The University of Minnesota

AGRICULTURAL EXPERIMENT STATION

REPORT OF NORTHEAST DEMONSTRATION FARM AND EXPERIMENT STATION DULUTH

1916

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FEBRUARY, 1917

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NORTHEAST DEMONSTRATION FARM AND EXPERIMENT STATION, DULUTH

REPORT OF SUPERINTENDENT

The following is a summary of the experimental and demonstrational work in progress during 1916 at the Northeast Substation of the Department of Agriculture of the University of Minnesota, located near Duluth.

I. FIELD CROPS

Six varieties of oats were under test: Minnesota No. 295, Minnesota No. 26, Minnesota No. 261 (60-day), Minnesota No. 281, Swedish Select, and White Russian (side oat). The time required for maturity varied from 93 days for 60-day oats to 113 days for the White Russian side oats. It was a poor oat season, yet the average production was 42½ bushels per acre. Conclusions of previous years were borne out, that early maturing strains give the best yields here. The early oats were well filled and clean, while the side oats were badly blighted and rusted.

Four varieties of barley were tested: Minnesota No. 105 (six-rowed), Princess (two-rowed), White Hull-less, and Oderbrucker. Minnesota No. 105 continues to lead in production, with the two-rowed last. The two-rowed barley required 93 days to ripen, all other strains, 87 days. White Hull-less ranked first in quality. It should be more widely grown for hog and chicken feed. The season being unfavorable, the average yield on unfertilized ground was 20 bushels per acre.

Several minor crops were grown. Of the four varieties of peas, Alaska, Arthur (Canadian), Marrowfat, and Minnesota No. 95, the Alaska is recommended on account of early maturity (84 days) as compared to the extreme of 112 days for Minnesota No. 95. Flax was sown June 1 and matured, without frost, in 101 days. No difference was noticeable in the yielding power of three standard varieties of rutabagas: Purple Top, Hurst's Monarch, and Carter's Hardy Swede. This crop will take all of the season allotted to it. The seed is planted in May and the crop harvested by the middle of October.

Twenty-two standard varieties of corn were under test. This season the frost-free period lasted until September 16. For fodder the following gave most promise: Minnesota No. 13, Northwestern Dent, Longfellow, and King Philip Flint. Some seed of the following varieties matured: Manitoba Flint, Quebec No. 28, Malcolm Sweet.

II. ORCHARD DATA

The orchard is now passing through its second winter. Patten's Greening, Okabena, and Duchess continue to lead in hardiness, over Anisim, Wealthy, and Hibernal. This is probably due more to the particular stock than to varietal differences. Rutabagas were grown as an intertillage crop for the second time, and the experimental cross-fertilization work was begun. The trees made a good growth the last season. Altho they ripened their wood late, owing to the dry fall, little trouble from winter-killing is anticipated. Following the rutabaga harvest the land was cross-disked and harrowed and sown to rye for a winter cover crop. It will be turned under for green manure next June. Dynamite as a labor-saving factor in making tree holes was tested, and netted a saving of 50 per cent in labor. Paul Jones, Kansas, Parker's Early, and Hanbach Cherry outyielded all other varieties of strawberries.

III. FERTILIZER WORK

In 1916 three series of eighteen plots each were laid out for fertilizer tests, to be operated under a three-year rotation plan. Each series consists of one group of six plots, operated in triplicate. In the cultivated-crop series, each tenth-acre plot is split lengthwise, making one-twentieth-acre plots each of potatoes and rutabagas. Data for the first season are available from one series only.

The results were modified by poor drainage, before and after tiling, until the drainage system got into full operation; by a deposit of raw clay on plots adjacent to ditches; by late application of fertilizers; and by the delays incidental to starting a new project. The effect of the manure is quite evident the first year.

Key to Table I

Plots		Potatoes and Rutabagas
A	1, 7, 13	Check plots
B	2, 8, 14	Rock phosphate, 1 ton per acre
C	3, 9, 15	Rock phosphate, 1 ton, and manure, 10 tons per acre
D	4, 10, 16	Manure, 10 tons per acre
E	5, 11, 17	Manure, 10 tons, and acid phosphate, 360 pounds per acre
F	6, 12, 18	Acid phosphate, 360 pounds per acre

TABLE I

PLOT YIELDS

(See key)

Three-Plot Average

	Plots	Potatoes	Rutabagas	
			Roots	Tops
		Bushels per acre	Tons per acre	Tons per acre
A	1, 7, 13.....	161.6	15.28	2.64
B	2, 8, 14.....	166.3	15.8	2.72
C	3, 9, 15.....	193.6	16.93	2.85
D	4, 10, 16.....	174.6	17.91	2.99
E	5, 11, 17.....	171.8	16.5	2.63
F	6, 12, 18.....	142.6	16.67	2.41

* Only two plots of rutabagas. Ground was too wet for the third plot, which, if planted, would have materially reduced the average.

IV. PASTURES

A. PASTURE VALUES IN PRODUCING BUTTERFAT

The study of pasture values in producing butterfat is a continuation of the work described in the 1915 report. Four cows were pastured on the same five-acre tract every day, from June 1 to October 15, inclusive, or 137 days. They were pastured near the barn at night. A ration of 1 pound of grain to four pounds of milk was fed. The cows were an average of the herd.

Total production, four cows, 137 days, in pounds of butterfat....	497.83
Value of same at 33 cents per pound, (average local price)...	$164.28
Value of grain fed.....	25.95
Net value of day and night pasture to cows.....	138.33
Net value of day pasture to cows.....	69.16
Net value of day pasture per acre, season of 1916.....	13.83

B. PASTURE VALUES IN PRODUCING BEEF

In studying the values of pasture in beef-production, young animals were used. The weight was taken when they were turned out on grass and also when taken off it. No other feed was given them. Acre values could not be determined, since only a part of the range was tame-grass pasture. The period of test was from June 12 to October 17, or 128 days. The stock could have been pastured at least two weeks earlier, if the fences had been ready. If shelter is provided, continuous pasture can be had from the middle or latter part of May until nearly the first of December.

TABLE II

GIANS MADE BY YOUNG STOCK ON PASTURE

Name	Age	Days on grass	Total gain	Gain per day
	Months		Pounds	Pounds
Starlight	26	49	74	1.51
May	24	49	105	2.14
Marion	22	49	82	1.67
Edith	21	127	190	1.50
Nellie II	19	127	200	1.57
Bridget	17	127	160	1.26
Tilly	15	127	195	1.53
Daisy	14	127	250	1.96
Helen	8	127	160	1.26
June II	6	127	200	1.57
Average	17.2	...	...	1.59

C. PASTURE VALUES IN MAINTAINING BROOD SOWS

The plan followed at this Station is to keep several brood sows and produce two litters of pigs a year, most of which are sold young. The problem then, is to keep down the maintenance cost of boar and brood sows. Each dry sow is allowed 1/3 of a pound of grain per hundred pounds daily, plus pasturage. Sows are weighed monthly from June to September, inclusive. The first three weighings showed an average increase in weight of nine pounds per sow, indicating ample nourishment. Weights increased more rapidly as farrowing time approached. When penned, 1 pound of grain per hundred pounds is allowed. The saving made, therefore, was 2/3 of a pound of grain per hundred pounds per day. At current prices this is an approximate monthly saving of $1 per sow for a period of from 90 to 120 days. No value has been placed on the pasture available in May and October, when heavier grain feeding was needed because of the demands of the young.

D. PASTURE VALUES FOR WORK HORSES

The experiment with pasture for work horses will interest those who have a limited clearing and an abundance of stump-land pasture. Not enough forage is produced to winter over the stock kept, so it is necessary to utilize the summer pastures whenever possible. In this case, the test was made with horses. The usual grain ration was fed morning and noon, but it was cut slightly at night. The big saving was on hay. Altho it was before them at all times, the horses would eat of it at noon only. They were turned out at night after feeding and left out until feeding time next morning.

Number of horses fed	6
Average weight per horse, April, May, June, pounds*	1,306
Average weight per horse, June, July, August, pounds†	1,339
Increased weight maintained while on pasture	33
Hay eaten daily, per horse, pounds*	18
Hay eaten daily, per horse, pounds†	6
Daily saving (six horses) $10 per ton	$0.36
Average grain daily per horse, pounds*	13
Average grain daily per horse, pounds†	12
Saving (six horses) at 40 cents per bushel	$0.075
Total daily saving on feed	$0.435
Possible duration of night pasture, months	4
Monthly saving on feed	$13.05
Possible saving for the season (six horses)	$52.20

* Period of barn feeding during the spring.
† Night pasture period during the summer.

The observation to be drawn from the data presented is that it is possible, in our cool climate, to maintain farm work horses at full weight while keeping them on night pasture during the summer months. This conserves the forage for winter use, saves labor in cleaning the barn and hauling manure, and benefits the horses.

E. METHODS OF GRASS SEEDING ON CUT-OVER LAND

A test was made of three methods of soil tillage in sowing grass seed among the stumps. One acre was harrowed with one section of a spring-toothed harrow both before and after seeding; another was harrowed before seeding, and a third after seeding. The first plan was most satisfactory, the second was a little better than the third. Six pounds, three each of mixed grasses and of clovers, were sown per acre.

V. POTATO DISEASE CONTROL

A small area of land was devoted to the study of powdery scab of potatoes. Various fertilizers and seed treatments were used and a soil test was made with soils obtained from different regions of Northern Minnesota. Owing to the dry season, which was unfavorable for the development of the disease, no results were secured from these tests.

VI. BY-PRODUCTS OF LAND-CLEARING

The land-clearing work in progress deals only with development up to the stumping stage. One ten-acre tract was cleared by contract at $38 per acre. The contractor took out the brush; felled and trimmed the timber; burned all brush, tops, branches, and windfalls; did everything up to the stumping stage except cut the cordwood. This was contracted at $1.25 per cord. The data on lumber, fence posts,

and cordwood are on record. The polewood is not yet sawed and the sawdust was used for bedding.

TABLE III

COST OF CLEARING AND RECEIPTS, PER ACRE

Expenditures per acre		Receipts per acre	
Clearing contract	$38.00	3,505 feet of lumber at $16	$56.08
Sawing lumber—3,505 feet at $5.00 per M	17.52	1½ cords of wood at $3	4.50
Splitting cordwood at $1.25 per cord	1.87	15 fence posts at 10 cents	1.50
		Pole wood for fuel	....
		Slab wood for fuel	....
		Sawdust for bedding	....
Total	$57.39	Total	$62.08

The lumber was sawed on the farm with a portable mill. The sales figures represent farm values. Generally speaking, where there is a market within a reasonable distance, the cost of clearing up to the stumping stage should not only be covered by the receipts but there usually should also be a small margin of profit. This, of course, refers to lands of the local soil type and vegetation.

VII. FEEDING WORK

A. SELF-FEEDER WORK WITH YORKSHIRE HOGS

The self-feeder work started June 15 when the pigs were weaned. It was necessary to close the work October 15 and put all stock on the same feeding system. In 1917, the work will be carried through the entire season. Thirteen Yorkshire pigs constituted the stock. Tankage, shorts, ground barley, and skimmilk made up the ration.

The pigs made an average gain of 118 pounds, or about 1 pound per day, at a cost for grain of $4.69. With pork at 10 cents a pound, this gain was worth $11.80, showing a profit of $7.11 over cost of grain feed. After paying 50 cents per hundred for skimmilk consumed, or $1.95, they still produced a profit of 80 per cent on cost of purchased feeds. It was necessary, for a while, to pen the pigs to protect some plots, otherwise total weights would be larger. Growth was immediately retarded when the pigs were confined. In this work the feeds were put before the pigs separately. They ate whatever and whenever they wished, making combinations to suit themselves.

B. FEEDING FALL PIGS FOR THE "ROASTER" MARKET

A litter of fall pigs was weaned October 15. Owing to the difficulty of wintering fall pigs, it was decided, November 1, to fit them for the roaster market at Thanksgiving time. They were fed all they would eat of tankage, shorts, and buttermilk, for 24 days. They made

a gain of 128 pounds, which, wholesale, was worth $12.80. They consumed 87 pounds of tankage at 3 cents per pound, 120 pounds of shorts at 1 1/8 cents, and 80 gallons of buttermilk at 1 cent per gallon, a total cost of $4.76. The pigs returned a profit of $8.04, or 168 per cent on cost of feed. If dressed and retailed, they would sell for from 15 to 20 cents per pound. This is a good way to dispose of fall pigs and it is necessary to produce a fall as well as a spring litter in order to obtain the largest returns for the cost of maintaining the brood sow.

C. POULTRY-FEEDING TEST, HOME-GROWN VS. PURCHASED FEEDS

One handicap to the poultry industry in the new northeast section is the amount of high-priced concentrated feeds that must be purchased, owing to the limited local production. In order to determine the possibilities of farm-grown feeds, this project was planned. The hens were of the same hatch, and of Single Comb White Leghorn breed. Forty were put in each pen. Those in pen No. 1 were fed corn and meat scrap in addition to other feeds; those in pen No. 2 had barley instead of corn, and milk and peas instead of meat scrap as a source of protein. The chickens were hatched very early and were heavy fall layers, which explains the declining yield.

TABLE IV

Egg Production

Month	Days	Eggs Laid	
		Pen No. 1	Pen No. 2
January	22	102	87
February	29	234	215
March	31	140	197
Totals	..	476	499

Two conclusions are suggested: The home-produced feeds give as good results as the purchased ones and they can be fed at a lower cost.

VIII. POULTRY HOUSE CONSTRUCTION PROBLEMS

Regulation of moisture, light, and temperature are ever-present problems during the winter months. Moisture is largely controlled by having a straw loft or shed above the poultry; light, by the use of storm windows. This project involves a comparison of glass and muslin screening as a regulator of temperature. Thermometers were hung in each of the two pens and readings taken three times daily.

TABLE V

AVERAGE TEMPERATURES

Month	Days	7 a.m.		1 p.m.		7 p.m.	
		Glass	Muslin	Glass	Muslin	Glass	Muslin
		Degrees	Degrees	Degrees	Degrees	Degrees	Degrees
January	22	32.3	30.9	40.4	37.0	37.0	34.69
February	29	33.95	31.44	44.1	30.6	38.8	36.48
March	31	36.59	35.93	47.69	44.4	42.7	42.19

While the temperature is at all times higher with the glass, there is little difference in the daily range.

IX. THE APIARY

The apiary is gradually developing as a side project. Until the work will require one man's entire time, the plan is to concentrate all effort on increase of colonies by division, making honey-production secondary. This plan or system of increase, by anticipating swarming, gives excellent results with a small investment of time and attention. (See Agricultural Extension Letter No. 9, May, 1916.)

X. WEATHER RECORDS

This Station has been taking weather records for less than a year and a half, so data are still insufficient for definite conclusions. However, the readings here are about midway between those of Duluth, 7 miles away on the lake, and Cloquet, 32 miles away, an inland point. This indicates that the influence of Lake Superior is modified here by weather conditions farther back from shore, and that the influence of Lake Superior on temperature is limited to a very narrow area along the shore, except in a general and moderate degree.