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THE AGRICULTURAL STUDENT

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THE
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PUTTING ORCHARDING ON A COMMERCIAL BASIS

Requisites Essential to the Successful Production of Fruit for the Market; Selecting the Location; Caring for the Trees; and Placing of the Product Before the Consumers

W. W. FARNSWORTH, Waterville, Ohio

COMMERCIAL orcharding has received considerable attention for a number of years past, and the rules for its successful inception and management are much better understood and more generally followed than formerly. In the last 15 or 20 years, many large orchards have been planted in the West and South which were planted to sell and not to bear. The bubble of wild inflation has been pricked and would be fruit growers are learning that there is no royal road to orcharding either east, west or south.

There are several requisites essential to the successful production of fruit for market. As first I would mention location, altho probably there are more good fruit locations than good fruit men. The location should have proper air drainage and good natural soil drainage, or be so situated that it can be tile drained. We have often been told that only soils which were well drained naturally, should be chosen for fruit. I cannot agree to that as very many of the best fruit soils have to be underdrained, and while it is a saving of expense if the soil is already drained by nature, still I would select the fertile soil which needed draining in preference to a less fertile soil which did not need it. In addition to this it should be reasonably near to good markets or shipping points, and if you can ship to a number of markets, it is much better than to be dependent on one only as markets have periods of depression. While nearness to markets or railroads may not be as essential with orchards as with vegetables or small fruits, still one can afford to pay considerably more per acre for land within a mile or two of a station than to be obliged to haul 5 or 10 miles, especially if the roads are not good.

I would also select soil of good natural fertility, as I believe it is cheaper to buy fertility by the acre rather than by the bag of fertilizer or load of manure. However, if all other conditions are favorable, it may sometimes be wise to buy rather poor soil and build up, especially is this true if the soil is naturally good and is temporarily unproductive by reason of neglect. The idea is quite common that hilly land is the best for fruit, but while an elevation somewhat higher than the surrounding country is an advantage by affording air drainage and thus protecting against frost damage, still it is much better if the site is level enough so it can be cultivated when desired without washing soil.

Even when it is not intended to cultivate the orchard, it is much more convenient to spray and haul fruit and fertilizers or manures where the soil is seasonably level. Convenience in secur-

ing help should also be considered in deciding on a location as an orchardist near town can usually secure extra help easier than one farther away.

The fact that the proposed location is surrounded by many successful growers is in the majority of cases a decided advantage. If you can see a given variety of fruit succeeding finely on an adjoining farm, it is pretty sure that it will do equally well with you, if you give it equally good care. There are also many advantages in living in a community where fruit growing is general as it makes cooperative buying and selling possible and purchases will come where there are large quantities of fruit for sale. You can also avail yourself of the experience of your neighbors who are working under conditions similar to your own.

On the other hand, there are some advantages in being the only grower in the vicinity. You will have the retail trade to yourself if you desire it and you will have less trouble in securing extra help. You will, however, be obliged to assume the initiative and work out many of your own problems when you are the pioneer grower in a section not devoted to fruit growing. The nature of the soil is important also. Most fruits succeed fairly well in quite a diversity of soils but all fruits have their favorites. If a wide variety of small fruits and tree fruits are to be grown, I would prefer a sandy loam, altho for many kinds of tree fruits and some small fruits, a clay loam is better. Whatever the nature of the soil, it must be capable of retaining moisture and yet free from surplus water and must be well supplied with plant food for an orchard cannot yield abundant annual crops unless there is plenty of food and moisture to feed the trees.

Having selected the trees the next thing to decide is how you will market, altho possibly you should have decided this even before the location. If your means and acreage are limited and you are located near a good market, you will probably decide upon retailing directly to the consumer in which case your choice of varieties will be much different from what it would be if you are to engage in growing for the wholesale trade. But even if growing for the wholesale trade. I do not believe in limiting the varieties too severely. True it is an advantage to be able to ship solid cars of one or two varieties but the fruit farm, which has an assortment of the best commercial varieties of various kinds of fruit so arranged that something can be marketed every day of the season and where the varieties do not overlap so as to bulk the work, can be handled much more economically and efficiently than where a specialty is made of but one or two varieties. In the latter case a large amount of untrained and uncompetent help must be employed during the rush season and results cannot be as satisfactory as where a smaller number of trained men are employed for the entire season.

In the planting of the farm be sure to plan everything as far as possible before commencing. Study the different types of soil on the place and plant on each the kind of fruit best adapted to it. Plant the trees far enough apart to allow of easy spraying and for tilling with a tractor where cultivation is given. If you use the filler system be careful to select varieties which bear early and are of moderate growth. I would use apples as fillers for apples and in many cases the same varieties can be used both as permanent trees and for fillers.

When you start an orchard you should look upon each individual tree as you would an animal to be fed and cared for. The old system of planting a fruit tree where nothing else will grow and then going out to it a few years later to see what the Lord has sent you will not do any longer.

The markets are calling for something vastly superior to the natural product and our processes must be improved in accordance. Success in fruit growing depends so much upon a painstaking observance of the multitude of minor details that one who does not love the business for itself rather than for the dollars in it, is not very likely to succeed with it.

Forty years ago there was a great deal of chance and uncertainty in connection with commercial orcharding but since then much has been done to reduce the uncertainties. Remedies have been discovered for the various insects and fungus diseases and machines for applying them have been wonderfully improved. We have learned much about different methods of culture and pruning and also a great deal about marketing. On the whole we have reached the stage where fruit growing as a commercial proposition ranks as a fairly safe one.

In determining success or failure in commercial orcharding the most important factor is the man himself. To attain the fullest measure of success the planter should enjoy seeing the young trees thrive and take shape under his fostering care and guiding hand. He must have faith in his business and be willing to labor and to wait and to combat drouths, floods, bugs and rusts in defense of his friends, the trees. Then when the time of harvest arrives, he must be alert to care for his perishable product when it is at its best and to place it before the consumer when in its best condition and with the least possible intermediary expense.

View of a Commercial Orchard

GROWING APPLE SEEDLINGS FOR THE ORCHARD

Methods That May Be Used by the Amateur Plant Breeder in His Work

J. B. KEIL, Ohio Agricultural Experiment Station, Wooster, Ohio

IN the horticultural literature of days gone by much may be found that indicates the interest of the earlier fruit-growers in the production of seedlings. Many of them came from other lands where fruit growing was well established, and were accustomed to an abundance of fruit of many species and varieties. We owe much to the patience and foresight of these pioneers who realized the need for better adaptation of various fruits to the new country which they tried to bring under cultivation. The amelioration of the native fruits already adapted also became a part of their work, of which the development of the native grape is an eminent example.

A superficial student of the common fruits of the present day might be tempted to say that the varieties are already too numerous—in other words "Let well enough alone." This attitude may be more or less justified in the case of a commercial fruit grower with a profitable orchard, but fruit fanciers and the plant breeders with a wider knowledge of varieties, and of the possibilities of improvement, as well as a more intimate view of the shortcomings of existing varieties, see great opportunities before them.

They have at their command the rapidly accumulating fund of knowledge based upon Mendel's epoch-making experiments, to which is being added by plant breeders of today to a superstructure of such magnitude and intricacy that the fruit-grower loses himself in a maze of new terms.

However, it is from the standpoint of the average fruit growers that I wish to consider the growing of apple seedlings as a phase of plant breeding in which anyone with a little leisure and a little land may indulge. The fascinating work of cross-fertilizing the blossoms so that both parents of the seedlings may be known, cannot be touched upon in this article, but it should be said that much will be added to the interest of the amateur plant breeder in his work if he can begin it in this way.

It appears from the results obtained, that the best place to keep apple seeds is in the cores of the apples in which they grew. With winter varieties this is easily accomplished where a good cellar is available for storing the apples. Manifestly, the summer and early varieties cannot be handled in this way, and the use of cold storage is advisable to preserve the apples until planting time. In case this is impossible, there are two other ways in which the seeds may be preserved.

One is to remove the ripe seeds from the apples and allow them to dry, after which they may be stored in any suitable container, the same as with garden seeds. Since the consequent drying of the seed-coat is unfavorable to germination, and requires soaking the seed for several days to soften the shell, a method may be used which keeps the seeds moist. This is termed "stratifying."

A suitable box of wood or metal may be used, and a layer of moist sand placed in the bottom. If the seeds are all of the same variety they may be scattered in a thin layer over the sand, alternating sand and seeds until the entire lot has been stratified. If several lots of seed are to be handled, squares of cloth may be used to enclose

the different lots, and placed between layers of sand. The box should then be covered in such a manner that mice or other burrowing animals cannot gain an entrance, and then buried in some convenient place out-of-doors to ensure the moisture necessary to preserve the seeds and low temperature to keep them dormant until planting time.

Some writers claim that freezing is necessary to ensure germination, but my experience has been such as to indicate quite the contrary. In connection with the seedlings growing at the Station some experiments were made to determine this point.

Seeds of Northern Spy were taken from the apples in February. One hundred seeds were placed in sand in a good-sized flower pot and set under a bench placed in the greenhouse. Another 100 seeds were sowed in a flat and set outdoors to freeze. Four lots, each of 100 seeds, were also placed in the "zero room" in cold storage, and allowed to freeze 2, 4, 6 and 8 days respectively, at temperatures ranging from 18 degrees above zero to zero.

The 100 seeds kept in sand without freezing gave a 99 percent germination. The average of the other lots frozen in various degrees as above indicated was only 46 percent. This explains my preference for keeping the seeds in the apples, without freezing, until planting time.

If a greenhouse is available, considerable gain may be made in the first year's growth by sowing the seeds in flats of ordinary greenhouse soil in March. Furrows half an inch deep, with enough fine sand to cover the seed will provide excellent conditions for germination, if watering is carefully done to maintain the proper degree of moisture.

When the plants have 3 or 4 leaves they should be transplanted to other flats at a distance of 1½ or 2 inches apart. As the weather becomes warmer they should be moved out to some sheltered location to harden them gradually to out-door conditions. As soon as the soil can be worked they should be set in the garden or field 6 or 8 inches apart in rows, using the same precautions as in transplanting cabbage or tomato plants.

If seeds are to be sown out-of-doors, a bed of suitable size may be made in

Wealthy Seedling Two Years Old

good soil, and since a cloth shade should be used to guard against excessive drying of the surface and also against the effect of dashing rains, the bed should be of a shape to conform to the cloth or frames at hand.

The seed should be sown as soon as the ground can be worked, in furrows an inch deep, with a covering of half an inch of sand or a mixture of sand and muck if available.

Mice are fond of apple seeds, and the bed should be located away from buildings or fence rows, or should be protected with wire screen. If seeds are sown thinly in rows a foot apart in good soil the seedlings should be permitted to grow the entire season undisturbed, as it is difficult to transplant them in the warm weather of May. A growth of a foot or more in height, with perhaps a quarter of an inch diameter at the ground line, may be expected the first year. Another year in a nursery row at 10 or 12 inches apart will find the most of the seedlings large enough to plant in an orchard. For this, a distance of 8 or 10 feet apart will give room for the trees to grow to fruiting age.

Seedlings started in the greenhouse in Februrary or March, and handled carefully to prevent serious checking of growth, compare favorably in size at the end of the first season's growth with root-grafted trees of the same age. The larger trees may furnish scions at this time, for grafting into older trees, but better scions can be obtained from 2 year-old trees. Grafts set in mature trees often bear in 3 years from grafting, and seedling trees may be expected to bear at from 6 to 10 years of age. It depends in both cases upon the nature of the variety, which, in the seedling apple, is determined only by trial. Because of the mixed heredity of most of our varieties, little can be said regarding the selection of the seed parents for apple seedlings, but several groups may be mentioned. Winesap and Romanite have given us the most of our valuable varieties for southern conditions. The Spitzenburg group contains several varieties of high color and quality. The Fameuse and Oldenburg groups have given varieties of special hardiness. Northern Spy seedlings are generally of vigorous, healthy growth.

Seedling Nursery at End of First Season

CONTROLLING INSECTS AND DISEASES BY SPRAYING

Systematic Use of Materials Essential for Success

ERNEST J. RIGGS, Raccoon Island, Gallia County, Ohio

IT has been only within recent years that any attempt has been made by fruit growers to control insects and diseases which affect his fruit and trees. It was in 1883 that Prof. A. Millardet of Bordeaux, France, thru accident was lead to make experiments along this line and finally gave us the formula for Bordeaux Mixture. Within 10 years from that time progressive fruit growers in many sections of the country had begun to make systematic use of this solution for the control of apple scab and a few other so-called fungus diseases which had been developing with alarming rapidity, and causing enormous losses.

Coincident with the development of the diseases there was also a wonderful activity on the part of a few insects, particularly the codling worm, whose capacity for destruction is limited only by the number of apples on which it can feed. At that time Paris green was the "old reliable" for the destruction of potato bugs, and also quite useful in closing the careers of promising pet colts and calves, and so it became quite popular as a poison to be used with the Bordeaux in the control of the codling worm.

To further annoy, discourage and distress the fruit grower the pestivorous San Jose scale began its pernicious career of destruction, and neither the Bordeaux nor the Paris green would have any effect upon it. It was found that a solution of salt, lime and sulphur, or an application of miscible oil would destroy the pest, and thru the quite general use of the former, beneficial results were obtained not only in this respect but also in controlling the fungus diseases to some extent, and now we have the commercial lime-sulphur solution of standard quality superseding to some extent the Bordeaux; and arsenate of lead as a poison superseding almost exclusively the Paris green.

This is a very brief history of our spraying operations and from this, it will be noted that there are three general groups of enemies which we have to successfully and constantly fight if we are to have the satisfaction of producing perfect fruit profitably. The three groups or classes are: fungus diseases, insects other than scale insects and scale insects. We might also add a fourth class under the division of bacterial diseases, which so far, has completely outwitted the fruit grower as well as the scientist in any particular method of its control.

Under the first group a low order of plant life is parasitic upon the higher order of plants. As example we have scab, cedar rust, sooty fungus, blotch and bitter rot of the apple, and brown rot of the plum, peach cherry and grape. Any preparation for the control of these diseases is termed a "fungicide." and its success is dependent upon the prevention of the germination of the fungus spores when they find lodgment on the host plant. This prevention consists of a complete covering with a fungicide at the proper time, every particle of plant tissue on which the fungus may establish itself. A knowledge, therefore, of the time when the disease spores are disseminated is essential for the best results in their control, but as this is dependent upon the season, and coincident with the

vegetative growth, the time of application will be governed by the season's progress. For instance, it has been found that a mixture of Bordeaux 6-6-50 applied just previous to the opening of the flower petals has been most effective in the control of apple scab. Subsequent sprayings of the Bordeaux 4-4-50 every 2 or 3 weeks, under most conditions would keep the scab under control, but as some varieties of apples are very susceptible to injury from Bordeaux up to the time they are about half grown, it may be wise to use it, but use in its place the lime-sulphur solution.

As the so-called ripe fruit diseases, such as the blotch, bitter rot and brown rot do not begin to make their appearance until about the middle of July, the earlier season spraying will not suffice for their control, so that it becomes necessary to spray just as carefully the latter part of the season as it does the earlier part of the season.

The control of our more common injurious insects is much more simple and certain than are the diseases, but some knowledge concerning the life habits is necessary in order to use proper means for this control, for it should be understood that there are two classes of insects, the eating insects, and the sucking insects. Arsenical poisons, of which arsenate of lead is the most popular, are used for the control of the former, and its application is made upon the host plant. With the sucking insects it is necessary to make an application of some irritating or suffocating substance directly to the body of the insect. Oil emulsion and nicotine are the most effective for this purpose. The time for making the application will depend upon the presence of the insect, and in the case of the eating insects, the application should be made just previous to the first appearance of the insects. For the codling worm the best time seems to be just as soon as possible after the blossoms have fallen, using 3 pounds of arsenate of lead paste, or one-half as much of the powdered form to 50 gallons of spray material. The application should be made with a rather coarse nozzle under about 200 pounds pressure. The object being to thoroly fill the calyx cups of every apple with sufficient poison to satisfy the appetite of every unsuspecting worm that comes along.

A second application of the same strength and material is made about 2 to 3 weeks later, and a third about the first week in July for southern Ohio, and perhaps 2 weeks later for northern Ohio.

A score of years ago when San Jose scale began making its appearance in orchards thruout the state there was much consternation among the fruit growers for they looked upon this enemy as the climax of all evil, and were ready to give up in despair, but its activity and withering results were merely the blessing in disguise which compelled more careful methods of orchard practice.

San Jose and other scale insects may be quite easily controlled when proper materials of sufficient strength are used, but one must not be satisfied with work well done. It is a warfare to the finish, and unfortunately, the fruit grower is not permitted to see the finish. It is a never ending fight.

Miscible oils and lime-sulphur solutions are effective scalecides when used with thoroness and of the proper strength. For a number of years lime-sulphur solution diluted 1-10 gave satisfactory results, but for some unexplainable reason during the past 2 or 3 years it has required greater concentra-

tion, and now a 1-16 dilution is recommended. Most of the oil preparations give uniformly good results when used as directed, but they are somewhat more expensive than the lime-sulphur.

In controlling various insects and diseases in general the following general program is recommended. Early spring when the buds are beginning to show green tips is the proper time to make the first application of spray material, using the lime-sulphur solution 1-6. This is done primarily for the control of the scale insects, but it also acts as a fungicide, and will destroy young aphids if they are present. The older aphids are not affected by the lime-sulphur and too much confidence should not be placed in it.

The third application is made as quickly as possible after the petals have fallen, and consists of lime-sulphur 1-40 and 3 pounds of arsenate of lead paste or half as much in the powdered form. This is primarily for the control of the codling worm.

The fourth application is of the same material and strength as the third, and is made about 3 weeks later. The fifth application, same as the third, is made between July 1 and July 15. If fungus diseases are very much in evidence it would be better perhaps, to substitute Bordeaux mixture 4-4-50 for the lime-sulphur.

If one has varieties susceptible to blotch and bitter rot it should be presumed that they will, under favorable weather conditions, become affected with the disease, and it becomes necessary to protect the fruit with an application of Bordeaux 4-4-50 about every 3 weeks until a couple of weeks before the harvest. To any one having grown fruit under favorable conditions, this great amount of attention would seem ridiculous, but under extreme circumstances it is necessary.

A PLEA FOR AMATEUR HORTICULTURE

Great Advances Due to Persons With No Idea of Money Returns

WENDELL PADDOCK, Department of Horticulture, Ohio State University

AN amateur is one who follows a pursuit for pleasure which another may practice for gain. Amateurs are frequently less skillful than professionals, consequently something of a double meaning has been given to the word. However, amateurs are by no means necessarily less skillful than the professional as some of the greatest advances along certain lines have been made by persons who have had no idea of money returns. This has been especially true in many phases of horticulture.

The amateur horticulturist has always been conspicuous in the development of new countries. In the development of our own State the name of Nicholas Longworth always will be remembered. Longworth settled in Cincinnati early in 1800 where he engaged in banking and other business. But his taste for horticulture soon made him a leader among a number of horticultural experts for which that city was famous for many years.

Longworth together with many others in various parts of the country was long interested in growing the vinifera or raisin grape. He summed up his experience as follows: "I have for 30 years experimented on the foreign grape. I obtained a large variety of French grapes from the vicinity of Paris and Bordeaux. From Madeira I obtained 6000 vines of their best wine grapes. Not one was found worthy of cultivation in this latitude and were rooted from the vineyards. As a last experiment I imported 7000 vines from the mountains of Jura in France. But after a trial of 5 years, all have been thrown away. If we intend cultivating the grape for wine, we must rely on our native grapes, and new varieties raised from their seeds. If I could get my lease of life renewed for 20 or 30 years, I would devote my attention to the subject, and I would cross our best native varieties with the best table and wine grapes of Europe."

Finally the Catawba grape was found wild in the woods of North Carolina. Cuttings were sent to Longworth who soon became enthusiastic over its possibilities. When it had proved its worth on his grounds he began an active campaign for its introduction into American vineyards. Because of the importance of the introduction of this variety and the part that Longworth took in its dissemination, he is spoken of as the father of American grape growing. The following taken from his writings will give an idea of the enthusiasm that he had for grape growing:

"If the wild hills of California be as rich in grapes as in gold dust, Jerseyman tho I am, I shall be more gratified to receive a grape cutting than the largest lump of gold that region has ever produced."

But grapes did not alone claim his attention as he found much satisfaction in growing strawberries and raspberries. He, it was, that first called attention in a serious way to the fact that staminate and pistillate varieties of strawberries occur. While the horticultural importance of this fact was immense, yet the world was slow to appreciate it and so its sponsor was the object of much ridicule.

Cultivation of the American black raspberry also had its beginning in Longworth's garden. It was in the fall of 1832 that he found a wild rasp-

berry of unusual merit. He transplanted it to his garden where it was tested for a number of years. Finally he was convinced of its merits and he, with his usual enthusiasm, began to urge its cultivation. This variety was of the everbearing type, and it was named the Ohio Everbearing. Later on it came to be known as the Ohio.

Longworth is but one of many Ohio men and women who have given largely of their time and means to the advancement of horticulture in its many phases simply because of their love of the work. The amateur horticulturist is still with us, but apparently his comparative numbers have decreased and the value of his work has diminished.

At a recent meeting of Experiment Station and College pomologists the fact was deplored that many fine old varieties of fruit are passing out of existence. A number of factors enter into this loss, but a lessened interest on the part of amateurs was thought to have much to do with it. Then the horticultural botanist stated that the notable collections of plants such as begonias, orchids and the like, which were in existence a score of years ago are not now to be found in either Europe or America. Collections of the latter kind were almost entirely in the hands of amateurs and no attempt was made to account for the loss of interest.

Many times it is the amateur who can best afford time and money to try new kinds of plants and new methods of cultivation and of handling. It is usually the amateur alone who can afford to get together and maintain large collections of plants be they orchids, begonias, or apples. Certain it is that the state and government institutions are not maintaining and probably cannot support such collections.

This is an age of libraries and all rejoice when a new one is established. But to me many of them savor just a little of the commercial; certain it is that the collection of books that one finds in the average library was not selected from the collector's standpoint.

Museums of various kinds devoted to the several arts and sciences are also receiving much attention, but just now museums of live plants appear to be forgotten. Would it not be a fine thing if an arboretum could be established some place in the state where specimens of all kinds of trees and shrubs suited to this climate could be grown? Such an arboretum would be an inspiration to all, a delight to many who do not appreciate art, or even books, and of great scientific and practical value. A collection of apples including many species and varieties, or of grapes or of any other fruits or ornamental and useful plants would be exceedingly interesting as well as useful.

Interest in amateur horticulture may be fostered and aroused by societies, by shows and by various forms of competition. It is true that we have horticultural organizations of various kinds, but it is apparent that for the most part they do not meet present day needs. There is room for many more town, country and state organizations where a few are interested in growing certain plants. At the present time such activities are mostly carried on with commercial ends alone in view and this has resulted in great loss as we have tried to show.

Thru the amateur horticulturist, commercial horticulture is greatly benefited. Where a commodity is much talked about, the demand for it is always stimulated. There is no better way to create an interest in horticultural products either fruits or flowers than to develop as many amateur growers as possible.

THE INTER-STATE FRUIT JUDGING LEAGUE

Training Students to Be the Apple Judges of the Future

WILLARD H. MOSIER, Department of Horticulture, Ohio State University

IT is a well known fact among pomologists that there are no definite and well established rules for judging fruit thru the central and mid-western states and this condition of affairs has often led to rather embarrassing situations. An illustration of this situation is when two fruit growers exhibit at a fruit show in one part of the country and place exhibits in the same class or classes. The judge awards the prize to exhibit A. These same growers now take the same exhibits to another show in another part of the county, and the prize is given to exhibit B. After this performance it is natural that the two growers will get together and declare the so-called fruit experts are not consistent in judging and therefore know very little about the fruit, its judging or production. It is to remedy this condition of affairs that the Inter-State Fruit Judging league was formed for the students that take part in the contests will be the fruit judges of the future. If they are trained by a set of rules as set forth by the league, the chances are they will not forget the general principles after they leave school and take up their life's work.

The league was formed during the fall of 1914 with the department of horticulture of the West Virginia Agricultural College taking the lead. All the states which entered the league at the time of its formation are active members at the present time. They are West Virginia, Kentucky, Pennsylvania, Maryland, Delaware, New Jersey and Ohio.

To one familiar with fruit growing it is readily discernible as to why these states were grouped together in a league of this nature. They are approximately of the same latitude and elevation and grow practically the same varieties of apples for market and show purposes, so that they form what is generally known as the fruit belt of the central United States. It would not be advisable to have included states either farther north or farther south than the ones mentioned, for they would grow different commercial varieties, and if by chance they did grow varieties the same as those grown in the central belt, the fruits would be off type and difficult to identify and the comparisons would be manifestly unfair.

The first problem confronting the league was the selection of varieties of apples for the teams to identify and judge. As there are about 8000 named varieties in the United States, it was obvious from the first that only a few could be used, so 25 were selected as being representative of the commercial types for the region in question. They are the Stark, Stayman, Arkansas, Winesap, Rome, York, Jonathan, Grimes, King David, Baldwin, Spy, King, Rhode Island, Yellow Bellflower, Roxbury, Hubbardston, Wagner, Yellow Newton, Ben Davis, Delicious, Northwestern Greening, Fallawater, Mann, Winter Banana and Nero. It was further decided that in the contests only 20 of these 25 varieties should be used, but that the contestants should not know before hand what varieties the coaches had eliminated for the contest in question.

How the actual contest should be run, and how to determine the relative merits of the competing teams was the next

step to determine. It was accordingly agreed that three plates each of the 20 varieties chosen should be entered in the contest, but two of the three plates should contain a substituted apple, which however, must be taken from the 25 varieties. The test was for the contestants to name the varieties in question, name the substitutions, if any, and after this to place the three plates of each variety commercially, according to their commercial merit, first, second, and third. The indentification and placing is agreed upon by the coaches accompanying the teams before the contest starts. Each team consists of three members who work separately in the contest, at the end of which each individual's scoring and identification is checked with that previously determined upon by the coaches and his score determined on this basis. The scores of the members of each team are then added and averaged and the standing of the team determined.

At the time of the formation of the league, the West Virginia State Horticultural Society showed its interest in the enterprise by donating a silver cup valued at $125 to be given as a prize to the winning team, and to be held by that team until the following contest. It further provided that the cup was to become the permanent property of the team which should first win it three times. So far no team has won the cup twice, Rutgers College, New Jersey, having won at Morgantown in 1914, Ohio State University at Baltimore in 1915 and West Virginia Agricultural College at Columbus in 1916. The contest will be held at State College, Pennsylvania, in the fall of 1917.

Last, but not least, comes the fraternal spirit with which these various teams and coaches meet to participate in the contests. Good will prevails, and while all like to win, the mere winning of the trophy is relegated to second importance by common consent, and every one seems to feel that teams and coaches alike are working together for a common purpose and for the common good.

JACOB McQUEEN—GERM FARMER

How the Soil Was Made Productive by Inoculation

CLIFFORD T. CONKLIN, Extension Department, Ohio State University

NINE years ago Jacob McQueen of Tuscarawas County was in very poor health. In fact friends and physicians advised him to resign his position as traveling salesman, and to hurry back to his old home town if he wished to see his kin folk before he passed away.

But Jacob McQueeen was not thru with this world. There were still some knotty problems for him to solve. Taking his savings he invested in a notoriously poor farm of 45 acres near Baltic, Ohio. A struggle followed. At first his neighbors pitied him; when they found he was trying to raise soybeans, they ridiculed him. But when those run-down hillside acres each returned 30 bushels of soy beans, the scoffing neighbors began to drive over to learn the methods of the "Soy Bean King of Eastern Ohio."

At $50 an acre the old Rigby farm was no bargain when purchased by Mr. McQueen.

"In fact," said McQueen, "I soon found that I had a white elephant on my hands. Clover wouldn't grow, and corn was a failure. I was discouraged and ready to quit."

"But I couldn't sell out, so I had to do the best I could. Then I began to read, and finally visited the Ohio Experiment Station. Everything I read and everybody I talked to seemed to be driving away at the same point—'Legumes.' I went home determined that I would raise legumes on my farm or die trying."

"I decided that I would try soy beans. My soil was very thin, the shales cropping out in so many places that I was afraid alfalfa would not root properly."

"Do you know," he added, "I believe there is a great deal of land in alfalfa that would produce more profitable crops of soy beans, just because the soil is too thin for deep-rooting alfalfa plants."

The first efforts to raise soy beans were dismal failures. The acid conditions of the soil were intolerable, and Mr. McQueen and his bean failure were the joke of the neighborhood. The next year the soil was treated with one ton of lime per acre, but the results were no better. Then McQueen realized that inoculation of the soil with soy bean bacteria was absolutely necessary before he could hope for a paying crop.

Again the neighbors laughed, for who ever heard of using germs in farming? But Jacob McQueen said nothing. From many sources he introduced pure cultures with which to inoculate his soil, and anxiously awaited results. An examination in August showed but one plot of the 40 that were inoculated in which there were healthy nodules on the roots. McQueen was satisfied. He believed he had secured a culture of soy bean bacteria that was strong enough to develop under his soil conditions.

Using the soil from this small area he treated a hilly field of 15 acres. One ton of lime, several tons of manure and 300 pounds of acid phosphate, was the treatment prescribed for each acre. A 9-hoe drill was used for planting, all the holes but the ends and middle being closed, making the the rows of beans 28 inches apart. The first year the yield from this field was 20 bush-

els an acre, and the third year it was increased to 30 bushels. The beans were readily sold for seed at $3.00 a bushel.

As yet soy beans were practically unknown in McQueen's neighborhood. And even tho he had been preaching the gospel of improving the soil by legumes it remained for McQueen to convince the sceptics that it could be done.

McQueen pointed to a soy bean root with 900 nodules, which he has preserved and said. "a fellow can talk about these germs until he is blue in the face and it won't do half as much good as showing folks a crop which has been raised after a legume."

So Jacob McQueen paid particular attion to the crops which followed his soy beans. One field, in particular, that had never raised enough corn to pay for the cutting returned 80 bushels to the acre. Thirty bushels of wheat and three tons of mixed hay are now the rule on the old "Rigby Farm." Nine years ago the same hillsides were overgrown with weeds and poverty grass. Nine years ago this farm was expensive at $50 an acre, while today more than twice that figure would be no temptation to the owner to sell, and as McQueen says "germs did it all."

The soy bean problem solved, Mr. McQueen turned his efforts toward developing a plant that would prevent erosion of the steep hillsides of his county, and still furnish nitrogen to the soil. Hairy vetch has been tested on the McQueen farm and found to be satisfactory. After overcoming the difficulties of inoculation Mr. McQueen has raised a good stand of vetch each year.

Home of Jacob McQueen Baltic, Ohio

Rye is planted with the vetch and forage is produced, which the hogs completely harvest.

"You know," said McQueen with a twinkle in his eye, " I have been farming with the help of bacteria, so now I harvest livestock almost entirely. It seems to be the only solution to the labor problem on the farm."

McQueen pointed to a field that has been in rye and vetch for three years. Each year hogs are turned in to harvest the crop. Enough seed is scattered to reseed the field for the next year.

In order to demonstrate to himself and his neighbors just what soy beans would do as feed for fattening cattle, McQueen bought some 60 head of feeders. They were placed on full feed of corn silage and soy bean hay, and never received a pound of grain in any form. Some of the cattle gained an average of 3 pounds a day. They were shipped to Cleveland and topped the market on that particular day.

it was necessary to drive over for a wagon load of soil from McQueen's bean field before they could raise any soy beans.

But what of Jacob McQueen, the man who came home to die? Well, he is big and strong. Life in the open has restored his health. His farm is a paying proposition with its vetch, hay, soy beans, cattle and hogs, while as a side line more than 50,000 dahlia bulbs of

Soy Beans Produced by Inoculation

Since the first experience in fattening cattle on soy bean hay and silage, Mr. McQueen has annually fed out from 40 to 50 head. But that isn't all. For in the immediate neighborhood, which is the leading cheese-making district of Ohio, are a large number of dairy herds. These dairymen were all anxious to cut down the winter's feed bills and it seemed that McQueen had the right idea. Many of those who had laughed at "germ theories" found that

100 varieties are produced. Instead of being the joke of his community, the entire country side point with pride to the man who has shown them the possibilities of the soy bean on poor hillside farms. Grange meetings and farmers' picnics are held at the McQueen farm, while Mr. McQueen is spending all his spare time preaching in country schools and town halls the gospel of a germ for every legume.

COLD STORAGE AS A FACTOR IN MARKETING

Use of Seasonal Products Now Possible at Almost Any Time of the Year

WILLIAM H. LAPP, '16 Graduate School

FEW people, except those directly interested in the produce trade, have any adequate conception regarding the extent of refrigeration as a means of conserving food products from periods of high production till the seasons of scarcity. The great strides which have been made in perfecting the mechanical appliances constituting the refrigerating machinery have caused a remarkable advancement in the development of the produce industry. Enormous wastes have been stopped and millions of pounds of foodstuffs are being conserved. Large packing plants which were heretofore thought to be active only certain times in the year are now being operated thruout the entire year.

The supply of perishable commodities has been made continuous instead of seasonal. The standards of living have been increased more rapidly thru the development of the cold storage industry than thru any other one cause. Yet a great deal of discussion is heard, especially when the price of food commodities are high, about cold storage being one of the factors causing this high price. With a little careful consideration it can be seen that the cause for this sentiment is a lack of actual facts concerning the cold storage industry both from the standpoint of the producer and the consumer.

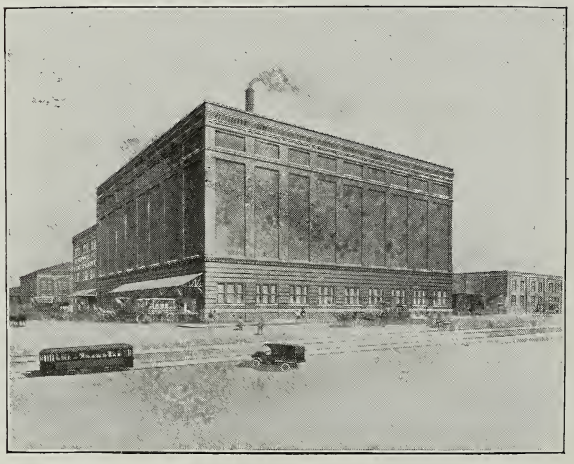
A cold storage warehouse can be defined as a warehouse constructed with insulating material in which refrigerating machinery has been installed for the purpose of holding food products at low temperatures. Cold storage warehouses can be classified into three groups. Public houses are those in which any person may store products until such a time when they desire to use or sell them. Private houses are those in which the owners of the warehouse store their products and control them. Lastly the semi-public or private houses in which the space is either held by the owners of the plant or is used by persons not connected with the operation of the warehouse. There are many storage houses in Ohio where food products are held for periods varying from several days to months.

The value of all the products held in storage in this State at any stated time is hard to determine accurately, however, it amounts into millions of dollars. Perishable commodities are arriving from large areas of production every day in the year, and are placed in storage until such a time when a demand is created for the product. They are then withdrawn from the warehouses and resume their journey thru the intricate channels of distribution which comprise the commercial machinery of our present marketing system.

One of the questions often asked relative to the storing of products is, How long can products be held in storage? In answering this question there are many factors that must be taken into consideration. The impression that products are often held in storage for years is absurd and utterly without foundation. As a general rule the products in storage are owned by a great number of people such as retailers, commission merchants and producers. The factors which govern the length of time that they will allow their products in storage are primarily the conditions of the market and to some extent the

weather. Each watches the market and releases their holdings when they are sure that they can realize a safe margin on the investment. The fact that the longer products are held in storage, the greater will be the expense is also another important feature. The competition between the various parties interested in storage is so strong that in most cases a holder of storage products must be his own judge in knowing just when to release his products. Items of storage charges, interest on the investment, insurance, and risk play an influential part in ascertaining just how long products will be held. Oftentimes the condition of the product in storage will have an effect on the time it is sold. If the owner of a certain product sees that his goods are not keeping well he will immediately commence to withdraw the product and try to avert a loss. In the case of storing onions and celery this is often found true because these products are hard to control even with our present efficient methods. The weather effects the time of withdrawal of certain classes of products like poultry. If it is very warm the owners of these products feel that they will probably sustain a loss if they try to move goods under unfavorable conditions.

The importance of different commodities stored can be gained by ascertaining the amount of space devoted to the storage of these products. Eggs appear to be regarded as one of the chief commodities since about one-fourth of all the space is devoted to storing eggs during a season which is from April to about January 1. Butter and cheese constitute from 20 to 30 percent, fruits 20 to 25 percent, meats from 10 to 12 percent. Meats are generally stored in houses especially constructed for that purpose. The average length of time that some of these products are in storage is for eggs 6 months, poultry frozen, 4 months, poultry not frozen, 2 months, butter 6 months.



A Modern Cold Storage Warehouse. Capacity 1,000,000 Feet.

The storage rates vary according to the locality and the kind of goods. In late years there has been keen competition among warehouse men which has resulted in bringing down the rates and naturally benefiting the man who stores. The rates for the coming year will be higher in almost every section of the country, since the owners of the warehouses find that their expenses for operating the houses have been steadily

increasing. The rates for some commodities are eggs, 40 cents per crate for a season from April till January 1, and if kept in storage longer than this period they are subject to an extra storage charge; apples 40 cents a barrel for the season commencing in November and extending till April; meats, one-fourth cent a pound per month. When the products are placed in storage receipts are issued upon which the owner of the goods can borrow added capital to as high as three-quarters of the value of the product. This makes it possible to store a large amount on a small amount of actual capital. Many men who store products take advantage of this feature.

No definite data is available to show the charges that have been made that cold storage causes an increase in price are true. It can be readily seen, however, that conditions are favorable for collecting a large supply of foodstuffs in several warehouses and then holding them thus creating a shortage in supply during periods of scarcity and hence higher prices. This impression has been gained in many instances. Yet investigations tend to show that instead of cold storage men forming these mutual agreements they are watching each other with the suspicion and the laws of competition play a very influential part. Undoubtedly there are years when those interested in storage do realize an exceptionally large profit. This is true at the present time. Naturally much investigational work is being done in various parts of the country in order to determine if possible the cause for these high prices. The average man using the cold storage warehouse as a means of conserving his products till the season of low production, does so, not with the intention of speculation but from the standpoint of supplying his trade with the products which they desire. Undoubtedly there are some men interested in storage simply for the speculative principle, but when the results obtained by these men over a period of years are studied it is found that they are not so much ahead after all. He may gain one year and lose it all the next.

Apples on Their Way to the Cooler.

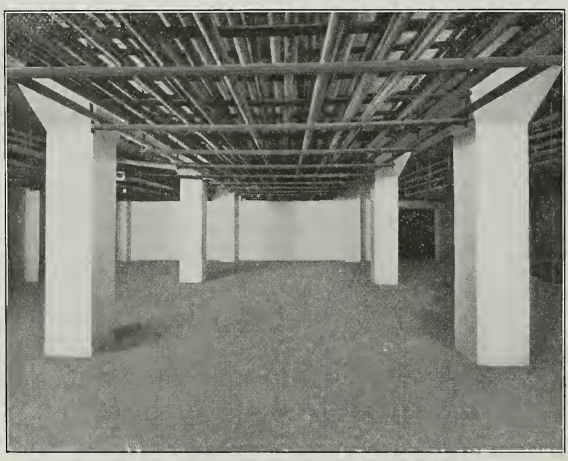
Increase in consumption has a direct effect upon the price of commodities and statistics will show in the case of eggs that the increased consumption in a city the size of Columbus amounts to from 50 to 75 percent. Production

and population are increasing as figures will show for a period of the last 10 years production of eggs increased 26 percent and population increased 21 percent, if then consumption increased 50 to 75 percent it can readily be seen that prices will be higher, for it resolves itself into the common law of supply and demand. Economical conditions have a certain influence. When money is plentiful and credit is liberally given, more products will enter storage.

When the price of foodstuffs is high during the periods of high production, the number of men storing will be less. Also if the previous year has been unprofitable the number of men who are willing to invest their money in storage products are reduced for they do not feel sure of realizing on the investment. The quality of the products must be considered as it does not pay to store anything but the best that is possible to obtain.

The losses resulting from storing poor products amounts into millions of dollars every year. Products held in storage for any length of time should be subject to a thoro inspection by some competent person familiar with that kind of work. At the present time all inspection regarding warehouse regulation in Ohio is being done by municipal authorities. The storing of wholesome products concerns the healthfulness of every community, hence should be regulated by state or federal authorities. Without a doubt such a procedure would minimize the excessive losses and reduce the costs of storing products considerable.

The importance of cold storage to the producer can be shown by the following facts. Twenty years ago the average price received by the producer for a dozen of eggs was 5 to 10 cents, at the present time they are receiving from 12 to 18 cents during the season of highest production, showing an increase of 100 to 150 percent to the producer.



Freezer Room For Storing Meats and Poultry; Temperature Close to Zero.

The importance of cold storage to the consumer has been equally as pronounced. The standards of living for the average man has increased since it is now possible to obtain seasonal products almost any time of the year. Twenty or 30 years ago one could not buy certain products out of season at any price, now we find these same products being sold every marketing day in the year.

NATURE'S GARDEN ACROSS SOUTHERN CANADA

ALFRED C. HOTTES, Department of Horticulture, Ohio State University

IT was August when I started from Toronto, but after a week had elapsed it seemed spring in the mountains of Alberta and British Columbia, because of the activity of growth and the melting of snow from higher altitudes. Going by way of Georgian Bay, Lakes Huron and Superior, and thence directly west thru Manitoba, Saskatchewan, Alberta and British Columbia, each mile of the distance proved interesting. To the traveler who has a slight knowledge of plant life all trips are filled with interest. Every rock which weathers gives sufficient soil for some sort of vegetation.

On the Great Lakes, I resigned myself to the luxury of the steamer and enjoyed feeding the sea gulls and gazed at the receding shore lines with their various shades of green. Finally islands came into view; islands which seemed overflowing with tree and shrub life. No wonder the novelist writes of islands of enchantment for they seem to hold a secluded mystery. In Lake Huron the land gradually became farther and farther from my vision and I recalled Washington Irving's sketch "The Voyage." The spirit of out-of-sight-of-land grew even more interesting when steaming across Lake Superior for here the water became rough, fogs gathered and reports were received of boats run ashore upon the rocks. It seemed now as tho I was really upon a body of water that would allow me to believe I had taken a voyage.

The end of my voyage was Fort William. Several hours were available to see this quiet Canadian town. I was particularly concerned with the aromatic atmosphere which was found to be due to the abundance of the Balm of Gilead, a species of poplar with resinous twigs. New England grandmothers would need no explanation that the gum from this tree makes an excellent liniment. Never have I seen the annual flowers so prolific of bloom as here. The lobelias were masses of flowers; the leaves were cheated of a space to get light.

Once aboard the train in Ontario the only opportunity to see the vegetation was to snatch glimpses of trees and fleeting patches of color at the sides of the railroad tracks. I soon recognized a reddish purple flower which was abundant all thru southern Canada. It is the fire weed which has been named not because of its color, but because it attains a hold upon the soil which has been recently burned over. After flowering, long seed vessels are produced which break open in four divisions, allowing fluffy seeds to escape.

After passing Winnepeg I came to the vast prairies. Mile after mile I rode and never saw a person or a village, but small shacks and log huts were scattered sparsely along thru this boundless flat country. When a city was reached the great beauty of the station grounds was surprising for the flowering plants grew luxuriantly.

After riding for several days I awakened in the morning and found myself at the gap of the Canadian Rockies. How bracing the air was! Outside the window I saw the Bow river, rapid, cool and green. The Rockies rise abruptly from the miles of prairie with a startling effect. In a few moments the snow capped peaks of the Three Sisters came into view. Arriving at Banff at eight o'clock I de-

posited my luggage at the hotel and set out to tramp among the mountains. Which were the most interesting to me, the mountains or the countless wild flowers? I admired the alpine plants at my feet and then when a vista opened up thru the trees I would look at the towering peaks about me or at the snake-like Bow river below.

The tree life is abundant, but the species are rather limited. The main evergreen was the columnar white spruce. So deceptive is the distance and clear the air that trees upon Sulfur mountain appeared like coarse grass. These trees are often 400 years old and grow about 100 feet tall. Interspersed among the spruces are the balsam firs. Two pines are found, the black and the white-barked. The black pine is a small, slender tree and is never found in the higher altitudes, the white-barked pine is less common, but extends into the upper ranges. Scattered thru the forest, huge specimens of the Douglas spruce were found.

Conifers far exceed the deciduous trees in abundance; poplars and birches together with a few willows including the range of broad leaved trees. Growing all thru the mountains in bare, rocky places or in partial shade were the gaudy scarlet and orange-scarlet Indian paint brushes. It is interesting to know that these plants are saprophytes, deriving their nourishment from the roots of other plants.

On the side of the mountain going to Sulfur Springs were seen several sorts of greenish hot-spring water and one had to marvel at the beauty of the white Rocky Mountain rhododendrons which bloom twice a year, in June and August. The eastern eye accustomed to seeing a low-growing species of wood betony, found here one of gigantic proportions, with yellow flowers, called the tall lousewort.

Lake Louise and Victoria Glacier

Just off the pony path is Kidney Springs. This was an interesting nook where the gaudy blanket flowers grew abundantly. These are cultivated and prized highly in the borders of our gardens. It was interesting to speak with an old gentleman who had gathered a bunch of self heal, or prunella, saying that it was good for affections of the heart and was a most lucky plant to have growing in one's garden.

To many minds Lake Louise is Amer-

ica's most beautiful picture. Here I looked across a deep milky blue lake, two miles in diameter and saw between towering mountains ranges the Victoria glacier rising to a height of over 13,000 feet. With the other hasty tourists I armed myself with a knapsack lunch and hurried up the winding path to visit the Lakes in the Clouds, Lakes Agnes and Mirror. It is impossible to make record climbs if one finds interesting plants at each step. I could not take a step without catching a color or a fragrance which drew my attention. When I stepped into a quiet hollow just off the bridle path I breathed deeply for there was a delightful perfume in the air. It proved to come from an insignificant pinkish blue flower, the northern twine flower. Its delicate charms were enhanced by remembering that it bears the name Linnaea, so called by great Linneaus himself because it was a chosen favorite with him. If interest leads one to admire the beautiful, even if it be miniature, other plants will be noted, namely, the white and red flowering wintergreens, the pearly everlastings, the yellow and white saxifrages, and the white anemones.

Reaching Lake Agnes the crystal Mirror Lake could be seen several hundred feet away and a mile straight down was Lake Louise, a robin egg blue in color. Lake Agnes is just at the base of a peak, the Beehive; the appellation is obvious to all who see this perfect replica of its namesake. I climbed the base and found a red lichen which caused the rocks to appear rouged in spots. Here also were patches of a plant which reminded me of the heather, it is the red and yellow false heath, fully as beautiful as its Scotch cousin, but without the sentiment of its associations.

View From Sulphur Springs Over Bow River Valley at Banff

The next morning I set out again upon my journey, soon passing the majestic Castle Mountain, and later Mt. Sir Donald, the Illacillewaet Glacier Field, and finally emerged upon the tumultuous Fraser River, with its banks lined with Indian salmon fishers who plied their labor in most hazardous positions and spread their fish to dry upon the shelving rocks. I continued along the river to the coast.

THE AGRICVLTVRAL STVDENT

OF

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EDITORIAL

WASHINGTON AND LINCOLN.

Washington and Lincoln are two men that stand out prominently in American history and both of them were farmers. One represented the refined and cultured class of the colonial period and the other the pioneer of the middle west.

Washington, as manager of his farm at Mount Vernon, was recognized thruout the colonies as a successful farmer. Lincoln, altho leaving the farm at an early age is known practically everywhere as the "rail splitter," and much of his success in later life was due to the training and development which he received during his early years on the farm.

Men are called into greater work because they have done the lesser work better than anyone else. So Washington became commander-in-chief of the Continental Army and Lincoln the leader in the Civil War because hey had done their work well. One was destined to become the founder and preserver of a great republic; the other the liberator of the slaves.

The American farmer can profit by the thoughtful consideration of these two men. Each was enthusiastic; each was a leader and a politician. The farmer of today needs more enthusiasm of the kind that Washington had at Valley Forge—the kind that can be instilled into those who are discouraged, whose debts are large and whose crops are small. Need for leadership is be-

coming more and more evident. Washington and Lincoln possessed the power of leading men in the right dircetion and for a high purpose. This is the kind of leadership that is needed today.

Farmers are learning that they must fill their place in shaping the legislative policies of the government if its is to be "a government of the people and by the people." To do this, they must be broad-minded in their views and well acquainted with all governmental affairs and with those of their business. They cannot afford to ignore the other industries of man when working for their own interests and welfare. More men like these two, who have a large vision, who are in sympathy with farm work and farm life are needed in rural work today and will still be needed when the boys of today become the farmers of tomorrow.

FARMING—A BUSINESS.

High prices for land and increasing labor costs are lowering the chances of obtaining a fair profit on the investment and make it necessary that means be taken to increase the returns from the farm. To put the farm on a more firm basis, it is necessary that its needs be studied to find whether or not more capital is needed to run it profitably, whether the labor used is efficient, whether the livestock kept is producing a profit or whether the crop yields are large enough. In other words, all the different factors affecting the income of the farm must be given a thoro consideration. This requires not only the keeping of a fairly accurate accounting system but also good judgment as to where changes should be made and as to what may be expected from such changes.

The amount of capital to use, the amount available and where it should be applied are among the considerations in the management of any farm. If using additional capital would increase the profits, it shows poor business judgment on the part of the farmer if it is not used, providing it can be gotten. There are many farms thruout Ohio as well as in other parts of the country that are under-capitalized not because the farmer hasn't the money or was not able to obtain it but because of a lack of judgment and a vision into the future to consider how their profits may be increased by the addition of capital and how their farm business may be put on a firmer basis. Other farms may be found where enough capital is used but where it was not applied to the best advantage. Some have an excessive amount of the capital placed in the buildings and equipment with not enough placed in livestock or other improvements which will directly increase the profits, while others have investments made heavily in high grade purebred livestock with no consideration given to the buildings and equipment as well as to the quality of labor necessary in caring for the higher grade of business.

Owners and managers of factories and other business establishments in our cities make improvements only after careful investigations have been made as to whether it will pay them to do so. They lay out plans as to how much they think should be expended on the different factors making up their business. They also hire men who are trained for the work for which they pay them for the grade of work done and do not depend on picking up anyone for doing work as is the case on the farm.

If the farm is to be managed successfully, methods such as used by the business firms in our cities must be studied and applied in a business-like way to the farm. Methods, such as are now

used and which would ruin most any city business firm, cannot be relied on any more today or in the future with the rising cost of production and increasing competition. Capital must be applied to the farm in a way that it will bring the most profit. Labor must be used and paid for according to the quality of the business carried on as cheap labor cannot be relied on to care for costly machinery, high priced livestock or other farm operations requiring skilled labor. By using these methods, farming will be put on a more permanent business basis and will make for a more profitable agriculture.

LIMITING FACTORS.

As a chain is limited in strength by its weakest link, so the operations in any orchard are limited by the factor in production which is weakest. Strengthening any of the other factors will not increase production until these weaker factors are strengthened. If insects and diseases are causing large losses in your orchard it would be folly for you to invest money in facilities for harvesting and marketing your crop until after you had successfully combatted this loss.

Among the orchard operations which are under control of the orchardist are the choosing of varieties adapted to the soil and climate of the localities in which they are grown, cultivation, fertilization and pollination. All these can be worked out by each individual with a little study and experience.

The question of marketing, however, is a factor that can be worked out by each individual only to a certain extent. It is here where the orchardist must cooperate with other growers in his community so that they can get better market facilities and thus decrease the cost of marketing their products. Each grower usually does not have enough of each kind of fruit so that he could grade his fruit and ship in carlots nor can he afford storage facilities to meet the seasonable demands of the retail trade. Furthermore, it is difficult for him to establish business relations with commission firms in the city who are looking for larger lots than can be supplied by one grower.

It is because of these problems that the fruit exchanges in the Pacific coast states was established. Thru these associations expert inspection service is furnished and all the fruit shipped has been carefully graded and packed. This standardization of packing and grading has resulted in so universally advertising the Pacific coast fruits that they are known the country over for their quality, yet less and no better fruit is grown there than in some of our eastern states.

The people in these western states have learned, and are taking advantge of the fact, that in cooperation there is strength. The question of marketing will always be a limiting factor in the growing of fruits. It is a problem that must be worked out by a group of people rather than by each individual as in this way market facilities can be provided so a standardized uniformly graded product can be supplied to the retail trade at almost all seasons of the year.

ACKNOWLEDGMENTS.

We are indebted to the National Ice and Storage Company, Columbus, Ohio, for the cuts used in illustrating the article "Cold Storage as a Factor in Marketing."

Home Economics Department

HOME ECONOMICS BUILDING NOW IN USE.

The new Home Economics Building which is now in use is one of the most modernly equipped buildings of its kind in the country. All the latest equipment has been installed or is being installed for the use of the students in the department of home economics in their study of foods, textiles and other work of the regular 4-year course.

The building faces Neil Avenue with three wings extending back from the main portion. In the south wing are the textile, textile chemistry and dress laboratories. The model flat and the experimental laboratories are on the third floor of this wing.

The large room on the lower floor of the middle section is used by the extension department as a laboratory for the short courses and home makers clubs, while the first and second floors make up the auditorium which will seat more than 500 people. In the north wing are the foods and dietetics laboratories, the institutional kitchen and the social room. Part of this section is now being used by the agricultural engineering department because of the crowded conditions in Townshend Hall and the Horticultural and Forestry Building.

Work in the first aid to the injured and home care of the sick is carried on in the rooms connecting the middle and south wings on the second floor. On the first floor is the museum. Across the front of the building are the research laboratories and library on the second floor, the main department offices on the first floor and the extension offices on the lower floor.

During Farmers' Week the large auditorium is used for the lectures given to the women. Using the facilities offered in cooking a large number of the students in the department aided in feeding the boys during Farmers' Week who were given a free trip to the University by winning in their county club work. The building also gives the girls in the Home Economics Club a place where they may meet regularly to discuss problems that come up in their daily work.

Eva Nouse, '16, is assistant in agricultural chemistry at Ohio State University.

Arilla Patterson, '16, is teaching home economics in the Cleveland schools.

Margaret Krause, '15, is an instructor in home economics in the extension department of Ohio State University.

Ettie Waid, '16, is a teacher of home economics in the schools of Columbus.

Stella Wiley, '16, is teaching in Akron, Ohio.

Carrie Zentmeyer, '14, is domestic art instructor in the schools of Newark.

Elsie Grove, '15, is teaching home economics at Covington, Ohio.

Helen Mougey, '16, went to Iowa City the first of January to accept a research position in the University of Iowa.

Rachel Nauman, '15, is teaching sewing in the Columbus schools.

Ruth Beach, '16, is teaching home economics at Summit Station.

Mary Betz, '13, is an instructor in home economics in the extension department of the Ohio State University.

Helen Boylan, '14, is teaching at Bridgeport, Connecticut.

Agnes Brady, '14, has resigned her position as a textiles instructor in the home economics department of the Ohio

State University. She will start a course in home economics in the high schools of Columbus.

Marie Brown, '15, is an instructor at Ashland College, Ashland, Ohio.

Helen Browning, '13, is a domestic science teacher in Toledo.

Josephine Davis, '16, is spending the winter at her home in Cambridge, Ohio.

Louise Darnbush, '10, is a domestic science teacher in Washington, D. C.

Mary Edmonds, '10, is an instructor in the home economics department of the Michigan Agricultural College at East Lansing.

Mary Elliot, '15, is teaching in the Central High School, Cleveland, Ohio.

Mable Ensign, '15, is teaching at Bryan, Ohio.

Mary Graber, '15, is connected with the extension department of the Ohio State University.

Mary Field, '15, is teaching domestic art at Butler, Pennsylvania.

Elsie Frank, '14, is teaching at Ney, Ohio.

Edna M. Haughton, '10, is connected with the Aetna Life Insurance Company of Columbus, Ohio.

Bessie Haynes, '14, is a teacher at Sidney, Ohio.

Ruth Hobson, '12, is teaching in Cleveland.

Susan C. Hoover, '06, is a domestic science teacher in the Ohio State school for the Deaf at Columbus.

Leonia Hoppinger, '15, is running the Mission Tea Room, 22—16th Avenue, Columbus.

Edith Hutchinson, '16, has charge of the home economics in the schools of Auburn, Illinois.

Laura E. Keller, '10, is teaching in Porterville, California.

New Home Economics Building

OPPORTUNITIES FOR TEACHING AGRICULTURE IN THE CENTRALIZED SCHOOL

VERNON M. RIEGEL, County Superintendent, Marion County, Ohio

VITALIZING instruction by fitting it to the needs of the community in which it is dispensed is a modern educational tendency of the utmost importance. Much is being said and written about keeping the boy on the farm, yet it is a simple problem. All we have to do is to cease driving him away. He leaves because of lack of social and cultural entertainment, educational advantages, and a lack of interest in the things about him.

You cannot keep him on the farm by not permitting him to visit the city. This, among other methods to which farmers resort with their boys, is the means of defeating their purpose. Country boys and girls should mingle with their city cousins and should be equipped so that they may realize that they are on an equality, socially and intellectually. Let them visit the city often that they may become familiar with city ways and thus be more able to resist the glitter and allurements of urban life; but develop in them such an interest in country life that they will desire to return after each and every visit.

It should not be the purpose of the farmer that all his sons should take up agricultural occupations. Places of honor and trust in the professional and commercial world are waiting for some of them now as in the past, but the beauty of flowers, shrubs, trees, lawns, and groves and an interest in home gardens, livestock, and crops should be made instruments in saving the farm child from the allurements of city life and in causing him to be contented with rural life until he has passed the secondary school stage when he will have already formed life-purposes and will be guided by more mature judgments thus enabling him to pilot his ship clear of the shoals. Many will remain permanently on the farm once they have become interested in the subject of agriculture and its kindred sciences and the best interests of the nation as a whole will be conserved.

Instruction in scientific, intensive farming reveals interesting features of rural life which were never before realized by country boys. Paradoxical as it may sound, the farm child has lived in the heart of nature and yet remained a stranger to it. His life has been an uninteresting rotation of the seasons with the seemingly endless plowing and planting followed in regular monotony by harvesting and storing in barns. But once awakened to the possibilities of modern methods of farming and to the surpassing beauties of rural environment, the American boy or girl will begin to perceive a field of opportunity quite as large and larger than that offered in the city.

For a number of years the subject of agriculture has been required to be taught in all rural and village schools. However, the work has been largely formal and bookish and real living nature has been neglected. Many times young girls 18 years of age who never lived in the country and who knew nothing of country life: who did not desire to learn anything about it; who had never studied agriculture, would take charge of a class in agriculture, assign a certain number of pages in a text book for a lesson and deceive themselves in thinking they were teaching. That they would attempt to teach farm

boys how to select seed corn, how to spray and prune trees, and how to prepare a balanced ration for a calf or pig is ridiculous to say the least. Conceding this to be an extreme example it must be admitted that the teachers in the one-room school, as a whole, are making a miserable failure in teaching agriculture. They do not vitalize the work.

To teach agriculture successfully requires one who has had training along that line. General education in an arts college is by no means sufficient. The one-room school can not afford to procure the service of a graduate from an agricultural college. Those who teach in the one-room school have not had special training in scientific agriculture in the majority of cases nor are they familiar with means of solving rural social problems. Not only will this be changed in the centralized school, but, if it performs its function to a full measure, the whole life of the community will be transformed. It establishes an educational equality necessary to give 12,000,000 boys and girls in the rural comunities just as thoro a preparation for their life work as is offered city children.

Many opposed centralization because in the proposed graded elementary and high school they could see only the reproduction of the city school and they feared that the education their children would receive in the consolidated school would turn their faces toward the city and away from the farm. But where the consolidated school has been given a fair trial, the people, to their surprise, realize that they have an institution in their midst that relates the work of the school to the industrial activities of the community. Place a good live man who has a conception of what true education is, at the head of one of these schools and the people of his community will await in amazement the agreeable surprises he has in store for them.

Folk dances, supervised play, gymnastics, and athletic games transform awkward, shambling gaits into movements of alacrity and gracefulness. Lecture courses, debating and oratorical contests, school orchestras, choruses, and mandolin clubs furnish wholesome yet attractive entertainment. Men and women from the extension departments of the colleges who are familiar with the problems of rural sociology and who are interested in farm and rural home life address the patrons of the schools on matters of interest and importance to them. There is a great awakening. People begin to think. To think, they must be interested, and this is the first great necessity for successful work of any kind. When the patrons of a community become interested in their school it is given a prestige that reacts to its progress and efficiency. The two great obstacles that must be overcome are public indifference and untrained teachers.

A 4-year course in agriculture constitutes part of the curriculum in this school. "Not English and history less but agriculture more." The agriculture course is in charge of a graduate of a College of Agriculture. He should be employed for the entire year at a salary worthy of his qualifications. In this course of study agronomy, horticulture, zoology, animal husbandry, farm accounts, and farm shop work are taught. Practical work in landscape and lawn beautification is done in the care of the school grounds. These grounds should be ideal and should present a vision pleasing to the eye. They should be a model for the com-

munity and from the school will emanate an influence that will result in improvement of home grounds and a country more beautiful.

The school orchard, berry patches, and vegetable gardens should be found on the grounds of the centralized school. These afford lessons in planting, spraying and pruning. From this work the community may ascertain what fruits and vegetables thrive best in its vicinity. Nursery stock may be planted and grown. This may be sold to the patrons of the school at a minimum cost. They know just what they are getting and the price paid for it is used toward the further education of their own children.

Test plots of wheat, oats and corn enable the neighborhood to know what varieties are best adapted to their community and give valuable training to the boys in charge of them.

Froebel, who rejoiced in the teaching that "God's spirit lives in nature, bearing, shielding, unfolding," sought to impress upon his patrons that children of school age should have gardens to cultivate. The work of this innovator and others has borne remarkable fruit, and today, in consequence thousands of flourishing school gardens are in operation all over Europe. In our country there is much practical value of school gardening in the city system for "Garden work is better than bummin'." In the rural districts it is superseded by the home garden. This work is done under the supervision of the teacher in agriculture. In the fall a school fair may be held at the centralized school where exhibits of these garden products may be shown and premiums awarded for meritorious work. In Canada, in 1903, after 3 years of work in seed selection and careful cultivation in plots of ground at home and in school, the yield of wheat thus sown and reaped was 28 percent heavier than that of 3 years before from unselected seed; in oats the increase was 27 percent, area for area.

Stock judging, poultry judging, and corn judging constitute the chief lessons in judging as well as the principal contests of this kind. Farmers readily cooperate in this work and it may be made interesting and instructive.

Club work may be conducted easily and satisfactorily in each centralized school district. Acre corn growing contests, vegetable contests, pig feeding contests and steer feeding contests may be carried on. The school district should be the unit for this work with the teacher of agriculture in charge. Members of these local clubs and competitors in local contests may become connected with county organizations. County boys' corn clubs and pig feeding contests are excellent, but club and contest work should be organized in each centralized school district which should be the unit. The school is thus given more prestige and more interest is manifested in the local organizations. These, however, may be subordinate to the county organizations.

Work that can be done along this line in a centralized school is limited only by the ingenuity of the teacher. These schools are fitted with everything essential for school work and the boys and girls learn to know nature and love it. Here they early learn to know that they are indigenous to the soil. With such schools performing their full and complete functions we shall need have no fear of the boys and girls unduly leaving the farm. The ultimate solution of the rural school problem, and to a great extent the problem of rural life in general, must be sought in consolidation. Let every one be a herald to proclaim this new rural education.

Fred G. Charles, '13, is in charge of the Cincinnati City Farms.

George B. Crane, '13, is in the agricultural extension department of the Ohio State University.

Ralph F. Crim, '13, is supervisor of agriculture in the schools at Benson, Minn. He also has charge of community work among the farmers. This is similar to the work of the county agent in Ohio.

Harry D. Drain, '13, is instructor in cheese and ice cream making at the Massachusetts Agricultural College at Amherst.

William L. DuBois, '13, is instructor in the department of forestry at the Ohio State University.

Paul Gerlaugh, '13, is instructor in the department of animal husbandry at the Pennsylvania State Agricultural College. He is also a specialist in swine production at the Experiment Station.

Attila C. Grant, '13, is employed by Columbus Bill Posting Company and is located in Columbus.

Thomas L. Guyton, '13, is instructor in the department of entomology at the Ohio State University. He received his Master's degree in 1916.

D. E. Haley, '13, is engaged in teaching in the department of agricultural chemistry at the Pennsylvania State Agricultural College.

E. Basil Hawes, '13, is teaching agriculture in a high school at Marion, Ohio.

Raymond L. Jaeger, '13, is employed by the Belle Vernon Dairy Company at Cleveland, Ohio.

Harry W. Jones, '13, is herdsman at the State Hospital for the Insane at Athens, Ohio. He has made quite a success with Holstein cattle.

Ralph Kenney, '13, is teaching in the Kentucky Agricultural College at Lexington.

Paul C. Laux, '13, is employed as fertilizer inspector by the Ohio State Board of Agriculture and is located at Columbus.

Paul L. Morgan, '13, is engaged in fruit farming near Mt. Healthy, Ohio.

Clayton L. Long, '13, is teaching in the department of horticulture at the New Hampshire Agriculture College at Durham.

Wallace Love, '13, is farming at Lockwood, Ohio.

Ernest A. Oliver, '13, is engaged in dairy farming near Versailles, Ohio.

Herbert E. Otting, '13, is employed by the John Wildi Milk Condensing Company and is located at Columbus, Ohio.

Walter A. Price, '13, is teaching in the department of entomology at Purdue University, West Lafayette, Ind.

Thomas A. Rouse, '13, is teaching in the department of animal husbandry at Clemson College, Clemson, South Carolina.

Schuyler M. Salisbury, '13, is assistant professor of animal husbandry at the Ohio State University.

Frederick J. Salter, '13, is teaching in the department of agricultural chemistry at the Ohio State University.

Grover C. Woodin, '13, is engaged in entomological work at the Michigan Agricultural College, East Lansing, Michigan.

Clell Solether, '13, is engaged in general farming near Jerry City, Ohio.

Byron A. Schnell, '13 was formerly employed in Y. M. C. A. work in Union County, Ohio. He is now engaged in the same work with the United States troops on the border.

Walter R. Wheelock, '13, formerly with the National Cash Register Company at Dayton, Ohio, has just been elected county agent for Trumbull County, in northeastern Ohio.

Elmore O. Williams, '13, is farming near Mt. Victory, Ohio.

Herbert A. Wise, '13, is with the Polk Sanitary Milk Company at Indianapolis, Indiana.

Lewis S. Work, '13, is with the Springfield Pure Milk Company at Springfield, Ohio.

Carl A. Gearhart, '13, is assistant in agronomy at the Ohio Agricultural Experiment Station.

Lott E. Bechtel, '16, who was formerly farming at Bradner, Ohio, is now engaged in teaching dairying to the winter course students in agriculture at the Ohio State University.

Archie Bishop, '15, is teaching animal husbandry to the winter course students in agriculture at Ohio State University. He is engaged in farming near Delaware, Ohio.

Ralph E. Boyce, ex-'18, who did not return to school this year is operating the home farm near Springboro, Pa.

H. A. Lehman, '16, was recently elected county agent for Mahoning County in northeastern Ohio. He succeeds D. W. Galehouse, who becomes state leader of boys' and girls' club work in North Dakota. This change became effective on Jan. 1, 1917.

Blair W. Adams, '13, is enrolled as a special student in agriculture at Ohio State University.

Joseph W. Calland, '13, is assistant in forestry at the Ohio Agricultural Experiment Station, Wooster, Ohio.

Walter H. Larrimer, '13, is working in the United States Entomological Laboratory at Missoula, Montana.

Ralph M. Pavey, '13, is teaching in the Scott High School at Toledo, Ohio.

Thomas D. Walker, '13, is teaching in the Bluefield Institute at Bluefield, Indiana.

Herman Lebeson, '15, is working at the State Experiment Station, College Station, Texas.

Walter D. Will, '16, is teaching physics and agriculture in the high school at New Lexington, Ohio.

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FEBRUARY NEWS NOTES

APPOINT THREE AGENTS.

Three new county agents have been appointed for Ohio during the past month. A. J. Swift of Morgantown, West Virginia, goes to Preble County. Mr. Swift was born on a farm in Pennsylvania, lived for a number of years on a farm in Iowa and was graduated from the Iowa State College of Agriculture and Mechanical Arts in 1914. He received his Master's degree in agriculture at the same institution in 1915. Following his graduation he has been an instructor in animal husbandry at the College of Agriculture of West Virginia. Mr. Swift will take up his work in Preble County about February 1.

H. A. Lehman a graduate of Ohio State University, succeeds D. W. Galehouse, who recently resigned as agricultural agent in Mahoning County. Mr. Lehman began his new work on January 1. He is a native of Miami County, Ohio, and was formerly an official tester for the dairy department of Ohio State University. At the time of his appointment he was manager of a dairy farm in Miami County. His headquarters will be at Canfield and Youngstown.

W. R. Wheelock, of Dayton, Ohio, was appointed agricultural agent in Trumbull County, effective January 1, to succeed M. O. Bugby, who recently resigned. Mr. Wheelock was brought up on a farm in New York, taught school several years in Trumbull, Portage and Ashtabula Counties and was graduated in 1912 from the Ohio State University. Following his graduation, he was manager of the Ohio State University farm and for two years was director of extension work of the University of Arkansas, College of Agriculture. He was later the manager of a farm of the National Cash Register Company at Dayton.

HOLD ANNUAL MEETING.

The annual meeting of the Cuyahoga County Farm Bureau Association was held December 30 with an attendance of over 100. Professor F. E. Bear of the Department of Agricultural Chemistry and Soils, and O. M. Johnson, county agent leader of the College of Agriculture, were present and spoke at the meeting.

HOLDS DEMONSTRATION.

E. C. Richey, agricultural agent in Franklin County,- has arranged for pruning, spraying and orchard management demonstrations as well as demonstrations with lime and acid phosphate.

WORLD'S RECORD BROKEN.

The world's record for butter fat production has not only again been broken, but the fifty pound cow, figuring butter on the 80 percent basis is at last a reality. Segis Fayne Johanna, a Holstein-Friesian cow owned by Oliver Cabana, Jr., Elma Center, N. Y., has produced on official test 40.45 pounds of butterfat the equivalent of over 50 pounds of butter in one week. In the full age class of the seven day division she displaces Hester Aaltje Korndyke whose record for seven days is 621.1 pounds of milk and 37.429 pounds of butterfat.

Because of her remarkable showing it has been decided to continue the official test in the hope of securing the 30-day record. The official test began on December 28 and if favorable weather prevails during most of the time conditions point to the 30-day record being easily broken.

Segis Fayne Johanna was bred by Mr. A. A. Cortelyou or Somerville, New Jersey, and is a typical big Holstein-Friesian type. She has a remarkable development of the mammary veins, square udder, deep barrel and a rugged and vigorous disposition. Her normal weight is 1450 pounds, but before freshening on December 22 last, she weighed 1900 pounds.

This record is all the more remarkable when the fact is realized that only 15 cows have ever produced over 40 pounds of butter.

COUNTY AGENTS REPORT.

In the yearly reports of Ohio county agents for the year ending December, 1916, some interesting achievements were made and much data to further prove the fact that county agent work pays.

Some of the work accomplished by the agents in the different counties is as follows: 150 purebred sires were introduced, the yield of oats was increased 73,000 bushels thru the treatment of smut, and 31 local sources of lime were developed. The agents induced the farmers to vaccinate 35,000 hogs, either having the farmers do the work themselves or hire veterinarians to do it. They also assisted in installing 51 tile drainage systems and increased crop yields as high as 50 percent thru introduction of 10,300 tons of lime as well as fertilizers, proper rotations and new crops such as legumes.

AGRICULTURAL TEACHERS MEET.

During the meeting of the Ohio teachers in Columbus, in December, the high school teachers of agriculture convened in a sectional meeting at the Studer Avenue school on December 28. Among the speakers were Dr. Paul L. Vogt, formerly head of the department of rural economics and now Superintendent of the department of rural work, Board of Home Missions, Methodist Episcopal Church of Philadelphia, Clark S. Wheeler, director of agricultural extension and Dean Alfred Vivian of the College of Agriculture.

Speaking of the teacher and the rural community, Dr. Vogt said that the rural community offers great possibilities for useful work by the teacher of agriculture. Mr. Wheeler showed many places where the high school teacher can cooperate with the extension department in the improvement of agriculture and rural life. Dean Vivian in speaking on "The Teacher of Agriculture and the Improvement of Farm Methods" said that the teacher should be a community advisor the year round. He also emphasized the importance of the teacher in agriculture settling in a community for his life work.

At the business meeting, Jacob P. Schmidt, '16, now teaching at Bourneville, was elected president of the organization for the coming year and William T. Spanton, '16, teacher at Plain City, secretary. The section will become a part of the regular Ohio State Teachers' Association and will be known as the Association of Ohio High School Teachers of Agriculture. The next session will be held in connection with the general session of the Ohio Teachers' Association at Cedar Point, June 27 to 29.

FARMERS' WEEK.

With an attendance of 4046 people, 1154 more than last year, and over 450 more than the attendance at Cornell last year, the Fifth Annual Farmers' week held at Ohio State University broke all former records for attendance. The record was formerly held by Cornell University.

Of the number in attendance, more than 800 were women. Twenty-five

states and Canada were represented by the visitors. Of the 200 speakers scheduled to speak during the week but one failed to come.

LOOK OUT FOR ROUP.

To determine whether a fowl is affected with roup note the odor from the head. The first symptom is moisture at the nostrils followed by a bead of moisture in the corner of one or both eyes. If the disease develops, the eyes become swollen, cheesy matter forms in them and also in patches on the inside of mouth and throat.

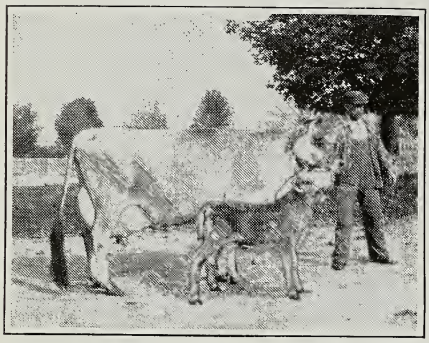
Where roup is prevalent in a flock do as follows: Place ½ teaspoonful permanganate of potash in a quart of water, shake up and add enough of this mixture in drinking water to color light violet. Cut off all other water supply. Permanganate of potash should only be used in glass, granite or stone drinking vessels. Give every bird a dose, 1 teaspoonful, of epsom salts once a day for three days. Feed in mash.

PRODUCING EGGS IN WINTER.

Poultry raisers who wish to obtain a satisfactory production of eggs during the fall and early winter should arrange to hatch their pullets during March and April. Birds hatched at this time will be mature by fall and can be induced to lay more abundantly in the winter if they are properly fed, housed and handled. On the average farm few eggs are secured at the time when they bring the highest prices.

A $25,000 son is the latest offering that the Jersey cow Sophie 19th of Hood farm, the world's champion long distance butter cow has made to the dairy

world. Sophie 19th for whom her owner C. I. Hood of Lowell, Massachusetts, refused an offer of $50,000 may be called the dam of the golden calf, for her



Sophie 19th of Hood Farm

son weighs 90 pounds which in gold would be worth $25,920 and Mr. Hood refused to consider an offer of $25,000 for the calf. Sophie 19th has made a record of over 2¾ tons of butter in 6 years, which is the greatest ever made by a cow of any breed.

THE NEW DE LAVAL

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THE FARMER who buys a De Laval this year will get bigger and better value for his money than ever before.

Not only will he get a better machine, a simpler machine, a machine that will skim even closer than any previous De Laval, but he will get a machine of larger capacity.

And the price has not been increased one cent.

Just think what that means to cow owners in the face of rising prices on almost everything else the farmer has to buy, including other cream separators.

Only the tremendous volume of De Laval sales makes it possible to give the farmer more for his money when others are giving less.

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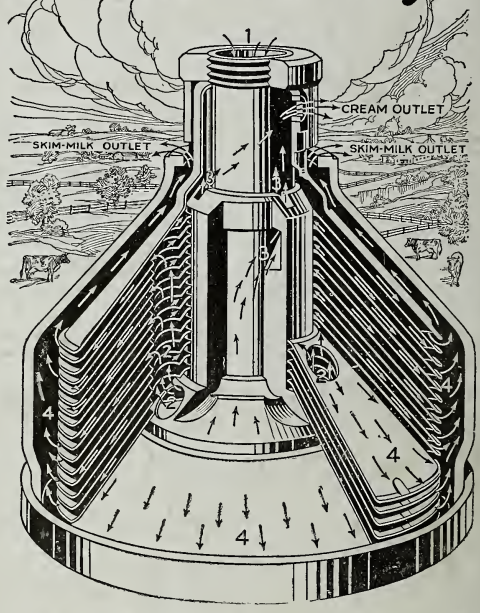

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Without increasing the size or weight of the new bowl, its capacity has been increased.

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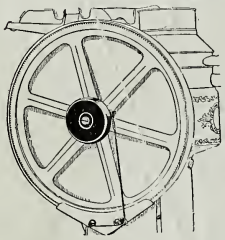
The bowl is loosely supported upon the spindle and will run true and do perfect work even after long wear.



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The improved bowl design, together with the patented milk distributor, gives greater skimimng efficiency.

Discs Interchangeable

All discs are exactly alike, are unnumbered, and are interchangeable.

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There are fewer discs in the new bowl, although the capacity is greater.

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Simpler bowl construction and fewer discs, caulked only on the upper side, make the bowl easier to wash.

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The low speed of the De Laval bowl, large capacity for the size and weight of the bowl, automatic oiling and righ grade workmanship, make the De Laval the easiest cream separator to turn.

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