ALASKA AGRICULTURAL EXPERIMENT STATIONS
SITKA, ALASKA
Under the supervision of the
UNITED STATES DEPARTMENT OF AGRICULTURE

REPORT OF THE ALASKA AGRICULTURAL EXPERIMENT STATIONS

1929

Issued December, 1930

ALASKA AGRICULTURAL EXPERIMENT STATIONS, SITKA, KODIAK, FAIRBANKS, AND MATANUSKA

[Under the supervision of the Office of Experiment Stations, United States Department of Agriculture]

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STATION STAFF

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[1] Beginning Apr. 1, 1929, assigned to work on colonization project with the Alaska Railroad.
[2] Appointed July 16, 1929.

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Washington, D. C. DECEMBER, 1930

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REPORT OF THE DIRECTOR

H. W. Alberts

A number of changes in the work of the stations were made during the year covered by this report. Several experiments were started, new buildings were completed, and additional cooperative activities with the Alaska Railroad were begun. Some changes were also made in the organization and personnel of the stations.

The duties of Eiler Hansen now include those of purchasing agent, disbursing agent, and administrative officer. He is also in charge of the physical plants of all the stations. W. T. White, formerly animal husbandman at the Matanuska station only, is now serving in

that capacity also for the Fairbanks and Kodiak stations. On April 1, 1929, M. D. Snodgrass was transferred from the Matanuska station to the Alaska Railroad office to assist in the work in land colonization. J. C. Wingfield was appointed acting superintendent of the Matanuska station, and F. B. Linn was made assistant animal husbandman of the Matanuska station, effective July 1, 1929.

An experimental orchard was started at the Matanuska station. Heretofore, most of the work undertaken in horticulture has been confined to bush fruits. This year many fruit trees were set in the new orchard. A mess house and a new cottage were completed. The cooperative experiment in creamery work at the Curry creamery was continued. (Fig. 1.) The creamery record for the year ended December 31, 1928, is shown in Table 1.

FIGURE 1.—Creamery at Curry, Alaska

TABLE 1.—*Cream and butter record of the creamery operated by the Alaska Railroad for the year ended December 31, 1928*

Month	Cream received	Butterfat received	Butter made	Month	Cream received	Butterfat received	Butter made
1928	*Pounds*	*Pounds*	*Pounds*	1928—Continued	*Pounds*	*Pounds*	*Pounds*
Janauary	780.5	258.3	276.0	August	774.0	265.7	336.5
February	731.5	219.4	300.5	September	405.5	130.8	161.0
March	1,161.5	348.9	325.5	October	466.5	123.9	163.0
April	996.5	316.5	345.5	November	354.0	98.9	120.0
May	872.0	256.8	346.5	December	380.5	98.4	119.0
June	1,012.8	329.1	381.5				
July	1,013.3	300.4	359.9	Total	8,948.6	2,747.1	3,234.0

At present, 58 farmers, 12 of whom are married, are engaged in farming in the Matanuska farming district, and 39 farmers, 6 of whom are married, are farming in the Fairbanks farming district. Over 400 square miles of agricultural land are available for immediate settlement in the Tanana Valley with the town of Fairbanks as

a center, and there is an equal area in the Matanuska region. According to Brooks (*5, p. 36*)[1] there are over 5,000,000 acres of prospective agricultural land lying within a zone of 100 miles of the Alaska Railroad. All the needs of the Territory in agricultural products could be produced in these two regions were there enough farmers occupying the land. Since it has been demonstrated that farming is profitable in these regions, the director of the stations devised a plan for attracting settlers to them. As a result of the plan a colonizing project is now being carried on successfully by the Alaska Railroad with the stations cooperating. Details of the project are given in full on page 37.

In May, 1929, the director of the stations, accompanied by W. T. White, made a survey of the Dunbar region to determine the grazing possibilities there. The report of the survey is given in full on page 38.

In August, 1929, the director made an agricultural survey of the Kusilof region, 100 miles south of Anchorage and on the west side of Kenai Peninsula. The report is given in full on page 40.

In September, 1929, W. T. White made a survey of the grazing possibilities on Kodiak Island, covering lands between Chiniak Point and Pashikshak Bay and adjacent to the north side of Ugak Bay. The report of the survey is given in full on page 41.

A survey of the dairy situation in Alaska was completed during the year. Over 1,000 head of cattle are being maintained in Alaska, and 50 per cent of them are in the southeastern part.

Some experiments were begun in raising livestock in the Healy region. This region was surveyed in 1928 to determine the value and extent of the bunch-grass areas found there.

A project on land clearing at Matanuska was begun during the year, the Alaska Railroad working in cooperation with the stations in an effort to solve the problems attendant upon clearing comparatively large areas.

The stations again participated in the annual agricultural fairs. The Fairbanks station made a representative exhibit of grains and forage crops at the fair at Fairbanks, the Matanuska station sent an exhibit to the fair at Anchorage, and the Sitka station sent one to the fair at Juneau.

A party of Members of Congress visited Alaska in 1929. They stopped at Sitka August 5, and, after inspecting the work in progress at the station, proceeded to Seward. They stopped at the Matanuska station August 8 and then visited farmers living at Palmer and Wasilla. On August 10 they stopped at the Fairbanks station, inspected the animals and the plant-breeding projects, and then visited farmers living in the vicinity.

SITKA STATION

WEATHER CONDITIONS

The growing season was cool and wet, as was the case the year previous. The mean temperature for the period, which extends from May to September, inclusive, was 51.9° F., and the total pre-

[1] Italic numbers in parenthesis refer to Literature cited, p. 57.

cipitation for the same period was 22.04 inches. There were 12 clear days, 60 partly cloudy days, and 81 cloudy days. The last killing frost in the spring occurred May 30, and the first killing frost in the fall October 20. The frost-free period was 143 days.

DISTRIBUTION OF NURSERY STOCK

The distribution of nursery stock for trial to 174 residents in different parts of Alaska included 1,536 strawberry plants, 268 raspberry plants, 165 gooseberry plants, 240 currant plants, 57 apple trees, 12 native crab-apple trees, 14 mountain-ash trees, 400 willow cuttings, 44 rhubarb plants, 686 ornamental shrubs, 162 perennial flowering plants, 36 gladiolus bulbs, 50 iris bulbs, 650 tulip bulbs, 800 narcissus bulbs, 50 perennial onion sets, and 67 pounds of seed potatoes in 2-pound to 4-pound lots.

THE ORCHARD

Apples.—Only a few apple trees bore fruit this year. The trees that were fertilized made better growth than did the unfertilized trees. The trees began to blossom June 22 irrespective of fertilizers and continued to bloom until July 13. Four trees of the Yellow Transparent variety produced some fruit of fair quality which was mature October 10. Keswick (Keswick Codlin) made the heaviest yield, but none of the apples were ripe as late as November 14. Whitney crab yielded a few apples of fair quality. Fruit which was picked October 20 was found to have kept in good condition, whereas that which was not picked until November 12 was badly cracked. Most of the apple trees have shallow root systems. The roots do not readily penetrate deeply into the soil, which at about a foot below the surface and extending to considerable depth is of hard, volcanic ash. The surface soil consists of decomposed peat. A number of trees were removed from the orchard in order to give those remaining more light and a better chance to develop. Examination of the root system of a 24-year-old Lowland (Livland) Raspberry apple tree showed the horizontal roots to be less than a foot beneath the surface. The tree was 13 feet in height, and the trunk measured 22½ inches in circumference. It made its most rapid growth during the years 1906–1907, 1912–1915, 1918–1923, and 1927–1929, and its slowest growth in 1911, as was indicated by the annual rings observed on a cross section of the trunk.

Cherries.—The Republican proved to be the best of the cherry varieties this year, two trees yielding 3 quarts of cherries which, while small, were of good quality. One tree of the Late Duke variety yielded 1 quart of cherries. Montmorency bore only a few cherries. Wragg, Governor Wood, and Black Tartarian failed to bear.

Plums.—Two trees of Bradshaw set an abundance of fruit, which failed to mature. Imperial Gage and Reine Claude (Green Gage) yielded a few plums, which began to crack before they matured.

GRAPES

None of the grapevines in the open field showed any sign of productiveness. New growth made during the summer months invari-

ably winterkills even when it is protected. Half the vines were taken up and planted against the wall in the old propagating house to determine whether they will thrive and produce there.

SMALL FRUITS

Strawberries.—Of the strawberries, hybrid No. 320 produced the first ripe berries July 5. Hybrid No. 468 (Harding) was ripe July 20. The berry of this hybrid is elongated in shape, has a good flavor, is firm, and should prove to be a good shipper. Hybrid No. 7537, a medium-late berry, ripened July 28 and bore fruit continuously to September 6. This variety proved to be the heaviest yielder of the lot under trial. The foliage makes rank growth and unfortunately shades the berries and retards their ripening. In texture the berries are not very firm. In color they are pale, and in flavor excellent. Hybrid No. 12087 was the latest variety to mature. Six plants of the Shermer seedling, an everbearing variety, were introduced for trial at the station this year. Although all were too small to produce fruit this season, three of the plants were beginning to bud about November 15. The strawberry crop as a whole was light. Deer were again destructive to the tender plants in the spring, and robins did much damage to the fruit before it had a chance to mature. Approximately 2,700 new plants were set out to take the place of old ones and 1,536 plants were distributed for trial to interested persons living in different parts of Alaska.

Raspberries.—Cuthbert made an average yield of berries. It was followed by Ranere (St. Regis) in production, and the berries were small and in quality poor. Some of the black-cap raspberries yielded a few small berries for the first time. The red variety, Latham, did not produce any fruit.

Blackberries.—Himalaya blossomed July 20, but did not produce any berries. It is not adapted to southeastern Alaska.

The old canes of the Logan (Loganberry) plants winterkilled, and the young shoots yielded only a few berries, which ripened after October 1.

Currants.—Currants can always be depended upon to mature at the station. Holland (Long-bunch Holland) yielded at the rate of 4,235 quarts of fruit per acre. Prince of Wales, the leading black variety, yielded at the rate of 3,630 quarts of fruit per acre, and White Dutch at the rate of 2,541 quarts per acre.

Gooseberries.—Champion is the leading variety of gooseberry. It yielded at the rate of 3,993 quarts per acre. Pearl produces larger berries than any other variety grown at the station. Weather conditions were favorable when the fruit matured, and it came through in first-class condition.

Cranberries.—The variety McFarlin was introduced from Long Beach, Wash., during the year for trial at the station. Some of the plants were set out June 14 in peaty soil, and the others were set out in a bed of moss. The vines have taken root but so far have made very little growth.

VEGETABLES

Asparagus.—Several cuttings of asparagus were made after May 12. About 50 per cent of the plants winterkilled. Asparagus can

not be produced as economically as some other vegetables in southeastern Alaska.

Beets.—Two varieties of beets were sown in the open May 23, and the resultant crop was harvested November 1. Oval Gem was ready for the table August 6 and yielded heavily. Black Red Ball did not do so well, producing at the rate of only 2¼ tons per acre.

Broccoli.—Riviera, a green variety, was ready for the table August 1. It is delicious and can be cut several times during the season. However, it must be cut when it is ready for use; otherwise it will run to seed.

Brussels sprouts.—Danish Prize was transplanted to the open June 8 and made a light yield. Brussels sprouts require a comparatively long season in which to develop good heads.

Cabbage.—Two varieties of cabbage were transplanted to the open June 8. Golden Acre was ready for the table August 24 and produced solid heads weighing about 4 pounds. Only about 50 per cent of Copenhagen Market, which was much later, formed heads. The land on which cabbage had been planted was again found to be infested with clubroot, due to a slime mold. Lime was applied to the land a year ago, but apparently did not eradicate the disease.

Carrots.—Danvers Half Long was sown in the open May 23. The crop was harvested November 1, and produced at the rate of 7½ tons per acre. Danvers Half Long has proved to be one of the best varieties for southeastern Alaska.

Cauliflower.—Of the cauliflower varieties, Gilt Edge Erfurt made the best growth. It developed good heads which were ready for table use August 8. Snow King developed only small heads, and these during the latter part of September.

Kale.—Blue Curled Scotch, a dwarf variety which was planted in the open June 8. was ready for the table September 28. This variety is very tender, has a good flavor, and makes an excellent green vegetable during the late fall and early winter when others can not be had.

Kohlrabi.—Earliest Erfurt was the only variety of kohlrabi grown. It is one of the earliest vegetables grown and must be used for the table when young.

Lettuce.—Three varieties of lettuce were sown in the open May 23. Grand Rapids leaf lettuce was ready for the table July 16, and successive cuttings were made to September 20. Iceberg yielded large, crisp heads. Delicacy produced small heads of good quality.

Onions.—Española, which is grown from seed, produced only a light yield of onions. Of the shallot sets which were planted May 23, only 50 per cent emerged and produced medium-sized bulbs. Perennial onion sets when planted in the fall or in the spring produce tender young onions. The older bulbs when left undisturbed in the ground multiply and produce onion sets.

Parsley.—The variety of parsley Fern Leaved was sown in the open May 23, and was ready for table use July 24. The plants continued to grow until late fall. They are hardy and do well in any good garden soil.

Peas.—Three varieties of peas were grown at the station. Quite Content was very productive, the large pods being well filled and the peas of fine quality. Early Eight Weeks, a dwarf variety, pro-

duced only a light yield of fairly good peas. Edible Pod produces tender, snappy pods which are prepared and cooked like string beans.

Radishes.—Two varieties of radishes—White Icicle and Crimson Giant—were grown. The seed was sown at 2-week intervals from May 23 to August 1. Root maggots attacked the two early sowings. Better results are obtained when the seed is sown from June 15 to July 15.

Rhubarb.—Red Giant rhubarb produced large leafstalks of fine quality from May 8 to September 20.

Rutabagas.—Imperial rutabaga was the only variety grown. The seed was sown May 25, and the resultant plants were ready for table use September 1 and yielded at the rate of 15 tons per acre.

Spinach.—The seed of Savoy spinach was sown at 2-week intervals from May 23 to July 5. The plants from the first two sowings produced large, thick leaves. Those from the sowings of June 20 and July 5 went to seed.

Swiss chard.—Fordhook Giant Swiss chard yielded continuously from August 5 to November 18. Swiss chard has dark green leaves and large white ribs. The leaves make a good substitute for spinach, and the ribs may be prepared and cooked like asparagus.

Turnips.—Petrowski turnip was the only variety grown. It yielded heavily and was free from attack by the root maggot.

POTATOES

Five hills each of 105 varieties of potatoes were planted at the station to determine their comparative value in developing varieties of economic importance to southeastern Alaska. Snowflake, White Beauty, and White Star were the leading commercial varieties tested. Of the station seedlings, Nos. 1236, 1238, 1308, 1312, and 1474 were in the lead. The average yields of the commercial varieties and the station seedlings were about the same. All the potatoes grown at the station were of good quality and flavor, but they were smaller than in other years because of cold rains during the growing season.

FLORICULTURE

Flowering plants at Sitka continued to bloom much longer than usual, some of them being as late as November 18. Perennial flowers can be raised more economically than annuals because the former require less care when they become fully established.

Bulbs.—Narcissus and tulips bloomed from May 18 to July 1. They were beautiful when in full bloom. Fully 40 per cent of the tulip plants were damaged by deer in the spring, and a few narcissus bulbs were found to be diseased. English iris bloomed from July 12 to August 20.

Shrubs.—Several kinds of ornamental shrubs grow exceptionally well at the station, including single and double flowered varieties of the Japanese rose (*Rosa rugosa*), honeysuckle (*Lonicera thibetica*), red-flowering currant (*Ribes sanguineum*), weigela, and several varieties of spireas. *Lonicera thibetica* and single-flowered varieties of *R. rugosa* have been found to make good hedge plants. The double-flowered varieties of *R. rugosa* and a double pink rose (Conrad F. Meyers) are the best of the roses grown as the station.

GENERAL CROP WORK

On April 22 common vetch and oats for forage were sown in the ratio of 2 parts vetch to 8 parts oats. The plants were 18 inches high June 24. Part of the field was used for pasture. The plants in the rest of the field grew 4 feet high and lodged. Some of the oats were mature October 1, but none of the vetch matured.

Canadian bluegrass was sown mixed with white clover on poor hillside land. About 10 per cent of the plants winterkilled. Most of those surviving are now fully established. The roots of white clover were found to be 6 to 8 inches long and bore a few nodules. The tract was used for pasture from June to November.

FIGURE 2.—Currant bushes heaved from the soil. Effect of alternate thawing and freezing of the ground

The first florets of the plants of strain No. 11902 of timothy appeared July 27, and those of the plants of strain No. 12421 August 2. The plants of strain No. 11902 were in full bloom August 2, and those of strain No. 12421 August 7. The plants of both strains averaged 4 feet high, and the heads averaged 3½ inches long.

HEAVING OF PLANTS

Repeated freezing heaves the surface soil to such an extent as to injure severely young currant, gooseberry, and strawberry plants that have not become well established. (Fig. 2.) Plants that are partly heaved from the ground must be reset, and those the roots of which are wholly exposed usually must be replaced with others.

Severe heaving occurs when the soil is saturated with moisture, freezes from the surface downward, and then alternately thaws and freezes for several days. The formation of ice crystals and consequent heaving are not so pronounced when the temperature remains low as when it rapidly falls at night after a thaw during the day. Heaving does not occur when the ground is covered with snow, and it can be prevented by covering the ground with a heavy mulch. The temperature of the ground thus protected remains more nearly constant than in exposed places.

FAIRBANKS STATION

WEATHER CONDITIONS

The winter of 1928–29 was unusually mild. On October 4 the freeze was hard enough to stop fall plowing, but during the rest of the month and throughout November the weather was comparatively mild. During December, January, and February there were several periods of very cold weather, but these were of short duration. The minimum temperature for the winter was −38° F. Up to January 14 the snowfall was light. During the latter part of the month and throughout February and March the snowfall was exceptionally heavy. Twenty-six inches of snow fell from January 15 to January 22, inclusive. The roads were impassable at this time and also during the latter part of March, when severe windstorms caused heavy drifts in exposed places. The total snowfall for the winter was 94.1 inches, which was 47.5 inches more than for the 17-year average. This snow contained 6.63 inches of water.

Spring planting was late on account of the heavy snowfall. The south-slope fields were dry enough to cultivate by May 17. Approximately two weeks later the north-slope and level lands were dry enough to cultivate. The growing season was characterized by a large number of cool, cloudy days, and frequent rains. The maximum temperature for the summer was 86° F. The mean maximum temperature was 60.4° for May, 73.9° for June, 71.9° for July, 66° for August, and 64° for September. The mean temperature was 47.4° for May, 59.9° for June, 59.4° for July, 54° for August, and 51.5° for September. The precipitation was 1.2 inches for May, 1.77 inches for June, 3.82 inches for July, 1.26 inches for August, and 0.59 inch for September, or a total of 8.64 inches during the growing season. The last killing frost in the spring occurred May 26 and the first killing frost in the fall September 20. This gave a frost-free period of 117 days, which was 16.6 days above normal. During May the weather was sufficiently clear for planting. Rain during the last part of May caused all seed to germinate rapidly and the crops to emerge from the ground. There was an abundance of moisture in the soil throughout the growing season. Plant growth was retarded somewhat early in the season by cool weather, but on the whole the season was very favorable to all crops. Weather conditions were especially favorable for hay and pasture crops. Harvesting in August was much interfered with by frequent rains and cool, cloudy weather. Ideal weather for harvesting prevailed during the greater part of September.

The total precipitation from October 1, 1928, to September 30, 1929, was 15.36 inches, which was 6.44 inches above the total for the preceding year and 3.62 inches more than for the 17-year average.

AGRICULTURAL ORGANIZATIONS

The Fairbanks station is working in cooperation with the Tanana Valley Agricultural Association, the Tanana Valley Agricultural Association (Inc.), and the Tanana Valley Fair Association with a view to solving problems of greatest interest to them.

The Tanana Valley Agricultural Association was organized in 1912. Its members are farmers and others who are interested in the agricultural development of the valley. The organization has the following objectives: (1) To promote the welfare of the farmers; (2) to make a survey of the number of acres under cultivation, the volume of production, and the amount and kinds of products and by-products that are consumed locally; (3) to determine prices on commodities on the basis of supply and cost of production; and (4) to cooperate with local growers in the purchase of seeds and fertilizers and in marketing farm crops. Each year the association holds a picnic on the station grounds. The farmers and their families gather for the day, a part of which is devoted to social activities and the rest to an examination of the different plats under experiment and a discussion of improved methods of producing both crops and animals. At present the association numbers 20 members. It holds regular monthly meetings for the transaction of any business needing attention. The work of the committee on statistics helps the farmers to proportion their areas in adapted crops according to market demands. Every spring commercial fertilizers are purchased through the association for farmers who grow potatoes and truck crops.

The Tanana Valley Agricultural Association (Inc.) was organized July 9, 1919, for the purpose of conducting business enterprises which would make for the betterment of agriculture in the Tanana Valley. This corporation has 157 stockholders, most of whom are engaged in some business in the town of Fairbanks. The board of directors meets as often as business conditions may require. The stockholders meet once a year. For several years after its establishment, the corporation kept a warehouse in which potatoes and vegetables were stored until the market demanded them. The flour mill, which was established in December, 1921, under the management of the association, is still in operation and converts an average of 15 tons of wheat into flour annually for the interior markets and coast towns.

The Tanana Valley Fair Association conducts an agricultural fair each year and awards premiums for the best farm crops, farm animals, art work, and school exhibits. The fair is financed by local contributions, territorial aid, and admission fees. It is well patronized, and the exhibits entered are numerous. It has proved to be a success educationally and financially. The Fairbanks station has made an exhibit at this fair annually since the association was formed.

CRANBERRIES AND BLUEBERRIES

Cranberries and blueberries grow very profusely over a large portion of the Territory. In recent years these fruits have not been shipped to the States, but in 1880 Jackson (*12, p. 20*) reported that hundreds of barrels of wild cranberries were picked annually in Alaska by the Indians and shipped to San Francisco.

In the summer of 1929 one of the merchants at Fairbanks stated through the medium of a local newspaper that he would pay 10 cents a pound for wild cranberries (*Vaccinium vitis-idaea minus*). A number of men, women, and children responded to his advertisement and furnished him with about 2,300 pounds of locally grown wild cranberries. These he shipped to the States. The venture proved to be a success, and the indications are that a large quantity of Alaskan cranberries will be marketed in the near future.

Native blueberries also were very plentiful, but because of the difficulty encountered in shipping the fruit it was not marketed in the States. Local restaurants purchased a limited quantity of the berries.

GRAIN CROPS

Varieties of spring wheat, barley, and oats were each sown on replicated $\frac{1}{40}$-acre plats for comparison of earliness, yield, quality, and stiffness of straw. South-slope land that had been cleared in 1927 and cropped with oats and barley for hay in 1928 was used for the tests. The land was plowed in the fall and thoroughly disked and harrowed, preparatory to seeding in the spring. No fertilizer was used. The new system of sowing, described by Delwiche (*7*) was employed, an 8-foot, 16-disk drill being used for the purpose. The third and fourteenth feed spaces were plugged, thus leaving a space of 1 foot between the second and third rows of grain on each side of the plat. Shortly before harvest time the grain in the two outer rows of each plat, as separated by the 12-inch space, was cut and removed. This method enables the planter to eliminate any border effect and all blank-alley systems. The method was satisfactorily used and will be tried again. After the border rows and the ends were removed each plat had an area approximating one-seventieth of an acre.

Recent introductions of wheat, oats, barley, rye, flax, and peas were grown in rod rows for observation on their suitability to this part of Alaska.

The season, except for cold rains that retarded maturity in the late varieties, was very favorable to grain growth. The early varieties matured well before frost. The season was fine for testing earliness. A number of the varieties under test failed to ripen this year.

Spring wheat.—Sixteen varieties of spring wheat were sown May 20 at the rate of 75 pounds per acre. Prior to being sown, the seed was treated with copper carbonate for smut control, as is recommended by Tapke and Meier (*17*). All the resultant seedlings had emerged by May 31. They grew rapidly, and the earliest variety was headed by July 6. Siberian No. 1, the variety recommended for this region, was ripe August 26, 98 days from the date of seeding,

and yielded at the rate of 21.3 bushels per acre. Tulun ripened in 98 days from the date of seeding and yielded at the rate of 22.2 bushels per acre. H. G., another early variety, ripened in 106 days and yielded at the rate of 28.1 bushels per acre. Ruby, Garnet, and hybrid No. 63 ripened in 109 days and yielded at the rates of 22, 25.9, and 26 8 bushels, respectively, per acre. Romanow, a later variety, required 113 days to mature and yielded at the rate of 27.7 bushels per acre. Hybrids Nos. 24, 101, 100 Bd, and 100 T Bd, and Marchosser, Red Bobs, and Kota were in the hard-dough stage on September 12, but failed to ripen. Weight per bushel ranged from 56.4 pounds for Garnet to 62 pounds for Ruby. Most of the varieties weighed about 60 pounds per measured bushel. Grain of the early varieties was of excellent quality, being hard and vitreous, with very little yellow berry. Much more yellow berry was observed in the grain of the later varieties.

Marked differences in moisture content were found between the early and the late varieties. For Siberian No. 1 it was 17.2 per cent, for Tulun 16.3 per cent, for H. G. 16 per cent, and for Ruby 16.1 per cent. For Garnet it was 21.7 per cent, for Romanow 19.1 per cent, and for Red Bobs 18 per cent.[2]

Ten recently introduced varieties were grown in rod rows, but none of them appeared to be suitable for this part of the interior.

Winter wheat.—Ten varieties of winter wheat were sown in rod rows in the early fall of 1928. About 10 per cent of Minturki, a hardy variety from Minnesota, survived, but the spring growth was weak. From 2 to 5 per cent of the other varieties survived. A much hardier variety than has as yet been tested must be found before winter wheat can be successfully grown here.

Oats.—Sixteen varieties of oats were planted May 22. The hull-less varieties were treated with copper carbonate for smut control and were then sown at the rate of 75 pounds per acre. The hulled varieties were treated with formaldehyde for smut control as is recommended by Tapke (*16*). They were then sown at the rate of 90 pounds per acre. The season was very favorable for oats, and the crop grew rapidly. Although ripening was retarded by cool, cloudy weather, the early varieties were mature well before frost. Canadian, the variety recommended for this region, was ripe 96 days after the date of seeding, and yielded at the rate of 63.8 bushels per acre. Hybrid No. 102, a very promising variety, was ripe in 107 days and yielded at the rate of 77 bushels per acre. Wisconsin No. 7, a somewhat later variety, ripened in 111 days and yielded at the rate of 77.2 bushels per acre. The hull-less varieties Disco and hybrid No. 51 each required 104 days to ripen and yielded at the rates of 42.7 and 35 6 bushels, respectively, per acre. Victory and Heavyweight did not ripen. Weight per bushel ranged from 32 pounds for hybrid No. 25a to 46 pounds for Disco. Canadian had a bushel weight of 42 pounds. As was the case with the wheat varieties, marked differences in moisture content were found between the early and the late varieties of oats. For Canadian it was 16.1 per cent, and for Leader 18.2 per cent.

[2] The stations gratefully acknowledge the cooperation of the Alaska Agricultural College at Fairbanks in lending apparatus for making the moisture determinations.

Five recently introduced varieties were grown in rod rows. They will be tested further.

Barley.—Twelve varieties of barley which were sown May 21 had emerged by June 1. The hull-less varieties were treated with copper carbonate for smut control and then sown at the rate of 75 pounds per acre. The hulled varieties were treated with formaldehyde and sown at the rate of 96 pounds per acre. Trapmar, a hull-less variety, is recommended for this region. This year it was ripe 89 days after the date of seeding and yielded at the rate of 28.1 bushels per acre (48 pounds per bushel). Hybrid No. 28, a hulled variety, made the highest yield, giving 41.6 bushels per acre. Hybrid No. 14a and hybrid N. D., Meloy, and Eagle did not ripen. Weight per bushel ranged from 49 pounds for hybrid No. 28 to 57.8 pounds for Trapmar. Striking differences in moisture content were found between the early and the late varieties. Thus, Trapmar had a moisture content of 16.3 per cent, whereas Eagle, which did not ripen, had a content of 22.7 per cent.

FIGURE 3.—Rod rows of Hogot rye, Fairbanks station

Winter rye.—Hogot winter rye is well adapted to this region. It is extremely hardy and survives the winters well. Previous tests at this station have shown that when sown in midsummer it will furnish an abundance of fall pasture the same year and will produce a good crop of grain the following year (*8, p. 9–10*).

Hogot rye, sown in rod rows in July, 1928, was 66 inches high and ripe August 14, 1929. (Fig. 3.)

Flax.—A variety test was begun this year by the station working in cooperation with the Office of Cereal Crops and Diseases of the United States Department of Agriculture, which supplied the seed for the purpose. On June 2 the seed of 164 varieties was sown in

rod rows, and by June 8 the young plants had emerged. Growth was rapid, and the first blossoms appeared July 8. Because of the cool, cloudy season only a few varieties ripened seed. These have not been threshed. From the result of the 1-year test, flax apparently is well adapted to local conditions. Further tests are necessary to determine the best varieties for Alaska.

Germination tests with small grains.—In this region grain varieties should ripen early so that the seed may have a chance to dry sufficiently to withstand the rigors of the winter. With a low moisture content the seed can be kept viable in an unheated granary during the winter. Some difficulty has been experienced by farmers in overwintering grain seed, and as a result a large quantity of it is shipped in from the United States each spring. Each farmer should save as much of his own grain seed as possible. In order that there may be no shortage, farmers are advised to grow the varieties recommended to them by the station and to utilize each clear day in placing their grain under shelter. The seed will then dry sufficiently to overwinter well. At the station grain seed is kept viable from one season to the next without any trouble.

During the summer of 1929 grain seed, produced at the station in 1928, was tested for germination. The varieties were harvested in August, 1928, left in the shock two to three weeks, and then threshed. They were stored during the winter in an unheated granary. The walls of this granary are made partly of wire screen, and the temperature within is approximately the same as that without. Siberian No. 1 wheat gave a germination of 98 per cent and Canadian oats and Trapmar barley each 95 per cent. The late varieties gave a somewhat lower germination. The early and mid-late varieties gave a germination from 90 to 95 per cent.

Hybridization work.—During the summer crosses were made between the varieties of wheat Romanow × Red Robs, Romanow × Garnet, Romanow × Rubob, and Marquis × Garnet, and between the varieties of oats Canadian × Anthony. Seed of the resulting progeny was harvested separately for planting in rod rows in the spring of 1930. It is hoped that the selection of desirable types can be begun by the summer of 1931.

FORAGE CROPS

A high-yielding, hardy perennial legume is much needed in Alaska for rotating with grain and other cultivated crops, and to furnish hay and pasture for livestock. All the hardy legumes that can be obtained are being tested for hardiness, yield, and feeding qualities.

Alfalfa.—Yellow-flowered alfalfa (*Medicago falcata*) survived the winter practically 100 per cent. One June 17 it was 12 inches high and on July 3, 18 inches, at which time the first blossoms appeared. Three square rods were harvested for hay on July 19 at the full-bloom stage. The height was 20 inches. The yield, green weight, was at the rate of 6.2 tons per acre. No seed ripened.

Of the 129 hybrids resulting from crossing Grimm with *M. falcata* which were living in the fall of 1928, only 89 survived the winter. The plants are staked and numbered, and individual detailed records of their behavior are being kept. No seed ripened, probably because the weather prevailing at the time the crop was growing was cool

and rainy. However, the plants were harvested before frost and hung in a dry room for threshing during the winter. The varieties Grimm, Orenburg, Cossack, and Perkins Hybrid winterkilled. Only a few of the plants started in 1926 are left.

The varieties Minnesota Grimm, Grimm No. 451 from Saskatchewan, and Ladak from the Office of Forage Crops of the United States Department of Agriculture, were planted in the spring of 1929.

Clovers.—Thirty per cent of a stand of biennial white sweetclover survived the winter. The plants grew rapidly and at the time of frost on September 20 were 60 inches high. They produced an abundance of seed pods, but the seed did not ripen. Medium red clover and alsike clover winterkilled, but white clover survived in thrifty condition. Hardy varieties of clovers, received from various experiment stations and from the United States Department of Agriculture, were planted in the spring. These made rapid growth and were in vigorous condition at the end of the season.

Vetch.—Perennial vetch (*Vicia cracca*) survived the winter well and made rapid growth. On July 19 it was 4 feet high. The yield, green weight, was at the rate of 6 tons per acre. Common vetch grown on a small plat on south-slope land bloomed July 18 and produced well-filled seed pods. On September 17 the vines were 4 feet long.

Vetch and oats for hay from a south-slope field of 9.7 acres yielded at the rate of 1.6 tons per acre and from another south-slope field of 9.9 acres at the rate of 1.8 tons per acre. Both fields had been cleared in 1928. The growth on this new land was very uneven. Variation in productivity was probably due to the occurrence of patches that had been rendered fertile by decaying logs and stumps, the heating of the soil in burning brush piles, and the ashes left after burning.

Peas.—The cool, rainy season was exceptionally favorable to the growth of field peas. The varieties Golden Vine, Mexican, Austrian Winter, Tangier, and Canadian, planted in test rows in the nursery, made rank growth, and the vines ranged from 5½ to 11 feet in length.

A 13-acre field of peas on south-slope land yielded hay of high quality at the rate of 1.3 tons per acre.

Grasses.—Bromegrass came through the winter in fine condition. It was in full bloom July 22 at a height of 3 feet. The yield, green weight, was at the rate of 4.3 tons per acre. Bromegrass, sown with a light mixture of white and alsike clovers on 51 acres of north-side land in the spring, made a good stand and vigorous growth throughout the summer. The season was exceptionally favorable for starting grass and clover.

Native redtop (*Calamagrostis* sp.) made a rapid spring growth. It was in full bloom July 22 at a height of 34 inches. The yield, green weight, was at the rate of 4.3 tons per acre.

A number of grasses were planted in the spring of 1929 and made full stands and grew vigorously.

Sunflowers.—Hybrid No. 671 and Russian Mammoth sunflowers were grown in rod rows for comparison. Hybrid No. 671 was in full bloom August 14 at a height of 4½ feet. At the time of the frost it was 66 inches high, and the seeds were well formed but not

mature. Russian Mammoth was just starting to head at the time of the frost, September 20. The plants were then 8 feet high. On rich ground sunflowers make very satisfactory growth.

CURING HAY

Grain hay crops should be cut with a grain binder and dried in small, uncapped shocks consisting of six to eight bundles. This method is much quicker and less expensive for drying and handling than is that of cutting with a mower, and usually it results in a better quality of hay. Crops when cut with a mower should be dried in tall, narrow cocks rather than in the large, flat type of cocks. The tall, narrow cock is made by piling the material on thin peeled stakes (fig. 4) that have been sharpened at both ends and firmly driven approximately 14 inches into the ground. A tenpenny-size nail driven through the stake 12 inches above the ground will

FIGURE 4.—Curing hay in cocks, Fairbanks station

help to hold the lower layer off the ground. Frequent rains in the fall often make it necessary to cock the crop while it is still green, and for this purpose the tall, narrow type of cock will be found desirable because it enables the air to circulate freely through the mass.

POTATOES

Each of 14 varieties of potatoes was planted May 24 in duplicate in two 132-foot rows 3 feet apart. The tuber seed pieces were spaced 18 inches apart in the row. About a month before the tubers were planted they were immersed for 30 minutes in a solution of corrosive sublimate (4 ounces dissolved in 30 gallons of hot water) for scab control, and then placed in a well-lighted room to sprout. South-slope land that had been cleared in 1927 and planted with oats and barley for hay in 1928 was used for the test. No fertilizer was used. All the varieties had emerged by June 12. The season was favorable

for potatoes, and they made rapid growth. At the time of the frost on September 20 the vines were beginning to turn yellow, and the tubers were rapidly maturing. In quality they were fine. The quality is improved by baking and steaming. Boiling causes the tubers to split into pieces, and a large amount of the food value is then lost.

The highest yield of marketable potatoes was made by Eureka, which produced at the rate of 214 bushels per acre. American Wonder and White Harvest each yielded at the rate of 213 bushels of marketable potatoes per acre. The quality of American Wonder was superior to that of White Harvest. June, Jean, Kate, Ohio Junior, and Irish Cobbler yielded marketable potatoes, at the rates of 212, 202, 199, 198, and 193 bushels, respectively, per acre.

BERRIES

Raspberries.—The Cuthbert raspberry overwintered well under a heavy straw mulch, and the spring growth of the canes was vigorous. The first ripe berries were harvested July 26. The yield was good and the quality excellent.

Strawberries.—Strawberries, the rows of which were mulched with straw in the fall, overwintered well. The first ripe berries were harvested July 18. For some reason strawberries do not yield well in this region. There are many blossoms but very few berries. Whether failure is due to the variety tried or to soil conditions or the climate is yet to be determined.

Blueberries.—The crop of wild blueberries was very heavy, and the fruit was of fine quality. Selections of desirable types were transplanted to the station nursery for study.

Service berry.—Three plats of the native service berry, locally called "sarvis" berry, were received from the region of the Healy River, east of McCarty, and planted in the station nursery.

NURSERIES

Two new nurseries were established in the spring of 1929—one on south-slope land and the other on the flat. Several varieties of currants, gooseberries, and strawberries were received in the spring from the Sitka station and started in the nursery, together with the following varieties of plants obtained from the Office of Foreign Plant Introduction of the United States Department of Agriculture: S. P. I. No. 72420 (*Syringa amurensis*), S. P. I. No. 76117 (*Sorbaria assurgens*), S. P. I. No. 69097 (*Prunus armeniaca*), and S. P. I. No. 43182 (*P. salicina* × Best's hybrid plum (*P. cerasifera*).

VEGETABLES

Spinach, kale, cabbage, celery, onions, parsnips, salsify, beets, carrots, turnips, radishes, cauliflower, Brussels sprouts, tomatoes, sweet corn, leek, Swiss chard, peas, head lettuce, and rutabagas were grown on a rich plat of south-slope land. Tomatoes in the open made a large yield of green fruit none of which ripened. Sweet corn grew very slowly, and tasseled and silked, but produced no

ears. The other vegetables made large yields of high quality. Root maggots attacked radishes, turnips, and rutabagas.

Experiments were begun to determine the effect of paper mulch on yield of vegetables and potatoes, the effect of length of day upon plant growth, and to study the annual nature of biennial crops.

Peas for canning.—No seed was obtained this year from peas for canning. The Alaska variety was planted May 28, and the plants emerged June 10, and were in bloom July 4. They reached the canning stage August 1, 65 days after date of planting. In growing this variety for the cannery, successive plantings should be made in the spring so that each planting can be harvested in succession in the fall.

The Horal and Badger varieties of peas for canning were also grown, but so far neither of them appears to be as desirable as the Alaska variety.

ORNAMENTALS

Flower growth during the early part of the season was checked by cool, cloudy weather. Later all the varieties under test grew with remarkable rapidity and bloomed profusely. Several shrubs were received from the Sitka station for test.

WEED ERADICATION

The weed problem is very important in this region, and it is highly desirable that experimental work be begun to determine the best methods of exterminating the pests from infested lands. Calcium chlorate was effectively used for the purpose on small areas, one sprinkling of the powder being sufficient to kill horsetail (*Equisetum* sp.) lamb's-quarters (*Chenopodium* sp.), wild barley (*Hordeum* sp.), and larkspur (*Delphinium* sp.). The cost of calcium chlorate, however, practically prohibits its use on large areas.

RABBITS

The rabbit, or northern varying hare (*Lepus americanus americanus*) (*15, p. 272*), which in past years has been very destructive to crops, is now making its appearance only in very small numbers. In 1924 the rabbits were so numerous that they destroyed crops at the station and caused heavy losses on neighboring farms and in local gardens. In 1925 the number of rabbits appeared to equal that in the preceding year, and they destroyed cereal grains in the shock. In 1926 and 1927 the number decreased, and in 1928 and 1929 it was practically negligible and no crops were damaged.

SOIL STUDIES

During the summer an experiment was begun to determine the depth to the frozen layer in the soils of several locations differing in topography, and the depth of the moss and other kinds of vegetation covering the soils. A soil augur was used to ascertain depth. The experiment is to be extended to include soil moisture and temperature determinations.

CATTLE

The Galloway-yak (*Bos grunniens*) crossbreeding work was continued. The breeding herd (fig. 5) now numbers 5 Galloway cows, 1 yak bull, and 6 hybrids. Hybrids Nos. 4 and 5, both males, proved to be sterile. The yak bull can not be used for breeding purposes much longer because of age. In December the station obtained from the Wainwright National Park in Alberta, through the courtesy of the Canadian Government, one young yak bull and three heifers for breeding experiments. The station is in urgent need of more yak in order that full-blooded yak as well as Galloway-yak hybrids may be included in the experiment. The hybrids are being kept under conditions that will test their ability to forage for themselves and withstand the low temperatures of the winters.

Both yak and Galloway-yak hybrids appear to be well adapted to the region. During the summer months they graze along the hillsides on native redtop (*Calamagrostis* sp.), and after the ground

FIGURE 5.—Herd of yak and Galloway-yak hybrids, Fairbanks station

freezes and the redtop becomes low in digestible nutrients the animals move to the lowlands where they feed on the "niggerhead" grasses (*Eriophorum* spp.). These grasses grow in small bunches on the so-called "niggerheads" (fig. 6) and are probably the same kind of plants Bennett and Rice (*3, p. 162*) refer to as being relished also by horses. Although these grasses are not as palatable as are many other kinds in the summer, they do not lose their digestible nutrients as soon as the others do when frost comes. The niggerheads are usually found in boggy areas, and many of them are almost inaccessible to cattle in summer.

Mosquitoes were very troublesome to the station animals during the past summer. Animals given free range found some relief from the pests by seeking shelter at night in the thick brush and in the high hills. The animals can be protected fairly well if they are provided at night with dark shelters the entrances to which are overhung with burlap.

MATANUSKA STATION

WEATHER CONDITIONS

Data on weather, including precipitation, minimum and maximum temperatures, and cloudiness, have been recorded each day at the Matanuska station since its establishment in 1917. Table 2 gives the average monthly precipitation for the period 1919–1929, inclusive.

FIGURE 6.—"Niggerhead" grasses (*Eriophorum* spp.) near Fairbanks

TABLE 2.—*Record of the monthly precipitation at the Matanuska station for the period 1919–1929*

Month	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	10-year average	1929
	Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inche*	*Inches*	*Inches*
January	0.58	0.24	0.83	1.45	1.47	0.79	0.53	0.61	0.93	0.55	0.798	1.07
February	0	1.76	.08	.95	.80	.41	.17	.14	.95	1.23	.649	1.88
March	.09	.72	.75	1.17	.47	.24	.32	.12	.82	1.34	.604	.98
April	0	.06	1.25	.80	.32	.92	.20	.05	.37	.44	.441	.53
May	.27	.49	.81	.28	.21	.83	.07	.29	.51	.29	.405	.77
June	.87	1.77	1.10	.92	.35	.71	2.20	.65	.75	1.33	1.065	.52
July	2.00	2.50	1.54	3.27	1.10	.61	.70	3.59	.55	1.71	1.757	2.51
August	2.23	1.60	3.83	2.71	1.05	4.18	3.06	3.32	1.94	2.05	2.597	2.09
September	1.90	.58	1.80	1.54	3.75	2.08	7.55	2.21	1.69	3.29	2.639	2.69
October	1.62	.66	3.57	1.77	1.91	1.74	1.88	1.36	1.32	2.63	1.846	2.42
November	.46	.67	.04	1.01	.97	.07	.59	.25	.10	2.06	.622	1.05
December	1.42	.43	2.25	.04	1.24	.98	2.87	2.72	1.22	1.15	1.432	.31
Total	11.44	11.48	17.85	15.91	13.64	13.56	20.14	15.31	11.15	18.07	14.746	16.82

Table 2 shows that April, May, and part of June, are comparatively dry. Grain that is planted in the spring depends largely upon the amount of moisture left available for the crop by the melting

snows. The total annual precipitation for the 11-year period ranged from 11.15 inches in 1927 to 20.04 inches in 1925, which was a difference of 8.99 inches in favor of the latter period. The precipitation during the harvesting seasons of 1925, 1928, and 1929 was materially above the average. Harvesting was delayed in consequence, and a good part of the forage and grain crops deteriorated in the field. April and May are the driest months of the year, and August and September are the wettest. The total precipitation for April and May, 1929, was greater than that for the same months during the 10 preceding years and delayed planting. Comparatively heavy precipitation in July, August, and September cooled the air and the soil and caused a failure of some of the cereal grains to mature. Threshing grains in the shock can not always be depended upon in the fall on account of the wet and cool weather then prevailing. Grain to be saved must be stored in a barn or stacked. (Fig. 7.) Precipitation for May has been uniformly low, the difference between

FIGURE 7.—Grain stacks on a farm in the Matanuska region

the minimum for September, 1920, and the maximum for September, 1925, being 6.97 inches. In 1925 the precipitation in May was 0.07 inch, and that in September 7.55 inches.

Temperature is one of the climatic elements that dominate plant growth and maturity of crops during the growing season. Table 3 gives the average monthly temperatures for 1919 to 1929, inclusive.

This table 3 shows that the temperature progressively increased from January to July and decreased from July to January. In 1929 the mean temperatures for March and April were 3.58 and 2.33° F., respectively, lower than for the average for those months for the 10 preceding years. The mean temperature for August, 1929, was 2.7° lower than the average for that month for the 10 preceding years and retarded maturity of farm crops. There is very little variation in the mean temperature for the growing months of May, June, July, August, and September, the range for them being 7.32, 6.36, 10.12, 8.15, and 6.1, respectively, during the period 1919–1928, inclusive. The summer is continuously cool, and the winter tempera-

ture of any given month varies more widely. The mean temperature for June, July, and August is about 55°. According to Henry et al. (*10, p. 480*), where the mean summer temperature ranges around 65°, a minimum annual rainfall of 15 inches is needed for ordinary farming. The Matanuska region, with its summer mean during May to September, inclusive, of about 52°, and a total precipitation of about 15 inches, is provided with ample moisture for farming.

TABLE 3.—*Record of mean monthly temperatures for the Matanuska station for 1919–1929, inclusive*

Month	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	10-year average	1929
	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.
January	10.72	4.50	6.20	13.90	5.80	14.42	4.74	29.94	11.42	13.38	11.50	19.30
February	21.30	27.40	12.00	14.40	23.70	18.10	9.48	19.72	21.80	25.47	19.33	24.98
March	23.00	16.50	26.70	17.60	22.16	34.73	23.74	38.85	22.78	20.78	24.68	21.10
April	37.80	29.20	36.20	34.90	38.00	28.66	36.58	44.53	28.76	36.51	35.11	32.78
May	47.00	44.20	45.60	45.10	48.00	47.12	47.60	51.52	46.62	46.65	46.94	48.60
June	53.60	52.45	56.30	54.40	56.60	56.48	53.54	56.79	54.61	50.43	54.52	55.44
July	58.10	55.20	55.80	55.50	60.70	56.57	58.40	50.77	50.58	56.94	55.85	55.93
August	54.70	52.90	55.05	53.25	61.05	54.67	56.45	56.65	54.64	54.41	55.37	52.67
September	46.80	44.30	46.30	45.20	50.40	45.45	49.85	49.70	47.08	44 70	46.97	52.26
October	33.20	33.20	33.70	40.80	45.09	29.77	43.16	41.41	32.09	35.51	36.79	37.42
November	14.90	19.60	18.90	22.50	27.25	28.63	26.38	29.06	9.65	26.20	22.30	21.11
December	8.40	13.50	14.20	12.53	10.98	8.01	18.69	14.57	11.81	24.01	13.67	7.32

Another element which enters into plant development is the amount of sunshine it receives during the growth period. Table 4 shows that the entire growing period is characterized by many days of cloudy weather.

TABLE 4.—*Record of clear, partly clear, and cloudy days at the Matanuska station for the period 1919–1929*

Year	April			May			June			July			August			September		
	Clear	Partly cloudy	Cloudy	Clear	Partly cloudy	Cloudy	Clear	Partly cloudy	Cloudy	Clear	Partly cloudy	Cloudy	Clear	Partly cloudy	Cloudy	Clear	Partly cloudy	Cloudy
	Days	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*	*Days*
1919	13	9	8	8	10	13	4	12	14	8	13	10	6	17	8	6	20	4
1920	13	13	4	19	10	2	12	3	15	9	18	4	3	25	3	7	14	9
1921	16	11	3	18	10	3	10	14	6	8	17	6	5	10	16	6	17	7
1922	11	17	2	13	9	9	13	8	9	7	17	7	8	14	9	12	8	10
1923	15	10	5	16	9	6	12	11	7	12	13	6	15	6	10	3	14	13
1924	11	10	9	17	6	8	12	7	11	7	8	16	8	15	8	12	10	8
1925	7	14	9	8	11	12	11	7	12	11	12	8	5	11	15	10	6	14
1926	8	14	8	7	13	11	11	10	9	3	17	11	11	12	8	9	10	11
1927	13	8	9	11	9	11	9	12	9	10	14	7	3	11	17	7	6	17
1928	10	8	12	9	15	7	9	9	12	5	11	15	2	8	21	7	6	17
1919–1928[1]	11.7	11.4	6.9	12.6	10.2	8.2	10.3	9.3	10.4	8	14	9	6.6	12.9	11.5	7.9	11.1	11
1929	10	9	11	10	8	13	8	6	16	11	2	8	11	5	15	7	4	19

[1] Average for 10-year period.

Although there is little precipitation during April, May, and June, the sky is frequently overcast, and plants grow slowly. In 1929 during April to September, inclusive, there were 92 cloudy days as compared with the average of 57.2 cloudy days for the 10 preceding years. Increased rainfall, decreased temperature, and addi-

tional cloudy days were the main factors which caused low yields this season.

NEW EXPERIMENTAL ORCHARD

Nine hundred and twenty-four different fruit trees and plants, obtained principally from the Bureau of Plant Industry of the United States Department of Agriculture, and from Shenandoah, Iowa, and Long Lake, Minn., were set out in the newly established orchard in the spring of 1929. (Fig. 8.) Preparatory to planting, the orchard was plowed and disked. After planting was done, the spaces between the rows were harrowed periodically, and weed growth was suppressed by hand hoeing. Bush fruits were planted in rows between the rows of trees. Fruit trees proving to be hardy and desirable will be left permanently in place. The plants were heeled in as soon as they were received and left in the nursery until

FIGURE 8.—New experimental orchard, Matanuska station

they were hardy enough to be transplanted to the orchard. Several plants were then taken up at a time, wrapped in wet burlap, and placed in a barrel partly filled with water. Holes for planting were dug deep enough to permit setting the plants lower than they stood in the nursery and wide enough to allow the roots to spread out in natural position. The surface soil that had been taken from the holes was placed about the roots and was topped with the subsoil. Dry weather following planting made it necessary to water the plants periodically for three weeks to keep the roots in good growing condition. A number of 3-year-old to 4-year-old plants that had to be severely pruned before they were planted grew vigorously during the summer. Notes were taken on the growth of the trees and shrubs throughout the summer. Cool weather early in the season checked growth, and some of the trees looked as though they never would revive. Table 5 gives a summary of the condition of the plantings in the fall.

TABLE 5.—*Condition of the plantings in the experimental orchard at the Matanuska station in the fall of 1929*

Kind of planting	Vigorous plants	Weak plants	Dead plants	Total
	Number	*Number*	*Number*	*Number*
Apple	24	10	3	37
Apple seedlings	55	45	----	100
Plum	25	10	----	35
Plum seedlings	43	54	3	100
Mulberry	----	77	27	104
Grape	39	139	30	208
Cherry	13	7	4	24
Pear	4	9	----	13
Raspberry	28	9	6	43
Strawberry	90	2	4	96
Currant	30	6	1	37
Gooseberry	15	6	6	27
Dewberry	41	39	20	100
Total	407	413	104	924

MISCELLANEOUS FIELD CROPS

The yield obtained in the fields was lower than in average years. Estimated acre yields for Siberian No. 1 wheat were 10.5 bushels, for Trapmar (No. 19) barley 18.5 bushels, for Climax oats 49.9

FIGURE 9.—Oat field, Matanuska station

bushels, for White Bliss potatoes 104.5 bushels, for oats and vetch for hay 2.7 tons, for peas for silage 8.4 tons, for oats and peas for silage 5.7 tons, and for mangels 8.8 tons.

Grain crops.—Grains in the large fields were planted May 27 and 28. All the plants had emerged by June 8, but on account of cool weather and lack of moisture they grew slowly until the second week of July when a comparatively heavy rain fell. During the rest of July all the crops grew vigorously. (Fig. 9.) August and the first part of September were cool and wet. Grains matured slowly, and harvesting was delayed until the last week of September. Grains that usually mature in 105 to 112 days required 10 days longer than in normal years. Several of the varieties had to be cut while

they were still immature and the grain allowed to harden in the shock in order to avoid the possible occurrence of frost.

Cultural practices.—Most of the fields were plowed in the fall. A few acres of land were plowed in the spring of 1929. All the land was double-disked and harrowed before seeding was done. The cultipacker was then used to firm the seed beds. No marked difference in yield was noted between fall-plowed and spring-plowed lands. The spring-plowed land was the more difficult to work because the soil had been loosened by the recent plowing. Much of the soil was so loose and dry that it rolled ahead and around the ends of the cultipacker and made this important operation slow and laborious.

Hay and silage production.—Most of the hay was produced on 26 acres of rented land. Oats and vetch in the ratio of 3 parts of oats to 1 part of vetch by weight were sown in this field, and the resultant crop made vigorous growth. The vetch grew faster and ranker than the oats and caused the latter to lodge so severely as to necessitate cutting the crop one way with a mower. About 20 tons of hay were cured by cocking on stakes sharpened at both ends and firmly driven into the ground. The remainder of the 40 tons obtained from the field was cured on the ground and stored in the barn when dry.

Oats, planted on a 3-acre plat late in June, did not mature grain. It was cut for forage after it had frozen and made a fair quality of hay. Barley sown mixed with vetch on a 2-acre plat the latter part of June was cut for hay with a mower the last week of September. It was put up in racks for curing. Peas and oats in the ratio of 2 parts of the former to 3 parts of the latter produced a total of 144 tons of silage on a 25-acre field. Cutting was begun August 25 and completed September 9.

Clovers and grasses.—Crimson, alsike, red, and sweet clovers were planted in square-rod plats. All the varieties made fair growth, and records are being kept to determine their winter hardiness. Several strains of alfalfa were planted in the spring but grew slowly.

Both native and cultivated grasses grew vigorously this year. During midsummer, when grasses are usually grazed closely, the mosquito infestation was so severe that the station stock would not leave the barns to feed. After the scourge abated the grasses were found to have made abundant growth, and in consequence feed in pastures was plentiful until late fall.

ROTATION PLATS

A series of 40 tenth-acre plats was laid out in 1925 in an experiment comparing the value of planting crops in rotation with a system of single cropping. Each plat was 181.5 feet long and 24 feet wide, the longest dimension running east and west. A 5-year rotation of wheat, peas, barley, oats and vetch, and potatoes, in the order named, was used. The check plats were planted in duplicate each year with the same kind of crops. The rotation plats were replicated six times. The rotation included wheat and barley as grain crops, peas as a legume, oats and vetch as a forage, and potatoes as a cultivated crop. Table 6 shows the scheme of rotation and estimated acre yields of the crops for the 5-year period.

TABLE 6.—*Estimated acre yields from 40 tenth-acre plats in five rotation groups at the Matanuska station*

Plat No.	Cropping scheme	Year	Yield per acre				
			Grain	Straw	Green forage	Hay	Tubers
			Bushels	*Tons*	*Tons*	*Tons*	*Bushels*
1	Cropped with wheat	1925	22.8	1.2			
		1926	24.8	1.6			
		1927	29.3	1.0			
		1928	19.1	.8			
		1929	6.8	.4			
2	Cropped with peas	1925			11.5		
		1926			12.5		
		1927			11.0		
		1928			11.6		
		1929			5.7		
3	Cropped with barley	1925	28.5	.8			
		1926	33.9	.6			
		1927	38.7	1.1			
		1928	30.0	.8			
		1929	18.9	.7			
4	Cropped with oats and vetch	1925			7.8		
		1926			6.3		
		1927			5.9		
		1928				1.8	
		1929				2.9	
5	Cropped with potatoes	1925					253.3
		1926					315.3
		1927					136.1
		1928					105.0
		1929					108.0
6	Cropped with Wheat	1925	21.5	1.6			
	Cropped with Peas	1926			11.8		
	Cropped with Barley	1927	45.2	1.2			
	Cropped with Oats and vetch	1928				1.8	
	Cropped with Potatoes	1929					142.3
7	Cropped with Peas	1925			11.6		
	Cropped with Barley	1926	38.9	1.2			
	Cropped with Oats and vetch	1927			5.6		
	Cropped with Potatoes	1928					122.5
	Cropped with Wheat	1929	15.2	.5			
8	Cropped with Barley	1925	28.1	.9			
	Cropped with Oats and vetch	1926			6.6		
	Cropped with Potatoes	1927					193.5
	Cropped with Wheat	1928	30.5	1.2			
	Cropped with Peas	1929			12.1		
9	Cropped with Oats and vetch	1925			8.7		
	Cropped with Potatoes	1926					294.5
	Cropped with Wheat	1927	30.3	.9			
	Cropped with Peas	1928			12.5		
	Cropped with Barley	1929	27.1	.9			
10	Cropped with Potatoes	1925					248.1
	Cropped with Wheat	1926	26.0	.9			
	Cropped with Peas	1927			7.8		
	Cropped with Barley	1928	41.8	.9			
	Cropped with Oats and vetch	1929				2.9	
11	Cropped with Peas	1925			11.1		
	Cropped with Barley	1926	38.2	1.0			
	Cropped with Oats and vetch	1927			3.6		
	Cropped with Potatoes	1928					155.0
	Cropped with Wheat	1929	10.3	.3			
12	Cropped with Barley	1925	29.8	.8			
	Cropped with Oats and vetch	1926			6.3		
	Cropped with Potatoes	1927					193.3
	Cropped with Wheat	1928	23.5	1.1			
	Cropped with Peas	1929			9.4		
13	Cropped with Oats and vetch	1925			8.7		
	Cropped with Potatoes	1926					327.5
	Cropped with Wheat	1927	25.5	.8			
	Cropped with Peas	1928			13.8		
	Cropped with Barley	1929	24.3	.6			
14	Cropped with Potatoes	1925					228.0
	Cropped with Wheat	1926	26.8	.8			
	Cropped with Peas	1927			10.0		
	Cropped with Barley	1928	38.1	1.2			
	Cropped with Oats and vetch	1929				2.7	
15	Cropped with Wheat	1925	21.3	1.1			
	Cropped with Peas	1926			10.5		
	Cropped with Barley	1927	40.8	1.0			
	Cropped with Oats and vetch	1928				2.0	
	Cropped with Potatoes	1929					122.7

TABLE 6.—*Estimated acre yields from 40 tenth-acre plats in five rotation groups at the Matanuska station*—Continued

Plat No.	Cropping scheme	Year	Yield per acre				
			Grain	Straw	Green forage	Hay	Tubers
			Bushels	*Tons*	*Tons*	*Tons*	*Bushels*
16	Cropped with Peas	1925			11.0		
	Barley	1926	42.2	1.4			
	Oats and vetch	1927			5.5		
	Potatoes	1928					148.5
	Wheat	1929	11.7	.5			
17	Cropped with Barley	1925	28.1	.7			
	Oats and vetch	1926			7.6		
	Potatoes	1927					168.8
	Wheat	1928	21.7	1.0			
	Peas	1929			6.4		
18	Cropped with Oats and vetch	1925			9.1		
	Potatoes	1926					308.2
	Wheat	1927	28.8	1.2			
	Peas	1928			9.4		
	Barley	1929	23.1	.7			
19	Cropped with Potatoes	1925					261.0
	Wheat	1926	26.7	1.0			
	Peas	1927			5.0		
	Barley	1928	26.8	.6			
	Vetch and oats	1929				2.9	
20	Cropped with Wheat	1925	18.8	1.0			
	Peas	1926			10.2		
	Barley	1927	36.4	.9			
	Oats and vetch	1928				1.6	
	Potatoes	1929					89.5
21	Cropped with Barley	1925	26.2	.6			
	Oats and vetch	1926			6.2		
	Potatoes	1927					183.3
	Wheat	1928	24.8	1.2			
	Peas	1929			8.8		
22	Cropped with Oats and vetch	1925			9.0		
	Potatoes	1926					387.2
	Wheat	1927	28.3	.8			
	Peas	1928			12.9		
	Barley	1929	24.5	.8			
23	Cropped with Potatoes	1925					191.8
	Wheat	1926	29.7	1.0			
	Peas	1927			12.5		
	Barley	1928	43.9	1.3			
	Oats and vetch	1929				3.0	
24	Cropped with Wheat	1925	17.7	.7			
	Peas	1926			11.3		
	Barley	1927	33.7	1.1			
	Oats and vetch	1928				2.2	
	Potatoes	1929					107.2
25	Cropped with Peas	1925			12.5		
	Barley	1926	46.8	1.5			
	Oats and vetch	1927			6.8		
	Potatoes	1928					168.3
	Wheat	1929	6.2	.5			
26	Cropped with Barley	1925	20.4	.5			
	Oats and vetch	1926			10.7		
	Potatoes	1927					191.2
	Wheat	1928	25.8	1.3			
	Peas	1929			10.2		
27	Cropped with Oats and vetch	1925			8.1		
	Potatoes	1926					385.7
	Wheat	1927	29.3	.7			
	Peas	1928			12.6		
	Barley	1929	17.5	1.3			
28	Cropped with Potatoes	1925					185.3
	Wheat	1926	30.7	1.0			
	Peas	1927			12.0		
	Barley	1928	38.3	1.3			
	Oats and vetch	1929				2.5	
29	Cropped with Wheat	1925	13.8	.5			
	Peas	1926			12.9		
	Barley	1927	37.9	1.5			
	Oats and vetch	1928				2.1	
	Potatoes	1929					85.8
30	Cropped with Peas	1925			12.7		
	Barley	1926	35.2	1.0			
	Oats and vetch	1927			4.6		
	Potatoes	1928					155.0
	Wheat	1929	8.5	.5			

TABLE 6.—*Estimated acre yields from 40 tenth-acre plats in five rotation groups at the Matanuska station*—Continued

Plat No.	Cropping scheme	Year	Yield per acre				
			Grain	Straw	Green forage	Hay	Tubers
			Bushels	*Tons*	*Tons*	*Tons*	*Bushels*
31	Cropped with: Oats and vetch, Potatoes, Wheat, Peas, Barley	1925			6.8		
		1926					309.8
		1927	25.7	0.7			
		1928			13.6		
		1929	26.6	1.3			
32	Cropped with: Potatoes, Wheat, Peas, Barley, Oats and vetch	1925					143.8
		1926	23.5	.8			
		1927			11.9		
		1928	33.3	.9			
		1929				2.7	
33	Cropped with: Wheat, Peas, Barley, Oats and vetch, Potatoes	1925	17.5	.5			
		1926			11.0		
		1927	36.0	1.1			
		1928			1.7		
		1929					87.0
34	Cropped with: Peas, Barley, Oats and vetch, Potatoes, Wheat	1925			9.6		
		1926	39.8	1.2			
		1927			6.2		
		1928					131.7
		1929	8.8	.6			
35	Cropped with: Barley, Oats and vetch, Potatoes, Wheat, Peas	1925	15.8	.4			
		1926			7.8		
		1927					150.8
		1928	18.3	.7			
		1929			9.7		
36	Cropped with wheat	1925	12.5	.7			
		1926	17.7	.6			
		1927	22.0	.7			
		1928	19.0	.8			
		1929	8.3	.3			
37	Cropped with peas	1925			8.5		
		1926			9.9		
		1927			10.5		
		1928			11.0		
		1929			3.6		
38	Cropped with barley	1925	19.3	.5			
		1926	28.7	.8			
		1927	27.7	.8			
		1928	27.3	.5			
		1929	11.0	.5			
39	Cropped with oats and vetch	1925			7.6		
		1926			8.4		
		1927			6.2		
		1928				1.6	
		1929				2.3	
40	Cropped with potatoes	1925					142.4
		1926					196.2
		1927					113.3
		1928					128.3
		1929					93.7

Topographically the field was well suited for the experiment, but it was not uniform in fertility, and as a consequence the results varied greatly on individual plats. The plats on which wheat and barley were grown continuously soon became so infested with weeds as to cause a material reduction in yield. Potatoes when grown continuously became severely infested with scab.

Experience has shown that lamb's-quarters (*Chenopodium album*) when badly infesting grainfields can be almost completely eradicated if the grain is cut for two years in succession soon after the heads emerge from the boot and used for soiling or silage purposes. When the grain crop is allowed to mature the weed seeds scatter over the field and reinfest it the following year. Weeds were a serious problem in the plats where continuous cropping was practiced.

The average acre yields on the plats on which continuous cropping was practiced were 18.2 bushels for wheat grain, 0.8 ton for wheat straw, 9.6 tons of green forage for peas, 26.4 bushels for barley grain, 0.7 ton for barley straw, 7 tons of green forage for oats and vetch, 2.1 tons of dried hay for oats and vetch, and 159.2 bushels for potatoes. The average acre yields of the plats on which crops were rotated were 21.5 bushels for wheat grain, 0.8 ton for wheat straw, 10.8 tons of green forage for peas, 32.8 bushels for barley grain, 9.9 tons for barley straw, 6.8 tons of green forage for oats and vetch, and 2.4 tons of dried hay for oats and vetch, and 195.5 bushels for potatoes. Yields obtained from crops grown in rotation were consistently higher in every instance, except one, than from crops grown on the respective plats continuously. Wheat following potatoes produced an increased yield of 3.3 bushels per acre over continuous cropping; peas following wheat an increase of 1.5 tons of green forage per acre; barley following peas an increase of 6.4 bushels per acre; and potatoes following oats and vetch an increase of 36.3 bushels per acre. No increase in yield of oats and vetch forage was obtained by planting them after barley. Equally good yields of forage were obtained where this crop succeeded itself.

CATTLE

Considerable improvement is evident in the Galloway-Holstein herd. The animals have been bred for high milk production and for hardiness. The best crossbred animals compare very favorably with the best Holsteins now kept at the station. Table 7 gives a comparison of the yield of milk and butterfat, in the first 100 days after the beginning of their respective lactation periods, of the best cows in the Holstein and Galloway-Holstein herds.

TABLE 7.—*Record of production of three Holstein and three Galloway-Holstein cows at the Matanuska station in 1929*

Breed and cow	Yield of milk during first 100 days of lactation period	Daily average yield of milk	Butterfat
Holstein:	*Pounds*	*Pounds*	*Per cent*
No. 24	4,993.9	49.9	3.8
No. 28	3,117.8	31.1	3.8
No. 29	2,944.5	29.4	3.7
Galloway-Holstein:			
No. 16	5,552.5	55.5	4.0
No. 41	3,675.6	36.7	4.0
No. 42	3,230.0	32.3	5.0

Six Holstein and 15 Galloway-Holstein cows were milked during a part or the whole of the year ended September 30, 1929. During December only 7 cows were milked, whereas during May and June 17 cows were milked. Table 8 shows the milk and butterfat production of the station herd for a period of 12 months.

TABLE 8.—*Monthly milk production of cows at the Matanuska station for the year ended September 30, 1929*

Breed and cow	1928			1929			
	October	November	December	January	February	March	April
Galloway-Holstein:	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
No. 41	1,055.4	1,018.3	1,040.5	982.0	907.0	958.7	870.5
No. 42	637.0	541.0	509.5	438.2	342.7		
No. 43				205.9	751.8	708.5	605.3
No. 44	300.2	169.4		593.4	746.5	736.4	646.8
No. 45	239.7	142.5		178.5	1,013.2	991.7	860.2
No. 48	494.7	487.0	443.3	393.4	324.7	113.4	
No. 52				122.6	517.1	549.9	476.8
No. 62							
No. 63							
No. 65							
No. 18	136.9						
No. 26	44.9		606.2				
No. 31		619.0	1,169.4	1,028.1	898.6	929.7	707.8
No. 34	129.9						
No. 16				1,343.8	1,667.9	1,697.2	1,586.3
Holstein:							
No. 13							
No. 23	168.8			1,127.3	1,404.5	1,315.4	1,050.5
No. 24	811.6	704.2	623.5	431.9		302.5	1,674.1
No. 26	671.0	609.0	606.2	533.2	364.3	128.5	1,331.9
No. 28					167.0	1,019.5	931.3
No. 29				912.1	843.7	925.4	902.3

Breed and cow	1929—Continued					Butterfat
	May	June	July	August	September	
Galloway-Holstein:	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Per cent*
No. 41	895.9	860.7	733.9	614.4	344.7	4.2
No. 42	51.7	557.9	1,246.5	1,076.2	839.7	5.5
No. 43	579.5	464.5	565.2	113.1		3.9
No. 44	663.3	623.3	571.3	523.3	409.1	4.8
No. 45	846.3	604.3	610.5	526.3	423.0	4.7
No. 48						4.3
No. 52	512.4	566.0	125.2			3.7
No. 62	219.2	900.4	809.1	713.0	717.8	4.5
No. 63	738.9	140.5				4.8
No. 65	410.9	944.2	793.7	653.4	561.7	4.3
No. 18						4.9
No. 26						4.6
No. 31	639.6	745.8	848.6	103.8	180.2	4.5
No. 34						4.7
No. 16	1,802.4	585.3				4.3
Holstein:						
No. 13	1,018.4	1,066.2	1,007.6	810.3	635.6	3.2
No. 23	1,015.3	1,147.4	1,078.1	996.9	855.3	3.6
No. 24	1,384.3	1,474.6	1,389.2	1,196.3	905.9	3.8
No. 26	1,268.0	1,184.0	1,166.2	1,051.3	810.4	3.6
No. 28	873.8	897.3	869.9	877.7	749.8	3.7
No. 29	789.0	763.8	644.5	590.0	377.6	3.2

During the winter of 1928–29, the cattle were fed a ration composed of native or locally grown forages and grains. From one-half pound to 2 pounds of linseed meal per animal were added to the ration of the cows in milk. The barley and oats for feeding were ground fine enough to pass readily through the hammer type of mill having $\frac{1}{16}$-inch perforations. Three pounds of oats, 3 pounds of barley, and 1 pound of linseed meal were fed at the rate of 1 pound of the mixture for each 4 pounds of milk produced. Approximately 35 pounds of oat and pea silage and 10 pounds of oat and vetch hay were fed for each 1,000 pounds of body weight.

Limited quantities of mangels, rutabagas, and potatoes were fed as appetizers.

Thirty pounds of oat and pea silage and 10 pounds of oat and wheat straw were fed daily per 1,000 pounds of body weight to the dry cows and young stock. These animals apparently can make satisfactory gains upon this ration.

SHEEP

The station flock of grade Cotswold-Lincoln sheep (fig. 10) was able to pasture near the station buildings during the summer of 1929. Beginning on November 1, the animals were fed from a rack, and from January 20 to March 25, 1929, when the snow was too deep for pasturing, they were fed daily per head 2 pounds of a hay

FIGURE 10.—Grade Cotswold-Lincoln sheep on summer pasture at the Matanuska station

mixture of oats and vetch. After March 25, the sheep ranged from three to five hours daily, and after April 10 they were no longer fed.

Shearing was done May 15. The weight of the clip from three rams and one wether was 56 pounds of first-grade wool, or at the rate of 14 pounds per head. The clip from the entire flock weighed 147.9 pounds, which was an average of 12.3 pounds per head. The wool brought 2 cents a pound above the prevailing market price at Seattle.

All the lambs were docked, and two ram lambs were castrated May 15. A hot iron was successfully used for docking for the first time at the station.

HOGS

Four brood sows and a boar of the Hampshire breed were wintered at the station. They were fed a maintenance ration composed of

oat and pea hay, turnips, potatoes, and oat and barley grain. Pregnant sows developed what appeared to be a bone or muscular ailment which caused them to have lame hind quarters. It is believed that the ailment was due to some nutritional deficiency the nature of which could not be determined. Apparently the deficiency caused unusual demands to be made upon the sows, for the ailment became worse as the gestation period advanced. Two of the sows were unable to stand about the time of farrowing. The sows nursed their litters for two weeks and became more helpless notwithstanding the fact that they ate heartily until two or three days before their death, which occurred about three weeks after farrowing. Two sows which were seemingly less affected recovered after they were turned on green pasture. The boar was not affected by the ailment. Two sow pigs were retained from the spring litters for use in breeding this coming year. These sows and the boar are being carried over the winter 1929–30 and will be given an ample supply of minerals in the ration should they show signs of malnutrition. The two sow pigs were turned out to pasture on oats, peas, and rape June 26. They weighed 112 pounds, an average of 56 pounds per head. The field was foul with weeds—largely lamb's-quarters. The pigs subsisted exclusively on these tender weeds for the first 10 days and then turned to oats, peas, and rape, in the order named. On August 1 the pigs were observed to be grazing almost exclusively on rape. The plant was so closely grazed as to be killed. The pigs were fed approximately 1 pound of skim milk daily per head as a supplement to the pasture. The weight of the sows on October 28 was 393 pounds, or an average of 196.5 pounds per head.

CHICKENS

A flock consisting of 15 hens, 15 pullets, and 5 roosters of the Rose Comb Buff Leghorn variety was purchased from a breeder in Ohio and shipped to the Matanuska station in December, 1928. The shipment was made without loss. Three hens began to lay December 25. An average of 1 egg per day was laid until February 16, when the flock averaged 4 eggs daily until March 18. For the period March 18 to September 1, inclusive, the daily production averaged 17 eggs, and from September 2 to 30, inclusive, 10 eggs. The production decreased from an average of 13 for the first three days to 8 for the last three days of September. Water and skim milk was kept before the fowls at all times. Scratch grain, composed of cracked corn, sunflower seed, and wheat, was fed from a self-feeder. Mash, composed of ground peas, ground charcoal, grit, oyster shell, and crushed eggshells, was fed from hopper feeders.

LAND CLEARING

Five acres of land was slashed and the trees felled in the fall of 1928. On June 12, 1929, the wind being in a direction to send fire through the proposed clearing, the windrows were burned, and all brush, small limbs, and tree trunks were destroyed. The larger trunks were piled for burning later. (Fig. 11.) The stumps are approximately 30 inches high. The cost of slashing the area was

$35 per acre. The cost of labor was $5.50 per 8-hour day without board.

Five acres of land was slashed in November, 1928. The trees were larger and more difficult to handle than those in the other area. The cost of felling and windrowing the trees was $42 per acre. On June 13, 1929, the windrows were fired, and all brush and small trunks were destroyed. Only the heavier logs were left, and these will be piled and burned later. (Fig. 12.)

Another 5 acres of land was slashed during September and October, 1929. Spruce and birch poles and logs were salvaged for use as fuel, and the brush was piled in windrows about 40 feet apart.

FIGURE 11.—Piling partly burned logs, Matanuska station

The cost of slashing was $29.57 per acre and of labor $4.50 per day where board was furnished.

BUILDINGS AND IMPROVEMENTS

The main barn was repaired. A cement trough 3 feet wide was built adjoining the north side of the barn with a slope to the east to carry off the surplus water. Every spring heretofore the water has run into the building.

Six galvanized-iron grain bins were installed on the loft floor of the main barn with spouts extending down into the grain room. These spouts are equipped with automatic devices for closing the gates. The installation of these bins eliminates the necessity of sacking and carrying the grain to the feed rooms.

A new galvanized-iron roof was put on the dairy barn during the summer. This roof is constructed of 26-gage sheets, each of which is joined with standing seams.

The north cottage, now occupied by the animal husbandman, was refloored and equipped with a new hot-water furnace. The furnace makes it possible to live in comfort in the building even during the coldest days. The largest room on the main floor of the building is used as the station office.

An extension was made to the hay shed on the east of the barn. A loft floor was built in the addition for the storage of hay and unthreshed grain. The lower part of the shed is to be used for storing farm machinery. The additional space meets the present needs of the station for storing hay.

The mess house (fig. 13), begun in 1928, was completed in 1929. It is a frame building 34 by 44 feet and contains a mess hall, a kitchen, a reading room, one bedroom, and a washroom on the first

FIGURE 12.—Stumps and logs left after burning windrows, Matanuska station

floor, and five bedrooms, each accommodating two men, a washroom, and a shower bathroom on the second floor. In the basement there are a furnace room, a coal room, and three storage rooms, and in the attic one storeroom. This building is used to house temporary laborers at the station.

A new cottage was constructed during July and August, 1929. The building is 24 by 34 feet and contains a living room and a kitchen on the first floor, two bedrooms and a bathroom on the second floor, and a furnace and a fuel room in the basement. The cottage was built to relieve the housing shortage at the station. At present there are four station staff members, but only three cottages for their families.

The construction of a propagating house was begun in the summer of 1929. Only the greenhouse portion was completed. This part

of the house is 18 by 50 feet. The house has a concrete foundation 3 feet thick. The walls and the roof of the greenhouse are of glass supported by steel frames. Narrow benches have been built along the sides of the interior with a wide bench through the center. This building will be used for propagating plants and conducting experiments with soils and fertilizers, and for working out practical problems of importance in commercial vegetable growing.

A well 38 feet deep was dug near the new propagating house. The walls of the well consist of concrete tiles 3 feet in diameter. The depth of the old well on the bench land above is 76 feet. Six

FIGURE 13.—Mess house and dormitory, Matanuska station

wells on farms at various distances north and east and within 6 miles of the station were found to range from 14 to 60 feet in depth, depending upon the topography of the land.

KODIAK STATION

WEATHER CONDITIONS

While the weather in interior Alaska was unusually severe during the winter of 1928–29, that at Kalsin Bay was mild and differed only from average winters by reason of excessive rainfall. Table 9, which gives a comparison of the weather records at the Kodiak station for January, February, March, April, and May, 1869–1921 (*6, sec. 1, p. 7, 12–13*), and for 1929, shows that the winter of the past year was mild and that the rainfall was heavy.

TABLE 9.—*Comparison of temperature and rainfall from January to May, inclusive, at Kodiak, 1869–1921, and for 1929*

Month	Temperature				Precipitation for 1929	Average precipitation for 34 years between 1869 and 1921
	Mean		Mean maximum			
	1929	1869–1921	1929	1917–1921		
	° *F.*	° *F.*	° *F.*	° *F.*	*Inches*	*Inches*
January	35.11	28.7	29.39	21.0	8.92	4.82
February	36.07	31.1	31.07	25.9	7.50	4.57
March	29.60	33.6	22.30	27.8	4.90	3.92
April	36.10	36.1	29.58	29.9	9.99	3.86
May	41.91	43.2	35.50	35.9	19.31	5.32

CATTLE

Five purebred Galloway cows, one Galloway bull, and one bull calf were given free range at Kalsin Bay until February 22, 1929. After that date each of the animals was fed 20 pounds of hay daily until March 22, 1929. They then left the yards and crossed the creek to the tide flats, where there is a good stand of beach sedge (*Carex cryptocarpa*). The new growth was about 3 inches high but was covered by old growth from the previous year. The animals did not return to the yards for feed.

HORSES

Work horses belonging to the station remained on the range nearly all winter and for a part of the period February 22 to March 22 referred to above, and did not come in for feed except when they were driven to the barn.

ELK

Eight baby elk were wintered at Kalsin Bay by the station for the Alaska Game Commission. The animals arrived at Kalsin Bay September 10, 1928, having been shipped from the Olympic Peninsula, Wash., in accordance with a Territorial program for stocking certain regions of Alaska with game. The elk were fed by an employee of the station at Kalsin Bay for a week. Then they jumped the fence and went to range upon the higher hills. The animals did not return to the station until January 8, when they were rounded up, driven to the barn, and fed. After this date the elk ranged on the hillsides, returning only occasionally to the barn. They were offered feed and salt whenever they came to the barn, but at no time did they seem to be hungry. Beginning about August 1, 1929, the elk began to cause trouble at the station by chasing the cattle, jumping fences, and destroying gardens and small crops. The Alaska Game Commission on September 21, 1929, transferred the animals to Afognak Island. Observations of these animals at the station indicate that they would thrive splendidly on the islands and that they are well able to forage for themselves.

HAYMAKING

Haymaking was begun July 8 at Kalsin Bay and continued until August 30. A total of 53 tons of first-quality native hay was put up by the station, one man with team, mower, wagon, and rake cutting, hauling, and storing 25 tons in the barns and stacking 28 tons in the field.

EFFECT OF BURNING ON YIELD OF GRASS

An experiment was begun to determine the effect of burning dead grass upon subsequent growth and yield. The work was based upon that reported by Hensel (11). A series of $\frac{1}{40}$-acre plats was laid out for the purpose. (Fig. 14.) The dead grass on some of the plats under experiment was burned early in the spring as soon as the snow had disappeared, and that on the other plats was burned

FIGURE 14.—Burned grass plats, Kodiak station, Kalsin Bay

at later dates. The results indicate that burning dead grass early in the spring increases the stand.

COLONIZATION WORK

The Alaska Agricultural Experiment Stations have taken an active part in aiding old settlers and in encouraging new settlers to establish themselves on the fertile lands of the Matanuska and Tanana Valleys. Numerous ways of colonizing these valleys, principally through the introduction of northern European peoples and subsidizing intending settlers from the States, have been suggested time and again by those interested in the development of Alaska. None of them, however, proved to be feasible.

Through the cooperative efforts of the Alaska Railroad and the stations, it has been made possible to induce new settlers to take up

farm lands in Alaska. Under the new plan, the Alaska Railroad advertises Alaskan homesteads in farm papers in the agricultural regions of the States to attract to Alaska persons (1) who are tenants on high-priced land and desire to become farm owners; (2) who are discontented with communities in which they now live and desire a change; (3) who would enjoy life on the frontier; (4) who are tradesmen and desire to own and live on a farm; and (5) who desire to live in a growing and thriving new agricultural region where opportunities are offered to establish prosperous homes. A request was made by the railroad for the services of the superintendent of the Matanuska station as agricultural representative and to interview prospective settlers in the States. This request was granted.

Advertisements of Alaskan farms were published in each of 39 leading agricultural periodicals in the States in April, 1929. Before July 1, 1929, over 1,000 inquiries were received in answer to these advertisements. The railroad company sent descriptive literature to the inquirers, and the agricultural agent who was sent to the States was asked to interview personally those who were interested in Alaskan agriculture.

The work carried on cooperatively between the Alaska Railroad and the stations will no doubt change the entire agricultural aspect of Alaska. It is difficult to predict the results because the work is too new. This colonization campaign has already brought in a number of families who expect to farm. Many more are expected to come. The first stage in pioneering is over. The bachelor homesteader, who, unaided, hewed a clearing in the virgin forest, has paved the way for the family man. The type of agriculture also is changing. The original homesteader planted cash crops only, such as potatoes and vegetables. The family man has introduced dairying and diversified farming.

SURVEY OF THE GRAZING REGION AT DUNBAR

On May 30, 1929, the director of the stations, accompanied by W. T. White, associate animal husbandman of the Matanuska station, made a trip to Dunbar, about 40 miles west of Fairbanks, to investigate the grazing possibilities there. The region between Dunbar and the Tanana River is flat river bottom crossed by many sluggish creeks and sloughs. Grasses consisting of sedges, marsh grasses on the lowlands, and blue top on the higher knolls and dry spots, cover a large part of the area not entirely covered by marshes and lakes. The timber is mostly black spruce (*18*) with white spruce, birch, aspen, and cottonwood on the better-drained area, and covers perhaps 40 per cent of the region between the Tanana River and the foothills. A short distance from Dunbar from northwest to east, occur hills, ranging from bluffs on the northwest side of Goldstream to low-lying ridges on the east, broken by the narrow valley of Goldstream Creek to the northeast. Grass covers these hills wherever fire has burned off the timber. The soil of the higher lands appears to be a deep loam, interspersed with small areas of gravelly deposits. Much of the land may be cleared and cultivated as the lands have been in the vicinity of Fairbanks. The adjacent flats,

extending from the eastern foothills on the east side of the railroad 40 to 50 miles west and northwest along the Tanana River, have a width of 6 to 20 miles. The flats in general are swampy and must be cleared of brush, moss, and small timber and then drained before they can be used for meadow or grazing purposes. Some available grazing lands are to be found along the railroad between Dunbar and Happy. The towns lie adjacent to lands of the foothills on the north side of Goldstream Valley, and although the area could be cleared and brought under cultivation at a nominal cost per acre, it would not exceed 100 square miles.

General farming in connection with grazing would be possible along the foothills east of the railroad between Nenana and Dunbar. Extensive use of the flats solely as range and meadow land is not at this time deemed possible as was formerly reported because of the lakes and marshy areas which abound. The presence of mosquitoes in large numbers and the absence of shelter for livestock on gravelly bars or higher ground would prevent the animals from profitably grazing there during the greater part of the summer.

The director made another trip to the region in the fall of the year for the purpose of investigating conditions when the water levels of the rivers and lakes were at a minimum. Starting from Dunbar on September 5, 1929, he made the trip by boat down Goldstream Creek into the Minto Lakes and then up the Chatanika River to the point where the winter trail from Dunbar to Livengood crosses the river, covering a distance of about 80 miles. The distance over the winter trail is only 17 miles. Brooks (*4, p. 86*) writing of this region states that—

> Many lakes and small ponds, usually surrounded by belts of treeless swamp, are irregularly distributed through this lowland. The streams are deep and muddy bottomed. Their surfaces are 10 to 20 feet below the valley floor at low water in the fall, but during floods are nearly flush with it. The banks are usually firm, and covered with a thick growth of birch and cottonwood.

An area of about 100 square miles directly west of the Dunbar-Livengood trail with a center about 15 to 20 miles northwest of Dunbar has large grassy flats on which mowers could be used when the water level is low. These grassy flats are irregular, and small ponds abound. Goldstream Creek meanders through the entire area. In this region hay would have to be made in late summer and stacked until the ground had frozen over. In the following spring the hay would have to be hauled from the region because of the overflows at that season. With favorable weather for haymaking, many hundreds of tons could be stacked in the area. The areas having better drainage are characterized by heavy growth of willow and blueberry bushes. A growth of moss several inches in depth is found among the bushes. Under present conditions, this region can not be recommended for grazing. Hay can be made here to supplement the forage that can be produced on the higher lands upon the foothills. The soil upon the foothills is deep and fertile, producing heavy crops of forage, and fine potatoes and vegetables. This possibility has been demonstrated at Lyden, which is at the intersection of the Dunbar-Livengood trail and the Chatanika River. (Fig. 15.)

SURVEY OF THE AGRICULTURAL POSSIBILITIES OF THE KUSILOF REGION

During the last week of August, the director of the stations made a trip to the Kusilof region, going by boat from Anchorage to Cook Inlet and up the Kusilof River to the head of navigation. This region has a climate similar to that of the Matanuska Valley and is about 100 miles south of Anchorage on the west side of Kenai Peninsula. It is typical of the lowland region, which, according to Martin (*14, p. 23*), comprises an area of about 2,900 square miles. Most of this land has agricultural possibilities. The area is sparsely timbered with birch and spruce, except where it has been swept by forest fires. Birch and willow brush now occupy the fire-swept places.

FIGURE 15.—Chatanika River at Lyden, showing birch and cottonwood trees

Large areas of bench lands and rolling hills extend from Cook Inlet to the Kenai Mountain foothills, locally known as the Caribou Hills. The timber consists chiefly of spruce and birch. The soil is a rich loam underlain with gravel and appears to be well suited to agriculture. The only land under cultivation is that in small gardens. Vegetables grow well, but the settlers do not produce a sufficient quantity to meet their requirements.

FOX-RAISING INDUSTRY

About six years ago settlers began to come to this region. Each settler located on a homestead of 160 acres. With one exception, all live along the banks of the river. The distance between the homesteads farthest apart is about 7 miles, and the others are located at intermediate places. In addition to four families and three single

men who are engaged in fur farming, about half a dozen fishermen live at the mouth of the river. All the homesteaders settled here primarily to engage in fox farming. Some of them have as many as 60 pairs of foxes. The men were attracted to the region in the hope of being able to obtain wild rabbits in large numbers for fox feed. At the time of settlement the rabbits were plentiful, and the men failed to take into consideration the fact that the rabbit has a cycle. This year scarcely a rabbit is to be found anywhere in the vicinity, on account, it is said, of the low ebb of a 7-year cycle. It is expected that rabbits will again be plentiful within the next few years. In the meantime the porcupine constitutes one of the chief sources of feed for foxes. Farmers are said often to catch as many as 75 porcupines in a day. Owing to the slow rate of increase, however, the porcupine supply in the immediate vicinity will probably last only a short time. Notwithstanding the fact that the soil is productive, farmers have done little in the way of clearing land or raising crops, and they spend nearly all their time in making and repairing pens or in hunting for animals to be used for fox food.

MOOSE

The moose is the main source of meat supply for human consumption. It is estimated that there is a herd of about 4,000 animals on the lowlands of Kenai Peninsula. This herd is believed to be the largest of its kind in the world. The animals are fearless and in winter frequently lie down near the settlers' houses. They browse on birch and willow brush and appear to be increasing in numbers.

TRANSPORTATION FACILITIES

Lack of adequate transportation facilities is the chief drawback to the development of the region. A motor boat brings in the mail and provisions from Anchorage and Seldovia every week during the summer. When the mouth of the river is filled with ice during several of the winter months the mail is brought in by dog team over the trail from the nearest station on the Alaska Railroad. As soon as adequate transportation facilities can be obtained, this region will probably prove to be suitable for dairying. The soil is fertile and the land easily cleared. Native grasses yield abundantly, and cultivated forage crops to be used for silage material can be produced without difficulty.

SURVEY OF THE GRAZING REGIONS ON KODIAK ISLAND

LANDS BETWEEN CHINIAK POINT AND PASHIKSHAK BAY

In September, 1929, W. T. White, associate animal husbandman of the Matanuska station, made a survey of the grazing lands lying between Chiniak Point and Pashikshak Bay. (Fig. 16.) On September 19 he landed at Chiniak Point from a small boat at a place approximately 12 miles east of the Kalsin Bay grazing station. A day was spent on the lands between the mountains and the beach line from Chiniak Point to Low Cape, opposite Ugak Island, and a day between Low Cape and Pashikshak Bay.

Chiniak Point ends abruptly in bluffs and is approximately 5 miles wide. A stand of spruce timber, the trees of which have a diameter of 8 to 20 inches, covers a large part of the point, but the area is interspersed with numerous small lakes and grassy parks. It affords good winter protection and range for cattle or sheep. The timbered area outside of Kalsin Bay proper covers approximately 10 square miles. Beginning at a point 5 miles southeast of Chiniak

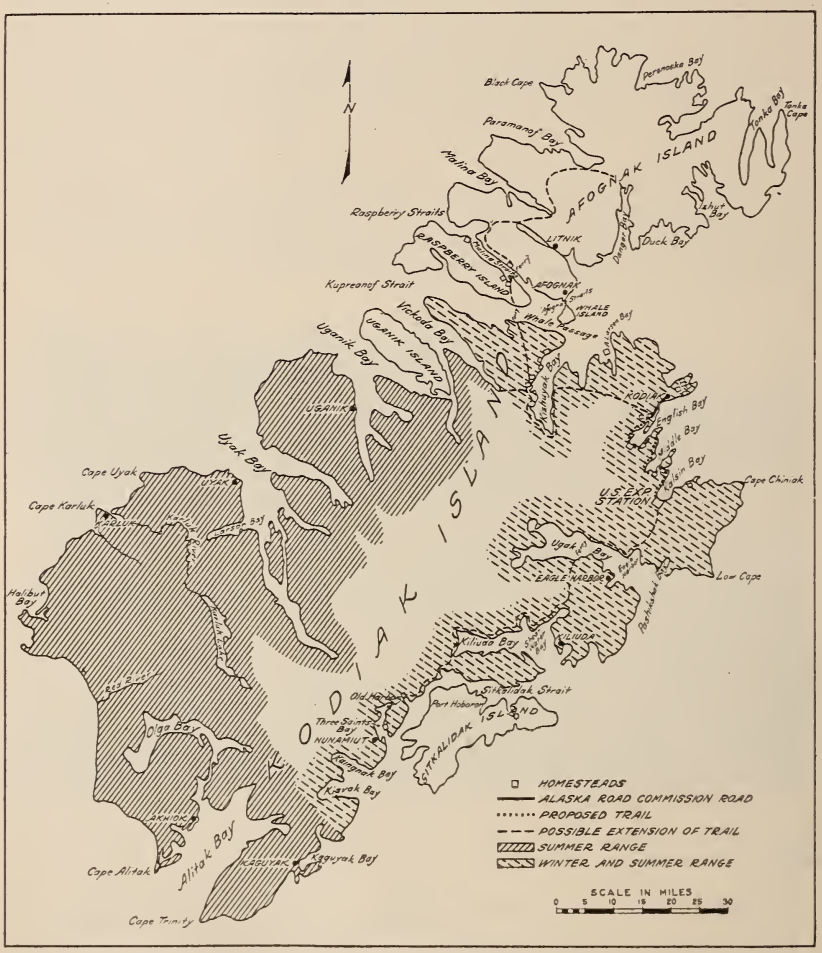

FIGURE 16.—Map of Kodiak and Afognak Islands, showing winter and summer ranges for grazing beef cattle

Coast and Geodetic Fixed Navigation Light, the beach line sweeps in a crescent shape to Low Cape. Range lands with good stands of upland grass abound from the beach across the slightly sloping plateau far up the mountain sides. For a distance of 1 to 4 miles all the land, excepting creek valleys running from the mountains to the beach, lies on a low flat plateau with a gentle upward slope westerly to the mountains. The plateau continues facing the beach from Low Cape to the easterly side of Pashikshak Bay. Here the beach

line is fairly straight and faces the south. It is believed that fully 50 per cent of this land is level enough to permit of using a mowing machine after the brush and dead grass are removed. The area, including lands suitable for ranging on the mountain sides, is at least 50 square miles in extent. The location of this range with the adjacent timberlands for winter shelter and range recommends this region for cattle raising. Roads and trails could be constructed at a nominal cost from Chiniak Point to Kalsin Bay, and likewise from Kalsin Bay to connect with the Abbert-Kodiak Road.

LANDS ADJACENT TO THE NORTH SIDE OF UGAK BAY

On September 15, 1929, Mr. White investigated the grazing possibilities of the region on the north side of Ugak Bay, locally known as Eagle Harbor. Beginning on the west side of Pashikshak Bay, low mountains extend north and east toward the head of Kalsin Bay. Approximately 10 miles to the west, foothills and low mountains form a western boundary of the valley paralleling the mountains on the west side of Pashikshak Bay. A low pass occurs between the watersheds of Eagle Harbor and the head of Kalsin Bay. Examination of two strips, beginning at a point where an old fish saltery was formerly located, as shown by old warehouses still standing, and continuing to the divide in the pass where one may look down into the Kalsin Bay basin, revealed an area of approximately 20 square miles of grassy flats and parks, and foothills having a terrain over a large part of which a mowing machine might be run after burning and clearing have been done. One main creek with numerous small tributaries traverses the valley in the general direction of Kalsin Bay from a point 5 miles west of Pashikshak Point, at which place the old salmon-saltery buildings are located. Approximately 40 acres of usable sedge (*Carex cryptocarpa*) and wild rye (*Elymus mollis*) meadows are to be found near the beach. On the valley rims and low foothills there are about 400 square miles of desirable upland range. Another 10 square miles of meadows and mow land and 30 square miles of range land are adjacent to the north in the Kalsin Bay watershed. Pashikshak Bay, which is immediately east of this area is at the entrance to a narrow valley. The bay offers fairly good shelter and anchorage to small boats against all winds except southeast blows, to which it is exposed. At the head of the bay there are about 15 square miles of flats, 40 per cent of which might be cut with a mower. The area of sedge and beach grass near the head of the bay is considerably "spotted." Approximately 10 square miles of range land are available in the higher lands. The valley faces the general direction of southeast, but the mountains both in the east and the west are high and steep, shutting off for a good part of the day the early and late sun during the winter.

The Eagle Harbor and Pashikshak regions seem to be well suited to sheep raising. The land is well drained, and apparently large herds can be raised there. J. M. Blinn and some other citizens who now live at Kodiak and 25 years ago worked at the salmon saltery at Eagle Harbor, state that a team of horses turned loose and abandoned at the time salting operations ceased in Eagle Harbor, wintered upon the range in this valley for 10 years, dying finally of old age.

SURVEY OF THE DAIRY SITUATION IN ALASKA

A survey of the dairy situation in Alaska, begun in 1926, was completed in 1929. It is safe to say that there are over 1,000 head of dairy cattle in Alaska, 50 per cent of which are in the southeastern part, 30 per cent in the interior, 5 per cent on western Kenai Peninsula, and 15 per cent on the south coast, including the regions of Prince William Sound, Kodiak-Afognak Islands, and the Aleutian Islands. While most of the land in southeastern Alaska is nonagricultural in character and has insufficient area for forage production, it is more densely populated with white persons than is any other region, and cattle are kept to supply milk for local demand. About 25 per cent of Alaska's total number of dairy cattle are in the vicinity of Juneau. During four or five months in summer the cattle obtain some feed from the tide flats of Gastineau Channel, which are covered

FIGURE 17.—Dairy cow showing traces of Siberian ancestry

with salt marsh grass. Similar tide flats are found also near Hyder, Wrangell, Point Agassiz, and Sitka. The native grasses are cut for hay and silage by the farmers at Point Agassiz. No hay is shipped to this region from the States. Milk is sold on the farm at 7 cents per quart and is delivered by boat to Petersburg, 8 miles away. The tide flats of Katlean Bay, 12 miles from Sitka, are utilized for grazing in summer, and some native hay and silage material is also produced. These are the flats which were utilized by the Russians about a century ago (*2, p. 73*).

The dairymen at Ketchikan, Petersburg, and Haines, in southeastern Alaska and those at Cordova and Seward, on the south coast, purchase all the dairy feed consumed by their cattle throughout the year. Others in these regions have an opportunity to pasture their cattle during at least a part of the summer but ship in most of their hay from the States. The cost of imported alfalfa hay is $44 per ton at Ketchikan and $53 per ton at Seward. Because of the high

cost of hay, dairymen at Anchorage are building silos in which to ensile their green fodder. The farmers in the Matanuska region grow all their feed, including both roughage and grain. In this region dairying is a comparatively profitable enterprise. Cream is shipped from here to the creamery at Curry for butter making. Farmers receive 55 cents per pound for butterfat.

There are 146 head of cattle at Gustavus in southeastern Alaska, but most of these animals are raised primarily for beef. It is reported that there are approximately 40 head of dairy cattle on Afognak Island which, according to Georgeson (*9*, *p. 1*), show traces of Siberian ancestry. (Fig. 17.)

Table 10 gives the number of dairy cattle in Alaska and the price at which milk retails.

TABLE 10.—*Number of dairy cattle and price received for milk in Alaskan towns*

Town	Dairy cattle	Price of milk per quart	Remarks
	Number	*Cents*	
Hyder	6	25	6 months grazing on tide flats.
Ketchikan	62	22	All feed is purchased. Alfalfa hay costs $44 per ton.
Wrangell	33	25	Some hay is produced on the Stikine flats.
Point Agassiz	55	7	All roughage is home grown.
Petersburg	16	20	All feed is purchased.
Juneau	250	20	Cattle pasture for 4 months on the Gastineau flats.
Haines	30	20	All feed is purchased
Skagway	24	20	Oats and vetch silage is produced locally.
Sitka	18	25	Summer feed is produced at Katlean Bay.
Cordova	21	30	All feed is purchased from the States.
Seward	39	25	Do.
Homer	56	(1)	Butter is sold to local fishermen.
Ninilchik	7	(1)	
Kusilof	5	(1)	
Kodiak	43	25	
Aleutian Islands	16	(1)	Some cattle are found as far west as Umnak.
Anchorage	98	25	Silage and hay is produced locally.
Matanuska	95	(2)	Butterfat sells for 55 cents per pound. All feed is produced on the farms.
Curry	4	(1)	
Nenana	5	25	
Dunbar	2	(1)	
Fairbanks	87	25	Some silage and hay are produced on the farms.
Holy Cross	21	(1)	Milk is produced for use by the mission.
Total	993		

[1] Milk is used for home consumption only, or butter is made at home and sold locally.
[2] Cream is shipped to the creamery at Curry, Alaska.

LIVESTOCK RAISING IN THE HEALY REGION

CATTLE

A general survey of the Healy region was previously reported (*1*, *p. 29*). Upon completion of the investigation, five head of hardy cattle from the Fairbanks station were placed on the range to determine how long they could be left to forage for themselves. Arrangements were made with a homesteader to report daily on the cattle. The animals soon gained in weight and were contented on the range. They were landed August 3 and remained on the range until December 15, when a sleet storm made it necessary either to feed or return them to the Fairbanks station. Hay had not been stored on the range, and in the interest of economy the cattle were shipped to the station, where an ample supply was available for them

for the rest of the winter. The trip from Healy to Fairbanks was covered in five hours by freight train.

HORSES

About 30 head of pack and saddle horses owned by a transportation company operating in McKinley Park were wintered on the range adjacent to Healy. They were given free range from September 30 to June 1. During stormy periods they were housed in sheds and fed a limited amount of grain.

SHEEP

To test further the adaptability of the range for livestock raising, 12 ewes and a ram were shipped from the Matanuska station to Healy August 22, 1929. It is planned to keep these sheep on the open range during as much of the year as possible. A settler is watching and reporting on the animals throughout the year.

GRASSES

Four specimens of grasses were collected from the range region near Healy and identified by A. S. Hitchcock, of the United States Department of Agriculture.

The greater part of the tufted or bunch grasses in this region is *Festuca altaica* and *Poa palustris*. *Calamagrostis canadensis* grows in the depressions on the plateau benches and in the well-drained areas at the foot of the benches. In some instances this grass grows also in tufts or bunches. *Agropyron yukonense* (*13*, *p. 35*) was observed growing both on the river bars and in protected depressions 1,000 to 1,500 feet up the mountain sides. In this region *A. yukonense* generally grows in small tufts. Apparently it starts into growth late in the summer and develops and matures seed in a short time. Plants 5 to 8 inches high were observed bearing seed. It is a deep, glassy green-colored succulent plant and is said to cure on the ground after it has been killed by frost and to be especially relished by wild mountain sheep and goats in the late summer and fall.

LAND-CLEARING ASSOCIATION

One of the chief difficulties of the pioneer farmer is that of extending the area of his clearing. Some of the settlers who came to Alaska in 1914 now have comparatively large areas of cleared land, whereas others who came later have made slower progress. The early summer of 1915 was very dry. Ground fires started then burned the moss slowly and exposed a considerable portion of the roots of the trees and killed them. These trees were blown down by the fall winds. In 1916 another fire was started to burn the dead trees, and only a small portion of the trunks was left for piling and burning later. Although this method of clearing is not recommended for general use because it is likely to cause forest fires and because the fires invariably become uncontrollable, it did enable the early settlers to convert virgin timber areas into farms in comparatively short time. Since 1915, fortunately, the summers have not been dry enough to permit of starting ground fires. In recent years settlers have

found it necessary to fell the trees during the winter and burn the trunks and branches either the following summer or the second year after felling.

One of the most difficult problems to solve in land clearing is how to remove the stumps. Most of the main roots of the spruce and birch trees are shallow and extend out at nearly right angles to the trunks. Even the stumps of such trees are difficult to remove with horsepower. Tractor power is needed to remove them. Realizing this, the Alaska Railroad and the stations devised a plan which would enable the farmers to clear their lands quickly by using a large caterpillar tractor. A project on land clearing was begun in which the Alaska Railroad, the stations, and the farmers (now organized as the Matanuska Land Clearing Association) participated. The Alaska Railroad lent a tractor and such equipment as could be obtained from the shops to the stations. These were used by the stations on neighboring farms because 5-year-old stumps were available on the farms but not at the station. On August 23, 1929, the farmers in the Matanuska Valley who desired to participate in the work of clearing met at Palmer, Alaska, where they organized the Matanuska Land Clearing Association. They elected officers and arranged for active land-clearing work to be undertaken the following spring. The association's activities are guided by the director of the stations. Each farmer is allowed to use the tractor and equipment free of charge. The gasoline and oil are furnished by the person whose land is being cleared. All machine and equipment breakages are repaired at the expense of the association. The complete equipment for land clearing arrived late in the season, and only a small area was cleared before the ground froze. Extensive land-clearing operations are being planned for next spring.

WEATHER REPORTS

CONDENSED METEOROLOGICAL REPORTS FOR 1929

AKIAK. Latitude 60° 52′, longitude 161° 23′. Regina M. Adams, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	42	−6	34.6	18.4	26.5	0.79	3	12	5	14
February	50	−22	29.4	11.1	20.2	.72	3	10	4	14
March	49	−30	21.4	−5.0	8.2	.91	6	18	4	9
April	74	−16	37.3	16.5	26.9	.19	1	14	6	10
May	78	23	53.9	33.7	43.8	.47	5	7	18	6
June	83	36	68.0	44.9	56.4	.11	5	9	11	10
July	77	39	66.8	46.0	56.4	3.70	13	11	7	13
August	75	31	61.6	43.4	52.0	3.20	17	9	0	22
September	68	34	60.0	44.4	52.2	2.09	12	7	11	12
October	57	−1	36.7	19.3	28.0	------	------	21	4	6
November	46	−1	37.0	22.3	29.6	.32	2	9	6	15
December	48	−37	18.6	.2	9.4	.35	1	22	2	7

ANNEX CREEK. Latitude 58° 19′, longitude 134° 07′. Alaska Gastineau Mining Co., observer

January	46	9	33.3	23.0	28.2	8.30	14	14	1	16
February	44	2	33.4	24.2	28.8	7.08	17	6	3	19
March	46	12	39.4	29.7	34.6	6.69	21	5	4	22
April	56	12	44.8	30.0	37.4	4.13	11	10	13	7
May	69	32	57.5	38.2	47.8	4.80	11	11	7	13
June	74	34	61.3	43.4	52.3	5.46	12	10	10	10
July	72	41	61.4	47.6	54.5	6.78	19	4	7	20
August	77	38	61.3	45.2	53.0	6.10	19	7	6	18
September	70	31	57.7	42.5	50.1	8.31	12	10	1	19
October	56	30	48.4	38.9	43.6	23.72	30	3	0	28
November	52	22	41.5	32.6	37.0	20.94	26	3	2	25
December	47	6	30.5	21.3	25.9	5.43	15	12	1	18

BARROW. Latitude 71° 23′, longitude 156° 17′. Weather Bureau, observer

January	28	−32	−4.9	−18.6	−11.8	0.41	4	9	8	14
February	26	−43	−6.8	−20.2	−13.5	.17	3	6	10	12
March	23	−41	−10.4	−28.2	−19.3	T.	0	6	18	7
April	34	−24	11.8	−3.1	4.4	.26	3	5	11	14
May	38	−6	26.0	13.2	19.6	T.	0	4	4	23
June	46	20	37.8	28.3	33.0	.48	2	6	3	21
July	56	27	41.7	30.7	36.2	.45	3	9	2	20
August	65	27	46.4	33.3	39.8	1.39	8	9	4	18
September	53	27	39.9	31.2	35.6	.39	6	0	7	23
October	36	−2	27.1	14.4	20.8	.60	7	1	10	20
November	21	−27	5.2	−5.6	−.2	.10	2	12	8	10
December	------	------	------	------	------	------	------	------	------	------

BETHEL. Latitude 60° 45′, longitude 161° 47′. Weather Bureau, observer

January	40	−10	30.6	18.0	24.3	1.59	13	7	11	13
February	44	−22	24.3	11.6	18.0	.69	5	8	4	16
March	36	−24	11.6	−3.9	3.8	.83	9	15	5	11
April	50	−10	32.5	16.0	24.2	.64	7	9	8	13
May	58	23	48.9	32.6	40.8	1.01	8	5	8	18
June	79	37	64.2	44.2	54.2	.81	10	8	12	10
July	78	39	63.9	45.4	54.6	2.24	16	3	10	18
August	71	33	57.7	43.5	50.6	3.45	20	4	7	20
September	66	30	56.0	42.6	49.3	3.94	23	2	2	26
October	56	−1	32.9	18.3	25.6	.08	2	13	9	9
November	39	2	33.0	21.2	27.1	1.20	15	0	8	22
December	38	−31	14.3	1.1	7.7	.36	7	15	4	12

Condensed meteorological reports for 1929—Continued

CALDER. Latitude 56° 10′, longitude 133° 27′. Harvey Sellers, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	F°.	*Inches*				
January	46	11	37.1	28.8	33.0	8.70	16	9	5	17
February	43	10	38.3	28.3	33.3	5.13	20	4	2	22
March	54	22	42.2	31.7	37.0	9.07	25	6	2	23
April	62	20	49.2	30.6	39.9	2.51	9	14	5	11
May	68	29	55.1	36.8	46.0	3.59	13	15	5	11
June	70	39	58.9	44.9	51.9	5.96	19	7	1	22
July	67	38	60.2	47.6	53.9	7.58	19	6	2	23
August	84	40	63.7	49.1	56.4	12.17	22	9	2	20
September	75	36	61.5	44.0	52.8	1.52	8	13	5	12
October	57	34	51.4	43.1	47.2	23.09	30	1	0	30
November	52	29	44.8	35.8	40.3	19.14	25	0	4	26
December	47	9	34.9	27.1	31.0	9.63	15	11	3	17

CHERNOFSKI HARBOR. Latitude 54° 27′, longitude 166° 42′. Claude D. Brown, observer

January	46	29	38.5	34.3	36.4	10.20	25	1	3	27
February	43	23	37.9	31.0	34.4	8.91	25	3	15	10
March	45	12	36.7	25.9	31.3	3.52	19	5	7	19
April	47	20	41.4	31.3	36.4	3.61	17	5	6	19
May	50	27	45.8	35.2	40.5	5.41	21	11	13	7
June	50	31	46.9	39.9	43.4	3.03	14	10	11	9
July	66	38	54.8	43.8	49.3	2.66	17	13	7	11
August	66	41	57.5	46.2	52.0	2.62	18	15	6	10
September	62	33	53.3	41.6	47.4	4.98	12	13	3	14
October	53	29	44.6	33.3	39.0	5.60	23	2	7	22
November	48	26	41.2	32.1	36.6	8.81	20	4	4	22
December	44	21	38.5	29.5	34.0	4.68	18	10	9	12

CHICKALOON. Latitude 61° 48′, longitude 148° 27′. Archie Lingo, observer

January	36	−17	23.9	6.3	15.1	1.90	9	20	6	5
February	39	−14	27.3	11.4	19.4	2.19	9	8	4	16
March	49	−12	27.3	8.6	18.0	2.55	7	16	3	12
April	57	−20	40.5	14.2	27.4	.45	2	20	7	3
May	63	22	55.7	31.0	43.4	.78	5	13	15	3
June	76	32	68.0	41.1	54.6	1.33	7	14	10	6
July	76	33	66.9	43.4	55.2	2.11	15	[1] 9	[1] 8	[1] 11
August	79	30	64.2	41.9	53.0	1.98	15	14	6	11
September	72	26	62.3	39.2	50.8	1.93	14	9	12	9
October	53	0	42.6	29.0	35.8	2.19	10	6	5	20
November	38	−6	29.0	15.2	27.1	1.61	10	6	7	17
December	34	−33	17.3	−.1	8.6	1.14	5	22	3	6

CHIGNIK. Latitude 56° 17′, longitude 158° 22′. Ivar Wallin, observer

January	-------	22	-------	29.5	-------	15.45	14	6	8	17
February	-------	11	-------	27.3	-------	19.34	22	4	11	13
March	44	7	33.6	20.1	26.8	5.17	7	13	13	5
April	46	10	39.9	27.5	33.7	6.14	11	8	9	13
May	53	25	45.4	33.5	39.4	22.98	16	9	9	13
June	61	32	52.0	40.0	46.0	13.09	18	11	6	13
July	65	34	58.0	42.1	50.0	6.57	18	10	13	8
August	65	35	58.0	44.5	51.2	2.14	13	9	15	7
September	65	32	57.2	44.8	51.0	34.34	25	3	8	19
October	54	27	44.6	34.4	39.5	14.78	16	2	11	18
November	48	23	42.2	31.4	36.8	27.99	25	6	4	20
December	43	6	33.6	22.0	27.8	4.48	10	12	13	6

[1] Incomplete.

Condensed metcorological reports for 1929—Continued

CORDOVA. Latitude 60° 32′, longitude 145° 42′. Weather Bureau, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	44	13	33.8	26.6	30.2	11.39	14	11	2	18
February	43	14	37.6	30.0	33.8	18.75	22	2	1	25
March	47	14	37.7	26.8	32.2	7.69	21	10	3	18
April	51	13	42.5	29.8	36.2	8.93	20	11	2	17
May	58	31	50.9	37.7	44.3	13.13	17	7	7	17
June [2]	73	39	60.1	44.1	52.1	4.38	16	6	9	15
July	75	40	64.2	46.0	55.1	7.79	20	7	8	16
August	78	39	66.9	45.1	56.0	8.08	16	10	8	13
September	67	36	59.8	45.1	52.4	91.64	23	4	1	25
October	62	31	50.3	39.1	44.7	22.39	31	2	4	25
November	50	22	43.6	31.5	37.6	15.44	25	3	4	23
December	46	−8	33.1	18.0	25.6	3.56	12	15	8	8

DILLINGHAM. Latitude 59° 00′, longitude 158° 28′. J. B. Fleckenstein, observer

January	42	8	35.4	24.9	30.2	1.20	5	8	6	17
February	42	−3	33.0	21.1	27.0	3.73	18	3	5	20
March	39	−20	24.7	3.9	14.3	2.06	11	13	6	12
April	42	2	36.0	21.5	28.8	1.41	11	13	5	12
May	62	29	50.5	33.7	42.1	1.59	16	7	11	13
June	78	36	63.0	43.9	53.4	.57	8	6	12	12
July	79	39	66.3	47.2	56.8	2.56	12	12	12	7
August	70	36	63.2	46.5	54.8	3.71	15	13	10	8
September	60	35	56.4	45.4	50.9	4.03	20	3	8	19
October	66	6	41.3	22.7	32.0	1.81	13	3	23	5
November	40	8	35.6	20.0	27.8	3.95	18	2	23	5
December	39	−22	24.5	9.7	17.1	.66	7	8	15	8

DUTCH HARBOR. Latitude 53° 55′, longitude 166° 30′. Weather Bureau, observer

January	56	28	44.9	55.3	40.1					
February	47	20	36.8	29.1	33.0					
March	52	18	58.4	26.4	32.4					
April	52	18	44.4	32.3	38.4					
May	64	30	50.4	36.8	43.6					
June	72	36	55.0	42.2	48.6					
July	70	38	59.0	47.0	53.0					
August	80	41	65.3	48.2	56.8	4.31	13	9	9	13
September	64	37	55.6	45.4	50.0	7.32	19	4	13	13
October	52	29	44.0	36.2	40.1	11.47	25	2	3	26
November	50	27	40.5	33.0	36.8	10.20	26	1	12	17
December	43	12	37.7	29.5	33.6	3.24	18	3	14	14

EAGLE. Latitude 64° 46′, longitude 141° 12′. Weather Bureau, observer

January	24	−54	4.9	−9.6	−2.4	1.26	11	11	3	17
February	34	−49	14.6	1.6	8.1	.39	7	7	4	17
March	50	−50	14.0	−12.5	.8	.28	6	11	2	18
April	56	−23	38.6	15.2	26.9	.23	5	9	3	18
May	70	23	56.9	31.6	44.2	1.45	10	6	2	23
June	80	32	71.2	43.6	57.4	1.53	10	13	4	13
July	79	29	68.5	45.7	57.1	2.89	21	5	5	21
August	84	28	63.7	40.5	52.1	1.43	17	7	5	19
September	70	22	59.4	35.5	47.4	.48	5	6	7	17
October	58	0	40.9	26.4	33.6	.97	12	8	3	20
November	37	−10	20.2	8.0	14.1	.57	10	7	5	18
December	29	−52	−2.3	−18.5	−10.4	.14	6	18	2	11

[2] Station moved to Mile Seven in June.

Condensed meteorological reports for 1929—Continued

FAIRBANKS. Latitude 64° 51′, longitude 147° 52′. F. L. Higgins, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	38	−25	15.1	−0.6	7.2	3.21	12	4	16	11
February	39	−25	20.9	2.4	11.6	1.10	11	4	12	12
March	47	−38	17.4	−7.1	5.2	.50	5	9	20	2
April	60	−13	40.0	15.5	27.8	.90	5	13	13	4
May	68	23	60.4	34.4	47.4	1.20	5	11	14	6
June	83	37	73.9	45.9	59.9	1.77	13	5	20	5
July	82	32	71.4	47.3	59.4	3.82	18	5	14	12
August	86	32	65.8	42.0	53.9	1.26	12	10	6	15
September	74	25	63.9	39.3	51.6	.59	9	8	16	6
October	58	0	36.4	19.8	28.1	1.07	14	6	7	18
November	38	−11	21.0	5.5	13.2	.42	10	9	5	16
December	38	−47	3.5	−13.8	−5.2	.25	2	13	2	16

FORT YUKON. Latitute 66° 34′, longitude 145° 18′. Weather Bureau, observer

January	31	−48	−4.4	−20.7	−12.6	0.44	9	17	1	13
February	28	−43	4.6	−10.4	−2.9	.22	4	10	2	16
March	35	−44	6.2	−17.7	−5.8	.08	3	18	3	10
April	57	−17	34.6	11.2	22.9	.08	1	14	4	12
May	68	24	57.1	34.2	45.6	.30	2	16	8	7
June	80	37	69.8	47.7	58.8	1.26	8	15	7	8
July	80	25	69.4	48.8	59.1	2.22	13	18	3	10
August	86	32	63.0	44.1	53.6	1.46	15	15	7	9
September	64	23	55.7	35.4	45.6	1.12	10	20	2	8
October	51	−9	30.3	18.2	24.2	.65	10	8	0	23
November	25	−28	10.7	−5.4	2.6	.45	10	12	1	17
December	21	−52	−7.5	−24.7	−16.1	.14	4	22	2	7

HAINES. Latitude 59° 13′, longitude 135° 34′. E. E. Bromley, observer

January	45	2	32.1	19.2	25.6	4.36	12	14	4	13
February	46	−3	32.8	21.9	27.4	1.48	12	5	1	24
March	46	14	38.8	27.3	33.0	3.94	15	7	8	16
April	57	9	46.2	27.6	36.9	1.18	9	11	12	7
May	68	28	57.9	37.7	47.8	1.62	9	10	10	11
June	76	35	65.5	45.5	55.5	.79	8	6	10	14
July	81	37	65.6	48.0	56.8	.92	14	6	4	21
August	86	35	65.8	46.5	56.2	1.67	11	11	5	15
September	65	31	59.1	44.9	52.0	2.97	13	10	3	17
October	53	30	48.9	39.6	44.2	17.70	25	1	0	30
November	49	18	40.8	31.1	36.0	9.37	20	2	3	25
December	51	−3	31.3	17.3	24.3	5.49	13	15	3	13

HOLY CROSS. Latitude 62° 16′, longitude 159° 50′. Holy Cross Mission, observer

January	40	−17	26.0	10.8	18.4	1.39	8	13	3	15
February	44	−34	22.2	7.5	14.8	1.20	6	11	5	12
March	38	−37	13.5	−8.0	2.8	2.05	4	18	6	7
April	48	−17	33.6	14.6	24.1	2.25	6	11	4	15
May	63	21	50.3	32.9	41.6	1.59	8	13	11	7
June	80	35	66.7	44.7	55.7	.86	3	25	4	1
July	77	40	66.3	46.6	56.4	3.12	15	16	8	7
August	70	28	58.6	41.8	50.2	3.45	15	10	6	15
September	63	30	55.8	42.9	49.4	3.73	17	6	4	20
October	52	−5	31.1	16.9	24.0	.20	2	21	2	8
November	41	1	29.1	16.2	22.6	2.25	14	4	2	24
December	40	−44	9.5	−4.3	2.6	.15	1	19	1	11

Condensed meteorological reports for 1929—Continued

JUNEAU. Latitude 58° 18′, longitude 134° 24′. Weather Bureau, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	46	12	34.2	27.2	30.7	9.09	20	7	4	20
February	42	11	34.2	28.0	31.1	7.24	22	2	3	23
March	47	21	38.8	31.4	35.1	6.15	24	2	3	26
April	59	13	45.5	30.5	38.0	3.34	14	7	8	15
May	67	33	55.3	39.1	47.2	4.74	15	8	6	17
June	74	40	61.6	46.9	54.2	4.15	18	5	7	18
July	76	45	61.1	49.5	55.3	4.81	24	1	5	25
August	85	43	63.2	49.0	56.1	5.08	17	6	4	21
September	66	38	57.7	46.7	52.2	5.52	15	4	8	18
October	54	32	49.8	41.8	45.8	17.31	28	1	0	30
November	50	26	42.6	35.3	39.0	17.56	27	1	3	26
December	51	15	34.4	26.2	30.3	4.58	15	11	3	17

KENNECOTT. Latitude 61° 29′, longitude 142° 57′. Kennecott Copper Corporation, observer

January	40	−21	18.8	5.2	12.0	3.05	13	11	4	16
February	38	−10	29.1	16.1	22.6	4.91	12	3	1	24
March	43	−15	29.1	11.3	20.2	1.60	8	15	3	13
April	49	−12	56.9	17.6	27.2	1.43	6	17	2	11
May	61	22	49.6	30.1	39.8	.03	1	20	3	8
June	71	32	63.5	38.6	51.0	.90	7	18	2	10
July	71	33	61.4	39.6	50.5	3.52	17	6	6	19
August	69	34	61.2	38.0	49.6	1.79	13	10	7	14
September	65	32	53.2	37.6	45.4	3.09	15	8	4	18
October	50	20	41.7	30.1	35.9	4.21	11	1	2	28
November	43	0	32.5	19.0	25.8	2.16	12	6	1	23
December	39	−33	5.8	−6.9	−.6	2.72	7	19	2	10

KETCHIKAN. Latitude 55° 20′, longitude 131° 37′. Harry G. Anderson, observer

January	49	6	39.9	26.7	33.3	13.24	15	9	2	20
February	45	6	39.1	25.7	32.4	6.96	17	3	8	17
March	48	25	42.6	31.6	37.1	16.34	27	1	6	24
April	65	16	49.4	29.2	39.3	4.90	14	11	3	16
May	67	30	56.4	37.5	47.0	5.82	14	10	4	17
June	77	39	61.2	45.1	53.2	8.62	19	6	3	21
July	72	40	61.6	47.1	54.4	10.90	22	1	4	26
August	84	40	63.6	48.7	56.2	21.07	23	7	0	24
September	78	35	64.3	43.1	53.7	1.68	7	[1] 14	[1] 4	[1] 4
October	61	34	53.9	44.0	49.0	28.16	27	1	3	27
November	53	31	47.5	39.4	43.4	21.95	25	1	4	25
December	48	10	39.1	29.3	34.2	10.00	17	9	5	17

KODIAK (KALSIN BAY). Latitude 57° 34′, longitude 152° 27′. Experiment Station, observer

January	52	12	40.7	29.3	35.0	8.92	17	10	2	19
February	51	13	41.2	31.1	36.2	7.50	20	2	3	23
March	51	4	37.0	22.3	29.6	4.90	14	10	9	12
April	51	19	42.6	29.6	36.1	9.99	13			
May	57	27	48.4	35.4	42.0	19.31	21	3	6	22
June	64	33	52.7	42.8	47.8	5.54	22	1	3	26
July	74	39	62.2	45.2	53.7	3.41	13	6	10	15
August	72	38	61.6	45.7	53.6	2.85	10	5	7	19
September	65	35	57.3	45.9	51.6	11.32	22	1	3	26
October	59	20	48.1	36.4	42.2	17.81	22	3	11	17
November	48	22	42.9	31.8	37.4	17.36	20	9	4	17
December	50	4	37.8	21.7	29.8	7.19	7	18	7	6

[1] Incomplete.

Condensed meteorological reports for 1929—Continued

KODIAK (WOOD ISLAND). 57° 46′, longitude 152° 22′. Weather Bureau, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	47	24	40.6	29.6	35.1	5.48	14			
February	48	23	42.4	32.4	37.4	4.75	17			
March	48	11	37.7	25.1	31.4	3.29	10			
April	57	22	44.1	31.6	37.8	4.14	11			
May	58	32	50.3	37.3	43.8	8.17	17			
June	67	39	54.2	44.2	49.2	3.34	19			
July	82	43	64.7	47.0	55.6	2.63	13			
August	74	44	63.2	48.5	55.8	2.28	12			
September	80	40	61.6	47.5	54.6	4.82	18			
October	74	26	51.9	38.9	45.4	7.27	22	[1] 5	[1] 7	[1] 12
November	60	25	44.1	33.7	38.9	5.71	18	8	7	15
December	62	17	39.3	27.0	33.2	1.54	10	13	9	9

KOTZEBUE. Latitude 66° 51′, longitude 162° 39′. Henry Copple, observer

January	28	−26	9.4	−2.1	3.6			7	10	14
February	28	−38	6.3	−6.6	−.2			9	5	14
March	24	−50	−7.7	−24.7	−16.2			13	7	11
April	46	−22	20.8	2.6	11.7			12	6	12
May	47	−3	37.7	24.1	30.9	0.21	2	14	8	9
June	70	24	53.4	35.0	44.2	1.70	3	18	5	7
July	78	36	57.6	41.5	49.6	1.31	8	16	2	13
August	68	28	54.6	39.1	46.8	1.84	11	6	8	17
September	57	32	51.6	37.7	44.6	2.30	12	2	11	17
October	48	−12	28.1	13.0	20.6	.75	2	11	7	13
November	31	−22	17.8	4.2	11.0			1	9	20
December	31	−38	4.3	−5.2	−.4			6	4	21

LATOUCHE. Latitude 60° 03′, longitude 147° 55′. Kennecott Copper Corporation, observer

January	47	21	38.8	28.6	33.7	14.25	11	11	6	14
February	46	19	39.0	31.4	35.2	19.90	24	6	1	21
March	50	13	40.4	26.5	33.4	17.09	21	16	1	14
April	54	19	44.0	31.5	37.8	9.02	16	9	4	17
May	62	32	50.3	37.3	43.8	17.65	18	7	8	16
June	68	37	58.1	44.8	51.4	4.91	12	2	9	19
July	73	44	62.9	48.5	55.7	8.98	21	10	3	18
August	75	44	65.4	49.9	57.6	8.45	16	10	1	20
September	67	42	59.0	49.3	54.2	16.85	24	2	2	26
October	62	31	49.7	40.3	45.0	32.83	29	0	12	19
November	49	28	43.5	33.5	38.5	25.40	28	2	10	18
December	48	6	37.0	26.2	31.6	6.13	13	9	16	6

MATANUSKA. Latitude 61° 30′, longitude 149° 15′. Experiment Station, observer

January	45	−10	26.4	12.4	19.4	1.07	7	9	5	17
February	45	−12	32.5	17.8	25.2	1.88	10	4	5	19
March	47	−8	29.4	12.2	20.8	.98	4	11	8	12
April	60	−8	42.5	22.6	32.6	.53	6	7	12	11
May	66	27	60.6	36.1	48.4	.77	5	7	11	13
June	77	34	67.8	43.1	55.4	.52	9	8	6	16
July	76	37	65.9	46.0	56.0	2.51	16	11	4	16
August	78	36	64.1	44.8	54.4	2.09	11	10	5	16
September	68	29	60.7	43.9	52.3	2.69	15	5	6	19
October	58	8	44.3	29.2	36.8	2.48	7	1	9	21
November	49	1	37.4	20.9	29.1	1.05	6	3	9	18
December	53	−30	15.5	−1.2	7.2	.31	3	18	7	6

[1] Incomplete.

Condensed meteorological reports for 1929—Continued

McKINLEY PARK. Latitude 63° 44′, longitude 148° 55′. Harry J. Liek, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	40	−14	21.8	6.6	14.2	2.43	5	12	6	13
February	39	−30	21.4	4.9	13.2	.04	1	9	6	13
March	38	−34	7.0	−10.9	−2.0	.02	1	10	11	10
April	50	−8	32.4	13.8	23.1	.95	2	11	12	7
May	64	19	51.3	29.9	40.6	3.21	3	6	13	12
June	84	32	63.0	40.1	51.6	1.16	11	14	8	8
July	75	30	61.2	43.0	52.1	4.11	21	8	12	11
August	78	24	63.6	36.3	50.0	1.55	5	9	14	8
September	75	25	60.0	35.5	47.8	0	0	25	2	3
October	52	−2	33.5	18.9	26.2	1.05	3	24	0	7
November										
December	38	−38	24.7	−7.1	8.8	1.05	3	24	3	4

NAKNEK. Latitude 58° 41′, longitude 157° 00′. W. N. Reed, observer

January	42	1	36.5	23.4	30.0	0.05	1	[1] 8	[1] 2	[1] 20
February	45	−5	35.0	20.9	28.0	3.57	8	5	1	22
March	40	−21	21.9	5.5	13.7	.87	3	9	1	21
April	51	−1	40.1	22.8	31.4	.34	3	11	2	17
May	64	25	51.4	34.6	43.0	1.65	3	10	5	16
June	72	35	62.4	43.1	52.8	1.00	3	9	6	15
July	73	37	62.8	46.5	54.6	3.55	8	11	5	15
August	72	38	61.9	45.4	53.6	2.67	9	10	6	15
September	70	31	60.7	45.0	52.8	5.26	11	8	1	21
October	54	2	41.7	25.8	33.8	2.46	6	5	2	24
November	44	9	38.9	27.2	33.0	2.27	12	3	2	25
December	41	−28	22.5	7.2	14.8	1.48	4	13	0	18

NOME. Latitude 64° 30′, longitude 165° 24′. Weather Bureau, observer

January	39	−21	27.8	13.5	20.6	1.82	18	5	9	17
February	38	−25	19.7	6.5	13.1	.61	9	7	8	13
March	36	−31	11.7	−10.4	.6	.55	10	13	10	8
April	47	−19	28.6	5.8	17.2	.63	9	9	6	15
May	55	18	41.3	28.8	35.0	.46	8	7	10	14
June	73	27	62.3	38.6	50.3	.15	3	12	10	8
July	71	30	61.4	39.8	50.6	1.97	10	8	11	12
August	66	24	55.2	37.4	46.3	4.29	15	11	4	16
September	65	30	53.7	42.9	48.3	4.29	22	0	12	18
October	53	−4	32.5	15.1	23.8	.24	3	11	15	5
November	32	−7	27.2	15.3	22.2	1.36	16	1	14	15
December										

RAMPART. Latitude 65° 30′, longitude 150° 15′. Clement Anderson, observer

January	37	−41	4.9	−7.0	−1.0	1.16	8	13	4	14
February	34	−37	7.1	−5.3	.9	.78	7	6	4	18
March	36	−43	5.9	−14.3	−4.2	.20	2	25	3	3
April	52	−15	33.4	10.8	22.1	.29	4	15	8	7
May	68	19	57.1	31.2	44.2	.60	2	17	9	5
June	79	33	70.2	42.3	56.2	.33	2	24	4	2
July	81	33	70.2	42.6	56.4	.55	4	17	7	7
August	84	26	61.4	38.3	49.8	2.02	10	13	5	13
September	69	22	54.0	34.5	44.2	1.08	6	9	4	17
October	50	−8	29.0	14.8	21.9	1.83	9	5	6	20
November	36	−18	14.2	2.4	8.3	1.03		[1] 3	[1] 1	[1] 14
December	26	−59	−7.8	−21.8	−14.8	.37	3	16	5	10

[1] Incomplete.

Condensed meteorological reports for 1929—Continued

SITKA. Latitude 57° 3′, longitude 135° 19′. Experiment Station, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	Inches				
January	52	9	42.6	27.7	35.2	9.65	18	6	10	15
February	46	8	40.5	30.1	35.3	9.86	24	1	7	20
March	48	20	42.0	30.7	36.4	10.10	28	2	13	16
April	61	6	47.7	28.6	38.2	2.53	18	5	16	9
May	68	28	54.8	35.5	45.2	4.79	18	4	14	13
June	76	35	60.2	43.4	51.8	1.59	16	1	18	11
July	72	38	60.6	46.9	53.8	6.83	24	1	8	22
August	86	38	64.3	48.4	56.4	4.25	21	3	10	18
September	70	37	60.8	47.2	54.0	4.53	16	3	10	17
October	60	30	52.1	41.8	47.0	17.71	29	1	1	29
November	51	25	44.0	35.4	39.7	20.76	30	2	7	21
December	49	5	36.2	24.1	30.2	5.85	16	10	4	17

SKAGWAY. Latitude 59° 27′, longitude 135° 19′. Peter I. Dahl, observer

January	47	6	31.9	21.5	26.7	2.12	8	16	3	12
February	44	2	34.5	25.4	30.0	.83	6	5	7	16
March	49	13	40.3	28.3	34.3	1.04	8	11	8	12
April	59	8	48.6	27.3	38.0	.16	1	[1] 16	[1] 7	[1] 5
May	68	27	59.7	38.5	49.1	.76	4	[1] 19	[1] 7	[1] 4
June	79	34	66.1	46.4	56.2	.55	5	16	4	10
July	80	36	66.1	48.8	57.4	1.15	9	9	12	10
August	87	35	67.8	45.5	56.6	.96	6	13	8	10
September	69	30	59.6	43.2	51.4	2.02	7	15	6	9
October	57	26	50.5	39.6	45.0	9.88	20	3	4	24
November	53	24	42.9	34.1	38.5	5.03	17	3	11	16
December	50	5	30.9	19.7	25.3	2.04	6	15	4	12

TALKEETNA. Latitude 62° 19′, longitude 150° 16′. P. W. McCarthy, observer

January	35	−24	23.9	6.4	15.2	2.37	8	9	2	20
February	38	−22	28.2	12.6	20.4	5.72	14	3	2	23
March	45	−28	27.5	3.3	15.4	2.20	9	7	4	20
April	55	−22	41.6	17.1	29.4	2.45	5	9	1	20
May	64	22	56.8	29.9	43.4	.24	2	5	5	21
June	78	30	67.9	42.6	55.2	2.35	7	7	0	23
July	78	32	67.5	43.6	55.6	6.16	12	6	2	23
August	80	30	63.9	41.3	52.6	5.33	10	7	5	19
September	69	27	59.6	42.6	51.1	8.37	20	6	2	22
October	56	1	42.7	27.3	35.0	3.41	9	1	3	27
November	42	1	31.2	19.2	25.7	5.60	15	3	2	25
December	35	−40	13.4	−4.9	4.2	1.09	5	22	1	8

TANANA. Latitude 65° 10′, longitude 152° 06′. Weather Bureau, observer

January	35	−34	9.8	−1.1	4.4	1.78	10	7	9	15
February	36	−32	13.4	2.4	7.9	1.51	15	4	6	18
March	37	−52	8.3	−17.6	−4.6	1.13	10	12	13	6
April	51	−29	34.1	9.7	21.9	.83	10	12	11	7
May	66	21	56.9	33.8	45.4	1.26	11	6	22	3
June	81	37	70.0	46.1	58.0	1.51	12	7	20	3
July	80	32	70.6	44.9	57.8	2.68	16	3	18	10
August	81	29	62.0	41.7	51.8	3.51	16	7	8	16
September	63	28	55.0	39.7	47.4	2.36	17	7	12	11
October	46	−4	30.0	18.5	24.2	.98	10	5	19	7
November	36	−10	17.4	7.4	12.4	.49	12	7	13	10
December	27	−57	−3.4	−19.1	−11.2	.59	6	19	7	5

[1] Incomplete.

Condensed meteorological reports for 1929—Continued

VALDEZ. Latitude 61° 07′, longitude 146° 16′. J. A. McGilvray, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	35	0	26.5	16.7	21.6	4.11	10	16	1	14
February	36	4	28.6	21.1	24.8	10.69	19	3	4	21
March	38	−2	29.1	18.9	24.0	7.07	19	13	8	10
April	39	5	33.3	22.6	28.0	3.87	10	13	7	10
May	46	23	41.3	32.8	37.0	4.01	8	9	5	17
June	62	33	48.7	37.3	43.0	1.54	12	8	14	8
July	71	36	58.2	41.6	49.9	3.89	21	8	7	16
August	73	38	61.6	45.4	53.5	4.07	18	9	9	13
September	64	35	53.3	43.4	48.4	12.70	24	4	0	26
October	58	18	43.1	33.7	38.4	15.01	28	1	4	26
November	41	14	34.5	24.7	29.6	13.38	21	5	1	24
December	48	−10	31.0	13.6	22.3	3.05	6	21	2	8

WHALE ISLAND. Latitude 57° 58′, longitude 152° 46′. B. C. Parker, observer

January										
February										
March		9		27.0		2.74	12	16	8	7
April	[3] 48	24	[3] 43.7	34.7	39.2	5.64	14	13	4	13
May	60	35	49.6	41.5	45.6	9.83	18	12	7	12
June	68	43	53.8	47.0	50.4	3.69	15	10	3	17
July	69	37	61.6	47.0	54.3	2.22	13	16	6	9
August	70	36	61.8	46.5	54.2	2.32	10	18	5	8
September	71	32	59.3	45.6	52.4	2.82	14	8	16	6
October	56	19	47.5	34.5	41.0	10.03	21	9	7	15
November	55	20	43.5	27.6	35.6	5.08	15	13	6	11
December	47	5	35.5	21.0	28.2	1.29	9	20	5	6

WHITE MOUNTAIN. Latitude 64° 40′, longitude 162° 20′. T. P. McCollister, observer

January	38	−19	30.5	8.6	19.6	10.24	13	11	3	17
February	44	−25	28.5	6.4	17.4	.17	10	11	5	12
March	40	−38	14.2	−11.2	1.5	.09	3	22	4	5
April	51	−20	36.4	13.3	24.8	.37	9	13	5	12
May	61	20	51.4	32.1	41.8	.03	3	11	15	5
June	79	35	70.9	42.9	56.9	.01	1	23	3	4
July	80	40	73.5	46.1	59.8	.25	6	11	14	6
August	71	30	58.6	37.8	48.2			[1] 7	[1] 6	[1] 5
September	62	36	53.9	43.0	48.4	4.17	14	3	5	22
October	52	−2	32.8	16.3	24.6	.10	2	14	3	14
November	45	−9	28.3	13.8	21.0	1.55	11	2	4	24
December	35	−48	16.5	−.7	7.9	.57	6	12	2	17

WONDER LAKE. Latitude 63° 28′, longitude 150° 52′. Mrs. Paula Anderson, observer

January										
February										
March										
April										
May	70	12	59.8	24.9	42.4	3.77	6	12	11	8
June	80	27	64.2	37.7	51.0	1.51	10	7	18	5
July	85	26	68.1	39.9	54.0	7.49	22	3	14	14
August	88	26	65.0	35.9	50.4	2.71	9	9	12	10
September	75	21	63.9	32.9	48.4	.92	9	8	12	10
October	68	−8	37.5	11.0	24.2	.80	8	10	5	16
November	46	−12	25.9	.8	13.4	.51	5	8	11	11
December	38	−42	9.6	−9.6	0	.58	4	17	2	12

[1] Incomplete.
[3] Record for 15 days.

Condensed meteorological reports for 1929—Continued

WRANGELL. Latitude 56° 28′, longitude 132° 23′. A. Rasmussen, observer

Month	Temperature					Total precipitation	Number of days—			
	Maximum	Minimum	Mean maximum	Mean minimum	Monthly mean		Rain or snow	Clear	Partly cloudy	Cloudy
	°F.	°F.	°F.	°F.	°F.	*Inches*				
January	48	8	35.5	25.5	30.5	8.65	16	10	6	15
February	45	9	36.0	26.3	31.2	5.59	18	5	5	18
March	52	21	43.0	32.4	37.7	7.28	27	2	10	19
April	68	16	49.6	32.0	40.8	2.73	11	12	13	5
May	69	30	58.6	38.2	48.4	3.08	16	12	5	14
June	76	40	65.1	45.0	55.0	3.16	17	7	5	18
July	78	40	69.1	45.0	57.0	5.91	17	3	12	16
August	71	40	64.5	48.5	56.5	8.50	21	8	5	18
September	73	33	63.4	44.4	53.9	2.06	9	14	4	12
October	60	35	53.5	42.2	47.8	16.25	30	1	5	25
November	52	28	44.6	35.8	40.2	20.71	24	2	6	24
December	44	9	33.7	24.9	29.3	7.64	17	12	1	18

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