DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

LACOMBE, ALBERTA

REPORT OF THE SUPERINTENDENT

F. H. REED, B.S.A.

FOR THE YEAR 1928

Record of Performance Holstein cows on annual oats and fall rye pasture.

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TABLE OF CONTENTS

DOMINION EXPERIMENTAL STATION, LACOMBE, ALBERTA

SEASONAL NOTES

The year 1928 was much warmer than the average, the average of the mean monthly temperatures being 2·33 degrees above the average of the past twenty-one years. January, February and March were decidedly above the average in temperature, but April was colder than usual. May was very warm and dry with a mean temperature of 5·61 degrees above the average. This unusually warm weather promoted a very rapid growth where sufficient moisture was available, but tended to prevent growth and germination of seed where moisture was at all limited, such as on spring ploughing. June was cool and moist. The total precipitation during this month was 7·30 inches which is 3·82 inches above the average. This abundance of moisture following a hot, dry May promoted a very rapid growth in all field crops with the exception of corn. The cool, moist weather during June appeared to retard the development of the corn crop, and gave it a setback from which it never recovered during the season. July appeared normal in every respect. Crops continued to grow rapidly and gave promise of one of the heaviest crops in the history of Alberta. Frost damage resulting from 3 degrees of frost on August 23 and 27 checked further development on all frost tender crops and did untold damage to cereals, particularly wheat and oats. Bright, dry and unusually warm weather prevailed during September, October, November and December. The precipitation during these months was decidedly below the average and suggests the possibility of a moisture shortage for next year's crop grown on stubble land.

The August frosts caused heavy damage by lowering the grade of wheat materially in central Alberta. Garnet wheat, in spite of the fact that it was discriminated against by elevator men, graded from one to two grades higher than other varieties. In most cases it gave a 2 or 3 northern grade while late-maturing varieties, because of immaturity when frosted, graded feed. Most of the corn crop was frozen before the ears had matured sufficiently for eating purposes. Fortunately there is an abundance of feed for all live stock, and the grain crop, as a result of wonderful harvesting weather, was harvested at a minimum of expense.

METEOROLOGICAL RECORD, 1928

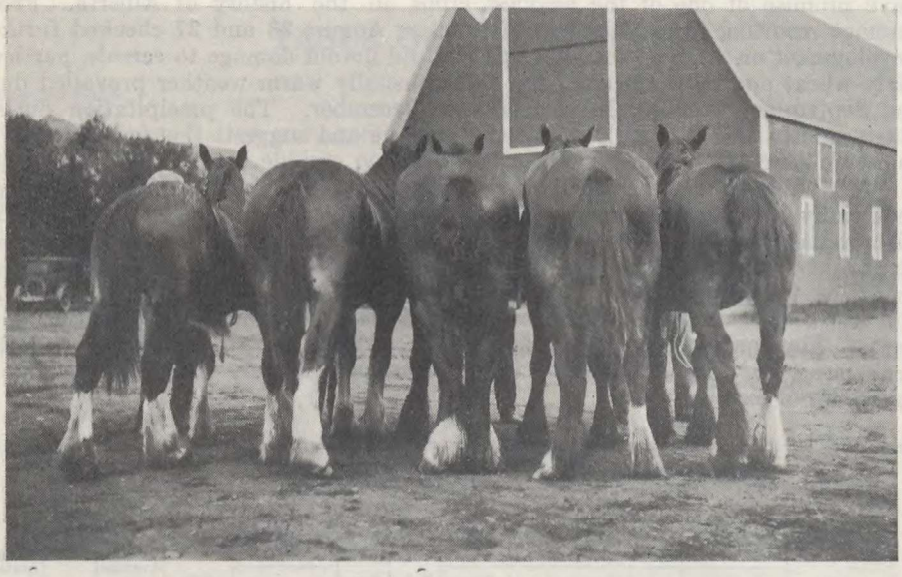
	Temperature (°F.)						Precipitation				Sunshine		Wind	Evaporation
	Mean		Maximum		Minimum		Rain	Snow	Total Precipitation		1928	Average 21 years		
	1928	Average 21 years	Highest in 1928	Mean Maximum for 21 years	Lowest in 1928	Mean Minimum for 21 years			1928	Average 21 years				
							in.	in.	in.	in.	hours	hours	miles	in.
January	14·16	9·53	54·0	44·40	−42·0	−35·70	.....	2·5	0·25	0·87	107·5	84·71	4,708	.....
February	20·17	12·49	52·0	50·92	−25·0	−31·06	.....	3·7	0·37	0·62	155·5	125·1	5,533	.....
March	25·93	21·46	64·0	56·14	− 7·0	−18·48	.....	5·6	0·56	0·70	158·0	162·4	5,770	.....
April	33·70	36·93	75·0	70·98	1·0	7·68	.....	17·0	1·70	1·14	192·3	211·14	6,133	April 23 0·720
May	54·32	48·71	90·0	80·50	22·0	19·27	0·50	.....	0·50	1·91	360·1	240·8	6,924	3·761
June	54·90	55·44	81·0	84·27	32·0	29·62	7·30	.....	7·30	3·48	209·8	254·14	5,398	2·364
July	61·93	59·95	89·0	87·90	39·0	34·25	1·66	.....	1·66	2·86	324·2	291·5	4,850	3·305
August	56·18	57·90	93·0	87·39	29·0	31·72	2·56	.....	2·56	2·57	295·3	262·8	4,840	3·017
September	50·85	48·44	85·0	81·32	16·0	21·00	0·74	.....	0·74	1·70	252·5	191·5	5,190	2·589
October	35·29	40·01	66·0	75·47	9·0	8·23	0·18	.....	0·18	0·68	155·7	148·1	6,188	0·440
November	29·70	25·48	60·0	57·70	7·0	−9·53	.....	0·1	0·01	0·72	146·8	109·2	4,932	Oct. 10
December	20·26	13·02	56·0	48·22	−30·0	−28·81	.....	3·2	0·32	0·69	84·5	84·96	5,931	.....
Totals	.....	.....	.....	.....	.....	.....	12·94	32·1	16·15	17·94	2,442·2	2,166·35	65,897	16·196

ANIMAL HUSBANDRY

HORSES

The horses kept at this Station numbered thirty-five head of all ages at the close of the year and consisted of one imported Shire stallion, ten pure-bred Clydesdales, twelve Shire-Clydesdale cross-breds, seven grade Clydesdales, two pure-bred hackneys, one hackney-thoroughbred cross-bred, one driving mare, and one two-year-old thoroughbred.

The Shire stallion Snelston Topper (1608) 38528 which was presented to the Canadian Government by Mrs. Stanton, Snelston Hall, Ashbourne, England, has been used at this Station for three breeding seasons. He was bred to sixty-one mares in 1926, to sixty mares in 1927, and to seventy mares in 1928, including pure-bred and grade Clydesdale, Percheron, and Shire mares shipped in from a radius of 100 miles of Lacombe. The fees are moderate, $5 at time of service and $10 when the mare proves in foal. Excellent pasture and water is supplied for mares shipped in from a distance and a reasonable charge of $2 a month is made for the keep of the mares until bred.



Grade Clydesdale mare and her one, two, three and four year old geldings sired by the shire stallions Snelston Topper and Marden Jupiter.

Seven Shire-Clydesdale cross-bred colts bred at the Station weighed an average of 1,654 pounds at an average age of 3 years, 212 days, amply demonstrating the ability of the Shire to secure growthiness and size in the progeny. Four of the colts are out of pure-bred and three out of grade Clydesdale mares.

Two pure-bred Clydesdale foals, two Shire-Clydesdale cross-bred foals and one thoroughbred-hackney cross-bred foal were born during the year. As a preventive of joint-ill the pregnant dams were given a teaspoonful of potassium iodide on the first and fifteenth of each month. The colts had no indication of joint-ill.

The idle work-horses and colts over a year old are wintered in the open with a good bush for shelter on the north side of the feed lot. Water is always

available in a trough with a tank heater. The feed for the most part consists of western rye grass, and sweet clover hay. When available oat green feed is fed in addition to give a little more variety to the ration. Horses handled in this manner come through the winter healthy and in good hard condition for spring work.

BEEF CATTLE

The beef cattle on this Station are of the Aberdeen-Angus breed and are all pure-bred. The herd numbers forty-six head, made up as follows: two mature bulls, seven yearling bulls and five bull calves; ten mature cows, five 3-year-olds, three 2-year-olds, seven yearlings and seven heifer calves.

During the year two pure-bred Aberdeen-Angus bulls were sold at the Calgary Bull Sale for $300 and $325 respectively. These bulls were placed second and third in their class. Two steers shown by the Station were placed second and third in the open class for 1,100 pounds and under.

In October, a 4-year-old bull, Blackcap of Heather Brook —35016— was acquired from G. A. Graham, Bentley, Alta. This bull is a son of Black Revolution —28570— by the great sire Blackcap Revolution —27530—, who in turn is also the sire of our former herd bull, Prideman Glencarnock 4th, and in breeding the "Heather Brook" bull to the daughters of Prideman Glencarnock 4th we will be following fairly close line breeding. His dam is Blackcap Tolan 5th —28573—, a well-bred Blackbird cow.

The herd is entirely free from tuberculosis, having been fully accredited since 1924.

In the herd there are a number of outstanding animals, both from an individual and a breeding standpoint. The families represented are the Queen Mothers, Pride of Aberdeens, Keepsakes, Ballindalloch Blackbirds, Enchantress Ericas, Blackcaps, and Miss Burgess.

COST OF REARING BEEF BULLS TO SERVICEABLE AGE

Average feed cost, including dam's keep, to raise a bull calf to breeding age, 13½ months, $88.45.

In compiling the above cost an attempt was made to set an average price on the basis of cost on bought feed brought in and laid down at the Station. The costs are much higher than a farmer growing most of his feeds would charge up to his cattle and this is one explanation for the high cost of rearing a bull calf to breeding age. Under average farm conditions the cattle would rustle for their living the greater part of the year with much lower total feed cost.

DAIRY CATTLE

The dairy cattle kept on the Farm are pure-bred Holstein-Friesians. On December 31 there were thirty-six head of cattle as follows: 2 mature bulls, 2 bull calves, 12 mature cows, 2 three-year-olds, 4 two-year-olds, 5 yearlings and 9 heifer calves.

Two breeding bulls are being used on the herd at the present time. Mutual Pontiac Korndyke —62338— and Strathmore Fairchild Evergreen —55831—. The former, a four-year-old bull, purchased as a calf in 1925, has developed into an outstanding individual of the breed as to type, quality and breediness and is showing his prepotency by producing offspring that give every indication of developing into individuals of real merit. This sire is classed as XX in the Advanced Registration and six of his bull calves have at the present time Advanced Registration standing, being recorded in Class X, indicating that they are of right type and worthy specimens of the breed. He is also the sire of four yearling heifers and six heifer calves in the herd but they will not be eligible

for Advanced Registration until they have freshened at least once. This bull represents better breeding than the average of the herd and it is expected that he will make an improvement in both milk and butterfat. The latter, a six-year-old bull, was purchased in April, 1927, from the Canadian Pacific Railway Demonstration and Supply Farm, Strathmore, Alta. He is in Class X in Advanced Registration. His sire is Sir Canary Fairchild —41443—, a bull whose dam and sire's dam average 22,160 pounds milk and 1,049 pounds butter in a year. Strathmore Fairchild Evergreen's dam is Susan Evergreen —34458— with a mature R.O.P. record of 17,544 pounds milk and 662 pounds butter.

In November, 1928, the yearly test for accreditation was made and the herd again found free from tuberculosis.

The average production of the ten cows finishing a lactation period within the calendar year 1928 was 15,004 pounds of milk and 684 pounds of butter for an average milking period of 380 days. Five mature cows, one 4-year-old cow and one 3-year-old cow completed 365-day R.O.P. records, averaging 15,110 pounds of milk and 696·7 pounds of butter. Two mature cows and one 2-year-old heifer completed 305-day R.O.P. records, averaging 12,924 pounds of milk and 568·7 pounds of butter.

OFFICIAL RECORDS

All normal cows and heifers that have not previously been tested or that look like bettering previous records are entered in the Canadian Record of Performance for Pure Bred Dairy Cattle as soon as they freshen in order that all bulls sold from the herd may have the necessary credentials in the way of official records. The 305-day record is the objective as there is a calving limit of 400 days, but where they do not hold to a service early enough to have them drop a calf within the time limit for the 305-day division they are carried on for the 365-day record.

The following table gives the list of cows qualifying under each of these tests during the year:—

Cows Qualifying in R.O.P. Tests in 1928 Together with Amount of Production

—	Class	Number of days milking	Pounds of milk produced	Average per cent fat	Pounds of fat produced	Pounds 80 per cent butter
			lb.	%	lb.	lb.
L.E.S. Mechthilde Korndyke	Mature	365	19,097	3·73	713	891
Rosa Keyes L.E.S.	Mature	365	16,987	3·59	610	763
Nina Gem Korndyke L.E.S.	4-yr.-old	365	14,417	3·68	531	664
L.E.S. Nina Mechthilde	Mature	365	14,335	3·67	526	658
L.E.S. Rosa Gretchen	Mature	365	14,221	3·85	548	685
L.E.S. Princess Echo	Mature	365	13,597	3·81	518	648
Korndyke Grecchen L.E.S.	3-yr.-old	359	13,114	3·48	457	571
Nina Gem Mechthilde L.E.S.	Mature	305	14,091	3·32	468	585
L.E.S. Evergreen Johanna	Mature	305	12,786	3·28	420	525
Midnight Princess L.E.S.	2-yr.-old	305	11,895	3·99	475	594

This gives an average production for ten animals of 14,454 pounds of milk and 527 pounds fat equal to 659 pounds of 80 per cent butter in 346 days.

FEEDING THE DAIRY HERD

The roughage ration for the winter season consists chiefly of oat, corn and sunflower ensilage, alfalfa, sweet clover and western rye grass hay. When available, roots and oat greenfeed are fed in addition to give a little more variety to the ration. Concentrates include such mill feeds as bran and oil-cake meal combined with oats grown at the Station. The meal mixture fed the cows consists of 400 pounds oat chop, 200 pounds bran and 150 pounds oil-cake meal. The average rate of feeding the above grain mixture is one

pound for every three and one-half pounds of milk produced. During the summer the cows are pastured mainly on an annual pasture seeded with two bushels of oats and one bushel of fall rye per acre early in the spring. To supplement the pasture a meal ration is fed three times daily in direct proportion to the amount of milk given by each individual animal.

CALF-FEEDING

The dairy calves are taken from the dam at birth, removed to the calf stable and placed in small individual stalls away from the sight of the cow. The first feed given is the colostrum which is so necessary in cleaning the digestive tract. Care is taken at the start not to overfeed. The young calf has a small stomach which cannot hold more than two or three quarts of milk, depending upon the size of the calf. A safe rule is to keep the calf always a little hungry. A calf whose appetite is satisfied is over-fed. Under-feeding is less objectionable than over-feeding for the reason that too much milk will cause indigestion, colic and scours which may have fatal results unless there is constant watchfulness on the part of the feeder. At the first sign of indigestion the quantity of milk should be reduced and a dose of castor-oil administered.

The young calves are fed whole milk beginning at three to five pounds at each feed daily depending on the size and strength of the calf, the amount fed being divided into three feeding periods. The quantity is gradually increased to a maximum of fifteen pounds per day at three months. The feeding periods are divided into eight-hour intervals as nearly as possible, since regularity of feeding is very important. The calves are fed just as soon as the milk is drawn from the cow to make sure that it is sweet and warm. At the beginning of the fourth month the milk allowance is gradually changed to skim-milk and increased to about eighteen pounds or possibly more for the large, lusty calf. Skim-milk is fed until the calves are from six to eight months of age.

At three to four weeks of age a small quantity of whole oats is fed after the milk. At the same time nice green prairie hay, or well cured alfalfa hay when available is kept before them, but if any feed is left the manger is cleaned before the next meal. At first they eat about equal quantities of grain and hay but as their paunches develop the proportion of roughage is increased. Well cured silage when available is fed at about the third month in small amounts gradually increasing to five pounds per day at about six months of age. As soon as the calves are eating grain well a mixture of two parts oat chop, one part wheat bran and a small amount of oil-cake meal (nut size) is fed beginning with a half pound a day and increasing gradually to four pounds a day at six months. All feed changes and increases are made gradually. By following this general practice twin Holstein heifer calves weighed at the end of ten months an average weight of 700 pounds. They were fed for a total of 306 days in which time they gained 1,247 pounds, which is an average daily gain each of 2·04 pounds for the first ten months after birth. When ready to calve at approximately 27 to 30 months of age the two-year-old heifers usually weigh from 1,400 to 1,500 pounds. Young calves are kept in the stable the first summer to protect them from heat and flies. They are turned out for exercise in the yard or paddock night and morning where they have access to water. They are not turned to pasture until the second summer.

The calves are dehorned with caustic potash at from one to two weeks of age. The hair is clipped from around the horn button and vaseline rubbed on the hair wherever the caustic is likely to touch. Heavy brown paper is wrapped around the stick of caustic to prevent it burning the fingers. The top of the button is snipped off with a sharp knife and caustic rubbed on the wound until bleeding is stopped. After the caustic has been properly applied, the horn button should be coated with vaseline.

OAT GREEN FEED VS. ALFALFA FOR MILK PRODUCTION

OBJECT OF EXPERIMENT.—To compare oat green feed and alfalfa hay as to their suitability for the economic production of milk.

PLAN OF EXPERIMENT.—Eight cows, nearly all well advanced in their lactation period, were used in this experiment. The experiment was divided into three three-week periods and data were taken during the final week of each period only, the first two in each case being used as transition periods. The first and last periods were averaged which average was directly comparable to the second period as it eliminated the natural decline in milk flow. For the first three weeks alfalfa was fed in addition to the meal mixture and ensilage. Oat green feed was fed for the second three weeks and alfalfa again for the final three weeks. To obtain the percentage of butterfat a test was taken in the middle of the final week of each period. The same amounts of feed by weight were fed throughout the entire nine weeks. Feeds were charged at the following prices, which are at cost of production for home-grown feeds, and at cost laid down at the Station for brought-in feeds:—

Alfalfa, $15 a ton.
Oat green feed, $8 a ton.
Corn ensilage, $4 a ton.
Meal mixture, $1.70 a pound.
The meal ration fed to these cows consisted of the following mixtures:—
Rolled oats, 400 pounds at 50 cents a bushel.
Bran, 200 pounds at $27 a ton.
Oilcake meal, 200 pounds at $50 a ton.
Bone meal, 5 pounds at $50 a ton.
Salt, 10 pounds at $1.80 a hundred.
Total 815 pounds; cost $13.88.
Cost per cwt., $1.70.

The alfalfa and oat green feed used in this experiment were grown at the Station in 1927.

OAT GREEN FEED VS. ALFALFA FOR MILK PRODUCTION

——		First period—alfalfa	Third period—alfalfa	Average of first and third periods—alfalfa	Second period—oat green feed
Number of cows on test		8	8	8	8
Total milk produced in final week of each period	lb.	1,743·8	1,541·4	1,642·6	1,527·2
Average per cow per day	"	31·1	27·5	29·3	27·3
Average percentage butterfat in milk	%	3·74	3·90	3·82	3·90
Total pounds of butterfat for one week	lb.	65·22	60·11	62·75	59·56
Average butterfat per cow per day	"	1·16	1·07	1·12	1·06
Value of butterfat at 40 cents per pound	$	26.09	24.04	25.10	23.82
Amounts of Feed Required					
Alfalfa at $15 a ton	lb.	820	820	820	.....
Oat green feed at $8 a ton	"	.....	.....	.....	820
Ensilage at $4 a ton	"	2,740	2,740	2,740	2,740
Meal mixture at $1.70	"	534	534	534	534
Total cost of feed	$	20.71	20.71	20.71	17.84
Profit over cost of feed not including skim-milk	$	5.38	3.33	4.39	5.98
Cost to produce 100 pounds of milk	$	1.19	1·34	1·26	1.17
Cost to produce 1 pound of butterfat	$	0.32	0.34	0.33	0.30

From the table it will be noted that the cows produced more milk and butterfat when fed alfalfa than when fed oat green feed. On alfalfa the cows gave an average of 20·5 pounds of milk daily while on oat green feed the average was 19·1 pounds of milk daily. In a week on alfalfa the cows gave 3·19 pounds of butterfat more than in a week on oat green feed. The difference in cost of production is, however, in favour of oat green feed. A week's feeding including alfalfa cost $20.71 as compared with $17.84 for a week's feeding including oat green feed. When fed alfalfa the eight cows showed a profit of $4.39 in a week and $5.98 when feed oat green feed. When fed alfalfa it cost $1.26 to produce 100 pounds of milk and 33 cents to produce a pound of butterfat, but when fed oat green feed it cost only $1.17 a hundred for milk and 30 cents for a pound of butterfat. Thus, while in this experiment the cows produced more of both milk and butterfat when fed alfalfa, the cost of production was in favour of green feed.

In this experiment the cows used were on Record of Performance and were fed a balanced meal ration of rolled oats, oilcake meal and bran. Had the grain ration contained less oilcake meal and bran which are high protein feeds the difference in favour of alfalfa would probably have been much greater. Alfalfa hay is high in protein while on the other hand oat green feed is low in protein.

BETALASSES FOR MILK PRODUCTION

OBJECT OF EXPERIMENT.—To determine if possible if any advantage is to be gained in the feeding of Betalasses to milch cows to increase milk production.

PLAN OF EXPERIMENT.—Four cows on test for Record of Performance were used in this experiment. The feeding period was of nine weeks' duration and divided into three periods of three weeks each. For the first three weeks Betalasses was fed in addition to the meal mixture, ensilage, oat green feed and alfalfa hay. For the second three weeks no Betalasses was fed. Betalasses was again fed for the final three weeks. The data were taken during the final week of each period only, the first two weeks in each case being used as transition periods. The first and last periods were averaged, which average was directly comparable to the second period as it eliminated the natural decline in milk flow. To obtain the percentage of butterfat a test was taken during the final week of each period.

The grain and roughage rations remained as constant as it was possible to keep them during the whole of the experiment.

Each cow was fed a mixture of four parts rolled oats, two parts bran and one and one-half parts oil cake meal, costing $1.85 per 100 pounds. Each cow also received approximately 15½ pounds of alfalfa hay, 4 pounds of oat green feed and 44 pounds of corn ensilage daily. The hay was valued at $15 per ton, the oat green feed at $8 per ton and the ensilage at $4 per ton. Each cow, when being fed Betalasses, received 3 pounds per day costing 1·8 cents per pound. The Betalasses was diluted in the proportion of about 1 part Betalasses to 3 parts water and sprinkled over the meal and silage in the mangers. The feeds used were charged at cost of production for home-grown feeds and at cost laid down at the Station for brought-in feeds.

The Betalasses used in this test was produced by the Raymond Sugar Factory, Raymond, Alberta. Betalasses produced from sugar beets is a sugar concentrate (carbohydrate).

The following table gives the data for this experiment:—

BETALASSES FOR MILK PRODUCTION

——		First period— Betalasses	Third period— Betalasses	Average of first and third periods— Betalasses	Second period— no Betalasses
Number of cows on test		4	4	4	4
Total milk produced in final week of each period	lb.	1,418·6	1,334·1	1,376·4	1,263·7
Average per cow per day	"	50·7	47·6	49·2	45·1
Average percentage butterfat in milk	%	3·42	3·70	3·56	3·55
Total pounds of butterfat for 1 week	lb.	48·52	49·36	49·00	44·86
Average butterfat per cow per day	"	1·73	1·76	1·75	1·60
Value of butterfat at 40 cents per pound	$	19·41	19·74	19·60	17.94
Amounts of Feed Consumed					
Alfalfa hay at $15 a ton	lb.	435	435	435	435
Oat green feed at $8 a ton	"	108	108	108	108
Ensilage at $4 a ton	"	1,230	1,230	1,230	1,230
Meal mixture at $1.85 per cwt	"	407	407	407	407
Betalasses at 1·8 cents a pound	"	84	84	84	.....
Total cost of feed	$	15.19	15.19	15.19	13.68
Profit over cost of feed not including skim-milk	$	4.22	4.55	4.41	4.26
Feed cost to produce 100 pounds of milk	$	1.07	1.14	1.10	1.08
Feed cost to produce 1 pound of butterfat	$	0.31	0.31	0.31	0.30

From the above table it will be noticed that the addition of Betalasses to a ration consisting of alfalfa hay, oat green feed, ensilage and a well-balanced grain mixture produced 112·6 pounds more milk and 4·13 pounds more fat than the straight ration without additions. The increased milk production was, however, at an increased cost of 2 cents per 100 pounds of milk and 1 cent per pound of butterfat. A week's feeding including Betalasses for four cows cost $15.19 as compared with $13.68 for a week's feeding without Betalasses. The increase in milk flow and in butterfat was, however, sufficiently large to counterbalance the additional cost of the Betalasses in the ration. The difference of 15 cents in profit over cost of feed for one week in favour of the four cows fed Betalasses may be regarded as too small to be significant.

In a similar experiment conducted the previous year the addition of Betalasses produced more milk and less fat, but the increase in milk flow was not sufficiently large to counterbalance the slight decrease in butterfat and the additional cost of the Betalasses in the ration.

Further work is necessary before final conclusions can be drawn.

MILK PRODUCTION OF PURE-BRED COWS

In the following table is given a statement of the milk and fat production and feed consumption records for all cows and heifers which have finished a normal lactation period during the year 1928. In addition to those reported there are several cows that have not completed a period during the year and four heifers which are now milking in their first period. The feed charges given in this table are for the feed eaten during the actual period of milking, no allowance being made for the dry period previous to calving.

The profit column shows a comparison only between cost of feed and value of milk produced. The labour cost of caring for the cattle, the manufacture of butter, the interest on the investment, depreciation, etc., are not included nor is the value of calf at birth.

Butter is computed at 40 cents per pound and skim-milk at 20 cents per 100 pounds.

In estimating the cost of feeds the following values were used:—

Meal (oats, bran and oil cake)	$35 00 per ton
Corn and sunflower ensilage	4 00 "
Hay	15 00 "
Oat green feed	8 00 "
Pasture per month per cow	2 00

The meal mixture is charged at cost price and roughage at cost of production.

From the figures in the table, it is found that the average feed cost to produce one hundred pounds of milk was just under $1 and to produce a pound of butter just under 22 cents.

INDIVIDUAL MILK RECORDS COMPLETED DURING THE YEAR 1928

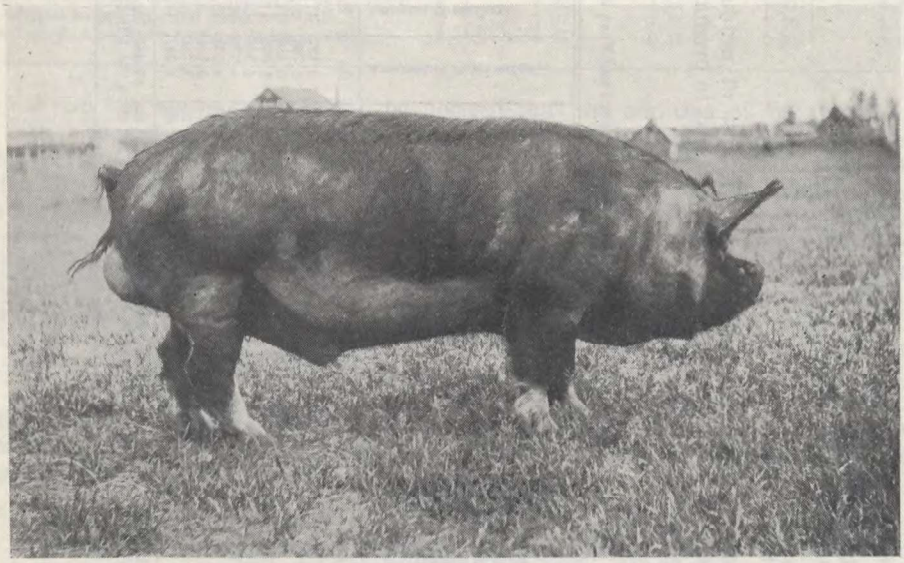
Name of cow	Number of lactation period	Number of days in milk	Total pounds of milk for period	Daily average yield of milk	Average per cent fat in milk	Pounds fat for period	Pounds butter for period	Value of butter at 40 cents a pound	Value of skim-milk at 20 cents per cwt.	Total value of product	Amount of meal eaten	Amount of ensilage eaten	Amount of hay eaten	Amount of green feed eaten	Months on pasture at $2 a month	Total cost of feed for period	Cost of feed to produce 100 pounds milk	Cost to produce 1 pound butter, skim-milk neglected	Profit on 1 pound butter, skim-milk neglected	Profit on cow for period, labour and calf neglected
		days	lb.	lb.	%	lb.	lb.	$	$	$	lb.	lb.	lb.	lb.	mos.	$	$	cts.	cts.	$
L.E.S. Mechthilde Korndyke	4	375	19,200	51·2	3·73	716	895·0	358 00	36 97	394 97	6,127	11,065	3,890	996	4	170 51	0 89	19·0	21·0	224 46
Ross Keyes L.E.S.	3	381	17,151	45·0	3·59	616	770·0	308 00	33 07	341 07	5,760	10,850	3,670	901	3	159 63	0 93	20·7	19·3	181 44
L.E.S. Rosa Gretchen	3	486	16,310	33·6	3·85	628	785·0	314 00	31 36	345 36	5,438	14,175	4,536	1,120	5	172 02	1 05	21·9	18·1	173 34
L.E.S. Nina Mechthilde	3	451	15,754	34·9	3·67	578	722·5	289 00	30 35	319 35	5,020	11,895	4,212	1,068	5	157 50	1 00	21·8	18·2	161 85
Nina Gem Korndyke L.E.S.	2	403	15,140	37·6	3·68	557	696·25	278 50	29 17	307 67	4,966	12,260	4,105	1,026	4	154 32	1 02	22·2	17·8	153 35
L.E.S. Princess Echo	3	411	14,352	34·9	3·81	547	683·75	273 50	27 61	301 11	4,872	13,060	4,398	1,037	4	156 52	1 09	22·9	17·1	144 59
Midnight Princess L.E.S.	1	317	12,125	38·2	3·99	484	605·0	242 00	23 28	265 28	4,105	10,650	3,525	887	3	129 13	1 06	21·3	18·7	136 15
L.E.S. Evergreen Johanna	7	305	12,786	41·9	3·28	420	525·0	210 00	24 73	234 73	4,190	8,370	2,770	690	4	121 60	0 95	23·2	16·8	113 13
Nina Gem Mechthilde L.E.S.	4	316	14,111	44·6	3·32	468	585·0	234 00	27 29	261 29	4,756	10,120	3,395	842	3	138 30	0 98	23·6	16·4	122 99
Korndyke Gretchen L.E.S.	2	359	13,114	36·5	3·48	457	571·25	228 50	25 31	253 81	4,247	10,870	3,643	916	4	135 04	1 03	23·6	16·4	118 77
Total for herd (10 cows)	.....	3,804	150,043	.....	.....	5,471	6,838·75	2,735 50	289 14	3,024 64	49,481	113,315	38,144	9,483	39	1,494 57	.....	.....	.....	1,530 07
Average for herd (10 cows)	.....	380·4	15,004·3	39·4	3·81	547·1	683·87	278 55	28 91	302 46	4,948·1	11,331·5	3,814·4	948·3	3·9	149 46	0·996	21·9	18·1	153 01

SWINE

At the end of 1928 the breeding herd at the Station was made up of 26 Yorkshire sows and 3 Yorkshire boars; 18 Tamworth sows and 1 Tamworth boar; 8 Berkshire sows and 1 Berkshire boar, and 1 cross-bred sow, making a total of 53 head of sows and 5 boars.

The Yorkshire herd has been much improved this fall by the addition of the boar Ottawa Alexander 138 —102759— from the Experimental Station at Scott, Sask. This boar is sired by the imported boar Dalmeny A.R. —88840— obtained by this Station from the Central Experimental Farm, Ottawa, in the fall of 1927. Crossed on the Yorkshire sows at this Station, these two boars, carrying new blood, should bring about an advancement in the way of increased substance and strength in the offspring as well as an improvement in Yorkshire type.

During the year six Tamworth females, three bred at the Experimental Station, Swift Current, Sask., and three at the Experimental Station, Rosthern, Sask., have been added to the herd. This new blood should strengthen the Tamworth herd.



Summerland Hyleg—69298—Berkshire herd sire at the Experimental Station, Lacombe.

No Berkshire breeding stock was purchased during the year as the same herd boar Summerland Hyleg —69298— used during the 1927-28 breeding season reproduced satisfactorily and will be suitable for the 1928-29 season's service.

ERADICATION OF ROUND WORMS

During the past few years Canadian swine raisers have been confronted with a perplexing condition in rearing their young pigs. The round worm, a comparatively new pest to the Canadian hog grower, is attacking many herds of swine and is causing serious losses in young pigs; losses not necessarily due to deaths but to coughs, thumps and broncho-pneumonia which are mainly attributable to the attacks of this parasite and which result in runts and

unthrifty pigs which prove very costly to grow and finish to marketable weight. Instead of being ready to go as a two-hundred-pound hog at six months it may be eight or even ten months before this weight can be attained.

In a herd which becomes infested, the adults of the round worm inhabit the intestines of the animals. Each female worm produces thousands of eggs daily which pass out with the droppings and are later swallowed by the swine. The eggs then hatch and the embryos emerge and quickly burrow through the bowel wall and find their way in the blood stream to the liver, the heart and the lungs. In the lungs they leave the blood stream and make their way up the air passages to the throat and cause the animals to cough. They are again swallowed and reach the stomach where they develop into mature worms capable of producing eggs. In this way they complete the cycle.

At this Station some investigational work has been carried on in regard to the control of worms in hogs. The hogs having been kept on very much the same land since the herd was started in 1913 had become seriously infested with worms. Keeping in mind that successful treatment for worms consists in prevention rather than cure and that the main feature in prevention is strict sanitation, the pigs were reared during the summers of 1927 and 1928 on brome grass sod which had not previously been used for hogs.

The brood sows being infested with these parasites were given treatment to remove as many as possible previous to farrowing, and to being placed on the uncontaminated soil with their litters. Oil of Chenopodium, which is recommended for the eradication of worms in hogs, was administered about three weeks before farrowing and again about three days before farrowing. For an adult sow the dose was one-half ounce or a tablespoonful mixed with the feed. Because of the strong and somewhat objectionable odour and taste the sow was starved before administering the oil so that it would be consumed readily. If, owing to its unpalatableness, the sow would not take it in the feed the capsule and balling-gun method was used and insured successful administration. Before the sow was put in the farrowing pen the floor and walls were scrubbed with boiling lye water using one pound of lye to 40 gallons of water. Soap and water was used to wash the udder of the sow before she was put in the clean pen. The young pigs were treated when six weeks of age or as soon after as they were eating freely from the trough and again six weeks later to remove such other worms as may have not yet emerged from the body tissues at the time of the first dose. The pigs were also starved in order to ensure that they consumed the material. The dose for the young pigs was one-half teaspoonful per pig.

Nema capsules and Santonin, which are also recommended for the eradication of worms in hogs, have been given trials but it will be necessary to carry on further experimental work with these drugs before it can be stated definitely as to their effectiveness as compared with oil of Chenopodium in expelling worms.

A post-mortem examination of the 87 hogs which passed through the abbatoir in the fall of 1928 in connection with the Advanced Registry tests with swine revealed only one of the number to show any trace whatever of worm infestation, indicating that as a result of the methods used the worms seem to have been almost entirely eradicated from the herd. In any event the health and thriftiness of the hogs has been very much improved during the past year.

CARE OF BROOD SOWS

A type of shelter which has proven very satisfactory for wintering brood sows at this Station is the "A"-shaped portable cabin. A number of these are ranged side by side and are located about 150 yards from the feeding trough so that the sows will be compelled to take exercise even in the severest weather. The land over which the sows walk back and forth is fall ploughed and the sows

consume some of the fresh earth daily. The tops, sides and backs of the cabins are covered with straw, leaving the fronts open and facing the south. Each 6 by 8 feet cabin will provide protection from the cold for four or five sows. The sows are brought into the piggery from ten days to two weeks before farrowing as a good many of the sows farrow too early in the year to attempt using the cabins for this purpose. As soon as the youngsters are from ten days to two weeks old, if the weather is not too severe the sow and litter are moved outside to one of the straw covered "A"-shaped cabins. These cabins have been a cheap and decidedly successful method of housing early litters at this Station.

During the winter of 1927-28 the pregnant sows were kept in a thrifty condition but not fat on a ration consisting of 3 parts oat chop, 1 part barley chop supplemented with one per cent bone meal, 8 per cent digester tankage and a small daily allowance of alfalfa hay. This latter is a valuable supplement to the grain ration.

As a precaution against hairless pigs, potassium iodide was given the pregnant sows in the following manner. One ounce of potassium iodide was dissolved in one gallon of water and one tablespoonful of the liquid per sow was given in the drinking water once per day. Even in herds where hairlessness does not occur it is considered that this allowance of iodide will have a beneficial effect on the general health of the herd. A cheap mineral mixture of 76 pounds of slacked coal, 3 pounds of air-slacked lime, 20 pounds of salt and 1 pound of sulphur was constantly available for the brood sows during the winter months.

During the summer the sows had the run of six acres of oat and fall rye pasture with access to natural shade and water as in previous years. The boars had the run of a large brome grass pasture.

FARROWING RECORDS

The following table gives the farrowing record during the year of all sows in the herd:—

FARROWING STATEMENT FOR 1928

—	Spring litters			Fall litters			Total spring and fall litters			Herd totals
	Yorks	Tams	Berks	Yorks	Tams	Berks	Yorks	Tams	Berks	
Number of litters farrowed in 1928	20	10	10	5	6	2	25	16	12	53
Total number of pigs farrowed	273	98	92	56	54	14	329	152	106	587
Number of pigs per litter (average)	13·65	9·80	9·20	11·2	9·0	7·0	13·2	9·5	8·83	11·07
Number of pigs dead at birth	48	14	8	4	10	1	52	24	9	85
Number of pigs dead at birth per litter (average)	2·40	1·40	0·80	0·80	1·66	0·50	2·08	1·5	0·75	1·6
Number of pigs died before weaning per litter (average)	5·40	3·60	3·30	2·2	3·83	2·5	4·76	3·69	3·17	4·07
Number of pigs weaned per litter (average)	8·25	6·20	5·90	9·0	5·16	4·5	8·40	5·81	5·66	7·0
Percentage of pigs, farrowed alive, raised	73·33	73·81	70·24	86·54	70·45	69·23	75·81	72·66	70·10	73·90

The above statement shows that 53 litters were raised during the year of which 40 were spring and 13 were fall litters. The litters averaged 11·0 pigs per litter farrowed and 7·0 per litter raised.

Litters farrowed after July 1 are called fall litters, as they must be grown and finished mainly under fall and winter conditions.

Another point which this table brings out, and which will be of interest to the farmer raising hogs is that the autumn seems a more suitable time for farrowing pigs than the spring time. In the spring 61·77 per cent of the total pigs farrowed were raised to weaning, while in the fall 68·55 per cent were raised

to weaning. In 1927 the percentage of spring farrowed pigs raised was only 63·5 as against 73·3 per cent of the fall farrowed. For good results fall litters should all be farrowed not later than September 15. Hogs farrowed before this date usually are well enough developed to stand the cold weather when it comes. In order to have the pigs born from the first to the fifteenth of September the sow must be bred between May 10 and 25. If she is to wean her spring litter before being bred she must farrow during the latter part of March or early in April.

PROLIFICACY OF DIFFERENT BREEDS

The Yorkshires have again demonstrated that they are more prolific than the Tamworths and Berkshires. The average Yorkshire litter farrowed in 1928 was 13·2 as compared with 9·5 for Tamworths and 8·8 for Berkshires. In the average number of pigs raised per sow, Yorkshires again lead with an average of 8·4 per sow; the Tamworths with an average of 5·8 and the Berkshires 5·7 per sow. This goes to show that the Yorkshire is more prolific, and that the sows are better mothers than the sows of the other two breeds.

PROLIFICACY OF DIFFERENT BREEDS OF SWINE—SUMMARY OF YEARS 1925, 1926, 1927, 1928

—	Yorkshires	Berkshires	Tamworths
Total number of litters	110	40	60
Total number of pigs farrowed	1,212	363	491
Average number of pigs per litter	11·02	9·08	8·18
Total number of pigs raised to weaning	768	243	327
Average number of pigs weaned per sow	6·98	6·07	5·45

The above table is a summary of four years of breeding work comparing the prolificacy of the Yorkshire, Berkshire and Tamworth breeds of swine. In size of litters farrowed and in average number of pigs weaned per sow the Yorkshire ranks first, the Berkshire second and the Tamworth third. The Yorkshires are the most prolific and make the best mothers. As Tamworths have been raised at the Station only since 1925, only a four-year average is possible.

COMPARISON OF BREEDS AND CROSSES IN FEEDING CHARACTERISTICS

OBJECT OF EXPERIMENT.—To determine the difference in economy of production between the different lots representing pure-bred Yorkshires, Tamworths, Berkshires and Yorkshire-Tamworth cross-breds, on identical rations, and fed and housed under similar conditions.

PLAN OF EXPERIMENT.—The pigs used in this experiment were selected from fall litters of the different breeds and crosses and weighed into the test on January 27. There was some difference in the age of the respective lots which was unavoidable. However, the general thrift and vigour was as uniform as possible. There was much similarity in the breeding. The pure-bred Yorkshire lot was selected from three litters by the same sire and the Yorkshire-Tamworth cross-bred lot all from the one litter was also by this sire. The pure-bred Tamworth lot was selected from two litters all by the same sire. The pure-bred Berkshire lot was all from one litter. All lots were fed identical meal rations from self-feeders placed close to the 6 by 8 feet colony houses in which the pigs were sheltered. Water from which the chill had been removed was provided twice daily. The mineral mixture to which all lots had access consisted of slacked coal, 165 pounds; bone meal, 20 pounds; and salt, 15 pounds.

BREEDS AND CROSSES IN FEEDING CHARACTERISTICS—PROPORTION AND QUANTITIES FED

Lot	Number of pigs	Days in experiment	Breed	Meal ration fed	Other feeds
1	9	83	Yorkshire	First 30 days— Oat chop, 2 parts; barley chop, 1 part, shorts, 1 part.	8 per cent tankage.
				Second 30 days— Oat chop, 2 parts, barley chop, 2 parts.	8 per cent tankage.
				To end of test— Oat chop, 1 part, barley chop, 3 parts.	8 per cent tankage.
2	9	83	Tamworth	Same as lot 1	Same as lot 1.
3	7	103	Berkshire	Same as lot 1	Same as lot 1.
4	8	83	York-Tam. crossbreeds	Same as lot 1	Same as lot 1.

Prices charged for feeds:—

Ground oats	55 cents a bushel
Ground barley	65 cents a bushel
Shorts	$29 00 a ton
Tankage	$50 00 a ton

The following table gives the information secured:—

COMPARISON OF BREEDS AND CROSSES

Items	Lot 1	Lot 2	Lot 3	Lot 4
	Pure-bred Yorkshires	Pure-bred Tamworths	Pure-bred Berkshires	York-Tam cross-breds
Date of commencement of test	Jan. 27, 1928	Jan. 27, 1928	Jan. 27, 1928	Jan. 27, 1928
Date test finished	April 19, 1928	April 19, 1928	May 9, 1928	April 19, 1928
Number of pigs in lot	9	9	7	8
Average initial age ..... days	153	146	120	140
Average initial weight ..... lb.	100·3	104·4	53·3	83·1
Average final weight ..... "	205·2	208·7	164·3	208·5
Average gain per head ..... "	104·9	104·3	111·0	125·4
Number of days on test ..... days	83	83	103	83
Average daily gain per head ..... lb.	1·26	1·26	1·08	1·51
Total grain fed per lot ..... "	5,299	5,815	4,528	5,214
Total supplement fed per lot ..... "	424	465	362	417
Cost of protein supplement for lot ..... $	10 60	11 62	9 05	10 42
Feed for 100 pounds gain—				
Grain ..... lb.	561·33	619·94	582·75	519·84
Tankage ..... "	44·91	49·57	46·59	41·57
Total cost of feed including supplement ..... $	87 86	96 63	74 33	86 38
Cost of feed to produce 100 pounds gain ..... $	9 31	10 30	9 57	8 61
Number of hogs grading select on foot	9	5	0	8
Average initial value per pig at $7 per cwt ..... $	7 02	7 31	3 73	5 82
Cost of feed per head ..... $	9 76	10 74	10 62	10 80
Total cost per head ..... $	16 78	18 05	14 35	16 62
Selling price per cwt. obtained for "thick-smooths" $	.....	9 00	9 25	.....
Selling price per cwt. obtained for "selects" ..... $	9 50	9 50	.....	9 50
Selling price per head ..... $	19 49	19 36	15 20	19 81
Average profit per head ..... $	2 71	1 31	0 85	3 19

When considering the "average profit per head" in this test it should be borne in mind that owing to unusual conditions all feeds in Alberta were extremely high in price during the winter of 1928. With shorts at $29 a ton, barley at 65 cents a bushel and oats at 55 cents a bushel, the cost per pound to

produce pork was unusually high. With a high feed cost combined with a low selling price for pork it was impossible for the swine grower to make a satisfactory net profit feeding pigs during the winter of 1928.

It will be noted from the table that the Yorkshire-Tamworth cross-bred lot made the highest daily gain and returned the highest net profit followed by the pure-bred Yorkshires and the pure-bred Tamworths in the order named. The pure-bred Berkshires made the lowest daily gains and returned the least net profit.

In fairness to the Berkshires in this particular test it should be mentioned that they were practically a month younger when started on test which may account, in part at least, for the poor showing made by them in comparison with the other breeds and crosses. A point worthy of consideration in this connection, nevertheless, is the fact that previous experiments at this Station comparing pure-bred hogs and crosses have always shown the pure-bred Berkshire to be inferior to the pure-bred Yorkshire and the cross-bred hog from the standpoint of rate and economy of gains under winter feeding conditions. The Yorkshire and cross-bred hogs have always stood up well under heavy winter feeding at this Station; whereas we have found the Berkshire to be a difficult hog to feed during the winter months because just a little too much feed seems to have a disastrous effect on them, resulting in unthriftiness and crippling. As only two years' results are available at this time respecting the comparison of the Tamworths with the Yorkshires, Berkshires and the various crosses, it will be necessary to conduct many more trials before any definite conclusions can be drawn as to the merits of the Tamworth as compared with the other breeds.

A striking contrast is shown in the table with respect to percentage of "selects." The Yorkshire-Tamworth cross-bred lot and the pure-bred Yorkshire lot graded one hundred per cent "select", while fifty-five per cent of those in the pure-bred Tamworth lot were given this grade. The lot of Berkshires did not give one select hog.

VALUE OF FROZEN WHEAT FOR HOG FEEDING

OBJECT OF EXPERIMENT.—To determine the feeding value of frozen wheat for growing pigs; also to note the effect of adding a percentage of oats to frozen wheat, or to compare various oat and frozen wheat combinations as rations for growing and finishing hogs for market.

PLAN OF EXPERIMENT.—In this experiment forty pure-bred Yorkshire pigs were used. They were divided into four groups of ten pigs each. In making the allotment the groups were arranged as nearly equal in weight, sex, age, and general appearance as possible. Previous to the beginning of the test the feeding and management of all pigs was practically the same. The pigs were farrowed in May and June and the average age at the beginning of the experiment was $2\frac{3}{4}$ months. Up until the cold weather set in on November 1 each lot had access to a self-feeder and to a brome grass pasture approximately one-third of an acre in extent. A-shaped portable cabins were provided for shade and shelter. On November 1 all lots were moved to winter quarters. During the winter each lot was fed outside and had a well banked portable cabin with openings to the south for sleeping quarters. The feeding lots, 12 feet by 24 feet, adjoined each cabin which provided space for limited exercise and the self-feeder. While on pasture each group had access to a constant supply of fresh water. In winter quarters water from which the chill had been removed was provided twice daily. The mineral mixture fed was: slacked coal, 164 pounds; bone meal, 20 pounds; salt, 15 pounds, and iron sulphate, 1 pound.

FROZEN WHEAT—PROPORTIONS AND QUANTITIES FED

Lot	Number of hogs	Breed	Number of days fed	Meal ration fed	Other feeds
1	10	Yorkshire.	140	Frozen wheat	8 per cent tankage.
2	10	Yorkshire.	140	Frozen wheat, 3 parts, oat chop, 1 part.	8 per cent tankage.
3	10	Yorkshire.	140	Frozen wheat, 2 parts, oat chop, 1 part.	8 per cent tankage.
4	10	Yorkshire.	140	Frozen wheat, 1 part, oat chop, 1 part.	8 per cent tankage.

FEEDS USED.—The frozen wheat used in this experiment graded No. 6 and the oats for the most part graded 3 C.W., but were rather variable as to quality. Digester Tankage—50 per cent protein was used.

VALUE OF FROZEN WHEAT FOR HOG FEEDING

Items		Lot 1	Lot 2	Lot 3	Lot 4
		Frozen wheat, tankage, 8 per cent	Frozen wheat, 3 parts; oat chop, 1 part; tankage, 8 per cent	Frozen wheat, 2 parts; oat chop, 1 part; tankage, 8 per cent	Frozen wheat, 1 part; oat chop, 1 part; tankage, 8 per cent
Number of hogs in experiment		10	10	10	10
Gross weight, August 23, 1927	lb.	520	520	510	519
Average weight, August 23, 1927	"	52·0	52·0	51·0	51·9
Gross weight, January 10, 1928	"	1,781	1,898	1,876	1,861
Average weight, January 10, 1928	"	178·1	189·8	187·6	186·1
Total gain per lot during test (140 days)	"	1,261	1,378	1,366	1,342
Average gain per animal for period	"	126·1	137·8	136·6	134·2
Average daily gain per animal	"	0·90	0·984	0·976	0·959
Frozen wheat consumed at 1·1 cents per pound	"	7,250	5,464	5,079	3,513
Oat chop consumed at 1·5 cents per pound	"	.....	1,822	2,540	3,513
Tankage at $2.50 per hundred	"	580	583	609	562
Amount of meal eaten by group (tankage not included)	"	7,250	7,286	7,619	7,026
Cost of protein supplement per lot	$	14 50	14 58	15 22	14 05
Amount of meal eaten per pound gain	lb.	5·75	5·29	5·58	5·24
Amount of tankage per pound gain	"	0·460	0·423	0·446	0·419
Amount of frozen wheat eaten per pound gain	"	5·75	3·97	3·72	2·62
Amount of oat chop eaten per pound gain	"	.....	1·32	1·86	2·62
Total cost of feed including tankage	$	94 25	102 00	109 19	105 38
Cost of feed per head	$	9 43	10 20	10 92	10 54
Cost of feed per head per day	cts.	6·73	7·29	7·80	7·53
Cost of feed to produce 1 pound gain	"	7·47	7·40	7·99	7·85
Profits per head at 8 cents per pound less cost of feed; labour neglected	$	4 82	4 98	4 09	4 35
Per bushel value of frozen wheat when marketed through hogs at prices given below, and oats and tankage at prices quoted above—					
12 cents per pound	$	1 13	1 35	1 31	1 61
11 cents per pound	$	1 03	1 20	1 14	1 38
10 cents per pound	$	0 92	1 05	0 98	1 15
9 cents per pound	$	0 82	0 90	0 82	0 67
8 cents per pound	$	0 71	0 75	0 66	0 69
7 cents per pound	$	0 61	0 60	0 50	0 46

SUMMARY.—As will be observed from the table the three lots getting various oat and frozen wheat combinations made larger gains than lot 1, which was supplied only frozen wheat and tankage. Of the three lots on various oat and frozen wheat combinations the greatest gains were made by the hogs getting the 25 per cent ration, followed in turn by the 33·3 per cent and the 50 per

cent ration of oat chop. These lots which were fed oat chop, however, showed little difference in the gains made, there being only 3·6 pounds per hog on the average for the 140 days between the 25 per cent ration and the 50 per cent ration, while the hogs on the 33·3 per cent ration showed an average of 1·2 pound lower gains per hog than the average for the hogs on the 25 per cent ration. On the other hand, the three lots that were fed various quantities of oat chop showed an average of 10·1 pounds higher gains per hog than the average for the hogs in the control lot which did not receive oat chop.

On the basis of pounds of feed required to produce a pound of gain, lot 4 showed a consumption of 5·23 pounds of meal and 0·419 pound of tankage per pound of gain in weight; lot 2 followed closely with ·06 of a pound more meal and ·04 of a pound more tankage; lot 3 with 5·58 pounds of meal and 0·446 pound of tankage, and lot 1 which was the control lot with 5·75 pounds of meal and 0·460 pound of tankage.

When compared on the basis of cost of feed per pound of gain the order was different with lot 2 showing a cost of 7·40 cents, lot 1 a cost of 7·47 cents, lot 4 a cost of 7·85 cents, and lot 3 a cost of 7·99 cents.

The addition of oat chop, therefore, resulted in an increase in daily gains and in total gains with a lower meal and tankage consumption per pound of gain. The increased gains, however, were not sufficiently large to counterbalance the 0·4 cent a pound higher cost of the oat chop as compared with the cost per pound of the frozen wheat.

DEDUCTIONS.—1. Frozen wheat when fed to fall pigs either as a sole grain or in combination with oats promoted satisfactory and reasonably economical gains.

2. The addition of oat chop to a frozen wheat ration increased the daily gains and lowered the feed requirement for 100 pounds gain but decreased the economy of gains.

3. When the market price of hogs is 8 cents per pound and tankage is worth $50 per ton, frozen wheat may be marketed through hogs at 71 cents per bushel. As the market price of hogs increases or decreases, the "hog market" value of frozen wheat would vary as follows:—

When hogs are worth—	Frozen wheat may be marketed at—
12 cents per pound	$1.13 per bushel.
11 cents per pound	1.03 per bushel.
10 cents per pound	0.92 per bushel.
9 cents per pound	0.82 per bushel.
8 cents per pound	0.71 per bushel.
7 cents per pound	0.61 per bushel.

SELF-FEEDING VS. TROUGH-FEEDING

OBJECT OF EXPERIMENT.—To determine the relative efficiency of the methods "Hand-fed" and "Self-fed" in the production of select hogs in dry lot.

PLAN OF EXPERIMENT.—In this experiment twenty-four pure-bred Yorkshire pigs were used. They were divided into two groups of twelve pigs each. In making the allotments provision was made for reasonable uniformity within the groups as to breeding, age, initial weight and potentiality as to ultimate type. The experiment was commenced on May 28 when the average weight of the pigs was approximately 63 pounds and the average age 3½ months. Both lots were confined to dry lots approximately one-eighth of an acre in extent and were provided with A-shaped portable cabins for shade and shelter. One lot was put on a self-feeder and the other lot on hand feeding. These two lots were fed the same meal mixture throughout. The hand-fed pigs were given all

they would clean up twice daily. Buttermilk at the rate of one hundred pounds a day to each lot was supplied throughout the entire test. In addition both lots were given water twice daily, which meant that as a general rule water was before the pigs at all times.

SELF-FEEDING VS. TROUGH-FEEDING—PROPORTION AND QUANTITIES FED

Lot	Number of pigs	Breed	Number of days fed	How fed	Meal ration fed	Other feeds
1	12	Yorkshire.	128	Self-fed.....	First 30 days:— Oat chop, 1 part, barley chop, 1 part, shorts, 1 part Second 30 days:— Oat chop, 1 part, barley chop, 2 parts To end of test:— Oat chop, 1 part, barley chop. 3 parts	Buttermilk Buttermilk Buttermilk
2	12	Yorkshire.	128	Trough-fed..	Same as lot 1.....	Buttermilk

The results of this test are given in the following table:—

SELF-FEEDING VS. TROUGH FEEDING

Method of feeding		Self-fed	Hand-fed
Number of hogs in experiment		12	12
Gross weight May 28, 1928	lb.	755	750
Average weight May 28, 1928	"	62·9	62·5
Gross weight September 13, 1928	"	2,485	2,353
Average weight September 13, 1928	"	207·1	196·1
Total gain per lot during test (128 days)	"	1,730	1,603
Average gain per animal for period	"	144·2	133·6
Average daily gain per animal	"	1·13	1·04
Amount of meal eaten by group	"	8,570	7,388
Amount of buttermilk consumed by group	"	12,800	12,800
Cost of protein supplement per lot	$	25 60	25 60
Amount of meal eaten per pound gain	lb.	4·95	4·61
Amount of buttermilk eaten per pound gain	"	7·40	7·99
Total cost of feed, including buttermilk	$	162 07	142 84
Cost of feed per head	$	13 51	11 90
Cost of feed per head per day	cts.	10·55	9·30
Cost of feed to produce one pound gain	"	9·37	8·91
Number of "select" hogs in each lot		5	8
Profit per head over cost of feed when sold at $12.35 per cwt. for "thich smooths" and $12.85 per cwt. for "selects", labour neglected	$	12 49	13 01

Prices charged for feeds:—

Ground oats	55 cents per bushel
Ground barley	75 cents per bushel
Shorts	$34 00 a ton
Buttermilk	2 cents a gallon

DEDUCTIONS.—Methods of Feeding: By briefly reviewing the above table the reader will observe that the self-fed hogs made an average daily gain of 1·13 pound as compared with 1·04 pound for the trough-fed hogs. On the self-feeder it required 4·91 pounds of meal for a pound of gain and on trough-feeding 4·61 pounds of meal for a pound of gain. The gains cost 9·37 cents a pound for self-fed hogs and 8·91 cents a pound for trough-fed hogs, a difference of 0·46 cent a pound. These results are similar to results obtained in previous tests of a like nature in that the self-feeder will give greater gains but more costly gains than trough-feeding.

TYPE.—In this experiment comparing the two methods of feeding, eight of the twelve hogs in the trough-fed group and five in the self-fed group graded "select." The result of this and similar experiments conducted at the Lacombe Station, indicate that the self-feeding method is less desirable than that of trough-feeding for the production of bacon carcasses, but the possibility of preparing hogs for market at a much earlier date when a self-feeder is used seems to be proven conclusively.

BUTTERMILK VS. TANKAGE VS. OIL-CAKE MEAL

OBJECTS OF EXPERIMENT.—1. To ascertain the profit in raising fall pigs.

2. To determine the relative value of buttermilk, digester tankage and oil-cake meal as supplements to a grain ration in feeding growing pigs during the winter months and in finishing pigs for the market.

PLAN OF EXPERIMENT.—Thirty-two Yorkshire pigs were divided as evenly as possible into four lots of eight each. All lots were fed the same grain ration throughout the test. In addition Lot 1 received buttermilk, lot 2 tankage, lot 3 oil-cake meal and lot 4, which was the check lot, received only the meal ration. Buttermilk was fed at the rate of sixty pounds per day and tankage and oil-cake meal at the rate of 8 per cent of the meal ration. All groups were self-fed with feeders placed close to the 6 by 8 feet colony houses in which the pigs were sheltered. All lots had access to a mineral mixture consisting of slacked coal, 165 pounds; bone meal, 20 pounds; and salt, 15 pounds. Water from which the chill had been removed was provided twice daily to all lots except lot 1, which received buttermilk to drink instead of water.

BUTTERMILK VS. TANKAGE VS. OIL-CAKE MEAL FOR PIGS—PROPORTION AND QUANTITIES FED

Lot	Number of pigs	Days in experiment	How fed	Meal ration fed	Other feeds
1	8	103 January 27 to May 9	Self-fed...	First 30 days:— Oat chop, 2 parts, shorts, 1 part, barley chop, 1 part. Second 30 days:— Oat chop, 1 part, barley chop, 1 part. Last 43 days of test:— Barley chop.	60 pounds of buttermilk per day.
2	8	103	Self-fed....	Same as above.....	8 per cent tankage.
3	8	103	Self-fed....	Same as above.....	8 per cent oil-cake meal.
4	8	103	Self-fed....	Same as above.....	No supplement.

Prices charged for feeds:—

Ground oats	55 cents a bushel
Ground barley	65 cents a bushel
Shorts	$29 00 a ton
Tankage	$50 00 a ton
Oil-cake meal	$50 00 a ton
Buttermilk	2 cents a gallon

The following table gives the information secured:—

BUTTERMILK VS. TANKAGE VS. OIL-CAKE MEAL

Items		Lot 1 Buttermilk	Lot 2 Tankage	Lot 3 Oil-cake meal	Lot 4 Meal ration only
Number of hogs in experiment		8	8	8	8
Gross weight, January 27	lb.	606	602	606	607
Average weight, January 27	"	75·8	75·3	75·8	75·9
Gross weight, May 9	"	1,561	1,615	1,299	1,271
Average weight, May 9	"	195·1	201·9	162·4	158·9
Total gain for period (103 days)	"	955	1,013	693	664
Average gain per animal for period	"	119·38	126·63	86·63	83·00
Average daily gain per animal	"	1·16	1·23	0·84	0·81
Total grain fed per lot	"	3,857	5,150	4,431	4,956
Total supplement fed per lot	"	6,180	412	354	.....
Cost of protein supplement for lot	$	12 36	10 30	8 85	.....
Feed for 100 pounds gain—					
Grain	lb.	404	508	639	746
Buttermilk	"	647·12	.....	.....	.....
Tankage	"	.....	40·67	.....	.....
Oil-cake meal	"	.....	.....	51·08	.....
Total cost of feed (including supplements)	$	68 62	84 69	73 07	71 31
Average inicial value per pig at $7 per cwt	$	5 30	5 27	5 31	5 31
Cost of feed per head	$	8 58	10 59	9 13	8 91
Total cost per head	$	13 88	15 86	14 44	14 22
Cost of feed per head per day	cts.	8·33	10·28	8·86	8·65
Cost of feed to produce 100 pounds gain	$	7 19	8 36	10 54	10 74
Selling price per cwt	$	9 25	9 25	9 25	9 25
Selling price per head	$	18 05	18 68	15 02	14 70
Average profit per head	$	4 17	2 82	0 58	0 48

INITIAL AND FINAL VALUATION OF PIGS.—The initial valuation of the pigs on this experiment was based on the price of thick-smooths on the date when the experiment started minus a 75 cent selling charge. The final valuation was based on the actual selling price of "thick-smooths" (minus a 75 cent selling charge) on the date when the pigs were removed from test without attempting to divide the hogs into their various grades.

SUMMARY OF RESULTS

A study of the table will reveal the fact that the lot receiving tankage as a supplement to the meal ration made the most rapid gains but not the most economical gains. The most economical gains were made by the lot which received buttermilk in addition to the meal ration. The lowest average daily gain and the least economical gain is found in lot 4 fed the meal ration only

The figures dealing with average profit per head over feed cost show that there was a fair profit return on the feed consumed in lots where buttermilk and tankage was used. The greatest profit of $4.17 per head was made in lot 1 where buttermilk was fed as a protein supplement. On the other hand there was an unsatisfactory return on the feed consumed in lots where oil-cake meal was used as a supplement and where the meal mixture was fed alone without any additions. The results would seem to indicate that oil-cake meal is not nearly as satisfactory a protein supplement to the meal ration for fall pigs from the standpoint of either rate or economy of gains as either buttermilk or tankage.

All factors considered in this particular test, there is a decided indication that where buttermilk is not available throughout the year in a more or less constant quantity, that tankage ranks very high as a substitute feed for buttermilk and should be fed as a supplement in a ration lacking milk.

DEDUCTIONS.—1. The pigs fed buttermilk returned the greatest net profit over feed cost. The smallest profit was secured on the "grain alone" group. The use of buttermilk reduced the cost of putting on 100 pounds of live weight from $10.74 to $7.19 and increased the gains by 44 per cent.

2. Tankage promoted the most rapid gains followed by buttermilk, oil-cake meal and the "grain alone" group in the order named. The use of tankage increased the gains by 53 per cent and reduced the cost of putting on 100 pounds live weight from $10.74 to $8.36.

3. While buttermilk fed as a supplement to a grain mixture of oats, barley and shorts, promoted more economical gains than tankage, the packing house by-product, nevertheless, proved a very satisfactory substitute.

4. The use of oil-cake meal resulted in increased gains and slightly more economical gains but it did not show up well when compared with buttermilk and tankage as a protein supplement.

5. Grain fed without additions gave rise to comparatively slow and expensive gains.

EFFECT OF OAT HULLS ON THE GROWTH OF PIGS

OBJECT OF EXPERIMENT.—To determine the effect of oat hulls as contained in oat chop on the growth of pigs.

PLAN OF EXPERIMENT.—Sixteen pigs were used in this experiment including twelve pure-bred Tamworths and four Tamworth-Berkshire crossbreds. They were divided in two lots containing eight pigs each. In making up the two lots due consideration was given to having uniformity in breeding, condition, age and weight. The pigs were farrowed in October and the average age at the beginning of the experiment was 3½ months. Both lots were fed outside in open corrals and had well banked portable cabins with openings to the south for sleeping quarters. The feeding-lots 12 by 24 feet adjoined each cabin which provided space for limited exercise and the feed-trough. Both lots were fed the same except that the hulls were removed from the oat chop for lot 2. For removing the hulls the chop was sifted through an ordinary screen door wire screening which removed about 20 per cent of the chop as hull. The portion of the hull that remained was the very fine particles which would not be seriously detrimental to the young pigs. The meal portion of the ration was fed dry on a feeding platform and the drink was fed in troughs. The lots were fed and watered twice daily.

EFFECT OF OAT HULLS ON THE GROWTH OF PIGS—PROPORTION AND QUANTITIES FED

Lot	Number of hogs	Days on test	Meal ration fed	Other feed
1	8	117	First 60 days:— Common oat chop, 3 parts, barley chop, 1 part.	8 per cent tankage.
			To end of test:— Oat chop, 2 parts, barley chop, 2 parts.	8 per cent tankage.
2	8	103	Same at Lot 1, except that the hulls were removed from the oat chop.	8 per cent tankage.

Items		Lot No. 1 Oat chop	Lot No. 2 Oat chop hulls removed
Date test commenced		Jan. 27, 1928	Jan. 27, 1928
Date test finished		May 23, 1928	May 23, 1928
Number of hogs in lot		8	8
Average initial age	days	126	126
Total initial weight for lot	lb.	531	532
Average initial weight	"	66·4	66·5
Total final weight for lot	"	1,440	1,454
Average final weight	"	180·0	181·8
Average gain per head	"	113·6	115·3
Number of days on test	days	117	117
Average daily gain per head	lb.	0·97	0·99
Meal required to produce 100 pounds of gain	"	526·2	415·0
Cost per 100 pounds of gain	$	8 98	8 01
Amounts and prices of feeds consumed:—			
Oat chop at $1.62 per cwt	lb.	2,788	.....
Oat chop (hulls removed), 2 cents per pound	"	.....	2,230
Barley chop at $1.35 per cwt	"	1,995	1,596
Tankage at $50 per ton	"	383	307
Gains made per head during:—			
First 30 days feeding	"	20·6	24·2
Second 30 days feeding	"	31·1	34·0
Third 30 days feeding	"	32·5	29·6
Fourth 27 days feeding	"	29·4	27·4

SUMMARY.—By briefly reviewing the above table the reader will observe that the lot which was fed oat chop with hulls removed made approximately the same daily gains as the lot eating straight oat chop but they used less feed to produce 100 pounds of gain. These results are similar to results obtained in previous tests of a like nature, in that oat chop with the hulls removed is capable of making more economical gains than straight oat chop.

One point that is worthy of note is the fact that during the first 60 days of the test the lot fed oat chop with the hulls removed made somewhat greater daily gains than the lot fed straight oat chop. After the sixty-day feeding period, however, the results show no advantage to be gained in removing the hulls. The results obtained, therefore, would seem to indicate that oat hulls as contained in oat chop are detrimental to young growing pigs but have no harmful effect in a ration supplemented with barley after the pig reaches a weight of approximately 125 pounds.

The amount of labour involved in the sifting of oat chop by hand prohibits the following of this practice where large numbers of hogs are fed unless some mechanical device can be used for this purpose. Hulless oats is the logical feed to use in the growing ration where middlings or shorts are not available, but the difficulty is that this crop cannot always be grown successfully.

PROTEIN AND MINERAL SUPPLEMENTS FOR GROWING PIGS IN DRY LOT

OBJECTS OF EXPERIMENT.—1. To compare the value of buttermilk and tankage for growing pigs in dry lot.

2. To determine the value of a mineral mixture for growing pigs in dry lot.

3. To note the effect of adding minerals to the ration of pigs receiving a tankage allowance while in dry lot.

4. To determine the value of salt in the meal ration of pigs in dry lot.

EXPERIMENTAL METHODS.—Sixty pigs were used in this experiment comprising 18 pure-bred Yorkshires, 18 pure-bred Tamworths, 6 pure-bred Berkshires and 16 crosses from these three breeds. These pigs were divided into six groups with ten pigs in each group. As even a distribution as possible was made with repect to age, type, sex, average weight and general thrift. Previous to the beginning of the test the feeding and management of all pigs was practically the same. All lots were self-fed the same grain ration throughout the test. In addition lot 1 received buttermilk, lot 2 tankage, lot 3 tankage and minerals, lot 4 minerals, lot 5 salt and lot 6 received the meal ration without additions. Buttermilk was fed at the rate of 80 pounds per day, tankage at the rate of 8 per cent of the meal ration, and salt mixed with the grain at the rate of 2½ pounds in 100 pounds of grain. The mineral mixture consisting of slacked coal, 76 pounds; air-slacked lime, 3 pounds; salt, 20 pounds; and sulphur, 1 pound, was available at all times to lots 3 and 4 from separate compartments of the self-feeders.

The pigs were confined to lots identical in area and did not have access to green feed of any kind throughout the experiment but were entirely dependent for their nourishment on the grain mixture supplied in the self-feeder. The pigs in all groups were watered twice daily, which meant that as a general rule water was before the pigs at all times. A-shaped portable cabins approximately 6 by 8 feet in size supplied shade and shelter, one of these cabins being available for each lot of ten pigs.

PROTEIN AND MINERAL SUPPLEMENTS—PROPORTION AND QUANTITIES FED

Lots	Number of hogs	Breed	Number of days fed	How fed	Meal ration fed	Other feeds
1	10	Yorkshires, Tamworths, Berkshires, and crosses from these three breeds.	120	Self-fed.....	First 30 days:— Oat chop, 1 part, barley chop, 1 part, shorts, 1 part.	Buttermilk.
					Second 30 days:— Oat chop, 1 part, barley chop, 2 parts.	Buttermilk.
					To end of test:— Oat chop, 1 part, barley chop, 3 parts.	Buttermilk.
2	10	Same as above.	120	Same as above.	Same as above.....	8 per cent tankage.
3	10	Same as above.	120	Same as above.	Same as above.....	8 per cent tankage plus a mineral mixture consisting of slacked coal, 76 pounds, air-slacked lime, 3 pounds, salt, 20 pounds, and sulphur, 1 pound.
4	10	Same as above.	120	Same as above.	Same as above.....	Minerals as above.
5	10	Same as above.	120	Same as above.	Same as above.....	Salt mixed with the grain at the rate of 2½ pounds in 100 pounds of grain.
6	10	Same as above.	120	Same as above.	Same as above.....	No supplement.

Items		Lot 1 Buttermilk	Lot 2 Tankage	Lot 3 Tankage and minerals	Lot 4 Minerals	Lot 5 Salt	Lot 6 Meal only
Number of hogs in experiment		10	10	10	10	10	10
Gross weight, May 29, 1928	lb.	503	504	501	498	499	499
Average weight, May 29, 1928	"	50·3	50·4	50·1	49·8	49·9	49·9
Gross weight, September 26, 1928	"	2,001	1,750	1,932	1,624	1,747	1,267
Average weight, September 26, 1928	"	200·1	175·0	193·2	162·4	174·7	126·7
Total gain per lot during test (120 days)	"	1,498·0	1,246·0	1,431·0	1,126·0	1,248·0	768·0
Average gain per animal for period	"	149·8	124·6	143·1	112·6	124·8	76·8
Average daily gain per animal	"	1·25	1·04	1·19	0·94	1·04	0·64
Amount of meal eaten by group (supplements not included)	"	8,581	7,719	7,506	8,212	8,480	7,819
Amount of buttermilk consumed by group	"	9,600					
Amount of tankage consumed by group	"		615	600			
Amount of minerals consumed by group	"			732	1,729		
Amount of salt consumed by group	"					212	
Cost of protein supplement per lot	$	19 20	15 37	15 00			
Cost of mineral mixture fed	$			2·63	6 22		
Cost of salt fed	$					3 82	
Amount of meal eaten per pound gain	lb.	5·73	6·20	5·25	7·29	6·79	10·18
Amount of buttermilk eaten per pound gain	"	6·41					
Amount of tankage eaten per pound gain	"		0·49	0·42			
Amount of minerals eaten per pound gain	"			0·51	1·54		
Amount of salt eaten per pound gain	"					0·17	
Total cost of feed	$	155 36	138 20	136 82	136 44	138 43	124 19
Cost of feed per head	$	15 54	13 82	13 68	13 64	13 84	12 42
Cost of feed per head per day	cts.	12·95	11·52	11·40	11·37	11·53	10·35
Cost of feed to produce one pound gain	"	10·37	11·09	9·56	12·12	11·09	16·17
Profit per head over cost of feed when sold at 12 cents per pound, labour neglected	$	8 47	7 18	9 50	5 85	7 12	2 78

Prices charged for feeds:—

Ground oats	$ 0 55 a bushel
Ground barley	0 75 a bushel
Shorts	34 00 a ton
Tankage	50 00 a ton
Buttermilk	0 02 a gallon
Minerals	0 36 per cwt.
Salt	1 80 a cwt.

SUMMARY.—Lot 1 which received buttermilk in addition to the meal ration made the highest daily gains but lot 3 which received tankage and minerals as supplements to the meal ration made the most economical gains and returned the highest net profit.

Lot 6 which received the meal ration without additions made the lowest daily gains and returned the least net profit.

In comparing lot 1 with lot 2 it will be seen that the lot receiving buttermilk made 0·21 pounds higher daily gain and produced this gain at a cost of 0·72 cents less per pound than the tankage-fed lot.

A comparison of lots 2 and 3 shows the tankage group with minerals to make 0·15 pounds higher daily gain and to produce this gain at a cost of 1·53 cents less per pound than the lot without minerals. Tankage apparently does not carry all the mineral matter required by growing pigs in dry lot.

Lot 5 receiving 2½ pounds of salt in every 100 pounds of meal mixture made 0·10 pounds higher daily gain and produced this gain at a cost of 1·02 cents less per pound than lot 4 having access to a mixture of minerals containing salt, indicating that salt may be the ingredient in the mineral mixture that plays the most important part in increasing gains and reducing the feed requirement.

In comparing lots 4 and 6 it is found that the lot receiving minerals made 0·30 pounds higher daily gain with a meal consumption of 2·89 pounds less meal per pound of gain than the control lot, indicating that the feeding of minerals materially increases the daily gains and reduces the feed required for a pound of gain.

In comparing lots 5 and 6 one finds that the lot receiving salt made 0·40 pounds higher daily gain with a meal consumption of 3·39 pounds less meal per pound of gain than the control lot.

The outstanding fact, however, that this experiment seems emphatically to prove, is the economy of gains which it is possible to make when the meal ration for pigs in dry lot is supplemented with a protein or mineral supplement. The use of a protein or mineral supplement not only resulted in higher daily gains and effected a greater saving in grain, but it had a very beneficial effect on the general health and thrift of the pigs. The pigs fed the meal ration without additions were dry in the hair, unthrifty in appearance and persisted in rooting up their lot.

A point not indicated in the table was the unevenness of maturity of the pigs fed the meal ration only. Of the twenty-two pigs that were not up to 170 pounds at the close of the experiment, 9 pigs, or 41·9 per cent, were from the lot fed no protein or mineral supplement.

The following table shows the weights according to lots:—

WEIGHTS OF PIGS IN THE VARIOUS LOTS

Lot No.	Under 170 pounds	Between 170 and 230 pounds	Over 230 pounds
1	1	8	1
2	3	7	0
3	2	8	0
4	5	5	0
5	2	8	0
6	9	1	0

DEDUCTIONS.—1. The pigs receiving "grain alone" made comparatively slow and expensive gains as compared with those receiving some form of supplement in addition.

2. The pigs fed tankage and minerals returned the greatest profit over feed cost. The smallest profit was secured on the "grain alone" group.

3. The pigs fed buttermilk made the greatest gain and the most economical gains of any except those fed tankage and minerals.

4. The feeding of minerals to pigs receiving an 8 per cent tankage allowance brought about a 14 per cent increase in daily gains and lowered the feed requirement by 18 per cent.

5. The feeding of salt at the rate of 2½ pounds in every 100 pounds of meal mixture resulted in a 62 per cent increase in daily gains and a 31 per cent decrease in cost of gains.

6. The use of a mineral mixture with pigs not receiving buttermilk, tankage or salt resulted in a 47 per cent increase in daily gains and a 25 per cent decrease in cost of gains.

Comparing the four protein and mineral supplement groups with lot 6 receiving grain alone, the following table is suggested:—

Items		Buttermilk	Tankage	Minerals	Salt
Increase in daily gain	lb.	0·61	0·40	0·30	0·40
Grain saved for 100 pounds gain	"	445	398	289	339
Grain saved by 1 pound of buttermilk, tankage, mineral or salt	"	0·69	8·14	1·89	19·9
Cost of 100 pounds of buttermilk, tankage, mineral or salt	$	0 20	2 50	0 36	1 80
Value of 100 pounds of buttermilk, tankage, mineral or salt based on value of grain replaced	$	1 10	12 97	3 01	31 72
Number of times value is increased on basis of grain saved		5·5	5·19	8·36	17·6

By briefly reviewing the above table the reader will observe that while buttermilk cost 2 cents per gallon it had an actual value of 11 cents per gallon on the basis of grain saved, and tankage costing $2.50 per hundred pounds had an actual value of $12.97 per hundred pounds. The mineral mixture costing 36 cents per hundred pounds had an actual value of $3.01 on the basis of grain saved, and salt costing $1.80 per hundred pounds had an actual value of $31.72 per hundred pounds.

PROTEIN AND MINERAL SUPPLEMENTS FOR GROWING PIGS ON PASTURE

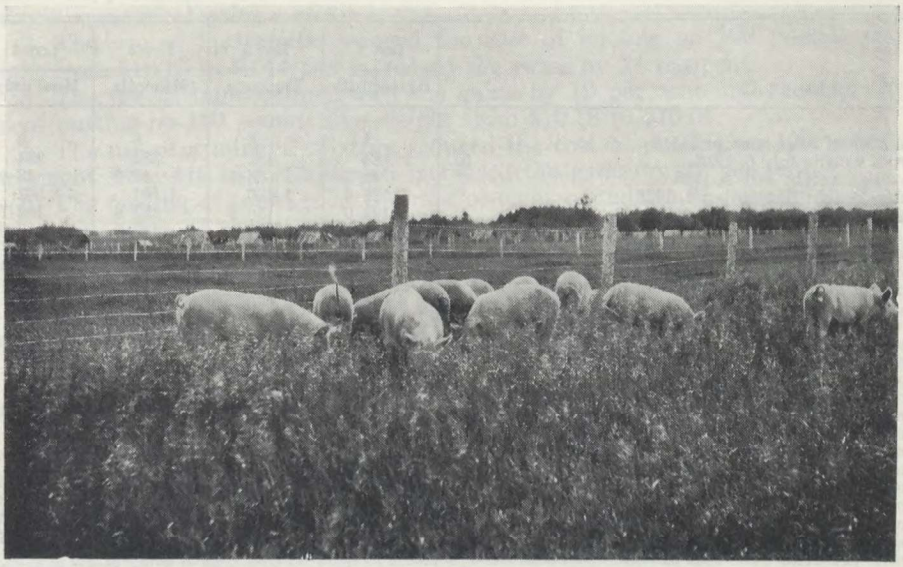
OBJECTS OF EXPERIMENT.—1. To compare the value of buttermilk and tankage for growing pigs on pasture.

2. To determine the value of a mineral mixture for growing pigs on pasture.

3. To compare buttermilk and tankage with a simple mineral mixture for pigs on pasture.

EXPERIMENTAL METHODS.—In this experiment 32 pigs were used. Each lot contained five pure-bred Yorkshires, two Berkshire-Tamworth cross-breds and one pure-bred Berkshire. In making up the four lots due consideration was given to having uniformity in age, type, average weight and general thrift. The experiment was commenced on July 6 when the average weight of the pigs was forty-eight pounds and the average age three months. All lots were fed the same grain ration throughout the test. In addition lot 1 received 60 pounds of buttermilk per day, lot 2 received 8 per cent tankage in the meal ration, lot 3 had access at all times to a mineral mixture consisting of 76 pounds of slacked coal, 3 pounds of air-slacked lime, 20 pounds of salt and 1 pound of sulphur and lot 4 received the meal ration without additions.

Each group of hogs during the test had access to one-third of an acre of brome grass pasture and a cabin for shelter. All grain was ground and fed dry in a trough twice daily. Water was supplied in a separate trough.



Advanced Registry litter of twelve Yorkshires on brome grass pasture.

PROTEIN AND MINERAL SUPPLEMENTS—PROPORTION AND QUANTITIES FED

Lots	Number of hogs	Breed	Number days fed	How fed	Meal ration fed	Other feeds
1	8	Yorkshires, Berkshires, and Berkshire-Tamworth cross-breds.	125	Trough-fed.....	First 30 days:— Oat chop, 1 part, barley chop, 1 part, shorts, 1 part.	Buttermilk.
					Second 30 days:— Oat chop, 1 part, barley chop, 2 parts.	Buttermilk.
					To end of test:— Oat chop, 1 part, barley chop, 3 parts.	Buttermilk.
2	8	Same as above.	125	Same as above.	Same as above.....	8 per cent tankage.
3	8	Same as above.	125	Same as above .	Same as above.....	A mineral mixture consisting of slacked coal, 76 pounds, air-slacked lime, 3 pounds, salt 20 pounds, and sulphur, 1 pound.
4	8	Same as above.	125	Same as above.	Same as above.....	No supplement.

The results of the test are given in the following table:—

PROTEIN AND MINERAL SUPPLEMENTS FOR GROWING PIGS ON PASTURE

Items		Lot 1 Buttermilk	Lot 2 Tankage	Lot 3 Minerals	Lot 4 Meal only
Number of hogs in experiment		8	8	8	8
Gross weight July 6, 1928	lb.	384	385	384	384
Average weight July 6, 1928	"	48·0	48·1	48·0	48·0
Gross weight November 8, 1928	"	1,528·0	1,490	1,501	1,302
Average weight November 8, 1928	"	191·0	186·2	187·6	162·7
Total gain per lot during test (125 days)	"	1,144·0	1,105·0	1,117·0	918·0
Average gain per animal for period	"	143·0	138·1	139·6	114·7
Average daily gain per animal	"	1·14	1·10	1·12	0·92
Amount of meal eaten by group (supplements not included)	"	5,874	5,830	5,714	5,904
Amount of buttermilk consumed by group	"	7,500			
Amount of tankage consumed by group	"		730		
Amount of minerals consumed by group	"			608	
Cost of protein supplement per lot	$	15 00	18 25		
Cost of mineral mixture fed	$			2 19	
Amount of meal eaten per pound gain	lb.	5·13	5·28	5·11	6·43
Amount of buttermilk eaten per pound gain	"	6·56			
Amount of tankage eaten per pound gain	"		0·66		
Amount of minerals eaten per pound gain	"			0·54	
Total cost of feed	$	108 01	110 59	92 71	93 50
Cost of feed per head	$	13 50	13 82	11 59	11 69
Cost of feed per head per day	cts.	10·80	11·06	9·27	9·35
Cost of feed to produce one pound gain	"	9·44	10·01	8·30	10·18
Profit per head over cost of feed when sold at 8 cents per pound, labour neglected	$	1 78	1 08	3 42	1 33

Prices charged for feeds:—

Ground oats	$ 0 55 a bushel
Ground barley	0 75 a bushel
Shorts	34 00 a ton
Buttermilk	0 02 a gallon
Tankage	50 00 a ton
Minerals	0 36 per cwt.

NOTE.—No charge was made for pasture.

SUMMARY.—The pigs which received buttermilk in addition to the meal ration made the most gains and returned to highest net profit. The most economical gains, however, were made by the lot having access to a mineral mixture in addition to the meal ration.

The lowest average daily gain and the highest meal consumption per pound of gain is found in lot 4 fed the meal ration only.

A comparison of lots 1 and 2 shows that the buttermilk lot made an average daily gain per animal of 0·04 pound above the tankage lot. The amount of meal per pound gain was 0·15 pound higher in the tankage lot.

In comparing lots 2 and 3 we find that the lot receiving the mineral mixture made 0·17 pound higher daily gain and produced these gains at a cost of 1·71 cents less per pound than the tankage-fed lot. The results point to the possibility of some of the unsatisfactory results secured from the feeding of a straight grain ration to pigs on pasture being due more to a lack of mineral matter in the ration than a lack of protein.

A comparison of lots 3 and 4 will show that the use of a simple mineral mixture gave rise to much higher and more economical gains than when a straight grain ration was used. The average daily gain was 0·20 pounds higher in lot 3 and the cost of 100 pounds of gain lower by $1.88. The pigs fed this simple mineral mixture as the only supplementary feed made the most economical gains of any pigs on the test. The mineral mixture apparently contains the main mineral elements which may be lacking on our ordinary grain rations.

DEDUCTIONS.—1. Bearing out previous results, the addition of a protein or mineral supplement to the meal ration resulted both in greater daily gains and in more economical gains.

2. The use of buttermilk reduced the cost of putting on 100 pounds live weight from $10.18 to $9.44 and increased the gains by 24 per cent.

3. The use of tankage increased the gains by 19 per cent and reduced the cost of putting on 100 pounds live weight from $10.18 to $10.01.

4. The use of a mineral mixture reduced the cost of putting on 100 pounds live weight from $10.18 to $8.30 and increased the gains by 22 per cent.

5. The feeding of tankage at the rate of eight pounds to 95 pounds of grain did not give as good results in this experiment as allowing the pigs access to a simple mineral mixture. While there was little difference in the rate of gains the feed cost was 21 per cent higher in the case of the tankage-fed pigs.

Comparing the three protein and mineral mixture groups with lot 4 we get the following table:—

Items	Buttermilk	Tankage	Mineral
Increase in daily gain..... lb.	0·22	0·18	0·20
Grain saved for 100 pounds gain..... "	130	115	132
Grain saved by 1 pound buttermilk, tankage or mineral..... "	0·20	1·74	2·44
Cost of 100 pounds of buttermilk, tankage or mineral..... $	0 20	2 50	0 36
Value of 100 pounds of buttermilk, tankage or mineral based on value of grain replaced..... $	0 32	2 77	3 89
Number of times value is increased on basis of grain saved.....	1·60	1·11	10·80

It will be noted from the above table that on the basis of grain saved buttermilk costing 2 cents a gallon had an actual value of 3·2 cents a gallon, tankage costing $2.50 per hundred pounds had an actual value of $2.77 per hundred pounds and minerals costing 36 cents per hundred pounds had an actual value of $3.89 per hundred pounds.

ADVANCED REGISTRATION OF SWINE

During the season of 1928 this Station co-operated with the Dominion Live Stock Branch in making a preliminary test of strains of swine. Eleven litters comprising eight pure-bred Yorkshires, two pure-bred Berkshires and one pure-bred Tamworth were selected for this work, and data have been tabulated separately for each litter from weaning time until each carcass was cut in the packing plant. The purpose of the scheme is to determine the advisability of establishing Advanced Registration for swine in Canada.

In considering the data from the eleven litters used in this experiment, we have noted a decided difference in the costs of production, rapidity of gains and the number of selects from litters of the three different breeds. In the Yorkshires we have noticed a considerable difference in the cost of production and type of the litters sired by different boars.

FIELD HUSBANDRY

The results of experiments with cultural methods, fertilizers and farm rotations are reported under this Division.

In reviewing this work it is well for the reader to keep in mind that the land on which the experiments were conducted is a dark friable loam and that the annual precipitation averages slightly over seventeen inches. Approximately sixty per cent of the precipitation occurs during the growing season.

CROP ROTATIONS

Fifteen rotations are under test at the present time. Accurate cost of production figures are kept in these experiments. The actual time required for the different field operations as well as the amount of seed, twine, manure, etc., is recorded. These, along with land rental, and use of machinery rental, are charged against the crop produced, while the crop produced is credited with the value it would realize if placed on the market during the regular marketing season.

The following values are used in computing the cost of production in the rotation experiments:—

COST VALUES

Rent, per acre	$ 4 00
Manure, per ton	1 00
Wheat, per bushel	1 25
Barley, per bushel	0 60
Oats, per bushel	0 50
Fall rye, per bushel	0 90
Corn, per bushel	3 00
Potatoes, per bushel	1 00
Mangolds, per pound	0 70
Sunflowers, per hundred pounds	13 00
Timothy, per hundred pounds	18 00
Sweet clover, per hundred pounds	13 00
Alfalfa, per hundred pounds	35 00
Alsike, per hundred pounds	20 00
Rye grass, per hundred pounds	13 00
Brome grass, per hundred pounds	13 00
Red clover, per hundred pounds (altaswede)	35 00
Machinery, per acre	1 35
Tractor, per hour	0 48
Silo filling machinery, per ton	0 25
Kerosene, per gallon	0 27
Gear oil, per gallon	1 25
Pasture, per month	1 50
Manual labour, per hour	0 30
Horse labour, per hour	0 08
Binder twine, per hundred	16 00
Threshing, per bushel—Wheat and rye	0 10
Barley	0 08
Oats	0 06

RETURN VALUES

Wheat,per bushel	0 92
Barley, per bushel	0 50
Oats, per bushel	0 40
Winter rye, per bushel	0 60
Sweet clover, per ton	8 00
Alfalfa, per ton	13 00
Mixed hay, per ton	10 00
Greed feed, per ton	7 00
Straw, per ton	1 00
Ensilage, per ton	4 00
Potatoes, per ton	20 00
Pasture, per month	1 50
Timothy, per ton	10 00
Roots	5 00

The following explanation of the above cost and return values may be of interest.

All cost of production figures are reduced to the basis of one acre, although the size of the blocks vary from one to forty acres.

Rent.—The amount of rent is obtained by charging the value of the land with the current rate of interest as obtained on first mortgages; to this is added the amount of taxes per acre.

Manure.—The charge for manure covers only cost of applying the manure to the land, and does not include any additional value it may have. The data

available at present indicate that it is doubtful if the direct profits from the application of barnyard manure more than compensate for the expense of applying it. The cost of applying the manure is distributed equally to all the crops in the rotation.

Manual Labour.—The rate for manual labour is an average of the prevailing summer wages for hired help in the district. The number of hours charged against a crop includes only that required to complete the work under average farm conditions, and includes all work required in the growing, harvesting and storing of the crop.

Horse Labour.—The rate for horse labour includes the cost of feed, the interest on the value of the horse, the depreciation in the value of the horse and harness, as well as the value of the manual labour required to care for the horse.

Machinery.—The charge for farm machinery was established to cover the interest and depreciation on the machinery used on an average farm. When a tractor is used, a rate per hour is charged to cover depreciation and interest on investment in the tractor. Where silo-filling machinery is used, the charge per ton for cutting the ensilage is sufficient to cover the rental of the machinery.

Threshing.—The charge per bushel for threshing covers the total cost incurred from stook to granary, and is representative of the price charged on custom work in the district.

Grass and Clover Seed.—The grass and clover seeding, when it does not fail, is distributed equally to each hay and pasture year in the rotation; when it does fail and there is no hay crop, the charge is made against the whole rotation and not against any one crop.

Summer-fallow.—The charges against the summer-fallow include rent, machinery, and labour. The first crop following summer-fallow is charged with two-thirds of the cost of summer-fallowing, while the second crop following summer-fallow is charged with one-third of the cost of summer-fallowing.

Ensilage.—Ensilage is given a value on the basis of 300 pounds of silage in the silo being equal to 100 pounds of hay in the mow or stack.

Roots.—Owing to their varying feeding value when fed in different amounts and to different kinds of animals, an arbitrary value is given. This value is based on the cost of production and observations during actual feeding tests.

Miscellaneous.—The cost values of seeds, twine, oil, etc., are the actual values for the year in the district for the class of material used. The return values which are used are market prices on November 1.

ROTATION "O"

First year—Hoed crop, potatoes.

Second year—Wheat.

Third year—Oats.

Fourth year—Summer-fallow.

Fifth year—Wheat, seeded with 10 pounds alfalfa and 10 pounds western rye grass per acre.

Sixth year—Hay, manured 15 tons per acre after harvest.

Seventh year—Hay, broken early after harvest and cultivated for the balance of the season.

ROTATION "O"—SEVEN YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
		1928	Average			1928	average
		bush.	bush.	$	$	$	$
1	Hoed crop, potatoes (9 year average)	134·00	219·00	80 40	58 46	21 94	50 56
2	Wheat (17-year average)	44·6	35·1	41 25	17 86	23 39	21 39
3	Oats (17-year average)	80·0	57·8	35 39	18 97	16 42	12 45
4	Summer-fallow (17-year average)				8 62	−8 62	−9 20
5	Wheat (6-year average)	39·0	27·9	36 07	20 08	15 99	10 91
		tons	tons				
6	Hay (15-year average)	2·37	1·57	23 70	14 43	9 27	5 92
7	Hay (6-year average)	1·57	1·31	15 70	13 10	2 60	4 34
	Totals for rotation			232 51	134 28	80 99	96 37
	Average per acre			33 22	19 18	11 57	13 77

Rotation "O" is a mixed farming rotation suitable for most districts in the park belt of Alberta. This rotation produced an average profit per acre of $13.77 since it was started. It is one of the most profitable of the rotations which have been under test for a number of years.

This rotation is particularly useful in maintaining fertility and soil hygiene. It has two years which tend to eradicate weeds, namely, the hoed crop and summer-fallow. The two years in wheat and one year in oats make excellent cash crops and the wheat following summer-fallow is an ideal place to get a catch of seeding of legumes and grasses. Wheat, if it is an early-maturing variety, has proven to be one of the best nurse crops tested at the Station. The hay mixture used in this rotation makes one of the finest hays for live stock, the first cutting being mixed hay and the second cutting pure alfalfa. In the seventh year the soil is broken early after harvest and cultivated for the balance of the season; this treatment acts as a cleaning crop and tends to eradicate perennial weeds.

ROTATION " K "

First year—Hoed crop, corn.

Second year—Wheat.

Third year—Barley, seeded down with 10 pounds alfalfa and 10 pounds western rye per acre.

Fourth year—Hay, manured 15 tons per acre after harvest.

Fifth year—Hay.

Sixth year—Hay, broken early in August and cultivated for balance of season.

ROTATION "K"—SIX YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
		1928	Average			1928	Average
		tons	tons	$	$	$	$
1	Corn (8-year average)	3·15	7·34	12 60	21 21	−8 61	9 01
		bush.	bush.				
2	Wheat (17-year average)	50·7	30·0	46 89	20 52	26 37	15 14
3	Barley (17-year average)	41·3	31·2	22 30	17 51	4 79	5 39
		tons	tons				
4	Hay (16-year average)	1·73	1·41	17 30	12 11	5 19	5 74
5	Hay (7-year average)	3·37	1·68	33 70	14 88	18 82	8 97
6	Hay (6-year average)	2·08	1·26	20 80	12 21	8 59	6 19
	Totals for rotation			153 45	98 44	55 15	50 39
	Average per acre			25 57	16 41	9 19	8 37

Rotation "K" is a mixed farming rotation designed for districts where a summer-fallow substitute will bring better results than the bare fallow. This rotation produced an average profit of $9.19 in 1928 and an average profit of $8.37 per acre since it was started.

This rotation is objectionable for the reason that a large part of it is taken up with forage crops, which are not as profitable, as a class, as cereals. This is an excellent rotation for cleaning the land of annual weeds such as wild oats, but is not effective in controlling perennial weeds such as quack grass and the thistles.

ROTATION " C "

First-year—Summer-fallow.
Second year—Wheat.
Third year—Wheat.

ROTATION "C"—THREE YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
		1928	Average 15 Years			1928	Average 15 Years
		bush.	bush.	$	$	$	$
1	Summer-fallow	.....	.....	.....	7 77	−7 77	*−8 48
2	Wheat	33·0	31·6	30 52	19 19	11 33	18 00
3	Wheat	28·0	19·5	25 90	12 60	13 30	9 92
	Totals for rotation	.....	.....	56 42	39 56	16 86	19 44
	Average per acre	.....	.....	18 81	13 19	5 62	6 48

*16-year average.

Rotation "C" is a straight grain growing rotation such as is frequently followed in the grain-growing district of Central Alberta. It produced an average profit of $5.62 per acre in 1928 and an average profit of $6.48 per acre since it was started.

This rotation has not been as satisfactory as those previously described. It is difficult to grow wheat continuously and maintain clean land and avoid soil troubles. An additional disadvantage was apparent in 1928 in that the wheat was frozen and took a very low grade, indicating another argument for a diversified cropping system.

ROTATION " LACOMBE "

First year—Hoed crop, sunflowers.

Second year—Wheat, seeded with 10 pounds western rye and 10 pounds sweet clover per acre.

Third year—Hay.

Fourth year—Hay, broken after harvest.

Fifth year—Oat green feed, stubble fall-ploughed and rotted manure applied 10 tons per acre during the winter.

ROTATION "LACOMBE"—FIVE YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
		1928	Average			1928	Average
		tons	tons	$	$	$	$
1	Sunflowers (6-year average)	10·97	14·10	43 88	24 57	19 31	25 78
2	Wheat (5-year average)	bush. 48·7	bush. 40·1	45 04	17 90	27 14	23 45
3	Hay (5-year average)	tons 2·13	tons 1·94	21 30	12 99	8 31	12 79
4	Hay (4-year average)	2·62	2·13	26 20	12 19	14 01	17 99
5	Oat green feed (4-year average)	2·13	3·03	16 17	22 12	−5 95	−0 14
	Totals for rotation	.....	.....	152 59	89 77	62 82	79 87
	Average per acre	.....	.....	30 52	17 95	12 56	15 97

Rotation "Lacombe" is essentially a live stock rotation. It combines a cash crop in wheat with a silage crop, an oat green feed crop, and two hay crops. It has been a very profitable rotation during the time it has been under test but is not a very practical rotation for many parts of the province. It would find its greatest usefulness near large cities where a maximum number of livestock are kept on a minimum area of land.

ROTATION "L"

First year—Hay.

Second year—Hay manured in autumn, 12 tons per acre.

Third year—Hay, broken after harvest six inches deep and cultivated for balance of season.

Fourth year—Wheat.

Fifth year—Oats.

Sixth year—Barley, seeded with 4 pounds timothy, 4 pounds alsike, and 4 pounds red clover per acre.

ROTATION "L"—SIX YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
		1928	Average			1928	Average
		tons	tons	$	$	$	$
1	Hay (5-year average)	2·93	1·64	29 30	12 87	16 43	7 90
2	Hay (4-year average)	3·24	1·97	32 40	12 51	19 89	11 85
3	Hay (4-year average)	2·08	1·52	20 80	11 26	9 54	7 89
4	Wheat (6-year average)	bush 23·2	bush. 28·4	21 46	17 57	3 89	12 40
5	Oats (6-year average)	55·3	47·9	24 32	17 40	6 92	6 98
6	Barley (6-year average)	30·7	26·4	17 24	16 36	0 88	1 09
	Totals for rotation	.....	.....	145 52	87 97	57 55	48 11
	Average per acre	.....	.....	24 25	14 66	9 59	8 02

Rotation "L" is a mixed farming rotation designed for districts where summer-fallowing gives too heavy a growth of straw. It has not been particularly profitable during the time it has been under test producing an average profit per acre of $9.59 in 1928, and $8.02 during the past six years.

Rotation "L" is a very satisfactory rotation in wet years or in districts where there is no shortage of moisture. One disadvantage this rotation has is that the red clover used in the hay mixture is subject to injury from winter

killing. This is most marked in dry seasons. Conditions not favourable to the growth of red clover give very light crops of timothy and as a result a very unprofitable hay crop.

ROTATION "MANITOBA"

First year—Wheat.
Second year—Wheat stubbled in.
Third year—Oats, on spring ploughing.
Fourth year—Summer-fallow.

ROTATION "MANITOBA"—FOUR YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
		1928	Average			1928	Average
		bush.	bush.	$	$	$	$
1	Wheat	34·2	35·0	31 63	17 12	14 51	22 07
2	Wheat	30·2	27·8	27 93	13 08	14 85	15 34
3	Oats	60·0	50·6	26 55	14 93	11 62	8 58
4	Summer-fallow	.....	.....	.....	9 30	−9 30	−9 21
	Totals for rotation	.....	.....	86 11	54 43	31 68	36 78
	Average per acre	.....	.....	21 53	13 61	7 92	9 19

Rotation "Manitoba" is a straight grain growing rotation which has been used extensively throughout the West. It produced an average profit of $7.92 in 1928 and an average profit of $9.19 during the last six years.

This rotation is quite satisfactory while land is new and in districts with a reasonable amount of rainfall. It does not provide means for the maintenance of soil fertility and it is quite possible that problems in the control of weeds and plant diseases will develop in such a rotation.

ROTATION "H"

First year—Wheat, stubble spring-ploughed.
Second year—Oats.
Third year—Summer-fallow.
Fourth year—Wheat, seeded with 10 pounds alfalfa and 10 pounds western rye grass per acre.
Fifth year—Hay, 15 tons rotted manure applied in winter and harrowed in the spring.
Sixth year—Hay, broken after harvest.

ROTATION "H"—SIX YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
		1928	Average			1928	Average
		bush.	bush.	$	$	$	$
1	Wheat (6-year average)	24·3	26·5	22 47	18 53	3 94	10 20
2	Oats (6-year average)	50·5	44·2	22 34	16 92	5 42	5 51
3	Summer-fallow (6-year average)	.....	.....	.....	10 20	−10 20	−9 91
4	Wheat (6-year average)	32·8	31·0	30 34	20 37	9 97	15 67
		tons	tons				
5	Hay (4-year average)	2·51	1·94	25 10	16 01	9 09	9 38
6	Hay (4-year average)	1·78	1·84	17 80	13 39	4 43	9 59
	Totals for rotation	.....	.....	118 05	95 42	22 65	40 44
	Average per acre	.....	.....	19 67	15 90	3 77	6 74

Rotation "T" is a mixed farming rotation that has proven very satisfactory at other Experimental Stations. It was not very profitable in 1928, producing an average profit of $3.77, and an average profit of $6.74 per acre during the past six years. As a result of the very dry spring, the wheat seeded on fall ploughed sod did not germinate evenly and produced a relatively poor crop of low grade grain.

ROTATION "SWEET CLOVER"

First year—Wheat, fall-plough stubble.
Second year—Wheat, seeded with biennial sweet clover.
Third year—Hay, sweet clover stubble fall-ploughed.

ROTATION "SWEET CLOVER"—THREE YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Rotation year	Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
		1928	Average			1928	Average
		bush.	bush.	$	$	$	$
1	Wheat (6-year average)	35·7	32·9	33 01	16 75	16 26	17 42
2	Wheat (6-year average)	36·7	29·7	33 94	15 60	18 34	15 62
3	Sweet clover hay (4-year average)	tons 1·86	tons 1·69	14 88	12 60	2 28	4 21
	Totals for rotation			81 83	44 95	36 88	37 25
	Average per acre			27 28	14 98	12 29	12 42

Rotation "Sweet Clover" is similar to rotation "C" except that the sweet clover takes the place of the summer-fallow. It has proven to be one of the most profitable rotations under test producing an average profit per acre of $12.29 in 1928, and $12.42 during the past six years. The yields produced by this rotation compare favourably with those produced following summer-fallow. For some unknown reason, foot-rot of wheat has been manifest to a greater extent in the crop following sweet clover than in the crop following any other crop or treatment. It remains to be proven, however, whether this is due to crop sequence or to some local soil condition.

ROTATION "FALL RYE"

First year—Wheat, 15 tons rotted manure applied during the winter and ploughed under in spring.
Second year—Oats for silage, fall rye seeded on disked oat stubble.
Third year—Fall rye.
Fourth year—Summer-fallow.

ROTATION "FALL RYE"—FOUR YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Rotation year	Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
		1928	Average			1928	Average
		bush.	bush.	$	$	$	$
1	Wheat (6-year average)	42·0	36·3	38 85	23 33	15 52	18 29
2	Oats for silage (5-year average)	tons 9·78	tons 7·8	39 12	26 72	12 40	10 74
3	Fall rye (4-year average)	bush. 31·0	bush. 32·5	20 77	17 09	3 68	2 31
4	Summer-fallow (6-year average)				9 95	−9 95	−9 21
	Totals for rotations			98 74	77 09	21 65	22 13
	Average per acre			24 68	19 27	5 41	5 53

Rotation "Fall Rye" was designed to give information relative to the profit one might expect to receive in winter rye production. This rotation has not been particularly profitable as indicated by the accompanying table. It would seem as though fall rye is too low priced to make its production very profitable. The summer-fallow is used to control the winter rye. It is quite possible that some other crop could be used as a summer-fallow substitute and effectively control the winter rye.

ROTATION "INTERTILLED"

First year—Wheat.
Second year—Wheat, stubble to be spring ploughed.
Third year—Wheat, half intertilled and half seeded 3 pecks per acre.

ROTATION "INTERTILLED"—THREE YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS PER ACRE

Rotation year	Crop	Yield per acre		Value of crop 1928	Cost of production 1928	Profit or loss per acre	
		1928	Average 6 years			1928	Average 6 years
		bush.	bush.	$	$	$	$
*1a	Wheat (seeded thinly)	17·6	27·5	16 28	13 85	2 43	15 65
2a	Wheat	17·3	20·8	15 99	13 55	2 44	10 39
3a	Wheat	31·3	27·0	28 90	18 59	10 35	13 83
*1b	Wheat (seeded in drills)	12·0	20·9	11 10	17 23	−6 13	6 19
2b	Wheat	14·7	22·3	13 59	13 19	0 40	11 72
3b	Wheat	31·3	27·0	28 90	18 59	10 35	13 83
	Totals for rotation	.....	.....	.....	.....	.....	.....
	Average per acre	.....	.....	17 17	15 28	1 90	11 56

*1a and 1b are 4-year averages.

Rotation "Intertilled" is a grain growing rotation designed to compare wheat seeded thinly and in rows as a preparation for wheat. This rotation produced an average profit of $1.90 per acre in 1928 and $11.56 per acre during the past four years. Rotation "Intertilled" does not appear to have one redeeming feature, the yields are remarkably low and noxious weeds are increasing at an alarming rate. Wild oats have increased to such an extent that the dockage on the grain sample would amount to approximately 25 per cent.

ROTATION "BROME"

Brome grass is grown continuously in this rotation.

Rotation "Brome" showed a profit of $5.33 per acre in 1928 and $9.78 during the last five-year period. It has given an average yield of hay during the same period of 1·35 tons per acre. This block of land has produced hay continuously during this time, but was rejuvenated in 1926 by ploughing about five inches deep immediately after harvest and working down to a level seed bed. The success of this treatment is indicated by the yield of 1·19 tons in 1927 and 1·32 tons in 1928.

ROTATION "ALFALFA"

Alfalfa is grown continuously in this rotation which was designed to ascertain the profits possible from growing alfalfa exclusively.

This rotation produced an average profit per acre of $12.35 in 1928 and $13.61 during the past six years. It is one of the most profitable rotations under

test. It gave an average yield per acre of 1·67 tons in 1928 and 1·74 tons during the past six years. It will be seen that after being cut continuously for six consecutive years, this field of alfalfa is still giving good yields.

This alfalfa has not received any treatment in the way of cultivation or fertilizer during this period. There is a tendency for some of the alfalfa plants to thin out in spots but these are being supplanted by grasses which are increasing in the field. It is quite possible that cultivation which would eradicate this grass would tend to lengthen the life of the alfalfa stand.

It would seem that alfalfa is one of the best crops for an exclusive hay farm in central Alberta.

Three other rotations, namely, "Timothy," "Western Rye," and "Livestock" are also being compared. The data compiled in these rotations might be somewhat misleading and it was deemed inadvisable to publish the same until at least two more years' results were available.

CULTURAL EXPERIMENTS

The cultural experiments were inaugurated in 1922. As the year 1922 was utilized in establishing the rotations of the different experiments, no data are available from that season's work.

SUMMER-FALLOW TREATMENT

This experiment was designed to ascertain the effect of different methods of cultivating the summer-fallow on yield, weed control and other factors incidental to crop production. The following three-year rotation has been followed: First year, summer-fallow; second year, wheat, fall plough for oats; third year, oats. Plots 1, 3, 7 and 11 are checks. As the summer-fallow treatment might be reflected in the second crop following the summer-fallow, the data of this crop are also presented in tabular form.

SUMMER-FALLOW TREATMENT FOR WHEAT

Plot No.	Plot treatment	Yield per acre	
		Yield 1928	Average yield 6 years
		bush.	bush.
1	Plough 6 inches deep June 15, cultivate as necessary	45·0	27·9
2	Plough 6 inches deep May 15, cultivate as necessary	45·0	30·3
3	Plough 6 inches deep June 15, cultivate as necessary	45·0	31·6
4	Plough 6 inches deep July 15, cultivate as necessary	45·0	31·5
5	Plough 6 inches deep June 15, and September 15, cultivate as necessary	46·7	32·4
6	Cultivate after harvest and plough 6 inches deep, June 15, cultivate as necessary	49·2	34·4
7	Plough 6 inches deep June 15, cultivate as necessary	47·5	34·2
8	Fall plough 4 inches deep after harvest and plough 6 inches deep June 15; cultivate as necessary	52·5	34·3
9	Disk after harvest and cultivate throughout summer-fallow year (do not plough)	51·7	33·4
10	Cultivate throughout summer-fallow year. This plot is not ploughed at any time during the progression of experiment	48·5	35·1
11	Plough 6 inches deep June 15, cultivate as necessary	48·5	36·5

OATS FOLLOWING SUMMER-FALLOW TREATMENT FOR WHEAT

Plot No.	Plot treatment	Yield of oats per acre	
		Yield 1928	Average yield 6 years
		bush.	bush.
1	Plough May 4, harrow and pack May 5	42·6	49·1
2	Plough May 4, harrow and pack May 5	63·2	56·3
3	Plough May 4, harrow and pack May 5	69·2	55·9
4	Plough May 4, harrow and pack May 5	70·6	59·1
5	Plough May 4, harrow and pack May 5	79·4	59·2
6	Plough May 4, harrow and pack May 5	85·3	63·5
7	Plough May 4, harrow and pack May 5	75·0	63·7
8	Plough May 4, harrow and pack May 5	75·0	63·8
9	Plough May 4, harrow and pack May 5	88·2	67·5
10	This plot is cultivated and not ploughed	85·3	68·8
11	Plough May 4, harrow and pack May 5	85·3	72·2

It will be noted that the difference in the yield of wheat per acre produced by land summer-fallowed in different ways is not very significant. There appears to be a gradual increase in the productivity of the soil from plots 1 to 11. The low yields of plot 1 are due to bird damage.

The similarity of the yields as indicated by the five-year averages may possibly be explained by the fact that the seasonal precipitation during the years the experiment was conducted occurred later than usual, e.g. after the usual season for ploughing summer-fallow, hence late ploughing conserved the bulk of the season's precipitation as efficiently as the early ploughing. In most cases the land was rather dry and weeds did not make a very rank growth on the land which was ploughed late for summer-fallow. It would seem that any method of fallowing which will control weeds can be recommended for the land in question.

Weed control is a vital factor in this experiment. Summer-fallowing without ploughing does not efficiently control perennial weeds such as dandelions, grass, thistles, etc. The frequency of ploughing will necessarily be governed by the kind of weeds to be controlled and the seriousness of the weed infestation.

SUMMER-FALLOW SUBSTITUTES

The object of this experiment is to study the effect of different intertilled crops as compared with the bare fallow on the production of wheat. A three-year rotation of summer-fallow or summer-fallow substitutes, wheat, and wheat, is followed in this experiment. The yield of the summer-fallow substitutes as well as the two succeeding wheat crops is presented in tabular form.

YIELD OF SUMMER-FALLOW SUBSTITUTES AND SUCCEEDING WHEAT CROPS

Plot No.	Plot treatment	Summer-fallow substitute		Wheat, 1st crop, yield per acre		Wheat, 2nd crop, yield per acre	
		1928	7-year average	1928	6-year average	1928	6-year average
		tons	tons	bush.	bush.	bush.	bush.
1	Summer-fallow			29·2	27·9	31·7	27·6
2	Corn	7·38	8·41	6·6	21·9	23·3	21·3
3	Sunflowers	13·02	13·57	10·8	24·6	26·7	21·2
4	Oat green feed	3·64	5·71	5·0	21·1	22·5	19·4
5	Summer-fallow			40·8	26·5	25·0	20·5
		bush.	bush.				
6	Oats (3 bushel per acre)	55·9	43·6	10·8	15·6	13·3	16·3
7	Oats (1½ bushel per acre)	50·6	40·0	10·8	15·6	13·3	16·2
8	Summer-fallow			43·3	27·3	11·7	18·2
9	Oats, 2 drills, alternating with 36 inches intertilled space	43·2	42·0	21·8	20·0	15·8	18·0
10	Oats, 3 drills, alternating with 36 inches intertilled space	50·0	45·1	18·3	21·4	16·7	19·6
11	Summer-fallow			33·3	26·2	20·8	21·5
12	Oats, 4 drills, alternating with 36 inches intertilled space	54·6	43·1	9·2	18·9	19·2	19·1
13	Oats, 5 drills, alternating with 36 inches intertilled space	37·9	41·8	14·2	18·6	24·2	19·3
14	Summer-fallow			29·2	28·4	25·8	23·2
		tons	tons				
15	Corn and oats	10·42	10·68	10·0	18·9	33·3	*
16	Sunflowers and oats	14·46	12·44	17·5	22·3	29·2	*

*Only two years' results available.

The results obtained in the experiment indicate that none of the summer-fallow substitutes can replace the summer-fallow as a preparation for wheat. The effect of the different treatments is apparent throughout the rotation of the experiment.

In considering the merits of the different summer-fallow substitute crops, it will be seen that corn, sunflowers and oat green feed appear to be more satisfactory substitute crops than oats in drills. The oat green feed appears to be a good smother crop for annual weeds such as lambs' quarters, etc., but is a complete failure as a crop to control couch grass. Corn and sunflowers are more effective than green feed for controlling couch grass but are not nearly as effective as the bare fallow. Green feed appears to have little or no effect in subduing quack grass, grain in rows is almost as inefficient, while intertilled crops always have enough plants of quack grass growing so closely around the corn or sunflower plants that it is impossible to remove them with tillage machinery without destroying the fodder plant; these plants which receive this protection are sufficient to reinfest the whole area under cultivation.

The production of cereals in rows has little or nothing to recommend it either as a grain or fodder growing proposition. This is particularly true if the grain is grown in double, triple or other multiple rows. The only argument for growing grain by this method in Central Alberta is to reduce the weed content; since this cannot be done with such cultural practices there appears little to recommend it.

STUBBLE TREATMENT

This experiment was designed to ascertain the most satisfactory method of treatment of wheat stubble in preparation for wheat and oats. A three-year rotation of summer-fallow, wheat, and wheat and oats, is followed. The summer-fallow is given uniform treatment, the variation in cultural methods occurring in the preparation of the wheat stubble for wheat and oats.

WHEAT STUBBLE TREATMENT IN PREPARATION FOR WHEAT

Plot No.	Plot treatment	Yield per acre	
		Yield 1928	Average yield 6 years
		bush.	bush.
1	Plough in autumn	31·7	30·0
2	Plough in spring	32·5	26·5
3	Disk stubble in spring and seed	26·7	28·4
4	Plough in autumn	34·2	29·2
5	Burn stubble in spring, plough and seed	33·3	28·5
6	Burn stubble in spring, disk and seed	25·8	22·6
7	Plough in autumn	31·7	23·6
	WHEAT STUBBLE TREATMENT IN PREPARATION FOR OATS		
8	Plough in autumn	66·3	56·4
9	Plough in spring	64·7	46·1
10	Burn stubble in spring, disk and seed	67·6	41·9
11	Plough in autumn	80·8	58·1

The results of this experiment indicate that fall ploughing will produce larger yields of both wheat and oats than spring ploughing. It would seem as though stubble burning was the least satisfactory of the different treatments. The lowest yields were produced on land that had the stubble burned and the land disked. Good yields were produced when the land was ploughed following stubble burning. It is difficult to understand why lower yields are produced by land that has the stubble burned before disking than by land handled in the same way except that the stubble is not removed by burning. Burning the stubble before disking makes it possible to disk up a good seed bed with less trouble; on the other hand, land so treated appears to dry out quickly and the grain tends to stop growing quicker than where the stubble is not burned. It would seem that stubble burning should not be practised except where the stubble is so heavy that it interferes with the operation of the tillage implements.

The question of weed control by stubble burning comes in for a lot of discussion among farmers. This experiment indicates that stubble burning has but little influence in lowering the weed content of the succeeding crop. If we admit that weed seeds on the surface of the soil are burned—which is doubtful —there usually is an abundance in the soil to pollute the growing crop.

BARNYARD MANURE FOR WHEAT

This experiment was designed to study the effect of different manurial treatments on the growth and development of wheat. A three-year rotation of summer-fallow, wheat and wheat is followed. The manurial treatments are given for both the first and second year wheat following summer-fallow.

When the full rotation is considered, the return of manure or straw in any form to the land resulted in an increase in the yield per acre. On the other hand, it is doubtful if the increase in the yield per acre was sufficient to pay for the cost of application. It is believed that, from the standpoint of farm management, it is much wiser to return manure to the land at seasons when teams and men are otherwise unemployed than to allow the land to become depleted in organic matter and then attempt to build it up again.

BARNYARD MANURE FOR SUNFLOWERS

This experiment is designed to study the effect of different manurial treatments on the yield and maturity of sunflowers. Five years' results are now

available and indicate that the application of barnyard manure tends to increase the yield of sunflowers but not in sufficient quantity to make it profitable. Summer-fallowing the land to be seeded with sunflowers is not advisable as the resulting increase in yield does not compensate for the loss of crop and expense of summer-fallowing. It is to be expected that as land becomes older, with more of its organic matter exhausted, that the application of manure will give greater returns.

BARNYARD MANURE FOR POTATOES

The application of barnyard manure for potatoes is of very doubtful value on most of the rich black soils of central Alberta. While there is a slight increase in yield as a result of the use of manure, the yields produced by unmanured land are so large and so nearly equal to that produced on manured land that increases resulting from the use of fertilizer appear insignificant. There is also the possibility that the addition of barnyard manure tends to develop additional vines instead of tubers and also to lengthen the growing season of the crop, which is a disadvantage in our comparatively short growing season.

GREEN MANURE CROPS

The object of this experiment is to study the effect of the different green manure crops on the yield and maturity of oats. The results to date indicate that green manure crops when ploughed down do not produce as good yields as the summer-fallow. Apparently the organic matter returned to the soil in the form of green manure does not compensate for the loss of soil moisture and plant food utilized by the growing green manure crops. It would seem as though moisture were a greater limiting factor in crop production than fertility on the land used in this experiment.

RATES OF SEEDING GRASSES AND LEGUMES

The object of this experiment is to determine the rate of seeding that will give the most satisfactory returns for the different grasses and clovers commonly grown in this district. A four-year rotation of summer-fallow, wheat seeded down, hay and hay is followed. The yields produced by the different rates of seeding are given in the table presenting the data of the experiment.

RATES OF SEEDING GRASSES AND LEGUMES—RESULTS OF TESTS

Plot No.	Crop and rate of seeding	Yield per acre	
		Yield 1928	Average yield 4 years
		tons	tons
1	Western rye, 5 pounds per acre, first year cutting	.....	0·92*
2	Western rye, 10 pounds per acre, first year cutting	.....	1·03*
3	Western rye, 15 pounds per acre, first year cutting	.....	1·05*
4	Timothy, 2 pounds per acre, first year cutting	1·38	1·56
5	Timothy, 5 pounds per acre, first year cutting	1·76	1·35
6	Timothy, 10 pounds per acre, first year cutting	1·43	1·28
7	Alfalfa, 5 pounds per acre, first year cutting	2·42	1·94
8	Alfalfa, 10 pounds per acre, first year cutting	2·85	2·09
9	Alfalfa, 15 pounds per acre, first year cutting	3·08	2·14
10	Sweet clover, 5 pounds per acre, first year cutting	1·91	1·84
11	Sweet clover, 10 pounds per acre, first year cutting	2·28	2·02
12	Sweet clover, 15 pounds per acre, first year cutting	3·41	2·58
13	Brome, 5 pounds per acre, first year cutting	.....	1·10*
14	Brome, 10 pounds per acre, first year cutting	.....	1·16*
15	Brome, 15 pounds per acre	.....	1·30*

*3-year averages.

RATES OF SEEDING GRASSES AND LEGUMES—RESULT OF TESTS—*Concluded*

Plot No.	Crop and rate of seeding	Yield per acre	
		Yield 1928	Average yield 3 years
		tons	tons
1	Western rye, 5 pounds per acre, second year cutting	.....	0·96*
2	Western rye, 10 pounds per acre, second year cutting	.....	1·27*
3	Western rye, 15 pounds per acre, second year cutting	.....	1·28*
4	Timothy, 2 pounds per acre, second year cutting	1·88	1·83
5	Timothy, 5 pounds per acre, second year cutting	1·64	1·91
6	Timothy, 10 pounds per acre, second year cutting	1·12	1·46
7	Alfalfa, 5 pounds per acre, second year cutting	3·78	2·91
8	Alfalfa, 10 pounds per acre, second year cutting	4·01	2·93
9	Alfalfa, 15 pounds per acre, second year cutting	4·54	3·27
		bush.	bush.
10	Oats following sweet clover	71·8	66·6
11	Oats following sweet clover	74·1	66·8
12	Oats following sweet clover	70·6	66·4
		tons	tons
13	Brome, 5 pounds per acre, second year cutting	2·42	1·88
14	Brome, 10 pounds per acre, second year cutting	2·19	1·09
15	Brome, 15 pounds per acre, second year cutting	1·27	1·68

*2-year averages.

The season of 1928 was ideal for most hay crops but for some reason the plots of western rye grass made such a poor growth that they were almost completely smothered with weeds. In fact the weeds were so bad that yields of hay were not recorded. Dandelions were in the majority and appeared to take most of the moisture and nourishment from the rye grass. The rye grass appears to make a better showing, as compared with other grasses, in dry years than in wet seasons such as the last two.

Five pounds of timothy appears to be the most satisfactory rate of seeding. Thinner seeding produces rather coarse weedy hay, while thicker gives a very fine quality hay. It gets sod bound quickly and dries up quickly in dry seasons. The thinner seeding is preferable if the land is left in sod for a number of years as the land tends to remain productive longer with the thin than with the thick seeding.

Results indicate that alfalfa should be seeded between 10 and 15 pounds per acre. Thinner seeding than 10 pounds gives a rather imperfect stand which tends to produce a low grade weedy hay. The thicker seeding appears to have no disadvantages and assures a good stand of clean hay. It is much safer to err a little towards the thick than the thin seeding.

There appears to be a decided advantage in favour of the 15-pound seeding of sweet clover over the lighter rates. Not only is the yield larger, but the quality is better as a result of finer stems on the plants and freedom from weeds and volunteer grain.

Brome should be seeded from 10 to 15 pounds per acre. For hay, the writer is inclined to favour 10 pounds, as the stand does not become sod bound as quickly as when the 15 rate is used; for pasture, the heavier rate is favoured, as an essential for good pastures is a good thick bottom that will give an abundance of leaf growth.

METHODS OF SEEDING TO GRASS AND LEGUMES

This experiment was designed to furnish information relative to the most effective method of seeding to grass and legumes. A five-year rotation with different crop sequences is followed. The essential points of this experiment

are given in the table relating to the experiment. A mixture of western rye, 8 pounds, and alfalfa, 6 pounds, is seeded on plots 1 to 8; while sweet clover at the rate of 10 pounds per acre is seeded on plots 9, 10, and 11.

METHODS OF SEEDING TO GRASS AND LEGUMES—RESULTS OF TEST

Plot No.	Plot treatment	Yield per acre	
		Yield 1928	Average yield 4 years
		tons	tons
1	Seeded with first year wheat after fallow	2·75	1·98
2	Seeded with first year oats after fallow	2·56	2·19
3	Seeded with second year oats after fallow	2·87	1·93
4	Seeded with first year wheat after fallow	3·53	2·35
5	Seeded alone after first year oats	4·59	2·83
6	Seeded early in spring on fall rye	2·82	2·24
7	Seeded with first year barley after fallow	3·48	2·48
8	Seeded with first year wheat after fallow	3·55	2·28
9	Seeded with second year wheat after fallow	3·24	2·12
10	Seeded alone after first year wheat	3·84	2·66
11	Seeded in early spring on fall rye	3·45	2·34
12	Seeded with second year wheat after fallow	2·85	2·02

The evidence collected in this experiment indicates that there are certain seasons with a very limited precipitation early in the growing season and that it is very difficult to get a good stand of grass or legumes in such a season even when the seeds are sown without a nurse crop. On the other hand, there are certain seasons with an abundance of rainfall when good catches of seeding will be obtained irrespective of the nurse crop used or the cultural methods followed. Conditions have been very favourable during the past three successive seasons and differences in yield have not been marked.

It will be seen that the average yield for four years indicates that seeding without a nurse crop produces the largest yields per acre. It is doubtful however if the increased yield resulting from this method of seeding compensates for the loss of the nurse crop. A heavy weed growth usually develops on land seeded without a nurse crop and it is the writer's opinion that it is much better to use a suitable nurse crop such as an early maturing variety of wheat, barley, or oats for green feed than no nurse crop at all. A thinly seeded nurse crop takes no more from the soil than weeds and has the advantage of giving some return.

Seeding on spring-ploughed stubble land seems less satisfactory than any other method. Spring ploughing makes the land very loose and, if the season is dry, the land is usually so loose that the seed is buried too deeply or else falls in loose dry soil and does not germinate. If there is sufficient moisture in the soil thorough packing will firm spring-ploughed soil sufficiently to bring the soil moisture near the surface and cause the fine grass and legume seeds to germinate if not seeded too deep. If it is the intention to seed down a piece of old stubble land, it should be fall-ploughed if possible. Good stands of seeding can be obtained on old stubble by stubbling in on disked land. Such a preparation appears to be ideal for the small seeds in that a fine mulch is prepared on a firm seed bed which promotes a quick germination of the small seeds and the nurse crop does not grow very rank. If this method is tried, seeding should be done as early in the spring as possible.

Fall rye is not a very satisfactory nurse crop in that it makes a very rank growth early in the spring and tends to smother the small seedling plants. It has the additional disadvantage in that it volunteers badly and thus tends to lower the quality of the hay produced.

Sweet clover has made a very vigorous growth during the last two seasons, with the result that it was almost as tall as the nurse crop with which it was seeded by the time the nurse crop was ready to harvest. The sweet clover thrived well after all crops. That seeded with fall rye did better than that seeded with wheat following wheat, and almost as well as that seeded without a nurse crop.

The rye grass seeded in the mixture used in this experiment made very little growth except where seeded without a nurse crop. The rye grass had practically disappeared in the second year alfalfa.

BREAKING SOD FROM CULTIVATED GRASSES

The object of this experiment is to gain information concerning the most satisfactory method to follow in breaking sod from cultivated grasses in preparing the land for cereals. Brome grass, when well established, is as difficult to eradicate as couch grass, while timothy frequently produces so much volunteer growth in wet seasons following breaking that yields are materially affected. In this experiment a five-year rotation of oats, oats, grass seed sown without a nurse crop, hay, and hay is followed. Plots 1 to 7 are seeded with a mixture of western rye grass, 8 pounds, and timothy, 2 pounds per acre, while plots 8, 9, and 10 are seeded with 10 pounds of brome grass per acre. The yields and treatments are given in the table relating to the experiment.

BREAKING SOD FROM CULTIVATED GRASSES—RESULTS OF TEST

Plot No.	Plot treatment of sod	Yield per acre	
		Yield 1928	Average yield 6 years
		bush.	bush.
1	Rye and timothy sod ploughed 5 inches deep after crop is removed, work as required	59·2	42·7
2	Rye and timothy sod ploughed 5 inches deep in October	38·3	41·2
3	Rye and timothy sod ploughed 5 inches deep in spring, disk and seed at once	28·3	33·6
4	Rye and timothy sod ploughed 5 inches deep after crop is removed, work as required	56·7	41·1
5	Rye and timothy sod ploughed 5 inches deep after crop is removed, disk and backset September 15	54·2	37·6
6	Rye and timothy sod ploughed 5 inches deep May 15, work as summer-fallow	62·5	38·6
7	Rye and timothy sod ploughed 5 inches deep after crop is removed, work as required	60·0	42·4
8	Brome grass sod ploughed 5 inches deep after crop is removed, work as required	55·0	43·7
9	Brome grass sod ploughed 5 inches deep after crop is removed, disk and backset September 15	56·7	42·0
10	Brome grass sod ploughed 5 inches deep after crop is removed, work as required	57·5	41·5

The six-year averages presented in this report cover a period of three dry and three wet seasons, hence results should be reasonably representative of central Alberta.

It will be observed that the spring-ploughed sod was least satisfactory of the different treatments although the late fall-ploughed sod did not produce much better results in 1928. These two plots were equally poor and showed an excessive amount of volunteer timothy.

The plot which was ploughed on May 15 and worked as a summer-fallow gave the highest yields in 1928 but this has not been the case throughout the experiment. It would seem that this plot should yield considerably more than any of the others but results show this is not always the case.

Plot 5 in which the sod is backset late in the fall is not to be recommended as such cultural methods result in an excessive amount of volunteer timothy in the succeeding crop. Apparently the timothy sod is not thoroughly rotted and some of it has sufficient vitality to recuperate after being exposed to the light by backsetting.

When everything is considered, the practice of cutting the hay and breaking the sod immediately after harvest and treating as a fallow during the rest of the season appears to give the most satisfactory results.

In handling brome sod, we have a very serious problem in that brome is almost as difficult to eradicate as couch grass. The results of this experiment indicate that brome sod ploughed shallow immediately after the crop is removed and backset rather deeply late in the fall is an effective way of handling brome sod. This treatment is more satisfactory in dry than in wet seasons. The six-year average yields show little to recommend backsetting but field observations indicate that deep backsetting controls the brome grass much more effectively.

DATES OF SEEDING WINTER RYE

The object of this experiment is to determine the date of seeding fall rye that will result in the largest yields per acre. A three-year rotation of summer-fallow, fall rye and oats is followed. The results of this experiment in 1928 largely substantiate the findings reported in 1927, hence the reader is referred to the 1927 report and thus avoid unnecessary repetition.

PLACE IN ROTATION TO SEED WINTER RYE

This experiment was designed to study the effect of seeding fall rye in combination with and following other crops as compared with seeding in the regular way. As was the case with the previous experiment, the 1928 results supplement those reported in 1927. Since a fairly complete report was given in 1927 it was deemed unnecessary to duplicate the statements in this report.

DATES OF SEEDING CORN AND SUNFLOWERS

The object of this experiment is to determine the date on which sunflowers and corn should be planted to obtain best results. A three-year rotation of sunflowers or corn, wheat and oats is followed.

The results of this experiment indicate that corn should not be seeded before the third week of May, while it would seem that the earlier sunflowers are seeded the higher the yields will be. Sunflowers are not very subject to frost injury, hence will stand seeding earlier in the spring than corn which is very susceptible to frost injury. The varieties of sunflowers usually grown for silage require a longer growing period than the varieties of corn grown for silage.

CEREALS

The season of 1928 was, with the exception of early fall frosts, one of the best in the history of the Station. Work on the land started during the last week of April and seeding was completed about one week earlier than usual. May was very warm and cereals seeded on summer-fallow made a remarkable growth. There was an abundance of moisture during the growing season but three degrees of frost occurred on August 23 and 27 with the result that very few varieties escaped frost injury. Practically no precipitation of any kind was received between harvest and December 1.

VARIETY TESTS WITH SPRING WHEAT

The wheats included in this experiment were seeded on May 2, in quadruplicate one-fortieth-acre plots. The land was a dark loam and was well summer-fallowed the previous season. Yields and other data are presented in the tables relating to this phase of the cereal work.

VARIETY TESTS WITH WHEAT

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on a scale of ten points	Weight per measured bushel after cleaning	Actual yield of grain per acre
			in.		lb.	bush.
Ceres	Aug. 27	117	47	8·0	61·5	22·9
Crown Ottawa 353	" 23	113	38	8·5	62·0	29·2
Duchess Ottawa 933	" 24	114	41	8·5	64·0	34·6
Early Red Fife Ottawa 18	Badly frozen, was harvested Sept. 12 while still green	.....	49	8·5	55·5	28·7
Garnet Ottawa 652	Aug. 24	114	40	8·0	61·0	41·3
Huron Ottawa 3	" 31	121	49	8·0	58·5	35·0
Kota	Sept. 1	122	48	5·0	59·0	20·4
Kitchener	" 1	122	57	8·0	58·0	29·6
Marquis Ottawa 15	" 2	123	55	9·0	62·0	36·9
Marquis 10B	" 2	123	55	9·0	62·0	36·9
Pioneer	Aug. 27	117	49	8·0	61·5	28·1
Prelude Ottawa 135	" 24	114	40	9·5	62·5	27·5
Renfrew U. of A	Frozen, cut Sept. 2 while still green	.....	.....	7·5	56·5	34·3
Reward Ottawa 928	Aug. 27	117	48	9·0	64·0	42·5
Ruby Ottawa 628	" 24	114	.....	8·0	63·0	36·3
Red Bobs 222	" 28	118	52	8·5	61·5	44·1
Supreme	" 28	118	51	9·5	59·5	48·0

WHEAT—THREE, FOUR AND FIVE-YEAR AVERAGES

Variety	Three-year average		Four-year average		Five-year average	
	Days to mature	Yield per acre	Days to mature	Yield per acre	Days to mature	Yield per acre
		bush.		bush.		bush.
Crown Ottawa 353	111	36·3	107	36·0	112	39·8
Duchess Ottawa 933	111	37·9	109	38·7	111	42·3
Early Red Fife Ottawa 18	123	38·2	123	38·4	124	41·0
Garnet Ottawa 652	112	46·0	110	45·0	112	48·3
Huron Ottawa 3	121	44·0	118	.....	120	.....
Kota	121	32·6	120	36·1	.....	.....
Kitchener	121	43·5	121	46·7	123	49·1
Marquis Ottawa 15	122	41·3	122	45·0	122	47·5
Marquis 10B	122	41·0	121	43·6	122	45·7
Pioneer	113	36·0	113	36·8	.....	.....
Prelude Ottawa 135	111	35·0	108	34·1	110	35·4
Renfrew U. and A	124	42·0	124	41·8	.....	.....
Reward Ottawa 928	116	42·8	114	41·0	115	42·1
Ruby Ottawa 623	112	39·0	110	36·6	112	38·3
Red Bobs 222	117	48·3	.....	.....	.....	.....
Supreme	118	50·8	117	50·0	119	52·7

One year's results might give somewhat misleading impressions as to the relative value of the different varieties, hence the three, four and five-year averages are also given. Varieties mentioned in the 1928 report and not listed in the averages have been grown in the variety tests for less than three years.

Marquis Ottawa 15 wheat is the standard milling wheat of Canada. It is doubtful if wheat growers, who are farming in districts where this variety matures and is not affected with rust, could do better than continue to grow it as the major portion of their commercial crop. It is true that some of the later maturing varieties have produced higher average yields per acre; on the other hand, yield per acre is not a true criterion of a variety's value. As a rule none of the later maturing sorts produce threshed grain of a quality to justify growing them as a commercial crop in Central and Northern Alberta. If growers in the district served by this Station do not find Marquis a satisfactory variety, the writer believes that they should turn to an earlier maturing rather than a later maturing sort.

Garnet Ottawa 652 wheat has become one of the most, if not the most popular wheat among the farmers of Central Alberta. This variety is undoubtedly the best of the early maturing varieties in the commercial trade at the present time. During the past series of seasons with moisture above the average, it has given a particularly good account of itself, producing yields decidedly above the average and grades that returned the farmer a reasonable profit per acre. While Garnet has proven one of our best wheats for wet seasons it is possible that Marquis might be preferable for dry seasons.

Reward Ottawa 928 wheat is gaining in popularity and is a wheat of unquestionable merit. This is the seventh season this variety has been included in our variety tests. In the first years it was tested it did not yield as well as many of the others. It has steadily improved in this respect until 1928 when it was outyielded only by three selections. It would therefore seem as though this variety could be expected to give a reasonably good account of itself with respect to yield. Its threshed grain is of unusual merit from an exhibition and milling standpoint. The five-year average indicates that it is three days later maturing than Garnet but seven days earlier than Marquis. In strength of straw it is among the best. It seems probable that this variety will largely replace most other early maturing sorts now being grown in a commercial way.

The early maturing selections of Red Bobs, namely Supreme, Early Triumph and Red Bobs 222, are among our heaviest yielding wheats and have given very satisfactory results in many districts. They lack something in quality when grown in the park belt and for that reason are not gaining in popularity.

Renfrew appears too late maturing for the park belt of the province. Like Early Red Fife, it is later maturing than Marquis, and like all late maturing wheats, is considered a risky variety for production in the Central and Northern part of the province.

Ruby Ottawa 628 has been largely replaced by Garnet.

Prelude Ottawa 135, Huron Ottawa, 3, Kitchener, Pioneer, Ceres and Kota have no place in the cropping system of Central and Northern Alberta. Anyone growing these varieties would be well advised to replace them with one of the varieties mentioned in the preceding paragraphs.

Crown and Duchess are not available in the trade at present and do not appear to have any special merits which would warrant introducing them at the present time.

VARIETY TESTS WITH OATS

The oat varieties were seeded on May 3 on land which was well summerfallowed the previous season. The yields and other data are presented in the accompanying table.

VARIETY TESTS WITH OATS

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on a scale of ten points	Weight per measured bushel after cleaning	Actual yield of grain per acre
			in.		lb.	bush.
Abundance	Aug. 30	119	43	8·5	43·0	62·5
Alaska	" 12	101	43	8·0	44·5	61·8
Banner Ottawa 49	" 26	115	54	6·5	42·0	81·6
Banner Waugh	" 28	117	54	7·0	43·0	86·0
Banner Dixon	" 29	118	60	8·0	43·0	64·0
Banner McDonald 44	" 27	116	54	7·0	42·0	91·6
Banner Dow	" 27	116	54	7·5	43·5	86·0
Banner Saskatchewan	" 26	115	54	6·0	43·0	92·4
Daubeney Ottawa 47	" 15	104	52	6·0	42·5	91·2
Gold Rain	" 25	114	55	7·0	44·5	84·6
Irish Victor	" 27	116	55	6·0	43·5	76·8
Laurel Ottawa 477	" 23	112	49	8·0	54·5	64·7
Leader	" 26	115	56	7·5	40·0	76·9
Legacy Ottawa 678	" 23	112	50	4·5	44·0	83·2
Liberty Ottawa 480	" 23	112	58	7·5	52·0	35·7
Longfellow	" 22	111	54	8·5	42·0	80·6
O.A.C. No. 144	" 31	120	59	6·0	42·0	72·5
Victory	" 30	119	48	7·5	44·0	85·1
Prolific	" 30	119	58	8·5	42·0	82·5

OATS—THREE, FOUR AND FIVE-YEAR AVERAGES

Variety	Three-year average		Four-year average		Five-year average	
	Days to mature	Yield per acre	Days to mature	Yield per acre	Days to mature	Yield per acre
		bush.		bush.		bush.
Alaska	98	69·7	97	71·2	98	69·6
Banner Dixon	116	59·1	115	66·1	117	69·8
Banner Dow	115	83·9	113	89·4	115	87·0
Banner MacDonald 144	114	89·9	113	93·9	114	93·9
Banner Ottawa 49	117	88·3	115	91·9	115	92·9
Banner Sask. 44	114	88·4	113	91·6	113	92·0
Banner Waugh	115	81·5	113	86·3	114	86·7
Daubeney Ottawa 47	99	82·4	98	80·4	100	81·1
Gold Rain	112	77·8	111	81·9	109	84·9
Irish Victor	113	77·7	112	79·0	113	82·0
Laurel Ottawa 477	108	65·6	106	60·0	107	59·7
Leader	114	87·3	113	87·8	113	91·7
Legacy Ottawa 678	108	84·9	108	86·0	108	87·9
Liberty Ottawa 480	108	44·3	105	46·6	105	48·9
Longfellow Ottawa 478	109	78·2	108	79·1	108	80·9
Victory	115	84·5	113	86·9	114	88·5

The three, four and five-year averages give a truer valuation of the different varieties than the 1928 results, in that they indicate the productiveness of the varieties under varying conditions.

Banner Ottawa 49 and McDonald 44 are considered the two best strains of the Banner group which is considered our most satisfactory commercial oat. In addition to being our most productive sort, it has straw of exceptional strength. One criticism against this variety is that it produces an excessive amount of straw, but this is to its advantage when the crop is grown for green feed. It is doubtful if this variety produces any more straw per bushel of threshed grain than any other sort. The kernel of Banner is longer and not so plump as Victory and does not weigh so much per measured bushel.

It has been estimated that fully 90 per cent of the oats grown in Alberta are either Banner or Victory. Victory is decidedly the most popular variety for exhibition purposes as it has a plumper kernel than Banner. When everything is considered, there is little to choose between these two sorts.

Alaska is the best of the early maturing sorts. It is being distributed from the Experimental Station for the first time this year. It is believed that this variety will have a place in the foothill country where Banner and Victory are frequently frosted.

It would also be useful in other districts where oats are seeded as a catch crop after wheat seeding is completed. It matures in the same number of days as barley, hence could be seeded as late as the last week of May with reasonable assurance of the grain maturing. Because of its early maturing habit, it may have a place in the eradication of wild oats; it would be particularly useful in this respect if used for green feed. Alaska has a rather short, fine straw that does not lodge as much as the ranker growing, later maturing sorts. It produces a kernel that is well filled, thin hulled, weighs well per measured bushel, and is much plumper than other varieties that mature as early.

Legacy Ottawa 678 is a very promising new sort that is showing up to advantage. It is decidedly earlier in maturing than Banner or Victory and yields well per bushel. It produces a very fine sample of threshed grain. There is the possibility that this variety may have a place in our agriculture.

VARIETY TESTS WITH BARLEY

The varieties of barley were seeded on May 5 in one-fortieth-acre plots on land that was well summer-fallowed the previous season. It was unfortunate that an error was made in connection with Bearer Ottawa 475, one of our heaviest yielding sorts, with the result that this barley was not represented in the one-fortieth-acre plots. Yields and other data relating to the barley tests are given in the accompanying table:—

VARIETY TESTS WITH BARLEY

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on a scale of ten points	Weight per measured bushel after cleaning	Actual yield of grain per acre
			in.		lb.	bush.
Barks Excelsior	Sept. 2	120	44	8·0	48·0	36·0
Canadian Thorpe	Aug. 30	117	53	6·5	52·5	35·3
Chinese Ottawa 60	" 19	106	57	7·0	53·0	33·4
Duckbill Ottawa 57	" 30	117	48	8·5	51·0	28·2
Feeder Ottawa 561	" 12	99	56	8·5	53·5	21·1
Fenil Ottawa 670	" 14	101	57	7·5	60·0	12·3
Gold	" 31	118	43	8·0	52·0	38·9
Himalayan Ottawa 59	" 14	101	39	8·0	63·0	41·7
Junior Ottawa 471	" 14	101	41	8·0	64·0	44·8
Manchurian Ottawa 50	" 19	106	57	7·0	52·0	41·8
O.A.C. No. 21	" 19	106	57	7·0	53·5	40·7
Stella Ottawa 58	" 19	106	54	7·0	54·0	28·6
Success	" 9	96	52	8·5	52·0	12·3
Trebi	" 19	106	42	8·0	51·0	60·9

BARLEY—THREE, FOUR AND FIVE-YEAR AVERAGES

Variety	Three-year average		Four-year average		Five-year average	
	Days to mature	Yield per acre	Days to mature	Yield per acre	Days to mature	Yield per acre
		bush.		bush.		bush.
Barks Excelsior	113	44·3	112	41·8	111	48·1
Canadian Thorpe	109	40·1	109	40·3	.....	.....
Chinese Ottawa 60	101	41·7	100	41·6	100	45·6
Duckbill Ottawa 57	110	34·7	109	33·9	108	37·8
Feeder Ottawa 561	97	32·9	96	31·5	96	35·5
Fenil Ottawa 670	96	26·6	97	24·9	97	27·2
Gold	111	38·2	110	33·9	108	37·3
Himalayan Ottawa 59	96	43·6	94	41·3	93	46·2
Junior Ottawa 471	96	45·5	94	43·9	93	49·4
Manchurian Ottawa 50	104	48·8	102	45·2	101	46·7
O.A.C. No. 21	104	47·9	102	44·7	101	47·1
Stella Ottawa 58	102	41·4	100	39·6	99	43·3
Success	94	29·2	92	30·7	92	36·4
Trebi	100	61·5	98	59·2	99	61·7

O.A.C. No. 21 is the most popular variety in the trade at the present time. It is also most favoured by the Canadian brewing interests. It has straw of fair strength and is reasonably productive.

Duckbill Ottawa 57 showed exceptional strength of straw in 1928. It stood up fairly well when all other plots showed lodging to a greater degree. A field crop of this variety, so heavy that a binder could not handle a full swath, showed very little lodging. The variety tests indicate that this variety is not as productive as some others, but it is believed it has a place on land where standard varieties lodge badly.

Trebi is an exceptionally heavy yielding sort. This variety is discriminated against by the Canadian brewing interests at present. In view of the heavy yelding character of this sort, however, it would seem likely that it will gain favour with the growers.

There are a number of varieties which are very similar in yield, strength of straw, etc. Stella Ottawa 58, Manchurian Ottawa 50, and Chinese Ottawa 60 are very similar in these respects to O.A.C. No. 21. Duckbill Ottawa 57 and Canadian Thorpe are so similar that some authorities consider them the same sort. Bearer Ottawa 475 is a six-rowed variety somewhat similar to Manchurian in type and one of our heaviest yielding sorts, but as previously explained, was omitted from this year's experiment by an error. It is one of the most promising of the newer sorts.

Barley as a crop is being more extensively grown each year. It is gaining favour as a feed for finishing hogs; there is a steady demand for good brewing barley and farmers are finding it a very useful crop for combating weeds, especially wild oats. For the latter purpose, early maturing varieties such as Himalayan or Junior might prove very useful.

MISCELLANEOUS CEREAL ACTIVITIES

In addition to the wheat, oat and barley tests reported herewith, a number of other projects are under way. Winter wheats and rye are tested in large plots; rod row tests are made annually with winter wheat and rye; spring wheat, oats and barley, field peas, flax and buckwheat are tested in large plots. Verification tests are made for Alberta members of the Canadian Seed Growers' Association; thousands of pure line selections are compared; new varieties are

introduced and compared with standard sorts; a collection of some 150 named varieties of wheat, 120 named varieties of oats, and 60 named varieties of barley is maintained, and pure foundation seed of a number of approved varieties is developed and distributed.

The Experimental Station is doing considerable work in the production of Elite Stock Seed and Registered Seed for distribution among the members of the Canadian Seed Growers' Association.

The cleaning plant still continues to be popular and runs continuously from about the first of December until May. This plant, in addition to the actual grain cleaned for the farmers of the immediate vicinity, has been the inspiration for similar plants throughout the province.

Verification test plots were seeded with grain supplied by the producers of registered seed grain in the province. A field day was held for the Alberta members of the C.S.G.A., during which each grower was able to compare the purity of his own crop with that of the other seed growers. Those who were producing impure stocks received a very convincing object lesson and, without exception, voiced a decision to dispose of their present strains and start with new and improved seed stocks.

Co-operative experiments are conducted throughout the district served by the Station. In these experiments, the seed is prepared and supplied by the Experimental Station, and the co-operator plants the seed according to an outline given, keeps field records and harvests the heads in sacks furnished for the purpose. The Experimental Station threshes the heads and keeps the permanent records of field notes, yields, etc. The results of the experiments have been somewhat disappointing to date as a result of frost and hail damage; on the other hand, this work is becoming more appreciated by the grain growers as manifest by an increasing number who are asking for material with which to experiment.

FORAGE CROPS

The season of 1927 was one of the best for the production of forage crops. All over-wintered crops went into the winter in ideal condition. There was an abundance of moisture in the fall to stimulate a vigorous growth and ample snow in the winter for protection. The result was that very little winter killing occurred. May, 1928, was very dry and seeds such as roots, when sown on spring ploughing, did not germinate until the June rains started. The abundance of moisture carry-over and the high precipitation during June made conditions ideal for hay crops but corn did not thrive as a result of the cool moist weather.

All forage crop tests are conducted in quadruplicate. Grasses and legumes are seeded in one-hundredth-acre plots, and corn, roots, etc., are tested in single 66-foot-row plots.

VARIETY AND STRAIN TESTS WITH ALFALFA

The varieties compared were seeded in June, 1927, in quadruplicate one-hundredth-acre plots, without a nurse crop, on land which was treated as a summer-fallow before seeding. The first cutting was made on July 19, and the second cutting was made on September 5. Yields are given in the table relating to this experiment.

VARIETY AND STRAIN TESTS WITH ALFALFA

Variety	Source	First cutting yield of hay per acre	Second cutting yield of hay per acre	Total yield of hay per acre
		tons lb.	lb.	tons lb.
Baltic	Disco	1 1,760	1,978	2 1,738
Cossack	Disco	1 1,180	1,924	2 1,104
Cossack	Paramount Alfalfa Farm	1 1,640	1,992	2 1,632
Grimm	Alberta Alfalfa Seed Growers' Association.	1 1,360	1,671	2 1,031
Grimm	A. B. Lyman	1 940	1,615	2 555
Grimm 451	University of Saskatchewan	1 1,500	1,640	2 1,140
Macsel	Manitoba Agricultural College	1 1,400	1,792	2 1,192
Ontario Variegated	Peel County	1 840	1,911	2 751
Siberian	Paramount Alfalfa Farm	1 1,640	.....	1 1,640

VARIETY AND STRAIN TESTS WITH ALFALFA

Variety	Source	Yield of hay per acre				
		1925	1926	1927	1928	Average
		tons	tons	tons	tons	tons
Baltic	Disco	1·09	3·16	2·85	2·87	2·49
Cossack	Disco	1·16	3·02	2·83	2·55	2·39
Cossack	Paramount Alfalfa Farm	1·33	3·03	2·83	2·82	2·50
Grimm	Alberta Alfalfa Seed Growers' Association.	1·21	2·93	3·11	2·52	2·44
Grimm	A. B. Lyman	0·96	2·54	2·90	2·27	2·17
Grimm 451	University of Saskatchewan	.....	.....	.....	2·57	.....
Macsel	Manitoba Agricultural College	.....	.....	.....	2·60	.....
Ontario Variegated	Peel County	.....	.....	2·80	2·37	2·58
Siberian	Paramount Alfalfa Farm	.....	2·63	.....	1·82	2·22

It will be seen that there is but little difference in the yield per acre produced by the different varieties. Alfalfa as a crop has given excellent results, both in the test plots and as a field crop. There has been practically no winter-killing in any of the alfalfa varieties.

Experience previous to that reported indicated that home-grown seed or seed produced under climatic conditions similar to Alberta was more dependable, with respect to the winter hardiness of the crop produced, than seed grown in more temperate climates. The Station has been using seed of Grimm alfalfa produced by the Alberta Alfalfa Seed Growers' Association for the main farm crop. The results from the use of this seed have been so satisfactory that the general use of this seed is unhesitatingly recommended.

VARIETY TESTS WITH SWEET CLOVER

Six varieties of sweet clover were seeded in quadruplicate plots on June 24, 1927, without a nurse crop, on land that had been summer-fallowed the previous year. The block of land used for the experiment had a gentle slope of about four per cent towards the north. There was a very noticeable decrease in yield of all varieties from the first and lowest plot to the last and highest plot. The average yield per acre for the lowest series of plots of all varieties was 3·96 tons, while that of the highest was 2·76 tons per acre. No winter-killing was observed in any variety, but from above results and other observations made at the Station, sweet clover, if sown on too high land, is liable to produce rather discouraging results. The variety, yields per acre for 1928, etc., are given in tabular form.

VARIETY TESTS WITH SWEET CLOVER

Variety	Source	Yield of hay per acre	
		tons	lb.
Arctic	Saskatchewan Registered Seed Growers' Association.	3	1,200
White Blossom	Commercial	3	1,460
Yellow Blossom	Commercial	3	1,240
Maccor	Manitoba Agricultural College	3	660
Grundy	Disco	3	1,100
Dwarf	Disco	3	1,160

VARIETY TESTS WITH SWEET CLOVER

Variety	Source	Yield per acre					
		1924	1925	1926	1927	1828	Average
		tons	tons	tons	tons	tons	tons
Arctic	Saskatchewan Registered Seed Growers' Association.	1·14		2·08	1·59	3·60	1·68
White Blossom	Commercial	1·00	All varieties winter-killed	2·62	2·29	3·73	1·93
Yellow Blossom	Commercial	1·14		2·61	1·79	3·62	1·83
Maccor	Manitoba Agricultural College.	.....		2·78	1·43	3·33	*2·51
Grundy	Disco	1·06		3·52	1·76	3·55	1·98
Dwarf	Disco	.....		2·86	.....	3·58	†3·22

*Three-year average. †Two-year average.
All others are five-year averages.

It will be observed that the yield of cured hay per acre for the different varieties is very similar. The writer is aware that this is contrary to the findings of many Stations and has no explanation to offer except that low yielding varieties, such as Yellow Blossom is supposed to be, when seeded on our fertile soils, produce an abundant crop of high-grade forage. Crops of Yellow Blossom have been grown in the vicinity of the Station which were almost equal to alfalfa in quality of hay produced and almost equal to the White Blossom in yield per acre.

It is unfortunate that sweet clover is not as winter hardy as alfalfa as it would fill an urgent need on the grain farms of Central Alberta. In spite of the fact that sweet clover is subject to some winter injury, it would seem as though a more general use of this crop is justified. The most logical way to handle this problem would seem to be for farmers to produce their own seed so that any stands of sweet clover lost would not mean a direct financial outlay.

VARIETY AND STRAIN TESTS WITH RED CLOVER

The different varieties of red clover were seeded in June, 1927, in quadruplicate one-hundredth-acre plots on land which had been treated as a summer-fallow before seeding. Yields, per cent winter-killing, and other data are given in tabular form.

VARIETY TESTS WITH RED CLOVER

Variety	Source	Per cent winter-killing	First cutting yield of hay per acre		Second cutting yield of hay per acre		Total yield of hay per acre	
			tons	lb.	tons	lb.	tons	lb.
Alfred	Ontario	14·2	2	120	1	1,111	3	1,231
Chauteauguay	Quebec	17·2	1	1,760	1	1,137	3	897
Dauphine	S. E. France	35·5	1	1,100	1	974	3	74
Early Swedish	General Swedish Seed Company.	19·7	2	420	1	1,172	3	1,572
Emilia	Italy	65·0	1	60	1	268	2	328
Marche	North Central Italy	75·0	.....	1,460	.....	1,812	1	1,272
Otofte	Royal Danish Agricultural Society.	4·2	1	1,820	1	491	3	311
Spadone	France	34·7	1	520	1	31	2	551
St. Clet	Quebec	22·5	1	1,320	1	708	3	28
Trystofte	Royal Danish Agricultural Society.	16·2	2	40	.....	1,960	3	.....
Alta. Swede	University of Alberta	3·7	2	320	.....		2	320
Kenora	Kenora Dist. Co-operative	3·9	2	680	.....		2	680
Late Swedish	General Swedish Seed Company.	2·9	2	600	.....		2	600
Medium Late Swedish	General Swedish Seed Company.	4·5	1	1,780	.....		1	1,780

VARIETY TESTS WITH RED CLOVER

Variety	Source	Yield of hay per acre					
		1924	1925	1926	1927	1928	Average
				tons	tons	tons	tons
Alfred	Ontario			2·82	.....	3·61	*1·61
Chauteauguay	Quebec			2·96	2·25	3·45	1·73
Dauphine	S. E. France			2·19	.....	3·08	*1·32
Early Swedish	General Swedish Seed Company.			2·15	2·19	3·79	1·63
Emilia	Italy	All varieties winter-killed	All varieties winter-killed	1·54	.....	2·16	*0·92
Marche	North Central Italy			2·20	2·06	1·64	1·18
Otofte	Royal Danish Agricultural Society.			.....	.....	3·15	.....
Spadone	France			.....	2·31	2·27	*1·14
St. Clet	Quebec			2·41	1·19	3·01	1·32
Trystofte	Royal Danish Agricultural Society.			.....	.....	3·00	.....
Alta. Swede	University of Alberta.			2·27	2·75	2·16	1·44
Kenora	Kenora District Co-operative.			2·11	2·69	2·34	1·43
Late Swedish	General Swedish Seed Company.			1·83	2·61	2·30	1·35
Medium Late Swedish.	General Swedish Seed Company.			1·94	3·25	1·89	1·42

*Four-year averages. All others five-year averages.

It will be seen from the 1928 yields that the double-cut or common red clovers as a class are heavier yielders than the single-cut or mammoth red clovers. If we refer to the yields produced by red clovers over a period of years, we will observe that this statement does not always hold true, as the average yields of the single-cut varieties are almost equal to that produced by the double-cut or common red clovers. We will also see that red clover as a crop was completely winter-killed two years out of five. Records show that this crop was completely winter-killed in 1921-22-24 and 25, or four years out of eight; hence red clover as a crop cannot be considered really safe as compared with alfalfa which was not seriously injured during these years.

The fact that the years during which the red clovers were winter-killed were decidedly below the average in precipitation might furnish the explanation for the cause of winter injury. It would seem as though red clover as a crop should be seeded on rather low moist soil or in districts with precipitation slightly higher than the average for the Lacombe district.

The per cent winter-killing which occurred in 1928 is possibly as good a criterion of the relative value of the different red clovers as we can find. It will be seen that the mammoth red clovers as a class are much more hardy than the common red clovers. Observations made throughout the growing season indicate that the weeds constitute quite a percentage of the yields credited to some of the common red clovers while the mammoth red clovers grow so vigorously that weeds are completely smothered. In view of these facts, it would seem as though the mammoth red clovers were more suited to production in Alberta than the common reds.

VARIETY TESTS WITH WHITE DUTCH AND ALSIKE CLOVER

The excellent yields produced by these legumes as shown in the accompanying table indicates that they could be used much more extensively in our agriculture. Alsike clover does particularly well if seeded under rather moist conditions. The White Dutch varieties appear to be more hardy than Alsike or Red clover. The White Dutch grows very close to the ground and would not have much value as a hay crop, but because of its hardiness should make an excellent pasture clover. White Dutch clover has not shown any lack of winter hardiness in the test plots.

VARIETY TESTS WITH WHITE DUTCH AND ALSIKE CLOVER

Variety	Source	Height when cut	Yield of hay per acre	
		in.	tons	lb.
Commercial (White Dutch)		16	2	1,580
Ladino (Mammoth White Dutch)	Idaho	16	2	960
Morso (White Dutch)	H. Hartman	16	2	780
Stryno (White Dutch)	H. Hartman	17	2	1,320
Alsike	Kenora Co-operative	28	3	1,200

YIELDS OF MISCELLANEOUS GRASSES

The accompanying table will give the reader data *re* the yield produced by the different grasses grown in the test plots during the past five years. It will be seen that there is little difference in the yield per acre produced by the grasses. As a rule timothy is more productive in a wet season than brome or rye grass, and vice versa in a dry season. Blue grass is the least productive of the different grasses reported on but has given surprisingly large yields. It should be borne in mind when studying these yields that they are the first crop following land which was partially summer-fallowed, hence there is little doubt that a report of second and third year yields would have shown greater differences.

YIELDS OF MISCELLANEOUS GRASSES

Variety	Source	Yield per acre					
		1924	1925	1926	1927	1928	Average
		tons	tons	tons	tons	tons	tons
Commercial brome		2·09	1·96	4·33	2·59	1·90	2·57
Boon timothy	Central Experimental Farm.	1·47	2·18	3·91	2·52	2·21	2·46
Commercial timothy	Steele-Briggs Seed Company.	1·48	2·18	4·53	2·77	2·68	2·73
Huron timothy	Ohio	1·51	.....	.....	2·55	2·55	†2·20
Commercial western rye		2·41	2·99	3·03	2·59	2·63	2·73
Grazer western rye		2·39	2·45	3·32	2·51	2·77	2·69
Kentucky blue		.....	1·61	3·53	1·10	2·76	*2·25

†Three-year average. *Four-year average.

STRAIN TESTS WITH WESTERN RYE GRASS

Ten strains of western rye grass were compared in 1928. Nine of these were developed at the Central Experimental Farm, Ottawa. They are compared with commercial stock. The yields produced are presented in the accompanying table:—

YIELDS OF WESTERN RYE GRASS STRAINS

Variety or strain	Yield of hay per acre	
	tons	lb.
Commercial	2	1,260
Grazer	2	1,540
Strain No. 8	3	180
Strain No. 13	3	120
Strain No. 15	2	1,860
Strain No. 19	2	1,500
Strain No. 56	2	920
Strain No. 79	2	800
Strain No. 80	2	1,640
Strain No. 116	2	1,200

It will be seen that there is not a marked difference in the yield per acre produced by the different strains of western rye. Some of these strains appeared quite distinct in habit of growth. One appears as though it would be a better pasture grass than others; another appears more leafy than the rest; another strain has a more upright growth than the others; it would seem as though some of these physical characters would determine the suitability of the crop for certain purposes rather than yield per acre.

VARIETY TESTS WITH MANGELS

The yields produced by the different varieties of mangels during the past four years are given in the accompanying table. It will be seen that yields are very similar, hence it would seem reasonable to assume that some character other than yield should be taken as a criterion of the value of the varieties. For this reason the Station has been using varieties of the oval or tankard type because they are much easier to harvest than the intermediate and long types. Mangels seldom attain full maturity at Lacombe. It seems possible this may explain the similarity in yields. Early fall frosts usually occur before growth is completed, hence the yields and quality of the roots produced are below par.

VARIETY TESTS WITH MANGELS

Variety	Source	Yield per acre				
		1925	1926	1927	1928	Average
		tons	tons	tons	tons	tons
Yellow Intermediate	Central Experimental Farm	20·42	18·00	12·73	14·45	16·40
Danish Sludstrup	Ewing	21·72	20·50	13·94	13·44	17·40
Golden Tankard	Ewing	26 27	13·90	10·13	8·12	14·60
Barres Half Long	General Swedish Seed Co.	20·70	13·80	12·22	13·71	15·11
Barres Oval	General Swedish Seed Co.	22·39	16·30	12·48	13·65	16·20
Red Eckendorfer	General Swedish Seed Co.	20·88	18·00	14·20	11·24	16·08
Svalof Original Aubra	General Swedish Seed Co.	21·94	15·30	11·83	12·80	15·47
Yellow Eckendorfer	General Swedish Seed Co.	17·06	17·80	13·42	12·64	14·98
Eckendorfer Red	H. Hartman	23·82	18·10	12·48	13·52	16·98
Eckendorfer Yellow	H. Hartman	21·11	15·40	13·08	13·32	15·73
Fjerritsler Barres	H. Hartman	22·40	17·90	11·97	12·61	16·22
Green Top Half Sugar	H. Hartman	18·24	19·50	12·40	14·82	16·24
Flevetham Mammoth	H. Hartman	15·39	13·90	10·79	11·05	12·78
Red Top Half Sugar	H. Hartman	23·18	17·50	10·28	12·52	15·87
Rosted Barres	H. Hartman	26·00	20·10	12·80	13·58	18·12
Sludstrup Barres	H. Hartman	.....	.....	11·99	13·74	*12·86
Stryno Barres	H. Hartman	18·02	19·10	13·83	14·62	16·39
Danish Sludstrup	McDonald	26·14	17·50	11·92	12·28	16·96
Giant Long Red	McKenzie	21·86	16·30	11·86	11·44	15·36
Monarch	McKenzie	23·17	17·50	12·18	14·36	16·80
Yellow Intermediate	McKenzie	24·47	18·50	11·83	11·89	16·67
Giant White Feeding Sugar	Steele Briggs	32·90	21·30	13·12	14·30	20·40
Giant White Sugar	Steele Briggs	25·21	18·40	14·18	14·04	17·96
Giant Yellow Intermediate	Steele Briggs	20·98	20·40	12·30	13·39	16·77
Giant Yellow Oval	Steele Briggs	26·53	20·00	13·55	13·45	18·38
Golden Fleshed Tankard	Steele Briggs	22·35	16·50	11·37	6·89	14·28
Prize Mammoth Long Red	Steele Briggs	20·94	15·40	11·99	11·47	14·95
Royal Giant Sugar Beet	Steele Briggs	23·92	22·90	13·86	9·62	17·57

*Two-year average.

VARIETY TESTS WITH SWEDES

The yields produced by fourteen varieties of swedes and turnips during the past four years are given in the accompanying table. Varieties which were not included for the full four years are noted.

It will be observed that the Bangholm selections and the Improved Yellow Swedish are among the heaviest yielders. In addition to producing large tonnages, these strains produce large smooth roots of exceptional quality.

VARIETIES OF SWEDES

Variety	Source	Yield of roots per acre				
		1925	1926	1927	1928	Average
		tons	tons	tons	tons	tons
Purple Top	C.E.F.	.....	.....	.....	21·12	‡21·12
Bangholm	Experimental Farm, Kentville.	.....	1·10	23·81	17·64	*14·18
Bangholm	Experimental Farm, Nappan	.....	20·60	.....	16·02	†18·31
Bangholm	Ewing	17·73	22·60	.....	16·02	*18·78
Bangholm	General Swedish Seed Company.	18·45	25·80	.....	20·73	*21·66
Improved Yellow Swedish	General Swedish Seed Company.	22·55	27·30	.....	22·38	*24·08
Bangholm	Halifax Seed Co	24·47	22·40	.....	17·29	*21·39
Olsgaard Bangholm	H. Hartman	18·21	26·60	27·75	23·01	23·89
Breadstone	A. E. McKenzie	15·69	21·90	.....	17·42	*18·34
Kangaroo	A. E. McKenzie	17·02	18·80	20·44	17·42	18·42
Monarch or Elephant	A. E. McKenzie	18·38	18·60	.....	16·44	*17·81
Good Luck	Steele Briggs	16·83	6·60	17·94	15·73	14·27
Selected Purple Top	Steele Briggs	17·56	19·10	15·60	17·55	17·45
Selected Westbury	Steele Briggs	21·41	17·00	16·77	17·48	18·16

‡First yield taken. †Two-year averages. *Three-year averages.
All others are four-year averages.

VARIETY TESTS WITH CARROTS

The results of variety tests with field carrots during the past four years are given in the accompanying table. Experience gleaned during a number of years indicates that the intermediate type of carrot is the most satisfactory. The long type, as represented by the Long Red Surrey and Long Orange Belgian, root so deeply that they are hard to harvest, and in addition they break in pulling to such an extent that yields are influenced. Carrots as a whole produce good yields if sown early in the season on suitable land. The writer believes that yields produced in 1927 indicate the possibilities of this crop to a greater extent than the yields from the other years given in the table.

YIELD OF FIELD CARROTS

Variety	Source	Yield per acre				
		1925	1926	1927	1928	Average
		tons	tons	tons	tons	tons
Long Red Surrey	Steele Briggs	3·34	3·50	10·15	4·31	5·32
White Intermediate	Experimental Farm, Summerland.	.....	4·30	13·96	9·32	†9·19
Improved Short White	Steele Briggs	4·82	4·50	14·61	10·07	8·50
Improved Intermediate White	Duprey and Ferguson	.....	3·10	14·51	7·15	†8·25
Champion	H. Hartman	3·95	3·30	12·62	6·20	6·52
Danish Champion	Central Experimental Farm	3·86	3·70	13·14	5·20	6·47
Long Orange Belgian	McKenzie	4·24	2·00	14·07	3·77	6·02
White Belgian	H. Hartman	4·54	2·50	13·86	6·40	6·82
Large White Belgian	Steele Briggs	.....	2·30	13·40	.....	*7·85

*Two-year average. †Three-year averages.
All others are four-year averages.

VARIETY TESTS WITH SUNFLOWERS

In presenting the data of this experiment a more complete report of the 1928 crop is given along with the averages for five years. It will be seen that the Mammoth Russian, in spite of its immaturity, is by far the most productive of the different sorts included in the test. The early-maturing sorts do not give as large tonnage, and are a much less satisfactory crop to handle than the later-maturing crop.

VARIETY TESTS WITH SUNFLOWERS

Variety	Source	Stage of maturity	Height	Yield per acre green weight	Per cent dry matter	Yield of dry matter per acre
			in.	tons lb.		tons lb.
Mammoth Russian	Disco	Heads had not appeared	84	26 1,300	11·72	3 247
Mennonits	Rosthern	Headed-seed in medium dough.	60	15 1,772	12·69	2 32
Ottawa No. 76	Central Experimental Farm.	" "	72	16 1,860	12·89	2 364
Manchurian	McKenzie	" "	60	15 290	14·75	2 468

YIELDS OF SUNFLOWERS

Variety	Yield per acre											
	1923		1925		1926		1927		1928		Average	
	Green	Dry	Green	Dry	Green	Dry	Green	Dry	Green	Dry	Green	Dry
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Mammoth Russian	15·37	2·98	31·72	2·94	14·70	.....	27·56	3·15	26·65	3·12	23·20	3·05
Mennonite	12·57	2·09	12·90	1·80	9·90	.....	11·84	1·94	15·89	2·04	12·62	1·97
Ottawa No. 76	10·59	1·61	20·14	2·08	12·70	.....	19·30	2·92	16·93	2·18	15·93	2·20
Manchurian	.....	.....	.....	.....	.....	.....	.....	.....	15·14	2·23	.....	.....

VARIETY TESTS WITH CORN

Nineteen varieties of corn were tested in 1928. They were seeded on May 19 and harvested on September 7. Yields and other data are given in the accompanying table. In reviewing this data it should be borne in mind that 1928 was a most unfortunate year for corn. Frost occurred on August 23 and injured the corn to such an extent that no further growth was possible, hence yields and maturity are decidedly below the average.

VARIETY TESTS WITH CORN

Variety	Source	Date of tasseling	Date of silking	Green weight		Dry weight	
				tons	lb.	tons	lb.
Gehu	Purple Springs	Aug. 5	Aug. 17	9	96	0	1,962
Northwestern Dent	Brandon	" 7	" 17	11	100	1	706
Northwestern Dent	Disco			8	1,550	0	1,470
Northwestern Dent	Purple Springs	Aug. 7	Aug. 17	6	1,260	0	1,680
Minnesota No. 13	Grand Forks, N.D.	" 8		8	1,186	1	178
Minnesota No. 13	Medicine Hat	" 5		10	1,112	0	1,904
Manitoba Flint	Manitoba Agricultural College.	July 25	Aug. 8	8	1,446	1	361
Twitchells Fride	Fredericton	Aug. 4		10	956	1	97
Falconer	O. Wills	" 4	Aug. 15	10	540	1	537
Longfellow	Duke			14	132	1	59
90-Day White	Disco			10	1,554	1	153
Golden Glow	Duke			6	64	0	829
Leaming	Duke			7	1,522	0	832
Comptons Early	Duke			14	730	0	1,605
Quebec No. 28	McDonald College	Aug. 8		9	824	1	224
Early Alberta	Truckenmillar, Blackfalds	July 24	Aug. 4	5	1,856	0	1,655
Howes Alberta Flint	University of Alberta	" 24	" 5	6	870	1	475
Gehu	McKenzie	Aug. 1	" 8	9	1,422	0	1,900
Northwestern Dent	McKenzie	" 1	" 6	7	222	0	1,361

Variety	Source	1923		1925		1926		1927		1928		Average	
		Green weight	Dry weight	Green weight	Dry weight	Green weight	Dry weight	Green weight	Dry weight	Green weight	Dry weight	Green weight	Dry weight
		tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Longfellow	Duke	18·39	2·43	13·05	1·58	17·60	..	19·24	2·10	14·07	1·03	16·47	1·78
Golden Glow	Duke	13·26	1·83	13·68	1·52	8·40	..	12·35	1·15	6·03	0·41	10·74	1·23
Leaming	Duke	12·72	1·98	12·47	1·14	11·00	..	10·26	1·30	7·76	0·47	10·84	1·22
Comptons Early	Duke	18·52	2·61	14·39	1·62	17·90	..	18·12	1·84	14·36	0·80	16·66	1·72
Quebec No. 28	MacDonald College	16·49	2·32	11·81	1·15	13·10	..	14·95	1·97	9·41	1·11	13·15	1·64
Howes Alberta Flint	University of Alberta	5·91	1·13	7·53	0·84	9·10	..	6·11	1·20	6·43	1·24	7·02	1·10
Gehu	MacKenzie	12·09	1·95	13·06	1·52	15·00	..	18·00	2·35	9·71	0·95	13·57	1·69
Northwestern Dent	MacKenzie	12·87	1·72	11·15	1·60	11·40	..	14·96	1·91	7·11	0·68	11·50	1·48
												4 years	3 years
Northwestern Dent	Disco	.....	.....	13·26	1·06	15·00	..	15·13	1·95	8·77	0·73	13·04	1·25
Twitchells Pride	Fredericton	.....	.....	12·74	1·44	13·90	..	17·20	2·13	10·48	1·05	13·58	1·54
Falconer	O. Wills	.....	.....	13·00	1·67	19·20	..	15·86	1·97	10·27	1·27	14·58	1·64
90-Day White	Disco	.....	.....	14·26	1·16	10·80	..	15·73	1·80	10·78	1·08	12·89	1·35
Wisconsin No. 7	Duke	14·62	1·67	12·79	1·62	9·10	..	13·00	1·30	.....	.....	12·38	1·53
Northwestern Dent	Brandon	.....	.....	12·23	1·74	13·60	..	12·87	2·12	11·05	1·35	12·44	1·74
												3 years	2 years
Can. Yellow Flint	Duprey & Ferguson	.....	.....	12·68	1·65	15·40	..	17·94	1·65	.....	.....	15·34	1·65
Cold Resistant	University of Wisconsin	.....	.....	13·88	1·49	11·50	..	15·08	1·81	.....	.....	13·49	1·65
Golden Glow	University of Wisconsin	.....	.....	12·08	1·29	13·10	..	14·62	2·47	.....	.....	13·27	1·88
Hybrid	Wimple	.....	.....	13·32	1·82	16·60	..	15·35	1·98	.....	.....	15·09	1·90
Yellow Dent	Wimple	.....	.....	11·23	1·30	10·90	..	14·57	2·05	.....	.....	12·23	1·67

The average yields produced by the different corn varieties are presented in the summary table. It will be noted that Compton's Early has the highest yield of green weight per acre and that Howes Flint produced the lowest green tonnage per acre; the differences in dry matter are not as large as the differences in green weight.

Northwestern Dent as grown at Brandon, and northern grown Gehu are the varieties grown for ensilage at the Station. It will be seen that these varieties produce only average yields of green weight but give good yields of dry matter. Most of the varieties that give such large tonnages of green weight are too late maturing for good silage crops in central Alberta.

HORTICULTURE

The work of this Division consists of variety and strain and cultural tests of different classes of vegetables, bush fruits, tree fruits, annual and perennial flowers, trees, and shrubs. The care and management of the grounds also comes under this department.

The season of 1928 started in very warm and dry during May although there was sufficient moisture in most cases to germinate spring planted seeds. There was an abundant supply of rainfall during June which provided sufficient moisture for all garden crops. The early frost of August 23 did considerable damage to many of the tender flowers and garden plants.

VEGETABLES

VARIETY AND STRAIN TESTS WITH BEANS

Sixteen varieties and strains of beans were tested. They were sown on May 18 in 30-foot rows spaced 30 inches apart. The seed was spaced approximately two inches apart in the row. The green varieties proved to be the heaviest croppers although the early maturing varieties are preferred. The runner varieties are later maturing, are heavy yielders, and are grown more extensively than heretofore. Yields and other data are given in the accompanying table:—

RESULTS OF VARIETY AND STRAIN TESTS WITH BEANS

Variety	Date when ready for use	Weight from 30-foot row	Remarks
		lb.	
Masterpiece	Aug. 3	22	Very fine, long straight, tender green bean.
Stringless Green Pod	" 14	22	Short bean, stringy in dry weather.
Peerless	" 15	21	Fine, long, green bean, very tender.
The Prince	" 14	20	New green bean, good.
Challenge Black Wax	July 27	19	Short, soon goes stringy.
Bountiful Yellow Pod	Aug. 16	18	Yellow butter bean, good.
Extra Early Valentine	" 15	18	Good bean, rather short.
Satisfaction	" 14	17	Fine, long, green bean, tender.
Round Pod Kidney Wax	" 3	14	Good and tender.
Prize Winner	" 27	11	Runner bean, large, stopped and grown as dwarf bean.
Yellow Eye Yellow Pod	" 14	10	Small, green and very good.
Best of All	" 27	10	Runner bean, grows to a great length.
Painted Lady	" 27	8	Runner bean, smaller than some varieties.
Hodson Long Pod	" 27	7	Fairly good variety.
Pencil Pod Black Wax	" 15	7	Not very heavy cropper.
Princess of Artois	" 18	7	Tender variety but poor cropper.

VARIETY AND STRAIN TESTS WITH GARDEN BEETS

Ten varieties of garden beets were tested. They were sown on May 14, and thinned to 3 inches apart in 30 foot rows and were harvested on September 18 Yields and other information are given in the accompanying table.

RESULTS OF STRAIN TESTS WITH GARDEN BEETS

Variety	Weight from 30-foot row	Remarks
	lb.	
Eclipse	60	Good early variety, not so dark as some varieties.
Early Detroit (Lacombe)	56	Deep colour, good grain, small core.
Detroit Dark Red (Ottawa)	53	Globular shaped, very tender.
Detroit Dark Red (McDonald)	52	Good shape and tender.
Detroit Dark Red (Moore)	51	Good grain, good colour.
Crosby Egyptian	50	Smoother and more regular than old Egyptian.
Extra Early Flat Egyptian	46	Early, good shape and quality.
Black Red Ball	35	Very deep colour, a favourite for exhibition work.
Imported Dark Red (Webb)	32	Good colour, does not grow so large.
Half Long	30	Keeps better than turnip variety.

VARIETY AND STRAIN TESTS WITH CABBAGE

Twenty-one varieties of cabbages were used for this test. The seed was sown in cold frames on May 8 and transplanted into the open early in June. Yields and other information are given in tabular form.

RESULTS OF VARIETY AND STRAIN TESTS WITH CABBAGE

Variety	Weight of 6 heads with stem and outside leaves	Remarks
	lb.	
Flat Swedish	112	Weight of 1 cabbage 21 pounds, good keeper, did not split, nearly all heads good.
Copenhagen Market	103	One of the best all round cabbages, flat, early and good keeper.
Enkhuizen Glory	100	One of the largest heads, not so firm as some varieties.
Brunswick Short Stem	92	Round firm heads, does not split, good keeper, medium late.
Early Summer	90	Conical shape, large heads, fairly good cabbage.
Fottlers Improved Brunswick	86	Few outside leaves, solid heads, good winter cabbage, stands weather well.
Danish Ballhead	86	Good shape, does not split with the rain, good keeper.
Ex. Amager Danish Ballhead	82	Many outside leaves, firm heads, not many split.
Best of All Savoy	82	Rather loose leaved, a very milk flavour, very curly variety.
Early Paris Market	80	Early conical cabbage, first to cut, no good as a winter cabbage.
Gooden Ace	78	Fine variety of Copenhagen Market strain, early flat variety.
Danish Hollander	70	Medium size, hard head, not many outside leaves.
Kildonan	68	Very good, good winter cabbage.
Early Jersey Wakefield	62	Conical shape, very early, no good for winter keeping.
Early Winnigstadt	62	Conical shaped, very hard heads, one of the best keeper
Danish Roundhead	64	Not very large, few outer leaves, good keeper.
Hollander	61	Long oval heads, leaves rather coarse, does not split.
Succession	45	Fair cabbage, good quality for eating.
Kinver Globe	34	Did not head well and many split.
Danish Stonehead	33	Red variety, heads small, pickling cabbage.
Delicatessa	30	Red variety, very small heads, good for pickling.

VARIETY AND STRAIN TESTS WITH CAULIFLOWER

Six varieties were used for this test. They were sown in cold frames May 4 and transplanted early in June. Some of the heads were very fine, weighing 8 and 9 pounds each. Cutting continued right up until late fall. Some of the heads were wrapped in paper before putting in the cellar. The protection given by this wrapper made it possible to keep the heads for many weeks after cutting. Experimental results are given in tabular form.

RESULTS OF VARIETY AND STRAIN TESTS WITH CAULIFLOWER

Variety	Weight of 6 heads	Remarks
	lb.	
Snowball	42	Very fine variety, large close heads, very white.
Dryencourt	41	Late variety, head well protected with leaves, close and white.
Early Dwarf Erfurt	41	Good standard variety, early.
Express	39	New variety, good heads.
Danish Perfection	35	Well protected with leaves, does not bolt the seed.
Earliest	30	Small heads, inclined to be loose.

VARIETY AND STRAIN TESTS WITH GARDEN CARROTS

Fourteen varieties of carrots were tested in 1928. They were sown on May 15 in 30-foot rows spaced 15 inches apart. The plants were thinned to two inches apart in the row. The crop produced was exceptionally good. Varieties recommended are Shorthorn, Danvers, Intermediate and Nantes. Additional information is given in tabular form.

RESULTS OF VARIETY AND STRAIN TESTS WITH GARDEN CARROTS

Variety	Weight from 30-foot row	Remarks
	lb.	
Chantenay (Ottawa)	65	Half long, good exhibition carrot, fine grained, good colour.
Chantenay (McDonald)	61	Good main crop, very tender, small core.
Improved Danvers	60	Good shape, true to type, does not split.
James Intermediate	58	Old variety, fine for exhibition, good colour.
Danvers D. & F	55	Good shape, crisp and tender.
French Forcing	55	Very early variety, useful on that account.
Early Scarlet Horn	57	One of the best all round carrots, early, good keeper.
Nantes Half Long	52	Stump rooted, good colour, small core.
Henderson Intermediate	52	Fine variety, good shape and colour.
Oxheart	46	Early variety, small, no good for winter keeping.
Intermediate L.S.F	46	Fine for exhibition, fine grained small core.
Favourite	45	Not very good colour, large core.
Champion Scarlet Horn	45	Early, good keeper, fine for exhibition.
Golden Ball	40	Small early variety.

VARIETY AND STRAIN TESTS WITH CELERY

Fifteen varieties and strains were used for this test. The celery crop was not as good as usual this year on account of the dry fall, although that produced had better keeping quantities than usual.

VARIETY AND STRAIN TESTS WITH CORN

Sixteen varieties of corn were on test. They were damaged by frost on August 23, only the earliest maturing sorts producing edible ears. Howes' Flint, Paramount, Banting, two strains of Sunshine, and Pickaninny were the only ones to produce edible ears.

VARIETY AND STRAIN TESTS WITH LETTUCE

Sixteen varieties of lettuce were seeded in the open on April 30. The four best varieties were Big Boston, Wonderful, Crisp as Ice, and Tom Thumb. Four other varieties were seeded in boxes in the greenhouse on April 3 and were later transplanted into hotbeds. This gave very early lettuce.

VARIETY AND STRAIN TESTS WITH GARDEN PEAS

Twenty-six varieties of garden peas were tested. They were sown on April 27 and the earliest were ready for picking on July 7 but were not picked until July 14. They were seeded in rows 30 inches apart and were staked and tied up with binder twine to prevent mixing and facilitate picking. The yields produced are a record for the Station. Yields and other data are given in tabular form. Yields of eight varieties are not given as these were kept for seed.

RESULTS OF VARIETY AND STRAIN TESTS WITH GARDEN PEAS

Variety	Weight from 30-foot row		Remarks
	lb.	oz.	
Kelvedon Wonder	32	0	New pea, the earliest of all, very heavy cropper, fine quality.
Gradus and English Wonder	31	0	Early, heavy cropper, good flavour.
Lincoln	30	0	Good cropper, one of the best for canning, small pea.
The Laxton	29	8	Large pea, good variety.
Duke of Albany	29	10	Very good pea, good exhibition, fine quality.
Gregory Surprise x English Wonder.	29	9	Small early pea, good yielder.
Distinction	28	7	Medium late variety, peas very large.
Carter Daisy	28	6	Very dwarf, large podded, fine eating pea.
Stratagem	27	8	One of the best late peas, stands a long time without going old.
Matchless	26	11	Pods rather short, peas large, good flavour.
British Wonder	26	6	Early pea, dwarf vine, large.
Gregory Surprise x American Wonder.	25	5	Small pea, early, tall vine.
Gregory Surprise	25	0	Tall vine, early small pea.
Little Marvel	24	0	Small early pea, sweet.
Early Morn	21	8	One of the earliest, large pea for an early variety.
Invermere No. 1	21	7	Mid season, wrinkled pea.
English Wonder	20	6	Early dwarf pea, very prolific.
American Wonder	20	0	Small dwarf early pea.

VARIETY TESTS WITH POTATOES

Twenty-four varieties of potatoes were compared in 1928. They were planted on May 21 and harvested October 2. In addition to the variety tests conducted, three acres of certified seed potatoes were grown as well as 385 individual tuber units. The yields for 1924-5-6-7-8 of the varieties tested are given. Since all the varieties were not grown during the full five-year period the average yield and per cent marketable are not comparable, hence only partially indicate the relative merit of the varieties with respect to the points in question.

Variety	Yields per acre in bushels											
	1924		1925		1926		1927		1928		Average	
	Yield	Per cent marketable	Yield	Per cent marketable	Yield	Per cent marketable	Yield	Per cent marketable	Yield	Per cent marketable	Yield	Per cent marketable
American Wonder	180·3	68·0	481·0	.....	583·0	98·0	474·5	73·0	310·0	87·4	405·8	81·6
Ashleaf Kidney	135·4	74·0	520·0	.....	570·0	94·5	426·7	91·0	234·4	79·0	377·3	84·6
Bliss Triumph	.....	.....	.....	.....	.....	.....	452·8	76·0	235·6	74·6	344·2	75·3
Carman No. 3	.....	.....	.....	.....	.....	.....	203·7	88·0	149·5	72·5	176·6	80·2
Carter Early Favourite	160·3	52·0	338·0	.....	583·0	86·5	387·8	68·0	320·7	66·2	358·0	68·2
Country Gentleman	160·2	64·0	463·7	.....	.....	.....	472·3	88·5	309·8	80·6	351·5	77·7
Early Bovee	213·4	66·0	344·5	.....	545·0	84·0	496·2	80·0	279·5	81·4	375·7	77·8
Early Hebron	189·6	75·0	407·3	.....	591·0	92·5	459·3	87·0	268·8	77·5	383·2	83·0
Early Norther	234·0	80·0	407·3	.....	.....	.....	535·2	85·5	307·7	83·1	371·0	82·9
Early Ohio	152·7	56·0	175·5	.....	490·0	76·0	314·0	63·5	208·0	68·8	268·0	66·1
Early Vermont	177·7	64·0	338·0	.....	506·0	97·0	450·7	76·5	283·8	71·0	351·2	77·1
Empire State	168·6	76·0	387·8	.....	.....	.....	500·5	76·3	309·7	83·7	341·6	78·7
Everitt	169·7	50·0	425·7	.....	592·0	93·0	487·5	86·0	136·5	81·6	362·3	77·6
Extra Early Eureka	171·2	68·0	316·3	.....	542·0	65·0	452·8	75·0	320·7	87·2	360·6	73·8
Green Mountain	134·3	66·0	407·4	.....	513·0	95·0	496·2	84·0	281·7	83·8	366·5	82·2
Gold Coin	153·8	66·0	400·8	.....	589·0	94·0	424·7	91·0	270·8	81·6	367·8	83·1
Gold Nugget	175·5	78·0	341·2	.....	591·0	76·0	433·3	75·0	264·3	80·2	361·1	77·3
Houlton Rose	195·0	70·0	397·6	.....	.....	.....	465·7	82·6	327·2	81·4	346·4	78·0
Irish Cobbler	171·2	70·0	299·0	.....	506·0	88·0	409·7	72·0	281·7	80·7	333·5	77·7
Netted Gem	.....	.....	321·7	.....	.....	.....	448·5	78·7	191·2	65·2	320·4	71·9
Rural Russet	123·5	62·0	275·2	.....	401·0	83·0	348·8	92·0	128·8	70·5	255·5	76·9
Six Weeks	182·0	62·0	419·7	.....	542·0	78·0	528·7	67·0	288·2	78·2	392·1	71·3
Table Talk	173·3	60·0	287·0	.....	496·0	90·0	457·2	70·0	225·3	56·7	327·8	69·2
Wee Macgregor	151·7	70·0	374·8	.....	583·5	92·0	520·0	75·5	270·8	81·6	380·2	79·8

In looking over the average yield per acre it will be observed that there is not as much difference in the yield per acre as one might anticipate. For this reason, factors other than yield per acre must be taken into consideration in choosing a variety. The most important of these are smoothness, shape, freedom from disease and table quality.

The Early Ohio is the earliest maturing but one of the lowest yielding varieties under test. Its exceptionally fine table quality and early maturity make it one of our best sorts for domestic use.

The Bliss Triumph is a little later maturing than the Early Ohio but still classifies as an early potato. It is a heavy yielder for such an early sort and produces tubers of extra good table quality.

Gold Coin is an excellent late maturing sort that can be depended on to give heavy yields of smooth tubers in districts where they will mature.

The Netted Gem is possibly the most popular variety in the potato trade at the present time. It appears to be rather late maturing for Central Alberta unless planted in light soil and very early in the spring.

VARIETY AND STRAIN TESTS WITH TOMATOES

Twenty-two varieties of tomatoes were included in this test. They were sown in the greenhouse on March 22, were transplanted into flats in the seedling stage and planted into the open during the second week of June. They made an excellent growth and set an abundance of fruit but the early frost on August 23 checked any further development before much fruit ripened. A lot of the fruit ripened after it was harvested. Yields and other information are given in the accompanying table.

RESULTS OF VARIETY AND STRAIN TESTS WITH TOMATOES

Variety	Weight from 30-foot row	Remarks
	lb.	
Sutton Open Air	34	One of the best open air varieties, fruit crinkley, very early, good cropper.
Abbotsford Argo	29	Fine variety, sets well any season, smooth fruit, very early.
Penn State Earliana	27	Large fruit, good cropper.
Sutton Open Air x Canadian	26	A new cross raised at Lacombe, good prospects.
Sutton Everyday x Open Air	24	A new cross raised at Lacombe, good prospects.
Early Atlantic Prize	24	Large fruit, good colour.
Alacrity	22	Good standard variety, fruit crinkley.
Sutton Best of All	21	Small smooth fruit, early, good flavour.
Avon Early	20	Large fruit, good variety.
Sutton Everyday	20	Sets well every year, small fruit good colour.
Alacrity x Earlibell	20	Early variety, fruit crinkley.
Alacrity x Hipper	20	Early variety, good flavour.
Earlibell	19	Not so early as some of the other varieties.
Red Rock	18	Very large fruit, does not ripen very quickly.
Sutton Open Air x Abbotsford Argo	18	A new cross raised at Lacombe, very promising.
Essex Wonder	17	Heaviest cropper, too late to make the size.
Pink No. 1	15	Pink variety, good flavour.
The Canadian	15	Crinkley variety, rather late.
Yellow Plum	14	A small yellow variety, very good for canning.
First of All	13	Good early variety, does not set very well.
L.G. x B.B.	10	A new variety from Ottawa.
Bonny Best	15	Very fine fruit, later than some varieties.

MISCELLANEOUS VEGETABLES

Among the miscellaneous vegetables on which variety tests were made are kohl rabi, leeks, lettuce, onions, parsley, parsnips, peanuts, pumpkins, radishes, rhubarb, spinach, swiss chard, squash, as well as a variety of herbs.

SMALL FRUITS

VARIETY AND STRAIN TESTS WITH STRAWBERRIES

Eleven varieties of strawberries were included in this test. An accurate statement of the yield cannot be given as it was impossible to prevent visitors from sampling the fruit. The largest fruit was produced by the Lacombe Seedling, Glen Mary and Stevens Late; while the finest quality was produced by Senator Dunlap, Gibson and the Lacombe Seedling. Yields and other information are given in the accompanying table.

YIELDS OF STRAWBERRIES

Variety	Weight from 50-foot row		Remarks
	lb.	oz.	
Delicious	45	4	Good cropper, not such good quality as some of the other berries.
Lacombe Seedling	38	2	Very good variety, stands the winter well, also good for preserving.
Senator Dunlap	32	3	One of the best standard varieties, good shape and colour.
Gibson	29	8	Good quality round berry.
Stibarts Everbearing	27	6	Fine large berry, good flavour, and colour.
Stevens Late	25	10	Very large, late variety, some berries measuring nearly 2 inches.
August Luther	24	8	Good shape, fine flavour.
Glen Mary	23	2	Late variety, very large, good flavour.
Dakota	20	12	Small early variety.
Marvel	20	0	Does not crop so heavy as some of the other varieties.
Everbearing Champion	18	0	Everbearing variety, medium size berries.

VARIETY TESTS WITH RASPBERRIES

Eight varieties of raspberries were included in this test. The yields and other information are given in the accompanying table.

YIELDS OF RASPBERRIES

Variety	Weight from 30-foot row		Remarks
	lb.	oz.	
Chegwin	46	0	Bright berry and heavy cropper, drops easily with the wind.
Herbert	41	0	The best variety of all, large fruit, good colour, very sweet.
St. Regis	26	0	Everbearing variety, medium size fruit.
Shaffer Colossal	26	0	Dark coloured variety, bluish in colour.
Cuthbert	24	0	One of the largest berries, very sweet.
Sarah	19	8	Late variety, purple berry, sweetest of all the raspberries.
Sunbeam	15	0	Poor variety, sour, hard berry.
New Brighton	12	0	Small bright fruit, not prolific.

MISCELLANEOUS BUSH FRUITS

Varieties of red, white and black currants as well as gooseberries are also tested at the Station. Yields are not given in this report as it was believed they might be misleading.

TREE FRUITS

Plums, cherries and some of the hardier apple varieties are grown with varying degrees of success. Some of the hardier plums and cherries are hardy enough to warrant trying them on a little larger scale. The apple trees usually provide a disappointment when they start bearing, although the newer introduced varieties are proving more promising.

ORNAMENTALS

FLOWERS

The flowers made a very fine showing in 1928. Since a complete report on flowers was presented in our 1927 annual report, the reader is referred to that publication, as this year's work largely substantiates that of the past year. It might be of particular interest to the reader to learn that forty varieties of roses are under test at the Station and that they have given most encouraging results in the way of beautiful blooms. The excellent results with roses are largely due to the winter protection given. The bush is bent over and covered with a wooden trough and the whole covered with manure or soil. No winter-killing of the canes has occurred during the two winters this protection has been given.

TREES AND SHRUBS FOR HEDGES

Thirty-one different hedges are on trial at this Station. They are a source of a good deal of interest to visitors and farmers. The accompanying table indicates the possibilities of the different trees and shrubs used.

RESULTS OF TESTS OF TREES AND SHRUBS FOR HEDGES

Botanical name	Common name	Remarks
Acer tatarica Ginnala	Ginnalian Maple	Very pretty, will not thicken out.
Acer Negundo	Manitoba Maple	Makes a serviceable hedge.
Amelanchier	Saskatoon	Ornamental but does not make a thick hedge.
Betula alba	White Birch	Fairly promising, graceful.
Caragana arborescens	Siberian Pea Tree	One of the best, pretty and useful.
Caragana frutescens	Scrubby Caragana	Not very suitable.
Caragana pygmaea	Dwarf Caragana	The best dwarf hedge, very graceful and ornamental.
Cotoneaster acutifolia	Roekspray	Winter kills, very pretty.
Cornus alba siberica	Siberian Dogwood	The growth is very loose.
Elaeagnus argentea	Wolf Willow	A very pretty hedge, sweet perfume, suckers a lot.
Lonicera tatarica	Tartarian Honeysuckle	When in bloom makes a very showy effect.
Neillia opilifolia aurea	Ninebark	Winter kills, ornamental only.
Picea canadensis	Native White Spruce	Slow growing but one of the best.
Pinus contorta Murrayana	Lodgepole Pine	Very uncommon, green all the year round.
Populus nigra	Black Poplar	Quick growing hedge, promising.
Populus tremuloides	Aspen Poplar	Rather loose for a hedge.
Rhamnus catharticus	Common Buckthorn	Very thick, slow growing.
Ribes aureum	Missouri Currant	Sometimes winter kills, its berries make good preserves.
Salix pentandra	Laurel-leaved Willow	Excellent quick growing foliage, has a beautiful sheen.
Salix voronesh	Golden Willow	Very good but kills back a little.
Shepherdia argentea	Buffalo Berry	Silver foliage, very good hedge, fruit makes good preserves.
Syringa japonica	Japan Lilac	Does not grow close enough.
Syringa villosa	Chinese Lilac	Fine dense, does not winter kill.
Syringa Josikaea	Josika Lilac	Makes a nice hedge, very pretty flowering time.
Spiraea Van Houttei	Meadow Sweet	Very pretty, covered with small creamy white flowers, winter kills.
Larix laricina	Larch or Tamarack	Not suitable for hedges.
Thuja Occidentalis	Arborvitae White Cedar	Winter kills, makes poor hedge.
Viburnum lantana	Wayfaring Tree	Slow growing, too loose.
Rosa spinosissima	Rosa	Very promising, covered with single creamy white roses.
Cornus fol, argentea varigata	Silver Dogwood	Foliage silver, very pretty (new).
Cornus aurea Spathi	Golden Dogwood	Foliage golden, very effective (new).

POULTRY

The work with poultry has been mainly a continuation of experiments and the keeping of pedigree records with a view to establishing a strain of White Wyandottes of high-production qualities combined with good breed type, fertility, hatchability and large eggs. Every bird is trap-nested throughout the year and only the heaviest producing birds of good type, and laying eggs weighing at least 24 ounces to the dozen, are retained as breeders. Many of the

highest producers in previous years have been discarded because their eggs were below the 24-ounce-per-dozen standard that is now required for registration. The selection of males which were from high record hens having produced large-sized eggs was continued this year and has already shown an improvement in the average production and the average egg-size of the entire flock.

In order to identify the progeny from outstanding individuals pedigree breeding is carried on. The eggs are marked at hatching time, are incubated separately in wire baskets and the chicks wing-banded as soon as they are hatched. The wing band, which bears a number, makes it possible to identify the different chicks in the fall when the pullets begin to lay. At this time a numbered leg band is put on. By mating males from dams of known production with females of known production it is possible to build up pedigrees the same as those in use for other classes of live stock.

The demand for breeding cockerels and eggs for hatching was met as far as possible by the sale of 85 cockerels, and thirty-seven settings of eggs for hatching. In the sale of eggs not more than two settings were sold to any one individual.

In the 1927-28 Alberta Egg-Laying Contest, pullet No. 203 from this Station qualified for registration. The qualifications for a bird to register are that she must have laid 200 or more eggs in a contest, these eggs to average 24 ounces or more to the dozen, and she must be free from Standard Disqualifications. The highest pullet record made at the Station during the past year was 300 eggs in 365 days.

In December, 1928, all the birds in the flock except the young cockerels were tested for Bacillus Pulorum. The nineteen males tested came through one hundred per cent clean. Of the 83 hens tested, twenty-two reacted, or 24·1 per cent. Of the 180 pullets tested, 19 reacted, or 10·5 per cent. All the reactors were disposed of immediately following the test.

HATCHING RESULTS

Artificial incubation is employed for all hatching. The results for the season were as follows:—

Total eggs set	3,660
Number fertile	2,221
Per cent fertile	60·7
Number of chicks	1,063
Per cent total eggs hatched	29·0
Per cent fertile eggs hatched	47·9
Number of chicks alive when wing banded	810
Per cent chicks hatched, alive when wing banded	76·2
Total eggs required for one chick hatched	3·4
Total fertile eggs for one chick hatched	2·09
Total eggs required for one chick when wing banded	4·5

The hatching results from hens and pullets were as shown in the following table:—

HATCHING RESULTS FROM HENS AND PULLETS

—	Hens	Pullets
Total eggs set	1,178	2,482
Number fertile	750	1,471
Per cent fertile	63·7	59·3
Number of chicks	353	710
Per cent total eggs hatched	30·0	38·6
Per cent fertile eggs hatched	47·1	48·2
Number of chicks alive when wing-banded	235	575
Per cent chicks hatched alive when wing-banded	66·6	81·0
Average number eggs required for one chick hatched	3·3	3·5
Average number fertile eggs for one chick hatched	2·7	2·07
Average number eggs required for one chick when wing-banded	5·01	4·32

The above table, comparing the hatching results obtained with eggs from mature hens and pullets, shows very little difference as to fertility and hatchability. These results are in accord with the results obtained in a similar comparison carried on in 1927. With regard to viability of chicks the results were in favour of the pullets, the hens requiring 5·01 eggs for one wing-banded chick against 4·32 by the pullets. There were 2,482 eggs from pullets set against 1,176 from the hens.

CORN VS. BARLEY

An experiment, begun the previous year, was continued for the purpose of determining if barley is a satisfactory substitute for corn in the grain ration of laying pullets for winter egg production. Eighty white Wyandotte pullets were used. They were divided equally as to size and general development into two pens of forty birds each. The grain feeds in one pen were the standard scratch and the standard mash, both containing considerable corn while in the other pen the corn was left out of the scratch and mash and barley and barley meal substituted. The scratch feed was fed in the litter and the mash was fed dry in a hopper and was always available. Alfalfa was given as green feed and the pullets had free access to grit and water. The results were:—

CORN VS. BARLEY IN RATION

Feed under test	Mash	Scratch grain	Grit	Green feed	Value of feed	Number of eggs laid	Feed cost per dozen
	lb.	lb.	lb.	lb.	$		cts.
Corn.....	751	725	25	358	33 09	2,195	18·1
Barley.....	783	675	32	358	30 80	1,922	19·2

The preceding table shows that the pullets receiving the corn in the rations produced a total of 273 more eggs with the consumption of only 18 pounds more feed than did the barley-fed pen. The cost per dozen of eggs produced was 1·1 cents per dozen in favour of the corn-fed pen. A similar experiment conducted in 1927-28 showed the corn-fed pen to produce 67 more eggs with the consumption of only 18 pounds more feed, but on account of the high cost of the corn as compared with barley the cost per dozen of eggs produced was 4 cents in favour of the barley-fed pen. The increased egg production in the corn-fed pen was not sufficiently large to counterbalance the additional feed cost of the ration. It will be necessary to repeat this work a number of times before definite conclusions can be drawn.

TEST OF HULLESS BARLEY FOR LAYING PULLETS

To determine the value of hulless barley in the mixture of grain for scratch feed, and of hulless barley meal in the dry mash for laying pullets a test was conducted during the past winter. Two pens, consisting of ten birds each were used. The ration for one pen contained hulless barley in the scratch grain and hulless barley meal in the mash while the ration for the other pen contained common barley in the scratch grain and common barley meal in the mash. Results are as follows:—

RESULTS OF HULLESS VS. COMMON BARLEY TEST

Feed under test	Mash	Scratch grain	Grit	Green feed	Value of feed	Number of eggs laid	Feed cost per dozen
	lb.	lb.	lb.	lb.	$		cts.
Hulless barley.	227	300	9	89	11 00	528	25·0
Common barley.....	196	290	14	89	10 16	433	28·1

The table shows that the hulless barley-fed pen produced a total of 95 more eggs than the common barley-fed pen. The cost per dozen eggs produced was 3·1 cents per dozen in favour of the hulless barley. The test is being repeated during the winter of 1928-29.

FEEDS FOR FERTILITY, HATCHABILITY AND VIABILITY

This experiment is similar to the one conducted last season and is an attempt to determine the value of supplementary feeds such as cod liver oil, raw liver, bone meal and a combination of cod liver oil and liver, when fed to breeding hens.

Five equal pens of birds used for breeding purposes were housed, handled and fed alike except for the special feeds added to the regular ration. Pen number five was considered as a check pen and received a basal ration of dry mash available in hoppers and scratch grain in the litter. The dry mash consisted of 100 pounds oat flour, 100 pounds shorts, 100 pounds bran, 100 pounds corn meal, 25 pounds beef scrap and 3 per cent charcoal and the scratch grain of equal parts wheat and cracked corn. Grit was supplied in hoppers. The other four pens were fed the same basal ration but received in addition the following:—

Pen No. 1—One and one-half teaspoonfuls of cod liver oil per pen daily.
Pen No. 2—Three ounces of raw liver per pen daily.
Pen No. 3—Five per cent by weight of bone meal added to the dry mash.
Pen No. 4—Two ounces of raw liver and one teaspoonful cod liver oil per pen daily.

All of the supplementary feeds excepting the bone meal were fed in a moist mash of the same composition as that fed in the hopper.

The experiment was divided into two periods with one week between them. For the second period the males were alternated daily from one pen to another in rotation. This would eliminate to a large extent the effect of individual males on fertility, etc. The first period covered 82 days and the second period 32 days. Separate records were kept for each of the two periods. The results are as follows:—

RESULTS OF DIFFERENT FEEDS ON FERTILITY, HATCHABILITY AND VIABILITY

	Pen 1		Pen 2		Pen 3		Pen 4		Pen 5	
	Basal ration plus 1½ teaspoons cod liver oil daily		Basal ration plus 3 ounces liver daily		Basal ration plus 5% by weight bone meal in dry mash		Basal ration plus 2 ozs. liver and 1 teaspoon cod liver oil daily		Basal ration	
	Males		Males		Males		Males		Males	
	Continuous	Changed daily	Continuous	Changed daily	Continuous	Changed daily	Continuous	Changed daily	Continuous	Changed daily
Eggs set	131	46	178	51	225	30	273	30	150	48
Number fertile	101	33	107	35	171	23	222	27	121	33
Per cent fertile	77·1	71·7	60·1	68·6	76·0	76·7	81·3	90·0	80·7	68·7
Chicks hatched	32	22	46	20	54	7	51	3	29	19
Per cent total eggs hatched	24·4	47·8	25·8	39·2	24·0	23·3	18·7	10·0	19·3	39·6
Per cent fertile eggs hatched	31·7	66·7	43·0	57·1	31·6	30·4	23·0	11·1	23·0	57·6
Chicks alive at three weeks	27	19	42	17	51	6	45	3	24	18
Total eggs required to hatch 1 chick	4·1	2·1	3·9	2·5	4·2	4·3	5·3	10·0	5·2	2·5
Fertile eggs required to hatch 1 chick	3·1	1·5	2·3	1·7	3·2	3·3	4·3	9·0	4·2	1·7
Total eggs required for 1 chick to three weeks of age	4·8	2·4	4·2	3·0	4·4	5·0	6·1	10·0	6·2	2·7

During the period in which the males were not alternated, liver, cod liver oil and bone meal apparently increased the percentage of the total eggs hatched and also apparently produced stronger chicks. A combination of liver and cod liver oil had practically no influence on the hatchability of the eggs and livability of the chicks.

During the period in which the males were alternated there was an increase in the percentage of fertility in all pens except the one fed raw liver. Cod liver oil increased the hatchability of the eggs considerably. Liver had practically no influence, while bone meal and a combination of liver and cod liver oil apparently decreased the hatchability. Further work is necessary before final conclusions can be drawn.

The following table shows only the cost of egg production and returns from eggs at market prices and does not take into consideration the increase in the flock, the sales of cockerels, laying stock, hatching eggs, market fowl, etc.

MONTHLY STATEMENT OF EGG PRODUCTION, FEED CONSUMED, PROFIT AND LOSS ON WHITE WYANDOTTES, BRED AND RAISED AT THE DOMINION EXPERIMENTAL STATION, LACOMBE, ALBERTA, FOR THE LAYING YEAR NOVEMBER 1, 1927 TO OCTOBER 31, 1928

Month	Number of birds	Total eggs laid	Average per bird	Average price per dozen	Total market value	Feed consumed					Total cost of feed	Cost to produce 1 dozen eggs, labour neglected	Profit on 1 dozen eggs, labour neglected	Loss on 1 dozen eggs, labour neglected	Total monthly profit	Total monthly loss
						Grain	Mash	Grit	Green-feed	Butter-milk						
1927				cents	$	lb.	lb.	lb.	lb.	lb.	$	cents	cents	cents	$	$
November	159	1,356	8·5	50	56 50	480	440	15	210	.....	19 79	17·5	32·5	.....	36 71	.....
December	148	1,036	6·9	50	43 17	445	424	16	210	.....	18 84	21·8	28·2	.....	24 33	.....
1928																
January	148	1,152	7·8	35	33 60	450	497	16	210	.....	20 68	21·5	13·5	.....	12 92	.....
February	146	1,318	9·0	35	38 44	465	520	19	200	.....	21 48	19·5	15·5	.....	16 96	.....
March	144	1,453	10·1	25	30 27	475	522	33	210	.....	22 99	19·0	6·0	.....	7 28	.....
April	142	1,596	11·2	23	30 59	410	502	24	210	.....	20 28	15·2	7·8	.....	10 31	.....
May	127	1,833	14·4	20	30 55	340	471	12	.....	190	17 50	11·4	8·6	.....	13 05	.....
June	127	1,454	11·4	23	27 87	366	397	18	.....	190	16 26	13·4	9·6	.....	11 61	.....
July	116	844	7·3	25	17 58	306	415	11	.....	200	15 60	22·2	2·8	.....	1 98	.....
August	71	398	5·6	30	9 95	190	224	6	.....	160	8 93	26·9	3·1	.....	1 02	.....
September	71	477	6·7	32	12 72	120	384	4	.....	180	11 63	29·3	2·7	.....	1 09	.....
October	71	246	3·5	40	8 20	170	248	5	.....	160	9 16	44·7	.....	4·7	.....	0 96
Totals	.....	13,163	.....	.....	339 44	4,217	5,044	179	1,250	1,080	203 14	.....	.....	.....	137 26	0 96

Net gain over cost of feed $136.30.

The figures in the preceding table reveal the fact that it takes fewer eggs from November to March to pay for a given quantity of grain than during any other time of the year. Therefore, the greater the egg production during the fall and winter the greater are the profits. What the poultryman or farmer should realize above all else is that, although they cannot control the price of grain or the price of eggs from season to season, they can control production, at least to a considerable extent.

COST OF REARING YOUNG CHICKS

Records were kept again this year of the eggs, fuel and feed required to hatch and rear chicks to the end of the brooder period, or approximately two months of age. No allowance, however, was made for labour, interest, and depreciation on buildings. The figures that follow cover chicks hatched as follows:—

Cost of Rearing Chicks to End of Brooder Period—

Number of eggs set	3,660
Number of chicks hatched	1,063
Number of chicks alive, July 3	810

Incubation and Brooding Periods

Statement of cost—	
2,221 fertile eggs at $1.50 per setting of 15	$ 221 10
1,439 infertile eggs at 40 cents per dozen	47 97
6,000 pounds petroleum coke at $13 a ton	39 00
350 pounds soft coal at $8 per ton	1 40
950 pounds chick starter (mash) at $5 per cwt	47 50
1,000 pounds chick feed (grains) at $3.25 per cwt	32 50
1,085 pounds growing mash at $2.80 per cwt	30 38
6½ bushels wheat at 75 cents a bushel	4 87
384 pounds corn meal at $2.30 a cwt	8 83
½ gallon cod-liver oil at $1.75 per gallon	0 44
65 pounds finely cut alfalfa at $18 per ton	0 58
Total cost of 810 chicks, labour neglected	$ 434 57
Cost per chick, labour neglected	0·536

On July 3 the chicks were taken out of the brooder house and put on range. They were run on range until October 1, or approximately to five months of age. The number of chicks alive on that date and the cost of feed are shown in the following table:—

Cost of Rearing Chicks to Five Months

Number of chicks alive July 3	810
Number of chicks alive October 1	703

Statement of Cost

Cost of 810 chicks to July 3	$ 434 57
2,717 pounds cracked corn at $46 per ton	62 49
44 bushels wheat at 75 cents per bushel	33 00
2,276 pounds growing mash at $2.80 per cwt	63 73
242 pounds oat chop at 1·5 cents a pound	3 63
3,500 pounds buttermilk at 2 cents per gallon	7 00
Total cost of 708 chicks, labour neglected	$ 604 42
Average cost per chick, labour neglected	0·854

From the summary it may be noted that the average cost per chick at the end of approximately five months was $0·854 for 1928. The average cost of 658 chicks during the same period last year was $0·862 and the average cost of 597 chicks during the same period in 1926 was $0·882.

BEES

The summer of 1928 was very satisfactory for the production of an exceptionally good crop of high-grade honey. During the month of May the weather was unusually favourable for brood-rearing, with the result that, although for the most part June was a wet, cold month, the bees were in excellent condition at the commencement of the main honey flow during the last week of June.

Thirty-three colonies were alive in the spring. Three of these were queenless and were united with other colonies, thus bringing the spring count down to thirty colonies, upon which the average yield is taken.

An average of 163 pounds of water white honey per colony was extracted. With the exception of a light honey flow during the month of May, this yield was produced during the period between June 25 and August 22. Unfortunately for the late honey flow, no gains were made from this time on, due to a frost of three degrees on the morning of August 23. The highest daily gain of the hive on scales was made on August 8, when an increase of 13·5 pounds was recorded. The highest yield from any one colony was 310·5 pounds.

The principal sources of nectar in the early or building-up period was the abundant supply of dandelions which were very much in evidence during May and June. These, together with the caragana hedges, White Dutch clover, and some fruit bloom, provided the bees with ample supplies of nectar and pollen during the season. Towards the commencement of the main honey flow plenty of sweet clover, alfalfa, alsike clover, and also numerous wild flowers were within easy access of the bees.

In addition to the crop of honey an increase of twenty 2-frame nucleii was started during the last week of June and the first week in July. These eventually built up into sufficiently strong colonies for overwintering, thus increasing the apiary from thirty colonies in the spring to fifty in the fall, which were placed in winter quarters. None of the hives were allowed to swarm, little difficulty being found in controlling this desire, due no doubt to methods which will be discussed under the swarm-control experiments.

Experimental work was carried on with several different projects, results of which are given, and commented upon, below.

METHODS OF WINTERING BEES

Eighteen colonies were wintered in the office basement at temperature between 40 and 50° F. Twenty-one hives were kept outside in single, double, and quadruple cases, packed with cut straw.

The cellar wintered colonies came through the winter with an average of one and one-half frames of bees more than the outside wintered colonies, and maintained this lead throughout the season, producing an average yield of twelve pounds per colony more than the outside wintered colonies. At the same time it was noted that the weaker colonies with good queens which were wintered outside built up much quicker and produced higher yields of honey than did similar cellar wintered colonies. This appeared to be due to the extra protection given by the outside case during the cold weather early in the spring. Had it not been for the unusually mild weather during the month of May, the results of this experiment would doubtless have altered considerably in favour of outside wintering.

Differences in the honey yield appeared to be due to reasons other than the way in which the bees were wintered. In economy of construction and ease in packing the 4-colony case seems to have advantages over the double case. Additional merits relating to the single, permanently packed, or Kootenay case

are given under the heading of "Spring and Summer Protection". Results indicate no significant difference in favour of either method. It would seem that the system of wintering to be used by the beekeeper depends upon circumstances. If he has a good cellar he would be advised to use it, and save the expense of wintering cases and heavier fall feeding. If no suitable cellar is available it might be wise to use the outside wintering, as the advantages between the two appear to alternate according to seasons.

PROTECTED VERSUS UNPROTECTED HIVES DURING SUMMER

The objects of this experiment, are to determine whether a colony of bees which is protected during the summer months will produce a larger yield of honey than one which received only such protection as may be afforded by windbreaks; and, if necessary, to decide how much protection is essential.

Eight colonies were included in this experiment, two of which were wintered in Kootenay cases. Additional lifts were placed on these cases as supers were added to the hives, during the honey flow, thus providing a 4 inch space between the hive and the outside case, as well as protecting both brood-nest and supers. The brood-nest only, of two more colonies, was protected by a 4 inch packing of cut straw, while the four colonies used as a check received no protection other than that afforded by the usual ten frame Langstroth hive, and by the windbreak which surrounds the apiary. Results are given in the accompanying table.

Indications are, that some type of summer protection is necessary for the best results.Although the colonies having only the brood-chamber protected gave a higher yield than those in the Kootenay cases, this was doubtless due to the fact that one of them was headed by an exceptionally prolific queen, and produced over three hundred pounds of honey. It might be well to observe that the additional protection given helped materially in producing this yield, possibly due to the fact that the queen did not have to curtail her egg-laying during the occasional spells of cold weather. It was also noticed that the bees in the protected hives did not cluster nearly as much on the outside of the hive during the hot summer days as did those belonging to the unprotected colonies. In fact, the hives which were fully protected by Kootenay cases were not observed to cluster at any time during the season. Another factor in favour of the protected hive is that the hive is not exposed to the direct rays of the sun, hence it is easier for the bees to keep it ventilated, and for this reason they do not devote so much energy to swarm preparation.

PROTECTED VS. UNPROTECTED HIVES DURING SUMMER

Number of colonies used	Type of protection	Average yield of honey per colony
		lb.
2	Kootenay case	188
2	Protected brood-nest	216
4	No protection	168

COMPARISON OF DIFFERENT RACES OF BEES

This experiment, which was started three years ago, consists of four colonies each of Italian, Carniolan and Caucasian bees. Both the Carniolans and Caucasians came through the winter in fairly strong condition; the Carniolans being slightly ahead in the number of frames covered by bees. Four colonies

of Italians, as nearly equal in strength to the others as possible, were chosen as a check in the comparison. All colonies were headed by young queens and were given similar treatment throughout.

The Carniolans built up more rapidly in the spring, but with the exception of one colony, persisted in building queen cells. The Caucasians, like the Carniolans, built up very quickly for the main flow, but similarly, three out of the four made several attempts to swarm. None of the Italians used as a check made preparations for swarming during the season.

The claim has been made that both Carniolan and Caucasian bees are very docile and easy to manipulate. From observations made during the past season it was noted that they were much more inclined to sting than were the Italians. In fact it was found almost impossible to control them when the weather was at all unfavourable.

The Caucasians appeared to be more active as nectar-gatherers than were the Carniolans, producing an average of 12 pounds more honey per colony. The Italians gave an average yield of 20 pounds per colony more than the Caucasians and 32 pounds per colony more than the Carniolans. The data of this experiment are summarized in the accompanying table.

COMPARISON OF DIFFERENT RACES OF BEES

Race	Number of colonies in group	Amount of honey produced	Average per colony
		lb.	lb.
Italians	4	710	178
Caucasians	4	631	158
Carniolans	4	584	146

COMPARISON OF DIFFERENT SIZES OF HIVES

This comparison was made in an effort to ascertain the relative merits of the different sized hives now in general use.

Six colonies, three each in ten frame Langstroth and ten frame Jumbo hives, were used in this experiment. Both types of hives came through the winter in equally strong condition as to the number of frames of bees and amount of brood at the first examination in the spring.

The queens in the Jumbo hives did not appear to be as prolific as those in the Langstroth hives. Two of the Langstroth colonies and one Jumbo colony made preparations for swarming. The colonies in Langstroth hives produced an average yield of 169 pounds while the Jumbo hives yielded only 115 pounds per colony. This discrepancy, however, appeared to be due to factors other than the different sizes of hives.

The chief disadvantage of the Jumbo brood-chamber would seem to be that it is not possible to interchange the frames with Langstroth supers and when Jumbo supers are used, they are too heavy and cumbersome for the ordinary person to handle. It was also observed that while the Jumbo brood-nest provides more room for the queen to lay, the addition of a shallow super to the usual Langstroth brood-chamber gives ample room for the ordinary queen bee.

METHODS OF DETECTING PREPARATIONS FOR SWARMING

The object of this experiment is to find out whether it is possible to detect swarm preparations by the use of a double brood chamber, thus reducing the time required for examinations.

During the month of May a shallow super was placed over the brood chamber of all strong colonies, a close check being kept on four of these. A queen excluder was later placed between the shallow and honey supers added.

It was found that in all cases preparations for swarming were easily detected by tipping the shallow super and noting whether or not queen cells were present along the bottom bars of the frames. In one case queen cells were not discovered in the shallow super, but two or three were found in the lower brood chamber. These cells were left untouched and later proved to be supersedure cells.

It was also noted that the use of the shallow super, in conjunction with the ordinary ten frame Langstroth brood-nest, helped materially in reducing the desire of the bees to swarm. This was due, in some measure at least, to the fact that the addition of a shallow super provided ample room for the queen to lay.

SWARM CONTROL BY DEQUEENING AND REQUEENING

In this project it is endeavoured to ascertain whether swarming may be easily and effectively controlled by this method.

Two colonies were treated by the removal of the queen when they were found to be making preparations for swarming. Two or three frames of capped brood were removed with each queen and were used in starting nucleii. Ten days after the queens were removed the colonies were again examined and all queen cells but one destroyed and the colonies left to requeen themselves. Possibly, if young queens had been available to requeen these colonies at this time, a more encouraging crop of honey would have been produced. As it was, although the swarming impulse was effectually controlled, and no further preparations for swarming were made during the summer, these two colonies loafed during the period between the time they were dequeened and the new queen commenced laying. The result was that as this time occurred during the honey flow, they produced an average of only eighty-nine pounds per colony, or seventy-four pounds less than the average for the apiary. The yield would probably have been much higher if it had been possible to requeen the colonies immediately after the second destruction of queen cells.

With few exceptions, swarming was very easy to control during the past season. In fact, several colonies made no attempts at swarm preparation during the entire season, and those which did were, for the most part, easily discouraged. A close check was kept upon all colonies during the season and, in all cases the queen was provided with plenty of room to fully exercise her egg-laying capacities, and the bees were given ample room for the storage of surplus honey. During extremely hot weather additional ventilation was provided by lifting the hive covers or staggering the supers.

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