxes.*	*Boxes.*	*Boxes.*				
Canada	1,491,539	1,682,824	1,489,746	1,725,432	95.7	95.6	94.6	93.2
Other countries	67,382	76,581	85,296	125,260	4.3	4.4	5.4	6.8
Total	1,558,921	1,759,405	1,575,042	1,850,692	100.0	100.0	100.0	100.0
Prunes—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Canada	12,757,585	9,321,355	11,857,965	11,112,227	18.3	21.4	20.7	18.6
France	13,514,086	1,129,323	4,869,201	23,852,707	19.4	2.6	8.5	40.0
Germany	17,417,865	1,100	......	......	24.9	0.0	......	......
United Kingdom	11,175,968	10,368,576	14,967,084	10,765,070	16.0	23.8	26.1	18.0
Other countries	14,948,207	22,658,538	25,728,577	13,915,137	21.4	52.2	44.7	23.4
Total	69,813,711	43,478,892	57,422,827	59,645,141	100.0	100.0	100.0	100.0
Fruits, canned—	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*				
United Kingdom	3,182,051	4,924,824	5,284,344	3,627,823	65.4	81.2	75.0	59.1
Other countries	1,681,895	1,139,941	1,765,717	2,509,872	34.6	18.8	25.0	40.9
Total	4,863,946	6,064,765	7,050,061	6,137,695	100.0	100.0	100.0	100.0
Glucose and grape sugar:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
United Kingdom	162,715,262	131,751,252	145,862,104	160,716,035	81.5	83.1	78.2	74.7
Other countries	36,815,612	26,711,256	40,544,078	54,307,280	18.5	16.9	21.8	25.3
Total	199,530,874	158,462,508	186,406,182	215,023,315	100.0	100.0	100.0	100.0
Grain and grain products:								
Corn—	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*				
Belgium	60,227	103,927	4,550	581,371	0.6	0.2	......	.9
Canada	4,641,737	8,283,156	6,568,407	15,724,738	49.5	17.0	17.2	24.3
Cuba	2,410,156	2,267,305	3,231,323	2,819,278	25.7	4.6	8.5	4.4
Denmark	118	11,169,550	9,527,032	7,075,254	......	22.9	24.9	10.9
Germany	303,303	15,785	......	......	3.2	0.0	......	......
Mexico	467,424	1,587,420	3,678,934	2,530,699	5.0	3.3	9.6	3.9
Netherlands	373,770	15,875,674	5,705,625	7,923,706	4.0	32.5	14.9	12.2
United Kingdom	540,515	2,850,252	5,627,128	24,493,817	5.8	5.8	14.7	37.8
Other countries	583,605	6,633,222	3,874,013	3,571,879	6.2	13.7	10.2	5.6
Total	9,380,855	48,786,291	38,217,012	64,720,742	100.0	100.0	100.0	100.0
Wheat—								
Belgium	12,873,372	5,320,685	2,682,919	2,698,044	13.9	2.0	1.5	1.8
Canada	4,113,701	19,664,674	6,244,732	4,714,836	4.5	7.6	3.6	3.1
France	5,536,731	49,878,655	21,802,818	16,253,282	6.0	19.2	12.6	10.8
Germany	10,983,060	2,652,128	......	......	11.9	1.0	......	......
Italy	1,839,830	47,122,740	31,441,667	13,746,512	2.0	18.1	18.1	9.2

TABLE 208.—*Destination of principal farm products exported from the United States, 1914–1917*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
VEGETABLE MATTER—continued.								
Grain and grain products—Continued.								
Wheat—Contd.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*				
Mexico	306,376	296,581	17,624	54,597	.3	.1	......	......
Netherlands	19,949,519	31,551,992	21,070,335	19,127,675	21.6	12.2	12.2	12.8
United Kingdom	27,961,348	65,911,501	53,550,376	67,982,120	30.3	25.4	30.9	45.4
Other countries	8,829,838	37,243,577	36,463,544	25,260,381	9.5	14.4	21.1	16.9
Total	92,393,775	259,642,533	173,274,015	149,837,427	100.0	100.0	100.0	100.0
Wheat flour—	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*				
Brazil	748,612	707,705	734,726	301,614	6.3	4.3	4.7	2.5
Canada	122,752	110,938	50,424	77,115	1.0	.7	.3	.6
China	136,374	13,273	10,762	9,806	1.2	.1	.1	.1
Cuba	892,705	924,989	1,124,562	1,016,675	7.6	5.7	7.2	8.5
Finland	429,354	35,588	....	....	3.6	.2	......	......
Germany	176,485	8,240	....	....	1.5	.1	......	......
Haiti	208,266	112,620	221,455	127,458	1.8	.7	1.4	1.1
Hongkong	1,141,095	626,978	356,263	61,800	9.7	3.9	2.3	.5
Japan	793,269	68,542	54,475	4,083	6.7	.4	.4	......
Netherlands	958,063	1,725,807	219,644	591,182	8.1	10.7	1.4	5.0
Philippine Islands	236,902	303,792	385,371	76,089	2.0	1.9	2.5	.6
United Kingdom	2,809,800	4,156,097	3,145,030	3,015,882	23.8	25.7	20.3	25.3
Other countries	3,167,784	7,388,196	9,217,957	6,660,801	26.7	45.6	59.4	55.8
Total	11,821,461	16,182,765	15,520,669	11,942,505	100.0	100.0	100.0	100.0
Hops:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Canada	1,214,028	1,071,601	626,126	801,162	5.0	6.6	2.8	16.4
United Kingdom	22,219,620	13,823,889	19,703,283	823,654	91.6	85.3	87.9	16.9
Other countries	829,248	1,314,953	2,080,409	3,250,060	3.4	8.1	9.3	66.7
Total	24,262,896	16,210,443	22,409,818	4,874,876	100.0	100.0	100.0	100.0
Oil cake and oil-cake meal:								
Cottonseed—								
Belgium	19,685,564	223,100	....	....	2.5	......	......	......
Denmark	347,584,172	1,067,161,664	812,720,685	673,151,482	43.4	72.2	76.9	58.5
Germany	210,348,664	6,819,250	....	....	30.0	.5	......	......
Netherlands	22,310,420	15,469,040	4,818,400	23,231,880	2.8	1.0	.5	2.0
United Kingdom	131,292,496	173,948,786	105,360,887	218,200,451	16.4	11.8	10.0	19.0
Other countries	38,752,936	215,443,175	134,321,597	235,575,878	4.9	14.5	12.6	20.5
Total	799,974,252	1,479,065,015	1,057,221,569	1,150,159,691	100.0	100.0	100.0	100.0
Linseed or flaxseed—								
Belgium	332,697,680	26,931,718	....	....	50.2	5.1	......	......
France	20,671,619	1,375,773	13,100	4,408,251	3.1	.3	......	.8
Netherlands	266,792,954	431,248,843	445,707,867	292,984,477	40.2	82.2	69.5	54.6
United Kingdom	29,084,892	22,829,656	25,532,292	86,400,787	4.4	4.4	4.0	16.1
Other countries	13,621,494	42,408,444	169,662,937	153,182,904	2.1	8.0	26.5	28.5
Total	662,868,639	524,794,434	640,916,196	536,976,419	100.0	100.0	100.0	100.0
Oils, vegetable:								
Cottonseed—								
Argentina	14,989,927	17,314,259	9,275,577	2,863,997	7.8	5.4	3.5	1.8
Austria-Hungary	4,211,198	70,394	....	....	2.2	......	......	......
Belgium	3,452,229	11,646	....	....	1.8	......	......	......
Canada	25,493,039	20,578,973	35,420,571	40,907,725	13.2	6.5	13.3	25.7
France	8,268,808	8,425,210	33,500,328	3,321,730	4.3	2.6	12.6	2.1
Germany	7,682,622	62,871	....	....	4.0	......	......	......
Italy	14,015,326	15,782,234	9,424,790	229,267	7.3	5.0	3.5	.1
Mexico	6,219,064	4,821,390	2,674,740	926,809	3.2	1.5	1.0	.6
Netherlands	26,994,772	90,979,466	56,981,676	28,034,879	14.0	28.6	21.4	17.6
Norway	6,985,490	26,442,259	31,055,628	33,591,436	3.6	8.2	11.7	21.1
Turkey, European	4,947,994	354,910	....	....	2.6	.1	......	......
United Kingdom	31,071,865	84,378,878	32,112,143	14,172,497	16.1	26.5	12.0	8.9
Other countries	38,630,745	49,144,035	56,066,604	34,937,302	19.9	15.6	21.0	22.1
Total	192,963,079	318,366,525	266,512,057	158,985,642	100.0	100.0	100.0	100.0

TABLE 208.—*Destination of principal farm products exported from the United States, 1914-1917*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
VEGETABLE MATTER—continued.								
Tobacco, leaf, stems, and trimmings:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Belgium	11,677,604	1,131,439	....	....	2.6	.3	......	......
British Africa	6,600,312	4,655,691	7,820,355	10,410,254	1.5	1.3	1.8	2.5
British Oceania	13,186,680	9,042,967	9,759,812	15,527,467	2.9	2.6	2.2	3.8
Canada	17,688,562	16,156,268	18,621,186	15,275,422	3.9	4.6	4.2	3.7
China	11,445,697	3,478,641	8,908,844	9,887,842	2.5	1.0	2.0	2.4
France	54,915,178	37,710,975	82,977,894	70,514,607	12.2	10.8	18.7	17.1
Germany	32,057,051	10,018,503	....	....	7.1	2.9	......	......
Italy	45,190,995	24,279,246	41,000,738	45,587,226	10.0	7.0	9.2	11.1
Japan	3,696,273	3,110,555	1,158,083	3,449,974	.8	.9	.3	.8
Netherlands	28,233,746	21,223,143	56,928,306	55,128,317	6.3	6.1	12.8	13.4
Spain	16,822,696	7,030	9,779,100	10,692,009	3.7	0.0	2.2	2.6
United Kingdom	174,779,326	189,345,349	150,639,054	122,725,357	38.9	54.4	31.0	29.8
Other countries	33,455,862	28,186,284	55,699,784	52,399,941	7.6	8.1	12.6	12.8
Total	449,749,982	348,346,091	443,293,156	411,598,416	100.0	100.0	100.0	100.0
FOREST PRODUCTS.								
Naval stores:								
Rosin—	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*				
Argentina	102,028	143,407	97,306	120,287	4.2	10.4	6.2	7.4
Austria-Hungary	66,257	....	....	....	2.7	......	......	......
Belgium	111,735	80,267	....	....	4.6	5.8	......	......
Brazil	99,632	105,529	132,545	147,162	4.1	7.7	8.4	9.0
Canada	77,064	74,113	120,146	172,578	3.2	5.4	7.6	10.6
Germany	796,757	53,331	....	....	33.0	3.9	......	......
Italy	109,380	94,217	117,740	54,927	4.5	6.9	7.5	3.4
Netherlands	247,339	48,883	18,175	720	10.2	3.6	1.2	0.0
Russia, European	144,653	5,447	70,537	74,080	6.0	.4	4.5	4.5
United Kingdom	504,400	500,545	557,611	668,893	20.9	36.5	35.5	40.9
Other countries	158,705	266,577	457,219	395,483	6.6	19.4	29.1	24.2
Total	2,417,950	1,372,316	1,571,279	1,634,430	100.0	100.0	100.0	100.0
Turpentine, spirits of—	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*				
Belgium	1,027,355	113,672	....	....	5.4	1.2	......	......
British Oceania	499,248	708,843	590,760	753,637	2.7	7.5	6.3	8.5
Canada	1,114,863	917,912	1,026,768	1,098,126	5.9	9.7	11.0	12.4
Germany	3,275,929	196,622	....	....	17.3	2.1	......	......
Netherlands	4,393,902	625,736	442,682	66,892	23.2	6.6	4.8	.8
United Kingdom	7,109,851	5,338,724	5,561,957	5,330,100	37.6	56.4	59.7	60.3
Other countries	1,479,556	1,562,611	1,688,101	1,585,217	7.9	16.5	18.2	18.0
Total	18,900,704	9,464,120	9,310,268	8,833,972	100.0	100.0	100.0	100.0
Wood:								
Lumber—								
Boards, deals, planks, joists, and scantling—	*M ft.*	*M ft.*	*M ft.*	*M ft.*				
Argentina	208,177	66,754	86,895	44,533	8.6	5.9	7.4	4.3
Belgium	62,772	8,793	....	....	2.6	.8	......	......
Brazil	38,125	10,370	8,116	3,341	1.6	.9	.7	.3
British Oceania	293,009	187,439	150,717	101,961	12.1	16.5	12.8	9.8
Canada	434,399	182,734	140,715	182,630	18.0	16.1	12.0	17.5
Central American States and British Honduras	81,251	45,777	49,357	58,752	3.4	4.0	4.2	5.6
China	107,115	56,238	30,746	21,354	4.4	5.0	2.6	2.0
Cuba	122,938	88,000	174,676	172,292	5.1	7.8	14.8	16.5
France	39,563	6,145	12,722	25,892	1.6	.5	1.1	2.5
Germany	69,852	7,983	....	....	2.9	.7	......	......
Italy	53,623	20,662	40,831	11,355	2.2	1.8	3.5	1.1
Mexico	69,111	31,296	45,626	46,840	2.9	2.8	3.9	4.5
Netherlands	120,661	17,218	3,039	98	5.0	1.5	.3	......

TABLE 208.—*Destination of principal farm products exported from the United States, 1914–1917*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
FOREST PRODUCTS.								
Wood—Continued.								
Lumber—Contd.								
Boards, etc.—Continued.								
Philippine Islands	*M. ft.* 22,485	*M. ft.* 6,623	*M. ft.* 4,833	*M. ft.* 1,987	*Per ct.* .9	*Per ct.* .6	*Per ct.* .4	*Per ct.* .2
United Kingdom	332,457	260,098	275,961	140,230	13.8	22.9	23.4	13.4
Other countries	361,901	139,082	153,097	233,734	14.9	12.2	12.9	22.3
Total	2,417,439	1,135,212	1,177,331	1,044,999	100.0	100.0	100.0	100.0
Timber, hewn and sawed—								
Canada	37,846	15,382	12,812	10,069	8.6	8.9	6.4	5.5
France	32,047	6,192	2,859	14,892	7.3	3.6	1.4	8.1
Germany	17,506	2,337			4.0	1.3		
Italy	65,314	25,763	29,946	17,684	14.8	14.8	14.9	9.6
Netherlands	57,776	6,733	9,964	1,961	13.1	3.9	5.0	1.1
United Kingdom	186,906	99,318	117,221	89,714	42.4	57.1	58.3	48.6
Other countries	43,771	18,064	28,403	50,369	9.8	10.4	14.0	27.1
Total	441,166	173,789	201,205	184,689	100.0	100.0	100.0	100.0

TABLE 209.—*Origin of principal farm products imported into the United States, 1914–1917.*

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
ANIMAL MATTER.								
Cattle:	*Number.*	*Number.*	*Number.*	*Number.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Mexico	625,253	343,809	197,788	183,827	72.0	64.2	45.0	49.0
Other countries	243,115	194,358	241,397	190,999	28.0	35.8	55.0	51.0
Total	868,368	538,167	439,185	374,826	100.0	100.0	100.0	100.0
Horses:								
Canada	4,435	3,515	6,250	6,348	13.4	27.8	40.2	50.4
France	1,171	235	110	170	3.5	1.8	.7	1.4
Other countries	27,413	8,902	9,196	6,066	83.1	70.4	59.1	48.2
Total	33,019	12,652	15,556	12,584	100.0	100.0	100.0	100.0
Dairy products:								
Cheese, including substitutes—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
France	5,418,904	3,554,297	2,321,543	1,937,341	8.5	7.1	7.7	13.4
Italy	26,453,826	25,662,362	16,084,058	8,482,290	41.5	51.2	53.5	58.6
Switzerland	22,490,006	14,766,682	9,514,008	1,640,656	35.3	29.5	31.6	11.3
Other countries	9,421,577	6,155,179	2,168,390	2,421,227	14.7	12.2	7.2	16.7
Total	63,784,313	50,138,520	30,087,999	14,481,514	100.0	100.0	100.0	100.0
Fibers, animal:								
Silk, raw—								
China	5,926,745	5,097,169	7,419,616	7,006,700	20.7	19.6	22.4	20.7
Italy	1,997,428	2,610,570	2,545,845	467,405	7.0	10.0	7.7	1.4
Japan	20,196,212	18,217,083	22,914,898	26,341,833	70.6	70.0	69.3	77.8
Other countries	474,287	106,103	190,543	52,947	1.7	.4	.6	.1
Total	28,594,672	26,030,925	33,070,902	33,8[illegible]8,885	100.0	100.0	100.0	100.0

TABLE 209.—*Origin of principal farm products imported into the United States, 1914–1917*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
ANIMAL MATTER—con.								
Fibers, animal—Continued.								
Wool, class 1—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Argentina	30,959,660	65,373,017	110,085,992	187,078,443	24.8	29.4	27.3	66.9
Australia, Commonwealth of	23,757,714	66,063,841	157,433,859	802,618	19.0	29.8	39.1	.3
Belgium	4,581,419	3,002,967	....	....	3.7	1.4	......	......
New Zealand	4,710,748	413,679	16,697,578	262,352	3.8	.2	4.1	.1
United Kingdom	45,223,714	38,897,503	30,188,711	1,555,182	36.2	17.5	7.4	.6
Uruguay	7,972,159	14,612,703	8,941,506	33,304,462	6.4	6.6	2.2	11.9
Other countries	7,883,347	33,653,710	79,773,939	56,478,444	6.1	15.1	19.9	20.2
Total	125,088,761	222,017,420	403,121,585	279,481,501	100.0	100.0	100.0	100.0
Wool, class 2—								
Canada	4,542,139	5,094,660	4,930,170	7,883,007	24.1	33.8	37.1	46.2
United Kingdom	12,301,661	8,607,635	4,135,963	56,400	65.3	57.2	31.1	.3
Other countries	1,995,898	1,352,396	4,226,027	9,116,546	10.6	9.0	31.8	53.5
Total	18,839,698	15,054,694	13,292,160	17,055,953	100.0	100.0	100.0	100.0
Wool, class 3—								
Argentina	5,452,526	10,509,249	14,670,272	15,075,173	5.3	16.0	13.4	22.3
British East Indies	2,788,130	859,121	3,025,191	423,661	2.7	1.3	2.8	.6
China	29,884,054	35,455,392	44,192,310	25,448,769	29.3	54.0	40.4	37.6
Russia (Asiatic and European)	22,627,514	2,273,360	3,269,328	....	22.2	3.5	3.0	......
Turkey (Asiatic)	5,350,091	2,486,957	42,560	....	5.2	3.8	0.0	......
United Kingdom	22,105,267	10,233,744	25,969,190	2,795,512	21.7	15.6	23.8	4.1
Other countries	13,795,731	3,891,929	18,100,148	23,924,556	13.6	5.8	16.6	35.4
Total	102,003,313	65,709,752	109,268,999	67,672,671	100.0	100.0	100.0	100.0
Packing-house products:								
Hides and skins, other than furs—								
Calf skins—								
Belgium	5,157,640	978,751	....	....	6.3	2.1	......	......
Canada	5,734,207	4,441,310	4,612,406	2,752,316	7.0	9.7	7.2	5.9
France	5,800,673	7,406,904	7,994,908	2,437,902	7.0	16.1	12.5	5.3
Germany	16,560,316	2,613,289	....	....	20.1	5.7	......	......
Netherlands	12,006,926	4,152,980	8,750,387	1,995,942	14.6	9.0	13.6	4.3
Russia (European)	19,747,462	1,471,713	....	....	24.0	3.2	......	......
Other countries	17,396,366	24,901,754	42,777,792	39,150,035	21.0	54.2	66.7	84.5
Total	82,403,590	45,966,701	64,135,493	46,336,195	100.0	100.0	100.0	100.0
Cattle hides—								
Argentina	79,787,332	113,366,344	149,537,519	118,987,425	28.5	33.9	34.4	30.8
Belgium	7,313,906	3,416,605	....	....	2.6	1.0	......	......
Brazil	3,259,873	23,223,310	59,362,639	49,918,402	1.2	6.9	13.7	12.9
Canada	46,588,543	33,394,505	27,217,476	23,240,504	16.6	10.0	6.3	6.0
Colombia	5,098,244	8,394,503	10,736,678	15,340,041	1.8	2.5	2.5	4.0
Cuba	5,528,502	15,260,111	16,068,265	13,487,275	2.0	4.6	3.7	3.5
East Indies	4,474,768	5,705,638	19,388,264	15,759,758	1.6	1.7	4.5	4.1
France	19,036,552	7,951,693	2,885,199	520,894	6.8	2.4	.7	.1
Germany	4,989,795	811,463	654	....	1.8	.2	......	......
Italy	1,967,552	3,125,932	....	219,402	.7	1.3	......	.1
Mexico	33,194,289	43,384,173	42,895,513	34,137,722	11.9	13.0	9.9	8.8
Netherlands	4,099,899	2,870,004	4,214,621	5,029,905	1.5	.9	1.0	1.3
Russia (European)	9,043,103	693,102	....	....	3.2	.2	......	......
United Kingdom	11,204,957	6,511,409	6,578,567	3,509,065	4.0	1.9	1.5	.9
Uruguay	13,403,443	21,809,611	43,497,431	38,138,800	4.8	6.5	10.0	9.9
Venezuela	5,149,398	7,033,582	7,530,521	8,053,116	1.8	2.1	1.7	2.1
Other countries	25,823,332	37,386,432	44,264,421	60,257,719	9.2	10.9	10.1	15.5
Total	279,963,488	334,341,417	434,177,771	380,600,028	100.0	100.0	100.0	100.0

TABLE 209.—*Origin of principal farm products imported into the United States, 1914-1917*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
ANIMAL MATTER—con.								
Packing-house products—Continued.								
Hides and skins, other than fur.								
Goatskins—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct*	*Per ct.*
Aden	3,595,909	2,291,012	4,151,509	3,499,925	4.2	3.4	4.1	3.3
Africa	2,817,948	1,440,984	6,913,422	7,001,130	3.3	2.2	6.9	6.6
Argentina	3,470,013	3,738,020	6,337,138	5,566,223	4.1	5.6	6.3	5.3
Brazil	4,191,124	4,260,495	6,919,497	4,601,848	4.9	6.4	6.9	4.4
China	7,304,761	7,897,387	15.084,600	21,340,353	8.6	11.9	15.0	20.2
East Indies	35,831,857	28,651,497	40,877,117	46,196,646	42.3	43.1	40.6	43.7
France	2,171,224	1,891,445	971,848	1,046,413	2.6	2.8	1.0	1.0
Mexico	4,010,150	3,507,940	3,833,616	4,642,396	4.7	5.3	3.8	4.4
Russia (European)	5,131,075	1,556,154	....	....	6.1	2.3	......	......
United Kingdom	5,281,468	4,089,212	5,936,113	2,181,600	6.2	6.1	5.9	2.1
Other countries	10,953,899	7,223,017	9,632,161	9,563,773	13.0	10.9	9.5	9.0
Total	84,759,428	66,547,163	100,657,021	105,640,307	100.0	100.0	100.0	100.0
Sheepskins—								
Argentina	3,874,944	8,689,826	13,308 025	22,698,632	5.5	14.8	13.1	23.7
Brazil	1,582,333	1,384,888	3,257,445	2,326,475	2.3	2.4	3.2	2.4
British Oceania	9,848,498	11,007,719	14,653,153	3,630,411	14.1	18.7	14.4	3.8
Canada	3,678,117	4,102,461	3,105,951	2,699,873	5.2	7.0	3.1	2.8
France	2,221,769	823,209	2,089,161	1,362,709	3.2	1.4	2.1	1.4
Russia (European)	9,158,287	826,898	22,840	....	13.1	1.4	0.0	......
United Kingdom	26,384,892	22,616,881	33,287,127	17,148,994	37.7	38.5	32.8	17.9
Other countries	13,327,985	9,267,656	31,735,579	45,863,504	18.9	15.8	31.3	48.0
Total	70,076,825	58,719,538	101,459,281	95,730,598	100.0	100.0	100.0	100.0
VEGETABLE MATTER.								
Cocoa, crude:								
Brazil	25,870,186	19,708,616	45,657,401	51,461,624	14.7	10.2	18.8	15.2
British West Indies	44,062,426	40,728,851	39,933,405	54,203,374	25.0	21.2	16.4	16.0
Dominican Republic	26,782,966	46,620,464	48,990,707	61,443,869	15.2	24.2	20.1	18.1
Ecuador	26,319,735	33,418,752	31,913,350	67,227,698	14.9	17.4	13.1	19.9
Portugal	17,738,638	3,516,655	7,531,924	16,191,624	10.1	1.8	3.1	4.8
United Kingdom	12,903,640	21,062,767	13,408,058	11,650,811	7.3	11.0	5.5	3.4
Other countries	22,590,055	27,250,529	55,797,094	76,474,876	12.8	14.2	23.0	22.6
Total	176,267,646	192,306,634	243,231,939	338,653,876	100.0	100.0	100.0	100.0
Coffee:								
Brazil	743,113,500	773,400,315	849,405,925	907,237,562	74.2	69.1	70.7	68.7
Central American States and British Honduras	40,202,480	75,350,258	95,565,305	127,059,741	4.0	6.7	8.0	9.6
Colombia	91,830,513	111,077,449	109,363,456	150,591,659	9.2	9.9	9.1	11.4
East Indies	8,673,941	11,354,631	6,258,733	4,024,243	.7	1.0	.5	.3
Mexico	49,385,504	52,706,120	49,832,801	54,908,223	4.9	4.7	4.1	4.2
Netherlands	5,811,934	1,583,672	50,896	150,000	.6	.1	0.0	.0
Venezuela	49,953,478	72,463,140	73,405,301	58,050,584	5.0	6.5	6.1	4.4
West Indies and Bermuda	4,711,269	16,230,552	10,832,182	8,463,883	.5	1.4	.9	.6
Other countries	7,845,698	4,524,387	6,389,886	9,384,907	.9	.6	.6	.8
Total	1,001,528,317	1,118,690,524	1,201,104,485	1,319,870,802	100.0	100.0	100.0	100.0
Fibers, vegetable:								
Cotton—								
Egypt	63,668,055	117,596,646	171,528,669	88,772,585	51.6	63.5	73.7	60.4
Peru	6,455,946	5,262,394	4,934,448	5,885,836	5.2	2.8	2.1	4.0
United Kingdom	2,557,041	3,417,851	14,227,785	13,817,744	2.1	1.8	6.1	9.4
Other countries	50,665,857	58,927,688	42,110,160	38,585,470	41.1	31.9	18.1	26.2
Total	123,346,899	185,204,579	232,801,062	147,061,635	100.0	100.0	100.0	100.0

TABLE 209.—*Origin of principal farm products imported into the United States, 1914–1917*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
VEGETABLE MATTER—continued.								
Fibers, vegetable—Continued.								
Flax—	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Belgium	1,266	122	20	....	12.8	2.6	.3	......
Russia, European	2,735	336	2,521	2,872	27.7	7.2	36.3	36.3
United Kingdom	5,076	3,767	3,230	3,814	51.4	80.3	46.5	48.2
Other countries	808	469	1,168	1,232	8.1	9.9	16.9	15.5
Total	9,885	4,694	6,939	7,918	100.0	100.0	100.0	100.0
Jute and jute butts—								
British East Indies	100,755	80,444	99,780	109,685	95.0	96.8	92.1	97.3
Other countries	5,278	2,696	8,542	3,010	5.0	3.2	7.9	2.7
Total	106,033	83,140	108,322	112,695	100.0	100.0	100.0	100.0
Manila fiber—								
Philippine Islands	49,285	50,587	78,809	76,300	99.2	99.0	99.9	99.4
Other countries	403	494	83	465	.8	1.0	.1	.6
Total	49,688	51,081	78,892	76,765	100.0	100.0	100.0	100.0
Sisal grass—								
Mexico	195,086	175,884	220,994	130,861	90.5	94.7	96.7	91.3
Other countries	20,461	9,880	7,616	12,546	9.5	5.3	3.3	8.7
Total	215,547	185,764	228,610	143,407	100.0	100.0	100.0	100.0
Fruits:								
Bananas—								
British West Indies	*Bunches.* 13,677,191	*Bunches.* 11,957,935	*Bunches.* 4,927,435	*Bunches.* 2,191,516	32.2	29.1	13.4	6.3
Central American States and British Honduras	25,432,760	22,470,600	24,440,649	26,211,939	52.1	54.7	66.5	75.6
Cuba	2,354,395	2,708,624	2,859,021	2,184,110	4.8	6.6	7.8	6.3
South America	2,271,866	1,567,461	2,710,047	3,578,500	4.7	3.8	7.4	10.3
Other countries	2,947,380	2,386,965	1,817,552	495,114	6.2	5.8	4.9	1.5
Total	48,683,592	41,091.585	36,754,704	34,661,179	100.0	100.0	100.0	100.0
Nuts:								
Walnuts—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Austria-Hungary	514,455	....	....	....	1.4	......	......	......
France	19,020,143	18,716,938	22,443,477	18,302,907	51.1	56.0	60.9	47.3
Italy	6,275,717	6,440,934	8,489,385	7,822,612	16.9	19.3	23.0	20.2
Turkey (Asiatic)	1,712,209	16,135	....	....	4.6	.0	......	......
Other countries	9,673,204	8,271,831	5,926,072	12,599,843	26.0	24.7	16.1	32.5
Total	37,195,728	33,445,838	36,858,934	38,725,362	100.0	100.0	100.0	100.0
Oil, vegetable:								
Olive, salad—	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*				
France	949,858	802,092	891,769	726,771	15.3	12.0	12.3	9.7
Italy	4,319,567	4,864,388	4,700,412	2,882,535	69.5	72.5	65.1	38.3
Other countries	948,135	1,044,487	1,632,250	3,923,843	15.2	15.5	22.6	52.0
Total	6,217,560	6,710,967	7,221,431	7,533,149	100.0	100.0	100.0	100.0
Soya-bean oil—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Japan	6,425,306	5,471,911	70,384,049	67,169,454	39.3	28.5	71.7	41.3
United Kingdom	1,453,932	906,134	187,722	....	8.9	4.7	.2	......
Other countries	8,481,214	12,828,476	27,547,924	95,520,781	51.8	66.8	28.1	58.7
Total	16,360,452	19,206,521	98,119,695	162,690.235	100.0	100.0	100.0	100.0

TABLE 209.—*Origin of principal farm products imported into the United States, 1914-1917*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
VEGETABLE MATTER—continued.								
Opium:								
Turkey (Asiatic and European)	*Pounds.* 383,489	*Pounds.* 440,529	*Pounds.* 27,883	*Pounds.* 599	*Per ct.* 83.2	*Per ct.* 91.0	*Per ct.* 19.0	*Per ct.* .7
United Kingdom	39,372	38,258	62,665	65,356	8.6	7.9	42.7	75.3
Other countries	32,339	5,240	56,110	20,857	8.2	1.1	38.3	24.0
Total	445,200	484,027	146,658	86,812	100.0	100.0	100.0	100.0
Seeds:								
Flaxseed or linseed—	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*				
Argentina		3,927,542	11,468,039	5,009,441		36.8	78.1	40.4
Belgium	3				.0			
British India	50	39,990		122,596	.0	.4		1.0
Canada	8,647,168	6,629,860	3,094,735	7,014,573	99.9	62.2	21.1	56.6
United Kingdom	6,010		3		.1			
Other countries	4	68,823	116,456	247,378	.0	.6	.8	2.0
Total	8,653,235	10,666,215	14,679,233	12,393,988	100.0	100.0	100.0	100.0
Grass seed—								
Clover—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Canada	5,741,516	1,525,080	1,620,609	5,654,366	19.1	6.3	3.9	31.1
France	15,402,710	18,879,326	26,964,867	10,037,945	51.2	78.2	64.4	55.2
Germany	4,200,141	336,575	44,000		14.0	1.4	.1	
Italy	44,000	343,546	10,300,153	660	.1	1.4	24.6	.0
Other countries	4,719,282	3,072,184	2,910,132	2,479,188	15.6	12.7	7.0	13.7
Total	30,107,649	24,156,711	41,839,761	18,172,159	100.0	100.0	100.0	100.0
Sugar, raw, cane:								
Cuba	4,926,606,243	4,784,888,157	5,150,851,544	4,669,097,398	97.3	88.3	91.5	87.6
Dutch East Indies		22,235	32,941	21,813				
Philippine Islands	116,749,211	326,842,296	217,190,825	267,891,954	2.3	6.0	3.9	5.0
Santo Domingo	4,316,282	86,188,211	107,503,110	114,367,301	.1	1.6	1.9	2.1
South America	9,386,732	120,869,986	118,659,613	158,107,460	.2	2.2	2.1	3.0
Other countries	4,506,153	99,819,597	37,034,733	120,101,434	.1	1.9	.6	2.3
Total	5,061,564,621	5,418,630,482	5,631,272,766	5,329,587,360	100.0	100.0	100.0	100.0
Tea:								
Canada	3,112,383	3,446,615	2,600,705	3,160,459	3.4	3.6	2.4	3.1
China	20,139,342	23,100,548	20,422,700	19,810,428	22.1	23.8	18.6	19.2
East Indies	10,551,735	12,645,303	14,855,825	13,138,534	11.6	13.0	13.5	12.7
Japan	41,913,273	43,869,012	52,359,526	52,418,963	46.0	45.2	47.7	50.7
United Kingdom	14,077,601	12,869,968	19,066,241	13,857,721	15.4	13.3	17.3	13.4
Other countries	1,336,481	1,056,496	560,938	978,305	1.5	1.1	.5	.9
Total	91,130,815	96,987,942	109,865,935	103,364,410	100.0	100.0	100.0	100.0
Tobacco, leaf:								
Wrapper—								
Netherlands	5,846,504	7,061,943	4,963,761	2,426,322	96.0	97.5	97.9	61.6
Other countries	246,283	179,235	106,547	1,515,614	4.0	2.5	2.1	38.4
Total	6,092,787	7,241,178	5,070,308	3,941,936	100.0	100.0	100.0	100.0
Other leaf—								
Cuba	26,617,545	21,987,848	23,946,363	23,417,539	49.3	57.1	55.8	55.5
Germany	456,445	91,578			.8	.2		
Turkey (Asiatic)	15,616,543	6,714,654		18,450	28.9	17.4		.0
Turkey (European)	8,502,742	5,950,915	19,890	10,051	15.7	15.4	.0	.0
Other countries	2,821,450	3,778,555	18,976,774	18,748,371	5.3	9.9	44.2	44.5
Total	54,014,725	38,523,550	42,943,027	42,194,411	100.0	100.0	100.0	100.0

TABLE 209.—*Origin of principal farm products imported into the United States, 1914–1917*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	1914	1915	1916	1917 (prel.)	1914	1915	1916	1917 (prel.)
FOREST PRODUCTS.								
India rubber, crude:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Belgium	11,005,246	1,902,370			8.3	1.1		
Brazil	40,641,305	48,753,670	54,968,227	56,818,966	30.8	28.3	20.5	17.0
Central American States and British Hundoras	565,487	790,368	1,313,454	1,317,931	.4	.5	.5	.4
East Indies	16,597,105	27,898,683	125,532,067	181,431,578	12.6	16.2	46.9	54.4
France	2,629,287	685,699	509,675	616,772	2.0	.4	.2	.2
Germany	7,079,260	739,105			5.4	.4		
Mexico	641,029	1,827,912	3,261,507	1,488,636	.5	1.1	1.2	.4
Portugal	556,560	4,130,624	2,773,656	3,719,703	.4	2.4	1.0	1.1
United Kingdom	48,279,674	75,168,236	72,459,408	78,742,217	36.6	43.7	27.1	23.6
Other countries	4,000,789	10,171,761	6,957,563	9,207,908	3.0	5.9	2.6	2.9
Total	131,995,742	172,068,428	267,775,557	333,373,711	100.0	100.0	100.0	100.0
Wood:								
Cabinet woods, mahogany—	*M feet.*	*M feet.*	*M feet.*	*M feet.*				
British Africa	12,888	6,941	6,888	12,530	18.3	16.4	17.3	29.3
Central American States and British Honduras	23,356	17,955	10,450	12,701	33.1	42.4	26.2	29.7
Mexico	10,381	8,119	8,453	8,229	14.7	19.2	21.2	19.2
United Kingdom	18,289	5,918	7,248	1,360	26.0	14.0	18.2	3.2
Other countries	5,556	3,392	6,816	7,960	7.9	8.0	17.1	18.6
Total	70,470	42,325	39,855	42,780	100.0	100.0	100.0	100.0
Boards, planks, deals, and other sawed lumber—								
Canada	892,833	908,663	1,180,018	1,155,916	96.1	96.7	96.9	98.4
Other countries	36,040	30,659	38,050	19,264	3.9.	3.3	3.1	1.6
Total	928,873	939,322	1,218,068	1,175,180	100.0	100.0	100.0	100.0
Wood pulp:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Canada	524,251,441	660,656,640	790,997,760	992,617,920	46.0	50.2	69.6	63.4
Germany	149,171,214	83,119,680	237,440		13.1	6.3	.0	
Norway	181,255,024	200,934,720	115,978,240	99,957,760	15.9	15.3	10.2	6.4
Sweden	265,457,874	350,183,680	225,955,520	458,805,760	23.3	26.6	19.9	29.3
Other countries	18,591,642	22,050,560	2,618,560	15,442,560	1.7	1.6	.3	.9
Total	1,138,727,195	1,316,945,280	1,135,787,520	1,566,824,000	100.0	100.0	100.0	100.0

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