DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

LETHBRIDGE, ALTA.

INTERIM REPORT OF THE SUPERINTENDENT

W. H. FAIRFIELD, M.S.

FOR THE YEAR ENDING MARCH 31, 1921

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EXPERIMENTAL STATION, LETHBRIDGE, ALBERTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

THE SEASON OF 1920-21

The crop season of 1920, although by no means as disappointing as that of 1919, was not a satisfying one. It started out with great promise. The precipitation for the last four months of 1919, September to December, which would influence the amount of moisture carried over winter in the soil, was fairly generous. It amounted to 5.63 inches, as compared with a normal precipitation of only 3.64 inches for the same period. During the winter the land was covered with snow almost continuously, something unusual for the district, which prevented the soil from drying out. April, which is ordinarily a dry month with us, was unusually wet, 4.37 inches of moisture falling. No work on the land was possible that month. General field operations on the land did not start until the 4th of May, a month later than usual.

The crop season, therefore, started out well with plently of moisture in the soil.

Seeding in southern Alberta, although getting a late start, was pushed with vigour, and was completed only about two weeks later than usual. Owing to lack of time the tendency of farmers generally was doubtless to do less work in the preparation of the seed bed than was desirable. From the 1st of May onwards, the rainfall was so scanty, except in a few favoured localities, that the promising outlook generally for grain crops did not materialize. The early moisture produced good grass on the ranges, and live stock picked up rapidly after the severe winter and were in excellent condition in the fall.

There were no severe spring frosts. The latest one was on June 3, when the thermometer recorded three degrees of frost. Fortunately there was a warm, late fall. No frost was recorded until September 19, and the first killing frost did not occur until October 17. In consequence of this, late sown crops on irrigated land had ample time to mature. Owing to the generous supply of moisture received early in the spring, grain made rapid and promising progress until continued dry weather in June interfered. On June 8 an unusually heavy wind caused material loss by soil drifting over a rather large area west and north of Lethbridge. Rains in July, which were local in character, were sufficient in some localities to produce excellent crops, but in the greater portion of the southern part of the province they were so light that grain generally failed to fill properly, the consequence being that the returns at threshing time were disappointing in nearly all cases.

One of the outstanding points about the season was the exceptionally severe winter of 1919-20. The ground was covered with snow almost continuously from early in November until late in April. Periods of low temperature were frequent. On account of the dry season of 1919 feed was not abundant, and the local supplies of hay were consequently soon exhausted. Very large quantities of feed had to be imported into southern Alberta and the prices paid reached a higher level than had ever before been known here. The situation was keenly felt by even the grain farmers, who had little more than their work horses to look after; but with the cattle and sheep men it was, in not a few cases, ruinous.

METEOROLOGICAL RECORD

Month	Temperature F.			Precipitation in inches	Sunshine in hours
	Maximum	Minimum	Mean		
January	54·0°	−39·5	11·31	·84	79·3
February	49·0	−12·0	24·49	1·21	124·0
March	64·0	−33·0	26·58	·89	177·3
April	65·0	− 4·0	30·59	4·37	103·0
May	75·0	23·0	46·99	1·66	255·2
June	81·0	29·0	55·66	·40	301·1
July	90·5	45·0	66·91	2·59	347·9
August	92·5	36·5	64·10	·20	329·4
September	82·5	22·0	53·01	·05	253·6
October	83·5	19·0	42·53	·99	150·3
November	56·0	−10·0	31·2	·06	103·1
December	55·0	−32·0	21·9	·79	92·6
Total for year				14·05	2,316·8
Average for 19 years				15·536	
Total for four months of growing season, April, May, June and July, 1920				9·02	
19 years' average for four months of growing season, April 1st to August 1, 1920				8·087	
Latest spring frost, June 3rd	29·0°				
First fall frost, Sept. 19th	30·0°				
First killing frost, Oct. 17th	19·0°				

BUILDINGS

A new lambing shed was erected 140 feet long by 64 feet wide. It is a gable-roofed structure with two 10 by 10-foot sliding doors in each end, to permit of driving through on both sides with a team and rack.

This shed is suitable for lambing 1,000 head, and is equipped with 3 by 4-foot portable lambing pens. These are placed lengthwise through the centre of the building and on either side by the use of 14-foot panels mothering pens are easily erected.

A 14 by 30-foot silo was erected at one end of the lambing shed.

EXHIBITION WORK

An exhibit was staged at the Coaldale-Lethbridge fair at which the products of the south country were featured. Much interest was evidenced in this exhibit and a large quantity of circulars on gardening and poultry subjects was distributed.

At the annual Flower Show at Calgary an exhibit was made. The attendance at this show was large, and the horticultural products grown at this Station attracted a great deal of attention.

VISITORS

The number of visitors to the Station increases year by year. A marked increase in the interest shown by visitors in the experiments carried out on the irrigated part of the farm is noticeable, the active progress being made in irrigation development in this part of the province being the cause.

ANIMAL HUSBANDRY

HORSES

At the present time there are twenty-three head of horses on the Station, made up of fourteen work horses and drivers and nine young horses, the latter ranging in age from one to three years. As in the past, all of the horses were wintered in a corral with an open shed, except the drivers and two draught teams. This method of wintering has proved to be entirely satisfactory. All of the horses improved in condition during the winter, and were in excellent shape to begin the spring's work. The saving in labour compared with stabling during the winter is considerable.

CATTLE

STEER FEEDING EXPERIMENT

A feeding experiment was commenced on January 24 to compare alfalfa hay with cut roughage made up of equal parts alfalfa hay and straw.

On the irrigated lands in the Lethbridge district, there are annually raised large quantities of alfalfa hay. The farmers realize that the time is rapidly approaching when it will be absolutely necessary to feed most of it, as the market for baled alfalfa is limited. In previous feeding tests at this Station it has been shown that better results have been obtained by feeding some other roughage in combination with the alfalfa than when it was fed alone. It was on this account that an experiment was planned to utilize with alfalfa a feed with little or no cash value.

With this purpose in view, two cars of steers were purchased through the Live Stock Commission Department, United Grain Growers, Limited, Calgary. They were ordinary feeders and were divided as evenly as possible into two groups of twenty, each group having steers uniform in size and type. They were fed outside and had straw sheds for shelter.

In no case was the amount of roughage limited, the steers being fed what they would eat up clean. The grain consisted of good quality ground screenings (Standard Stock Food) and the amount fed to each group was the same. On January 24 they were started on two pounds per head and were steadily increased until by March 9 they received daily 12½ pounds per head. Salt was kept before them at all times in troughs made for this purpose. The steers had access to water and, in extremely cold weather, tank heaters were used to keep the surface of the water free from ice.

The following table gives in detail the results of the feeding test:—

		Group 1	Group 2
Feeding experiment commenced		Jan. 24, 1921	Jan. 24, 1921
Feeding experiment ended		May 12, 1921	May 12, 1921
Number of days in experiment		108	108
Number of steers in experiment		20	20
Total initial weight	Lb.	23,250	23,270
Average initial weight	"	1,162.5	1,163.5
Final total weight	"	26,650	26,830
Final average weight	"	1,332.5	1,341.5
Total gain for period	"	3,400	3,560
Average gain per head for period	"	170	178
Average gain per head per day	"	1.57	1.65
Quantity of alfalfa hay fed for period	"	31,180	21,055
Quantity of straw fed for period	"	.....	21,055
Quantity of screenings fed for period	"	15,060	15,060
Quantity of salt fed for period	"	125	125
COST OF FEED			
Alfalfa hay at $20 per ton		$311 80	$210 55
Oat straw at $6 per ton		.....	63 17
Cutting mixture at $1 per ton		.....	21 05
Screenings at $34 per ton		256 02	256 02
Grinding screenings at $2 per ton		15 06	15 06

STEER FEEDING EXPERIMENT.—*Concluded.*

	Group 1	Group 2
Salt at $36.50 per ton	2 28	2 28
Total cost of feed	585 16	568 13
Cost of feed per head	29 26	28 41
Cost of feed per head per day	0 27	0 26
Cost to produce one pound of gain	0 17	0 16
Initial cost of steers	1,860 00	1,861 60
Initial cost of steers, per pound	0 08	0 08
Total cost of steers, including feed, insurance and freight	1,939 04	1,940 65
Total cost, plus cost of feed	2,524 20	2,508 78
Selling price of steers at 7½c. less 3 per cent shrink	1,938 75	1,951 87
Net loss on group	585 55	556 91
Net loss per head	29 28	27 85

The relative gains made by the two groups conform to the gains made in previous similar experiments. The group fed on the mixture did slightly better, making an average daily gain from January 24 to March 31 of 2·5 pounds, while the group fed on straight alfalfa hay as roughage made an average daily gain of 1·94 pounds.

The steers were sold locally on May 12. During the last five weeks of the feeding period, the feed of the group given cut alfalfa and oat straw was changed to cut alfalfa and wheat straw. This cut mixture was not relished to the same extent and, as a result, the average gain for the whole feeding period was reduced to 1·65 pounds as against 1·57 pounds for the group fed straight alfalfa.

Judging from the gains made by the steers, it is safe to conclude that oat straw can be profitably utilized as a feed, when cut and fed in conjunction with cut alfalfa.

From a financial standpoint, the experiment was a disappointment. This only confirms the experience of all cattle men in the district as those who bought steers in the fall or early winter for feeding purposes were forced to sell them at a loss.

SHEEP

At the present time some farmers on irrigated lands are keeping a few sheep, others would like to if they could provide cheap summer pasture. No readily accessible prairie range is within reach of the irrigated farms in the Lethbridge district. The question had been raised from time to time by farmers interested in the matter, as to whether it might not be possible to utilize some of the mountain pastures, now unoccupied, the suggestion being for a few neighbouring farmers to combine their flocks after shearing time, ship the sheep by rail to the mountains and pool the cost of herding for the three and a half or four summer months.

With this idea in mind, 800 head of grade Merino ewes were purchased in October, 1919, to carry out an experiment to determine the feasibility of this plan for alfalfa growers on the irrigated lands to carry sheep on their farms but to depend for summer pasture on the forest reserve in the Rocky mountains.

With the flock of sheep already on the Station, this purchase brought the number of breeding ewes to 900 head. If a commercial experiment were to be carried out along the lines indicated it would be necessary to have a band of at least this size, otherwise the cost of herding during the summer would be excessive. The greater the number of sheep in the band, provided the number is kept within practical limits, the more cheaply per head can they be carried during the summer. It might be observed in this connection that it is probably not wise on mountain ranges to run in a single band more than about 2,500 head, including lambs.

The ewes were bred to commence lambing the middle of March. The time selected to inaugurate this experiment proved to be, from a financial standpoint, unfortunate. Not only was the price of sheep still high when the purchase was made but the winter of 1919-20 was, as all stock men know to their sorrow, one of the

longest and most severe of any that have ever been experienced here. The price of all kinds of feed was extremely high. The weather was such that sheep could only be pastured at intervals of from two to three days at a time and for the long period from the beginning of November to well into May, sheepmen were obliged to feed almost continuously. Those who did not feed liberally sustained heavy losses and raised a low percentage of lambs.

The following table giving the amounts of the various feeds, with the cost, fed each month to the 900 ewes in the experiment will be of interest to sheep men though, fortunately, it is not a criterion for an ordinary winter:—

FEED	
October, 1919—	
2,700 lb. Alfalfa at $25 per ton	$33 75
November, 1919—	
33,260 lb. Alfalfa at $25 per ton	415 75
4,700 lb. mangels at $10 per ton	23 50
18,180 lb. corn fodder at $12 per ton	109 06
4,070 lb. screenings at $1.70 per cwt	93 84
December, 1919—	
17,390 lb. Russian thistle hay at $5 per ton	43 47
3,910 lb. alfalfa at $25 per ton	48 88
700 lb. corn fodder at $12 per ton	4 20
5,520 lb. screenings at $1.70 per cwt	93 84
January, 1920—	
17,070 lb. Russian thistle hay at $5 per ton	42 67
5,520 lb. screenings at $1.70 per cwt	93 84
900 lb. barley at $2.25 per cwt	20 25
February, 1920—	
2,400 lb. alfalfa at $25 per ton	30 00
7,980 lb. barley at $2.25 per cwt	179 55
5,760 lb. screenings at $2.37½ per cwt	136 80
March, 1920—	
13,700 lb. screenings at $2.37½ per cwt	325 38
5,050 lb. oats at $2.70 per cwt	136 35
2,550 lb. bran at $2.05 per cwt	52 28
42,155 lb. alfalfa at $25 per ton	526 94
April, 1920—	
28,800 lb. oats at $2.70 per cwt	777 60
5,200 lb. screenings at $2.37½ per cwt	123 50
12,000 lb. mixed hay at $40 per ton	240 00
1,950 lb. bran at $2.05 per cwt	39 98
38,660 lb. alfalfa at $25 per ton	483 25
2,000 lb. salt at $32 per ton	32 00
4 bricks salt at 85c. per brick	3 40
May and June, 1920—	
14,500 lb. oats at $2.70 per cwt	391 50
23,960 lb. alfalfa at $25 per ton	299 50
Winter pasture estimated at	166 00
	$4,967 08

From the table it will be noted that the total cost of feed for the 900 head, without any allowance for labour, comes to $5.50 per head. This might have been borne had the prices for wool and mutton, in sympathy with other live stock products, not declined as they did in 1920.

Notwithstanding the heavy feeding, the losses during the winter reached 11 per cent. This was due, in large measure, to the fact that the ewes purchased, although thrifty, were not in very good condition as they had been suckling lambs up to the day the seller made delivery of them. Under ordinary conditions breeding ewes have a chance to pick up while being pastured on the stubble field, but in this case the winter began too early. Sheep men generally suffered much greater loss, however, than is here indicated.

35612—2½

The lambing was done in a large shed, 140 feet long by 64 feet wide.

There were shipped with the ewes on June 24, 102 per cent of lambs. On account of the late spring it was impossible to move the sheep on to the forest reserve at an earlier date. During the fortnight preceding this the sheep were sheared and dipped. The ewes averaged nine pounds of wool per head.

The sheep did well in the mountains, and on August 24, 250 of the best wether lambs were shipped to the Calgary market. Their average weight off cars was 73 pounds. Shipping the top wether lambs at this time of the year, or a week or so earlier, makes it possible to reach the market with developed and well-finished lambs at a time when the market is usually still firm; that is to say, before the run of the lambs from the prairies starts to come in. After this sale there were left roughly one-third of the wether lambs and all of the ewe lambs, to be carried over the following winter.

The total losses sustained during the summer were light until September 23, when, during the night, in a severe snowstorm, the sheep piled and twenty-three were smothered.

In connection with the labour required in looking after the sheep the following summary for the year is presented:—

1919—

October.—One man.
November.—One man full time and one man one-third time.
December.—One man full time and one man one-quarter time.

1920—

January.—One man full time and one man one-quarter time.
February.—One man full time and one man one-half time.
March.—Two men full time and one man one-quarter time.
April.—Three men full time.
May to September, inclusive.—One man and one boy full time.

It will be observed that two herders, a man and a boy, were used during the summer. An economy in this regard could be effected if two bands of sheep were run within a reasonable distance of each other, for in that case three men could handle the two bands, one of the men acting as camp tender for both bands.

On October 5 the sheep were shipped back to the station. The date of return from the mountains concluded the first year's work.

On account of the abnormal conditions that prevailed, the hard winter, the high prices of feed and the falling prices for mutton and wool, it is difficult to draw very definite conclusions that might act as a criterion for a normal year. This much may be said, however: the sheep did particularly well on the summer pasture. The lambs made excellent growth and were estimated to be about 10 pounds heavier in the fall than lambs of the same age summered on the prairie.

The cost of carrying the sheep for the four summer months was high; probably higher than the returns for wool and mutton (lamb) in the fall of 1920 would warrant. The freight rate from Lethbridge to Coleman in June was 17 cents per hundredweight. Dividing the total amount paid for freight to the mountains among the ewes (leaving the lambs out of this reckoning) brought the transportation to 26 cents per head. The charge made by the Forestry Branch for the pasture was 8 cents per head for the four months. This is paid on the number of mature sheep, the lambs not being taken into the count. In October, when the sheep were returned, the freight rate had been advanced to 23½ cents per hundredweight. Dividing the total amount paid for freight on the sheep back from the mountains among both the ewes and the lambs not marketed brought the transportation to 21 cents per head.

The result of the experiment seems to hinge on the point as to whether this cost for transportation by rail to and from the summer pasture can be borne by the sheep.

FIELD HUSBANDRY

THE TWO FARMS

Two Experimental Farms are really being operated at Lethbridge. Of the 400 acres at the Station, one half can be irrigated while the balance is devoted to dry land farming. The object is not to compare the relative merits of the two systems, but to study their individual problems. To aid in doing this, and to prevent confusion, the reports are kept separate, except for that part of the report dealing with horticulture.

Although many of the tests carried out are the same on both the dry land and the irrigated land, it may be well to point out that the yields of even the same variety of crops grown on the two farms in any one season are not necessarily comparable, and that an increased yield on the irrigated portion may not be entirely due to irrigation owing to the fact that the preparation of the land on the two fields may not have been identical.

1. The Dry Farm

CROP ROTATIONS—DRY LAND

It is extremely difficult to arrange a rotation for dry land that will prove entirely satisfactory, and we are frank in admitting that we have not yet found one with which we are satisfied. However, the tabulated results from the following ones will, we feel sure, be interesting to farmers in the district who have been giving thought to this important question.

This is the ninth season for the following rotations:—

ROTATION "A"

Wheat continuously.

ROTATION "B"

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

ROTATION "C"

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Wheat or coarse grains.

ROTATION "M"

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Coarse grains; manured in full.
Fourth year.—Summer-fallow.
Fifth year.—Peas and oats for hay.
Sixth year.—Barley or oats.

ROTATION "S"

First year.—Summer-fallow.
Second year.—Hoed crop.
Third year.—Wheat.
Fourth year.—Summer-fallow.
Fifth year.—Wheat.
Sixth year.—Coarse grain.
Seventh year.—Summer-fallow; manured.
Eighth year—Peas and oats for hay; seeded to fall rye.
Ninth year.—Rye pasture.

ROTATION "T"

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Oats or barley.
Fourth year.—Seeded to alfalfa in rows.
Fifth year.—Alfalfa hay or seed.
Sixth year.—Alfalfa hay or seed.
Seventh year.—Alfalfa hay, seed or pasture.
Eighth year.—Summer-fallow.
Ninth year.—Hoed crop.
Tenth year.—Wheat; manured on stubble.

That the results may be easily compared, the following table shows the average cost, the returns and profit per acre for the past nine years, with the values all based on normal, pre-war prices:—

COST, RETURNS AND PROFITS FROM ROTATION

Rotation	No. of years duration	Average cost per acre 9 years	Average returns per acre 9 years	Average profit per acre 9 years
		$ cts.	$ cts.	$ cts.
"B"	2	7 33	10 84	3 51
"C"	3	7 09	12 53	5 44
"M"	6	9 69	12 87	3 18
"S"	9	9 44	12 66	3 22
"T"	10	9 49	16 55	7 06

Prior to 1920 a fixed set of values was used in calculating the rotation returns. In computing this season's results values are based on current prices paid during 1920.

COST VALUES FOR SEASON OF 1920

Rent, dry land, per acre	$2 00
Rent, irrigated land, per acre	10 00
Manure (cost spread equally over all years of the rotation), per ton	1 00
Seed wheat, per bushel	2 50
Seed oats, per bushel	1 00
Seed barley, per bushel	1 50
Seed peas, per bushel	3 00
Seed rye, per bushel	2 50
Seed corn, per pound	0 07½
Seed alfalfa, per pound	0 75
Seed potatoes, per ton	50 00
Twine, per pound	0 20
Machinery, per acre	1 00
Manual labour, per hour	0 40
Horse labour, per horse per hour	0 16
Engine, cost of operating, per hour	1 51
Threshing wheat, per bushel	0 20
Threshing oats and barley, per bushel	0 10

RETURN VALUES

Wheat, per bushel	2 00
Oats, per bushel	0 58
Barley, per bushel	0 98
Peas, per bushel	3 00
Alfalfa, per ton	20 00
Wheat straw, per ton	5 00
Oat straw, per ton	6 00
Barley straw, per ton	6 00
Pea straw, per ton	2 00
Corn ensilage, per ton	6 00
Pasture, one horse or cow, per month	1 00
Pasture, one sheep, per month	0 25

The following tables contain details in connection with these rotations:—

ROTATION "A" (WHEAT CONTINUOUSLY)

Rotation Year	Crops: Last Year	Crops: This Year	Area	Items of Expense in Raising Crop per Acre: Rent and Manure	Seed, Twine, and use of Machinery	Manual Labour: Hours Manual Labour	Manual Labour: Cost of Manual Labour	Horse Labour (including Teamster): Hours: Single Horse	2 Horse Team	3 Horse Team	4 Horse Team	5 Horse Team	Value of Horse Labour	Cost of Threshing	Cost for 1 Acre	Cost for 1 Bushel	Cost for 1 Ton	Height of Stubble	Particulars of Crop per Acre: Weight: Grain	Straw	Hay	Hoed Crop	Value of crop per Acre	Profit or Loss per Acre
			Acres	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.	$ c.	$ c.	$ c.	$ c.	$ c.	Ins.	Lbs.	Lbs.	Lbs.	Lbs.	$ c.	$ c.
	Wheat	Wheat	1·57	2 00	4·58	1·27	0·51	.....	.....	0·57	4·48	.....	5 16	2 63	1,488	102	.....	6	879	841	.....	.....	31 40	16 52

ROTATION "B" (TWO YEARS' DURATION)

2	Summer-fallow...	Wheat	1.57	2 00	3 79	1.59	0 64	.....	.....	0.96	1.80	.....	2 72	4 67	13 82	0.68	.....	6	1,220	1,022	.....	.....	43 23	29 41
1	Wheat	Summer-fallow...	1.57	2 00	1 00	1.27	0 51	.....	.....	1.11	2.86	.....	3 95	.....	7 46	.....	.....	.....	.....	.....	.....	.....	....	7 46
	Aggregate		3.14	4 00	4 79	2.86	1 15	.....	.....	2.07	4.66	.....	6 67	4 67	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Average per acre		.....	2 00	1 57	1.43	0 58	.....	.....	1.04	2.33	.....	3 34	2 34	10 64	.....	.....	.....	.....	.....	.....	.....	21 62	10 98

ROTATION "C" (THREE YEARS' DURATION)

2	Oats	Summer-fallow...	1.57	2 00	1 00	1.27	0 51	.....	.....	1.11	2.52	.....	3 60	.....	7 11	.....	.....	.....	.....	.....	.....	.....	.....	7 11
3	Summer-fallow...	Wheat	1.57	2 00	3 79	1.59	0 64	.....	.....	0.85	0.80	.....	1 58	3 98	11 99	0 60	.....	6	1,194	1,334	.....	.....	43 14	31 15
1	Wheat	Oats	1.57	2 00	3 29	1.27	0 51	.....	.....	0.80	0.85	.....	1 58	4 32	11 70	0 28	.....	6	1.468	1,166	.....	.....	28 54	16 84
	Aggregate		4.71	6 00	8 08	4.13	1 66	.....	.....	2.76	4.17	.....	6 76	8 30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Average per acre		.....	2 00	2 69	1.38	0 55	.....	.....	0.92	1.39	.....	2 25	2 77	10 27	.....	.....	.....	.....	.....	.....	.....	23 89	13 63

ROTATION "M" (SIX YEARS' DURATION)

4	Oats	Summer-fallow...	1.25	4 00	1 00	.....	.....	.....	.....	.....	8.74	.....	9 09	.....	14 09	.....	.....	.....	.....	.....	.....	.....	.....	14 09
5	Summer-fallow...	Peas and Oats....	1.25	4 00	4 00	2.00	0 80	.....	1.86	.....	1.60	.....	3 00	.....	11 80	.....	7 46	.....	.....	.....	3,164	.....	31 64	19 84
6	Peas and oats	Oats	1.25	4 00	4 10	1.60	0 64	.....	.....	1.20	4.80	.....	6 05	4 12	18 91	0 46	.....	4	1,400	912	.....	.....	26 62	7 71
1	Oats	Summer-fallow...	1.25	4 00	1 00	.....	.....	.....	.....	.....	5.53	2.40	8 63	.....	13 63	.....	.....	.....	.....	.....	.....	.....	.....	13 63
2	Summer-fallow...	Winter Wheat.....	1.25	4 00	4 80	1.60	0 64	.....	0.80	1.60	1.20	.....	3 24	3 46	16 14	0 92	.....	5	1,048	1,544	.....	.....	38 82	22 68
3	Winter Wheat	Oats	1.25	4 00	4 10	1.60	0 64	.....	.....	1.20	4.80	.....	6 05	3 46	18 25	0 53	.....	4	1,176	868	.....	.....	22 66	4 41
	Aggregate		7.50	24 00	19 00	6.80	2 72	.....	2.66	4.00	26.67	2.40	36 06	11 04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Average per acre		.....	4 00	3 17	1.13	0 45	.....	0.44	0.67	4.45	0.40	6 01	1 84	15 47	.....	.....	.....	.....	.....	.....	.....	19 96	4 49

ROTATION "S" (NINE YEARS' DURATION)

8	Summer-fallow...	Peas and oats.....	1.25	3 33	4 00	2.00	0 80	.....	2.00	.....	19.20	.....	21 44	.....	29 57	.....	21 00	.....	.....	.....	2,816	.....	28 16	—	1 41
9	Peas and oats.....	Winter rye.....	1.25	3 33	3 90	0.66	0 26	.....	.....	1.60	1.20	.....	2 66	1 00	11 15	2 23	.....	4	280	63	.....	.....	7 50	—	1 41
1	W. rye pasture....	Summer-fallow...	1.25	3 33	1 00	.....	.....	.....	.....	.....	8.00	.....	8 32	.....	12 65	.....	.....	.....	.....	.....	.....	.....	.....	—	12 65
2	Summer-fallow...	Corn.....	1.25	3 33	3 00	14.40	4 76	.....	1.60	2.00	1.80	.....	4 78	.....	15 87	.....	3 64	.....	.....	.....	.....	8,728	26 18		10 31
3	Corn.....	Wheat.....	1.25	3 33	4 73	1.20	0 48	.....	.....	1.20	2.74	.....	3 91	5 37	17 82	0 66	.....	5	1,612	2,044	.....	.....	58 84		41 02
4	Wheat.....	Summer-fallow...	1.25	3 33	1 00	.....	.....	.....	.....	.....	2.86	3.20	6 81	.....	11 14	.....	.....	.....	.....	.....	.....	.....	.....	—	11 14
5	Summer.....	Winter wheat.....	1.25	3 33	4 80	1.20	0 48	.....	0.80	1.20	2.00	.....	3 72	3 61	15 94	0 88	.....	5	1,082	1,133	.....	.....	38 90		22 96
6	Winter wheat.....	Oats.....	1.25	3 33	4 10	1.20	0 48	.....	.....	1.20	4.00	.....	5 22	1 91	15 04	0 79	.....	4	648	1,424	.....	.....	15 32		0.28
7	Oats.....	Summer-fallow...	1.25	3 33	1 00	.....	.....	.....	.....	.....	1.53	4.00	6 39	.....	10 72	.....	.....	.....	.....	.....	.....	.....	.....	—	10 72
	Aggregate.....	.....	11.25	29 97	27 33	20.66	7 26	.....	4.40	7.20	43.33	7.20	63 25	11 89	.....	.....	.....	.....	.....	.....	.....	.....	.....		.....
	Average per acre.	.....	.....	3 33	3 04	2.29	0 81	.....	0.49	0.80	4.81	0.80	7 03	1 32	15 55	.....	.....	.....	.....	.....	.....	.....	19 43		3 88

ROTATION "T" (TEN YEARS' DURATION)

3	Winter wheat.....	Oats.....	1.57	3 20	4 10	1.27	0 57	.....	.....	0.80	3.34	.....	4 17	4 69	16 67	0 36	.....	4	1,594	1,266	.....	.....	28 05		11 38
4	Oats.....	Alfalfa seeding....	1.57	3 20	3 81	17.19	6 88	.....	.....	3.18	4.50	.....	7 48	.....	21 37	.....	.....	.....	.....	.....	.....	.....	.....	—	21 37
5	Alfalfa seeding....	Alfalfa seeding....	1.57	3 20	3 81	17.19	6 88	.....	.....	3 18	4.50	.....	7 48	.....	21 37	.....	.....	.....	.....	.....	.....	.....	.....	—	21 37
6	Alfalfa seeding....	Alfalfa seeding....	1.57	3 20	3 81	.....	.....	.....	.....	3.18	4.50	.....	7 48	.....	14 49	.....	.....	.....	.....	.....	.....	.....	.....	—	14 49
7	Alfalfa seed.....	Alfalfa.....	1.57	3 20	3 81	.....	.....	.....	.....	3.18	4.50	.....	7 48	.....	14 49	.....	.....	.....	.....	.....	.....	.....	.....	—	14 49
8*	Alfalfa seed.....	Summer fallow...	1.57	3 20	1 00	5.73	2 29	.....	2 96	.....	1 38	.....	3 57	.....	10 06	.....	10 53	.....	.....	.....	1,911	.....	19 11		8 58
9	Summer fallow...	Corn.....	1.57	3 20	2 70	23.57	9 43	.....	.....	1.91	1.00	.....	2.72	.....	18 05	.....	18 76	.....	.....	.....	.....	1,924	5 77	—	12.28
10	Corn.....	Wheat.....	1.57	3 20	4 10	1.27	0 51	.....	.....	1.43	0.79	.....	2 08	4 09	13 98	0 68	.....	5	1,226	1,551	.....	.....	44 75		30 77
1	Wheat.....	Summer-fallow...	1.57	3 20	1 00	.....	.....	.....	.....	.....	8.54	.....	8 88	.....	13 08	.....	.....	.....	.....	.....	.....	.....	.....	—	13 08
2	Summer-fallow...	Winter wheat.....	1.57	3 20	4 10	1.27	0 51	.....	0.63	1.59	0.66	.....	2 54	3 00	13 35	0 89	.....	5	9,013	1,156	.....	.....	32 93		19 58
	Aggregate.....	.....	15.70	32 00	32 24	67.49	27 01	.....	3.59	18.45	33.71	.....	53 88	11 78	.....	.....	.....	.....	.....	.....	.....	.....	.....		.....
	Average per acre..	.....	.....	3 20	3 22	6.75	2 70	.....	0.36	1.85	3.37	.....	5 39	1 18	15 69	.....	.....	.....	.....	.....	.....	.....	13 06	—	2 63

* 1911 pounds per acre of alfalfa hay cut before alfalfa was ploughed for summer fallow.

CULTURAL EXPERIMENTS

The cultural work begun in 1912 has been concluded, and a revised set of experiments started on new land.

A study of the seven years' results, 1912 to 1918 inclusive, of the cultural experiments, in which over 500 plots were used each year, would lead to the following general conclusions:—

PRAIRIE BREAKING

The most profitable way to handle prairie sod is to break one year and let it stand over to the next season before attempting to grow a crop.

Sowing wheat on spring breaking is a doubtful practice as three years out of five the crop was a total failure. It was the wet years 1915 and 1916 which brought the average yield up to 9 bushels and 20 pounds per acre.

The common practice of sowing flax on spring breaking has not given satisfactory results. The crop is often a failure while the yield of wheat following the flax is always considerably lower than the yield of wheat following a crop of wheat on land which was broken in June of the year before the planting of the first crop of wheat.

Shallow breaking and backsetting gave an average yield of 28 bushels and 3 pounds of wheat as compared with a yield on deeper spring breaking without backsetting of 26 bushels and 26 pounds.

SUMMER-FALLOW TREATMENT

Once ploughing for Summer-fallow.—From examination of the wheat yields following 4-inch, 6-inch, and 8-inch ploughing for summer-fallow, there is a noticeable increase in favour of the deeper ploughing. Throughout the fallow season, each plot received similar treatment, the only difference in the cultural operations being the depth of ploughing for summer-fallow.

Twice ploughing for Summer-fallow.—In the case of shallow ploughing, ploughing twice has given slightly larger yields, but at an added expense.

When ploughed land was left unharrowed in the fall there was a loss of over one bushel per acre as compared with land which was harrowed.

Growing pasture crop on Summer-fallow.—When rape was sown to take the place of summer-fallow and pastured off, there was a loss of over 9 bushels of wheat per acre and a loss of 4 bushels of oats following the wheat crop.

Date of ploughing.—As to the date of ploughing in this particular experiment, land ploughed for summer-fallow about the middle of June gave higher yields than did earlier or later ploughing. In other investigational studies it was found that May ploughing for summer-fallow does not fall below June ploughing, but as an actual fact usually produces a distinctly better yield than does June ploughing.

In this district, ploughing for summer-fallow should be done in May, and in any event not later than the early part of June, for land ploughed after the middle of June was harder to keep clean and showed evidence of weeds the following year.

Fall cultivation before Summer-fallow.—Fall cultivation before ploughing for summer-fallow has not given any increased yields, and such a practice only increases the cost of production.

Packing when ploughing for Summer-fallow.—The use of the packer in ploughing for summer-fallow resulted in a slight increase of wheat and a 3-bushel increase of oats following wheat, but probably not enough to warrant the expense of its use.

Fall Ploughing vs. Spring Ploughing.—The results indicate that in this district spring ploughing of stubble to be seeded either to wheat or oats gives higher yields than fall ploughing of stubble. This is accounted for by the fact that the stubble holds

the snow which otherwise would be blown away by the prevailing high winds. The average seven-year yield on fall ploughing was 18 bushels and 24 pounds while the spring ploughing produced, on the average, 1½ bushels more per acre.

Discing at Harvest time.—Discing at cutting time increased the yield of wheat by slightly less than one bushel to the acre. This was the case with both the fall and spring ploughing. With oats the reverse was true; that is to say, discing at time of harvest which broke down or destroyed the stubble prevented it from holding the snow and reduced the yield to the extent of 7 bushels per acre, or from 54 bushels to 47 bushels on spring ploughing.

Breaking sod from cultivated grasses.—In breaking from grasses and clovers, the best results were obtained from ploughing early and treating as a summer-fallow. When it was desired to obtain the crop of hay the next best results came from ploughing in July, immediately after the hay was cut, and backsetting in September. The poorest yield of wheat was obtained from fall ploughing the sod land.

Application of Manure.—For best results, manure should be turned under when ploughing for summer-fallow. When the summer-fallow is top-dressed in the fall, a slight increase is shown over no manure. This also checks soil drifting. There is little to be gained from ploughing under green manure crops.

Seed-Bed Preparation.—Unnecessary cultivation of summer-fallow in the spring before seeding does not gives an increase in yield. It would appear that the only work necessary is some form of light, shallow cultivation before seeding.

Soil packers and Harrowing growing grains.—The results of experiments with different kinds of soil packer and their use at various times are not such as to allow one to draw any definite conclusions. The harrowing of the growing crops has reduced the yield. The only time that this practice can be recommended is when the land is very weedy and when by harrowing the weeds can be destroyed. Under such circumstances, the advantages gained by the destruction of the weeds will doubtless more than offset the mechanical damage to the growing grain.

Depth of Seeding.—The condition of the soil varies so from year to year that no hard-and-fast rule can be laid down as to the best depth to seed grain. When possible, it should be placed deep enough to be in moist soil. The seven-year average seems to indicate that from 2 inches to 2½ inches gives the best results.

ROTATIONS ON THE IRRIGATED LAND

ROTATION "U"

First year—Alfalfa hay.
Second year—Alfalfa hay.
Third year—Alfalfa hay.
Fourth year—Alfalfa hay.
Fifth year—Alfalfa hay.
Sixth year—Alfalfa hay.
Seventh year—Hoed crop.
Eighth year—Wheat.
Ninth year—Oats.
Tenth year—Barley and alfalfa seeding.

ROTATION "V"

Alfalfa continuously. This field was seeded down to alfalfa in 1909, and will be left indefinitely, one of the objects of the experiment being to get some idea of the probable life of an alfalfa field under favourable conditions.

The following table gives the average cost, the returns, and the profits per acre for the past nine years of rotations "U" and "V." The values used in this summary statement are based on normal pre-war prices, so that the years are comparable. (Alfalfa hay is here valued at $12 per ton).

COSTS, RETURNS AND PROFITS OF ROTATIONS (IRRIGATED)

Rotation	Duration	Average cost per acre 9 years	Average returns per acre 9 years	Average profit per acre 9 years
"U"	10	$17 23	$63 02	$45 79
"V"	1	8 69	51 63	42 94

EXPERIMENTS WITH FLAX (IRRIGATED)

The same varieties were again tested this season. Below are yields obtained for the past five years:—

FLAX (IRRIGATED) TEST OF VARIETIES

Variety	1916		1917		1918		1919		1920		Average for 5 years	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Longstem	11	44	32	28	45	..	32	8	7	50	25	48
Novelty	17	8	30	..	40	10	28	52	8	42	25	..
Common	6	24	28	52	42	33	30	..	10	18	23	37

In computing the results for this season, current prices are charged. The field which has been in alfalfa continously for the past nine years yielded slightly better than 4 tons per acre. Apart from taking care of the hay crop, the only work put on this field is irrigation. Generally the field is fall irrigated, and again after the first crop of hay is taken off. The cost of one ton of alfalfa, including $10 per acre charged for rent of land, amounts to $4.37.

The average yield of hay on Rotation "U" for the six years producing hay is 4 tons 774 pounds per acre. The field on which manure was applied in the winter gave about one ton greater yield. This shows very clearly that it is a good practice to apply manure on alfalfa in the fall as it materially increases the hay crop the following year.

In drawing a comparison from the fields on which three and two cuttings were taken respectively an increase of one ton per acre is obtained in favour of three cuttings. The additional profit per acre did not any more than pay for the extra labour involved.

In this connection it is only fair to mention that, with three cuttings, the quality of the hay is improved in that it is finer in texture, not having reached the same stage of maturity as is the case where but two cuttings are made.

In new irrigation projects in Alberta grain is certain to be grown almost exclusively during the early years of development, on account of the quick cash returns.

With the high price of irrigated land a more diversified system of farming of irrigated land will eventually have to be followed. Rotation "U" is an example of what may be expected from a rotation of crops. In this case two-thirds of the land is in hay, one-tenth is hoed crop, one-tenth in wheat and one-fifth in coarse grains. Alfalfa, being a legume, the yields of the succeeding crops are increased.

ROTATION "U" (TEN YEARS' DURATION)

Rotation Year	Crops: Last Year	Crops: This Year	Area	Items of Expense in Raising Crop per Acre: Rent and Manure	Seed, Twine, and use of Machinery	Manual Labour: Hours Manual Labour	Manual Labour: Cost of Manual Labour	Horse Labour (including Teamster): Hours: Single Horse	2 Horse Team	3 Horse Team	4 Horse Team	5 Horse Team	Value of Horse Labour	Cost of Threshing	Cost for 1 Acre	Cost for 1 Bushel	Cost for 1 Ton	Height of Stubble	Particulars of Crop per Acre: Weight: Grain	Straw	Hay	Hoed Crop	Value of crop per Acre	Profit or Loss per Acre
			Acres	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.	$ c.	$ c.	$ c.	$ c.	$ c.	Ins.	Lbs.	Lbs.	Lbs.	Lbs.	$ c.	$ c.
10	Oats	Barley and alfalfa seeding	1.00	11 20	4 90	4.00	1 60	.....	0.75	1.50	6.00	.....	8 10	5 53	31 33	0 56	.....	5	2,665	2,460	.....	.....	61 79	30 46
9	Wheat	Oats	1.00	11 20	4 80	4.00	1 60	.....	0.75	1.66	5.42	.....	7 64	8 12	33 36	0 41	.....	6	2,760	2,690	.....	.....	55 15	21 79
8	Potatoes	Wheat	1.00	11 20	5 65	4 00	1 60	.....	.....	1.83	2.66	.....	4 38	9 73	32 56	0 67	.....	6	2,950	4,010	.....	.....	107 36	74 80
7	Alfalfa	Potatoes	1.00	11 20	44 78	94.00	37 60	2.33	13.25	.....	25.50	.....	37 36	.....	130 94	0 47	.....	.....	.....	.....	.....	16,835	246 55	115 61
6	Alfalfa	Alfalfa	1.00	11 20	3 50	7.50	3 00	0.50	7.17	.....	.....	.....	5 44	.....	23 14	.....	4 16	.....	.....	.....	11,135	.....	111 35	88 21
5	Alfalfa	Alfalfa	1.00	11 20	3 50	7.50	3 00	0.50	6.66	.....	.....	.....	5 08	.....	22 78	.....	4 91	.....	.....	.....	9,270	.....	92 70	69 92
4	Alfalfa	Alfalfa	1.00	11 20	3 50	6.50	2 60	0.50	6.83	.....	.....	.....	5 20	.....	22 50	.....	4 97	.....	.....	.....	9,050	.....	90 50	68 00
3	Alfalfa	Alfalfa	1.00	11 20	3 50	6.50	2 60	0.50	3.66	.....	.....	.....	2 92	.....	20 22	.....	5 85	.....	.....	.....	6,910	.....	69 10	48 88
2	Alfalfa	Alfalfa	1.00	11 20	3 50	6.50	2 60	0.50	3.83	.....	.....	.....	3 04	.....	20 34	.....	5 18	.....	.....	.....	7,860	.....	78 60	58 26
1	Barley and Alfalfa seeding	Alfalfa	1.00	11 20	3 50	6.00	2 40	0.50	3.83	.....	.....	.....	3 04	.....	20 14	.....	5 85	.....	.....	.....	6,880	.....	68 80	48 66
	Aggregate		10.00	112 00	81 13	146.50	58 60	5.33	46.73	4.99	39.58	.....	82 20	23 38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Average per acre		.....	11 20	8 11	14.65	5 86	0.53	4.67	0.50	3.96	.....	8 22	2 34	35 73	.....	.....	.....	.....	.....	.....	.....	98 19	62 46

ROTATION "V" (ALFALFA CONTINUOUSLY)

9	Alfalfa	Alfalfa	1.06	10 00	1 00	8.32	3 33	.....	4.48	.....	.....	.....	3 23	.....	17 56	.....	4 37	.....	.....	.....	8,038	.....	80 38	62 82

HORTICULTURE

Until 1915 all garden work was carried on under irrigation. As there were no data obtained under dry land conditions up to that time and as there are probably ten dry land farms for every irrigated farm, a portion of dry land was given over for this work. Cottonwood windbreaks were planted every 200 feet for protection. Windbreaks do not necessarily have to be of cottonwoods; willows or caragana may be used. The distance between the caragana windbreaks should be not more than 150 feet, since they do not grow so tall. It is most essential that the windbreaks be cultivated and kept clean for at least a rod on either side, and if soil drifting should take place with cultivating, a mulch of strawy manure would be advisable, care being taken that all seeds in the manure have been destroyed. If one strip of land is used for garden purposes with a windbreak on the west side, one half should be summer-fallow and the other cropped alternately each year.

Good yields of garden crops have been obtained each year on dry land, although not so good as with irrigation.

Owing to the late season and the large amount of precipitation, the irrigated garden remained in a wet condition, and the sowing of seed did not commence till May 20, 1920. In the dry land garden, the sowing of vegetable seeds commenced ten days earlier. The weather was excellent, however, after the seeds were sown, and by June the growth made was almost as good as in an ordinary season.

VEGETABLES

ASPARAGUS.—This is the first vegetable of the season, and very easily grown. It is advisable to set the plants out three feet apart, six inches in depth, with rows four feet apart. The land should receive a good application of manure and be deeply ploughed or dug. The rows should then be marked out and a furrow made to the depth of six inches, ploughed out when planting a large quantity and made with a spade for small quantities. In planting, care should be taken to spread the roots out flat and to notice that the crown or buds are up. The soil should then be filled in with the plough or spade and firmly pressed down. It is advisable not to commence cutting until the third year, and then for a period not exceeding four weeks, or a poor crop of weak shoots may be the result. The plantation should be cultivated and kept free from weeds. Conover Colossal has proved to be a good variety.

BEETS.—In the selection of beets for culinary purposes those not too large and of a dark red colour are to be preferred. Among the varieties tried out, Early Wonder, Crosby Egyptian, Detroit Dark Red and Black Red Ball are all good.

It is advisable not to thin beets too much or large beets will be the result. Thinning to three inches has been the most satisfactory. Storing in moist sand will keep the beets fresh all winter.

BEANS.—Beans do exceptionally well in this district, but not all varieties tried matured. Fourteen varieties were tested, but less than half ripened seed. The best dual purpose bean was Early White Kidney, it being a good cooking bean when used green, and a nice bean for baking. Among the best for pulling green were: Masterpiece, Pencil Pod Black Wax, Davis White Wax, Plentiful French and Refugee.

CABBAGE.—Fourteen varieties of cabbage were grown, consisting of early, mid-season and late cabbage. The varieties recommended are: For early use, Early Jersey Wakefield and Early Paris Market; for midseason, Copenhagen Market, Enkhuizen Glory and Fottler Improved Brunswick; for winter, Amager and Danish Ballhead. Two good varieties of red cabbage for pickling are Delicatesse and Red Dutch.

Before setting out the young plants, a good plan is to puddle the roots in a thin mixture of soot and mud by making a round hole in the ground and mixing an equal amount of soot and soil with water until it is fairly thin. This will adhere to the roots and act as a preventative against root maggots.

A good way to keep cabbages in the winter is to hang them up by the roots in the cellar, providing the air is not too dry.

CAULIFLOWER.—Success with cauliflowers depends largely on the season. When planted early in hot dry seasons, the heads are usually small and deformed, but if a patch is set out about the middle of June the heads do not usually reach the stage for cutting until the cool nights arrive, thus giving them better conditions to grow under since the growth is not forced.

It is advisable to treat the young plants as suggested for cabbage plants, to aid in the prevention of root maggots.

Two of the best varieties tried are Early Snowball and Extra Early Dwarf Erfurt.

CELERY.—Various methods of growing celery have been tried, but planting six inches apart between plants with rows four feet apart and blanching with boards or tar paper one foot wide set up on either side of the row when the plants are one foot high is very satisfactory.

Paris Golden Yellow and White Plume are good early varieties. With the late ones, such as Winter Queen, Giant Pascal and Evans Triumph, the usual method is to plough on either side, adding more soil as the plants grow. A little shovel work will also be necessary to make sure no soil gets into the heart of the plant, as this would cause the heart to rot during wet weather. This appears to be the best and cheapest method for growing late celery.

Storing Celery.—As celery cannot be left outside all winter, storing has to be resorted to. Difficulty is usually experienced in keeping it through the beginning of the year. Experiments have been tried out for some years in storing. The usual method employed is to dig up the plants with soil adhering to the roots, trim the leaves back slightly and tie a string loosely around each plant to keep it compact. The plants are then taken to the cellar and planted in sand or soil about one inch over the roots. After planting is completed, a good watering should be given, taking care not to get water on the plants, or the hearts will start to decay. After the first watering no more should be given until absolutely necessary; this will eliminate the chances of the plants moulding. The cellar should be ventilated whenever the weather is mild.

Where there is but little space for storing, another method found to do well is to trim the leaves off the plants, still keeping the stalks tied loosely with string, then spreading a layer of sand in a box or bin and placing the celery horizontally and compact in layers, covering each layer with sand. Six layers would be considered sufficient. Care must be taken not to get the sand too wet, only moist, or the plants will rot. It is advisable to grow only late varieties for storing as the early varieties do not keep well.

CUCUMBERS.—No difficulty is experienced in growing cucumbers in the open, as they do well every season provided extra early sorts only are used. Seed should be sown in hills after danger of frost is past, usually about the second week in June. The varieties to be recommended are Improved Long Green, Davis Perfect, Giant Pera and Early Russian. The last-named is the earliest but only a few hills should be grown as it is of small size.

CARROTS.—Six varieties were under test, all doing exceptionally well. Among the best tried out were, Chantenay, Danvers Half Long, and Early Scarlet Horn, the last-named being the earliest.

In the thinning experiment, those thinned to two inches gave the heaviest yield.

Storing in moist sand keeps the carrots fresh all winter.

CORN.—Corn is usually planted when danger from spring frosts is considered to be over but it may be sown early, about the first week in May, as it is usually safe to take a chance on a late frost nipping the plants since they are rarely damaged enough to kill them. It is important, owing to the cool nights, that the earlier varieties are used, as only certain sorts will mature in this district, although this year all but two of the nineteen varieties grown reached the edible stage. The earliest corn so far is White Alberta, this variety being from seed selected each year from White Squaw. Another promising corn, on a par with White Alberta for earliness, has been introduced by Dean Howe, of Edmonton, and is called Howe's Yellow Flint. It has an advantage in being a taller corn of golden-yellow colour. These varieties are closely followed by Pickaninny, and next in order of earliness are Early Malcolm, Early Sweet Squaw, Early Sweet Kloochman, Square Deal, Wills Gehu, and Golden Bantam. The last-named variety, although not edible until the end of August, is more in demand than any other corn, owing to its delicious flavour. If a good strain of Golden Bantam has been obtained, enough seed can usually be ripened to furnish seed for the following season.

LETTUCE.—Nine varieties of lettuce were grown, all varieties doing exceptionally well. It is advisable to make a succession of sowings, as in hot, dry weather lettuce quickly runs to seed.

Among the best varieties of head or cabbage lettuce are Salamander, Iceberg, All Heart, and Improved Hanson; and of leaf lettuce, Grand Rapids. This lettuce is used extensively for forcing under glass.

MELONS, MUSK.—Although musk melons cannot be grown on a commercial scale, yet there are two varieties which have ripened fruit in the open in particularly favourable seasons. These are Emerald Gem and Extra Early Hackensack. Experiments have been carried on to get the plants well under way by the time danger of late frosts is over. One method employed is to start the plants under glass and harden them in the cold frame ready for planting. Another method employed is to place a box about one foot square, with a pane of glass set in on top, over each hill of seed planted. Plenty of air must be admitted, and on warm days the box removed, being replaced over night to protect plants against frost.

ONIONS.—Twelve varieties of onions were sown, and all varieties yielded well, several being outstanding: For pickling, White Pearl and Early White Bartletts; for red onions, Large Red Wethersfield, Southport Red Globe, and Early Flat Red; for yellow onions, Southport Yellow Globe, Ailsa Craig, and Giant Prizetaker.

In sowing for pickling onions, the seed should be sown thickly so that the onions will not be too large. In sowing seed for large onions, the seed should be sown thinly so that very little thinning is necessary. To raise onion sets from seed, the seeds should be sown very thickly in the row, so that the plants are crowded out and have but little room to develop.

As yellow onions are more in demand for cooking purposes, it is good practice to grow more of these than of the red or white onions.

Onions stored for winter should be kept in boxes with plenty of ventilation, and in a cold place, but should not be allowed to freeze.

PEAS.—All of the fourteen varieties yielded heavily. The varieties to be recommended are: For early use, Early Morn, Gregory Surprise, Little Marvel, and Eight Weeks; for midseason use, Thomas Laxton, Gradus, and Pioneer; for late use, Stratagem and Telephone.

PEPPERS.—Peppers do well in an ordinary season, quite a number making full growth before frost. If the peppers are fuly developed, although green, they will turn red when spread out on the cellar door. The varieties grown were Harris Early and Neapolitan.

PUMPKINS.—Pumpkins usually ripen from seed sown in the open after danger of spring frosts is over. The three varieties grown were Connecticut Field, King of

the Mammoths, and Small Sugar, the last-named being a good winter keeper and a convenient family size.

PARSNIPS.—Parsnips keep best when left in the ground all winter and dug when required, but for convenience they may be stored in moist sand where they will keep all winter. Two varieties were grown, Hollow Crown and Intermediate, and both yielded well.

PARSLEY.—Parsley is very easily grown and extensively used for culinary purposes. The plants may be lifted and planted in pots to provide fresh parsley for the winter. Four varieties were grown, all making good growth. Two good varieties are Champion Moss Curled and Triple Curled.

POTATOES.—Variety tests have been carried on for a number of years on both the dry and irrigated land. Nine years ago some thirty varieties were under test each year, the poorest being discarded, until this year eleven varieties are left. The following table gives the yield for this year:—

POTATOES—YIELDS ON DRY LAND, 1920

Variety	Yield marketable Potatoes		Yield unmarketable Potatoes		Total yield per acre		Average for 8 years per acre	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Gold Coin	155	..	33	20	188	20	229	27
Irish Cobbler	161	40	20	..	181	40	227	10
Morgan Seedling	171	40	20	..	191	40	224	34
Factor	163	20	26	40	190	..	216	58
Reeves Rose	151	40	50	..	201	40	214	26
Dalmeny Beauty	70	..	78	20	148	20	204	1
Table Talk	66	40	70	..	136	40	200	22
Wee MacGregor	166	40	16	40	183	20	199	4
Perry Early	191	40	25	..	216	40		
Empire State	161	40	43	20	205	..		
Sutton Abundance	50	..	71	40	121	40		

NOTE.—Planted May 14. Dug October 9.

POTATOES—YIELDS ON IRRIGATED LAND, 1920

Variety	Yield marketable Potatoes		Yield unmarketable Potatoes		Total Yield per acre		Average for 8 years per acre	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Reeves Rose	366	40	175	..	541	40	509	47
Irish Cobbler	495	..	48	20	543	20	487	17
Dalmeny Beauty	515	..	63	20	578	20	484	41
Empire State	536	40	100	..	636	40	473	29
Table Talk	385	20	100	..	485	20	473	9
Factor	421	40	115	..	536	40	470	45
Wee MacGregor	505	..	116	40	621	40	469	5
Gold Coin	336	40	48	20	385	..	463	35
Morgan Seedling	295	..	63	20	358	20	448	
Sutton Abundance	425	..	50	..	475	..		
Perry Early	228	20	78	20	306	40		

NOTE.—Planted May 27. Irrigated July 21 and August 9. Dug October 9.

As the market demands a white potato, Gold Coin has been most satisfactory, being of good shape with shallow eyes. It has always been a consistently high yielder and a good keeper. Gold Coin is a main crop and not an early potato, therefore is too late for the northern belt. In the Lacombe district, Irish Cobbler is used

as a main crop potato. It is also the earliest variety here, and a heavy cropper. By sprouting a quantity of Irish Cobbler potatoes in boxes, near the light, new potatoes can be had about two weeks earlier than from unsprouted seed.

RADISH.—Five varieties of radish were under test, all doing well. It is advisable to make weekly sowings to have a continuous supply. The varieties recommended are: Early Scarlet Turnip White Tipped and Forcing Turnip Scarlet.

SALSIFY.—Salsify or vegetable oyster is used extensively for making soup. Three varieties were under test, all doing well. The varieties recommended are Long White and Sandwich Island.

SWISS CHARD.—Giant Lucullus was the variety tried, and it made very strong growth. The green leaves are cooked as is cabbage, the white stalks being cooked separately as a vegetable.

SQUASH.—Squash ripen readily from seed sown in hills in the open. Five varieties were under test, all yielding abundantly. The varieties recommended are: Long White Bush Marrow, English Vegetable Marrow, Green Hubbard and Golden Hubbard, the first two varieties being best for summer use and the last two varieties for winter use, keeping well if stored in a fairly warm, dry place.

TOMATOES.—Tomato plants are started under glass and hardened off in a cold frame so as to have good, sturdy plants by the time planting out can be undertaken. Various experiments were tried in starting tomatoes. Transplanting the seedlings into flats or boxes; transplanting into paper pots; transplanting into small clay pots and then repotting to four-inch pots and finally into six-inch pots. The last method has given the best results, ripening fruit over a week ahead of the others.

Different methods of training the vines that were tried were: Tieing to stakes, tieing to three wires placed one foot apart, and growing flat on the ground. The plants tied to the stakes and wires give the best results, producing cleaner fruit and ripening earlier. To ensure early ripening one or two stems should be left and all side shoots pinched out. When five or six bunches of fruit have set on the stems, the tips should be pinched out above the last bunch of fruit formed. This directs the energy of the plant to the ripening up of the fruit. Before danger of frost some of the plants may be pulled up by the roots and hung in the cellar, where quite a number of the tomatoes will ripen.

Eleven varieties were under test. Those recommended are: Burbank Early, Alacrity, Danish Export, Earliana, and Chalk's Early Jewel. It is essential that only the earliest varieties be grown.

TURNIPS.—Four early varieties were under test, all doing well. Early turnips should be used before they get more than three inches in diameter or they will become too woody. The varieties recommended are, Early Snowball, Purple Top Milan and Golden Ball.

TOBACCO.—A few varieties of tobacco have been tried out in a small way since 1915. Owing to the prevailing winds throughout this district and to our cool nights, tobacco growing on a commercial scale cannot yet be considered possible. Fair results have been obtained each year where the plants were well protected by a windbreak.

The varieties grown were, Comstock, Cuban, and White Broadleaved Burley, and all made good growth. Nine leaves were left on each plant, most of the plants reaching the proper stage of ripeness before frost. As the atmosphere is too dry to cure tobacco in a shed, the root cellar was resorted to, where the humidity could be more evenly regulated. So far the leaves have cured up very favourably.

SMALL FRUITS

Few people yet seem to realize the possibilities with small fruits in southern Alberta and at present small fruit growing is somewhat limited. This naturally means that nearly all fruit consumed in the district is imported from British Columbia or the United States.

On both the irrigated and the dry land, it is necessary to have the plantation protected by a windbreak against the prevailing southwesterly winds. Two windbreaks are used for this purpose, the Native Cottonwood and the Russian Golden Willow, although the Laurel-leaved Willow can also be recommended. As the climatic conditions vary in different parts of southern Alberta, each district must use the variety of willow found to do the best.

CURRANTS.—In planting out the bushes on the dry land, it is advisable to set the rows from ten to 12 feet apart so as to allow plenty of room for cultivating; eight feet is sufficient between the bushes. If there is room to cultivate both ways, then the bushes may be set out ten to 12 feet each way. Currants will yield well on the dry land, although not so heavily as on irrigated land. On the latter, setting the bushes out eight to ten feet each way is advisable. After the bushes have become established, a mulch of good manure spread over the plantation will be found very beneficial. This can be worked into the soil in the spring. Pruning is an important factor for the welfare of the bushes as well as the size of the fruit. A neglected plantation will soon get full of dead branches, and the size of the fruit will get noticeably smaller.

Methods of pruning are given for the benefit of those not acquainted with the methods employed. In pruning red and white currants the first thing to remember is that the fruit is borne on the older wood. The old branches which are going out of bearing should be cut out with just sufficient new growth left, so that the bush will not be crowded, all branches being equally distributed so as to balance the bush. All suckers not required should then be removed, taking care to leave those already mentioned for replacing branches cut out. Then prune back slightly all the small shoots growing from the branches, leaving the leaders on the end of each branch about six inches long. The reverse method is employed in pruning black currants. As the fruit is borne on the young wood only, the old branches and unnecessary suckers should be removed, so as not to have the bushes too crowded. Pruning the tips of the shoots back is advantageous where large fruit is desired. As currant bushes are inclined to width rather than height it will be found advantageous to prune out all branches that are close to the ground, since the fruit on such branches will only be spoiled.

BLACK CURRANTS.—Out of the seventeen varieties under test those to be recommended are: Beauty, with a five-year average of 6,045 quarts per acre; Saunders, with 5,924 quarts per acre; Mervéille de la Gironde, with 5,742 quarts per acre; and Eagle, with 4,674 quarts per acre.

RED CURRANTS.—Nineteen varieties are under test. Those to be recommended are: New Red Dutch, with a five-year average of 10,075 quarts per acre; Moore Seedling, with 8,986 quarts per acre; Red Dutch, with 7,556 quarts per acre; and Victoria, with 7,495 quarts per acre.

WHITE CURRANTS.—As white currants are not in demand, only a few bushels should be grown. Nine varieties are under test. The best of these are: White Pearl, with a five-year average of 6,226 quarts per acre; White Cherry, with 5,813 quarts per acre; White Grape, with 5,259 quarts per acre; and Large White, with 4,916 quarts per acre.

RASPBERRIES.—Pruning raspberries is done in the fall, and consists of removing the dead and weakly canes before the canes are covered for the winter. In the spring, pruning back the tips ensures larger fruit.

After pruning has been completed in the fall, the canes are bent down as far as possible and then covered with moist soil; no other substitute will do, such as dry soil, straw or manure. If the rows are set out at least nine feet apart, the soil can be ploughed up to cover the canes on either side and the finishing touches made with a shovel. With this method of wintering, all varieties can be grown to perfection. The varieties under test to be recommended are: Ruby, with a five-year average of 3,562 quarts per acre; Marlboro, with 2,586 quarts per acre; Herbert, with 2,426 quarts per acre; and Louden, with 2,199 quarts per acre.

STRAWBERRIES.—Owing to the scarcity of labour during the last year or two of the war, the strawberry plantation did not receive the necessary amount of attention. The result was that when a new plantation was set out in 1919, sufficient young plants could not be obtained. In some cases only three or four could be procured. No notes were kept this year, on this account, but the plants set out yielded heavily. Varieties to be recommended are: Senator Dunlap, Cassandra, Portia, Tennessee Prolific and Splendid.

TREE FRUITS

APPLES.—In 1908 an irrigated and a dry land orchard were set out, consisting of standard apple trees, Dr. Saunders' cross-breds, and several varieties of the commercial crabs. Several of the standards winter-killed, while others were killed back. The amount of winter-killing depended upon the severity of the weather. In 1915 the trees came through the winter in good shape, and nearly all varieties then living were well laden with fruit, including many of the standard sorts. The two winters following were unfavourable, and in the spring of 1917 all but a few trees of the standard sorts were dead. The commercial crabs survived, but were killed back considerably. Dr. Saunders' cross-breds were but slightly damaged and some varieties were not affected. The standard apple orchard has again been partially replanted on the irrigated land, and most of the trees are in good shape this year. The cross-breds to be recommended among those tested are Jewel, Robin, Tony, and Norman.

PLUMS.—None of the ordinary named varieties of plums is hardy in this district, but the native plum of Manitoba has proved to be absolutely hardy, and by careful selection plums of good size, colour and flavour have been procured. In 1912 some 350 plum trees were set out, all trees growing well each year. This year the majority of the trees bore fruit, although some varieties have borne in previous seasons. A few specimens appear very promising.

SHRUBS AND TREES

SHRUBS.—In 1908 a large number of varieties of shrubs were planted in the nursery, afterward being set out in permanent positions. Notes were taken each year on each individual shrub as regards condition, amount of winter killing, dates of blooming, etc. A large number of kinds died out completely; others would kill to the ground every winter and come up again in the spring. Quite a number were half hardy, as part of the season's growth would kill back. Yet there is a good selection to be made from various kinds of shrubs that have proved to be absolutely hardy. Among those to be recommended are numerous varieties of named lilacs, *Syringa villosa,* Common lilac, *Syringa Josikæa, Caragana arborescens, Caragana pygmea, Cornus alba sibirica, Lonicera tatarica grandiflora, Shepherdia argentea,* and *Viburnum Opulus.*

This year the shrubs bloomed very freely, the lilacs in particular making a beautiful showing.

ROSES.—Roses do well in sheltered positions, but should be earthed up at least one foot with moist soil in the fall.

TREES.—Although the coniferous trees are slow growing, they greatly add to the beauty of the surroundings, and in time take the place of the more rapid-growing deciduous trees. Those recommended as doing well are:—

Coniferous.—Blue Spruce, White Spruce, Douglas Fir, Swiss Stone Pine, Scotch Pine, Lodgepole Pine.

Deciduous.—Mountain Ash, Birch Cut Leaved Weeping, White Oak, Green Ash, Elm, Native Cottonwood, and Balsam Poplar.

FLOWERS

ANNUALS.—Most of the annuals tried out have done well every year. Some ninety-five kinds were planted, mostly hardy and half-hardy. All the half-hardy varieties were started under glass and hardened off in the cold frames, while the hardy varieties were sown in the open. Among the varieties recommended for sowing in the open border are: Nasturtiums, Eschscholtzia, Codetia, Candytuft, Calendula, Poppy, Mignonette, and Spencer Sweet Peas. The following should be sown in pots or boxes in a fairly warm room near the window, transplanted when large enough, and hardened off outside in a sheltered place: Asters, Balsam, Nicotiana, Verbena, Antirrhinum, Petunia, Phlox, and Lobelia.

PERENNIALS.—The perennials or herbaceous plants did well this season, giving a continuance of bloom. Very little attention is required with perennials, when once they are established. The plants come up year after year without seeding, and an occasional hoeing to keep down the weeds and loosen the soil is all that is required during the summer. A mulch of manure spread over the border in the fall, after the stalks have been cut down, is beneficial; this can be dug in the following spring. Some of the varieties to be recommended are : *Gypsophila Paniculata,* Pyrethrum, Veronica Delphinium, Thalictrum, Polemonium, Iris, Paeony, Lupinus, Aquilegia, Anchusa, Papaver, Lychnis and Iberis.

BULBS

Tulips.—The tulip beds present a mass of colour every spring, and seem to flourish under the most adverse conditions. Bulblets form at the base of the tulips. It will be necessary every third year or so to lift all the bulbs and replant, using the large bulbs for blooming, and propagating the smaller bulbs in a separate plot until they get large enough to bloom. Bulbs should always be obtained from a reliable source, as poor results will be obtained from inferior bulbs.

In the tulip plots are fifteen varieties of early-flowering tulips, eight varieties of late-flowering tulips and fifteen varieties of Darwin tulips.

Daffodils.—Daffodils do not thrive so well as the tulips in the open, but always manage to make a fair showing. Fourteen varieties are in the plot.

CEREALS

As in the past seasons, the variety plots of the different grains have been grown on both the dry and the irrigated land.

EXPERIMENTS WITH SPRING WHEAT (DRY LAND)

Nine varieties of spring wheat were tested. They were sown on summer-fallowed land. The yield of the plots in all cases was affected by soil drifting, on account of their location on the farm.

The following table gives the yield for the past seven years of six of the best yielding varieties:—

SPRING WHEAT (DRY LAND)—TEST OF VARIETIES

Variety	1914		1915		1916		1917		1918		1919		1920		Average for 7 years	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Kubanka..	20	30	91	..	73	45	24	..	8	..	nil		9	55	32	27
Huron.....	24	15	63	..	72	30	27	30	15	..	nil		3	13	29	21
Early Red Fife.	24	30	64	30	50	45	26	..	13	..	8	..	2	55	27	5
Marquis...	24	30	63	15	48	30	28	..	14	..	6	..	2	38	26	42
Red Fife..	19	30	70	25	50	30	26	..	14	..	nil		4	58	26	29
Pioneer...	20	30	49	45	32	30	25	..	14	..	4	30	3	30	21	24

An analysis of the above table indicates that although Kubanka wheat heads the list on a seven-year average, it is not a consistently heavy yielder in dry seasons. During the two wet years 1915 and 1916 it produced phenomenal yields, and it is only on this account that its average is as high as it is, for in all other years it yielded less than either Red Fife or Marquis, except in the season just past. As noted above, during the season of 1920 these plots, on account of their location, suffered from soil drifting, some of them suffered more than others. On this account the yields obtained are probably not entirely fair to each particular variety. The point that we wish to make is that although Kubanka has been at various times in the past exploited as a particularly good dry land wheat, our results do not support this contention, for only in very favourable seasons have we been able to obtain outstanding yields.

Huron stands second, but this is a wheat of low milling value, and in addition has the disadvantage of being bearded.

The Fife and Marquis varieties, taking everything into consideration, have maintained their reputation for reliability so far as yield is concerned. In milling quality they are, of course, in a class by themselves.

EXPERIMENTS WITH OATS (DRY LAND)

Eight varieties of oats were seeded on the dry land. They were sown on summer-fallow but, due to the prolonged period of drought, accompanied by the soil drifting affect, no crop was harvested. However the following table gives the yields for the past six years of four of the best varieties under test.

OATS (DRY LAND)—TEST OF VARIETIES

Variety	1915		1916		1917		1918		1919		1920		Average for 6 years	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Banner.....	142	32	118	8	56	16	24	12	nil		nil		57	31
Gold Rain.....	159	24	120	30	55	20	35	10	nil		nil		61	6
Danish Island.....	134	4	138	3	60	30	28	8	nil		nil		60	11
Daubeney.....	119	19	81	6	38	28	20	10	nil		nil		43	

A field of 28·6 acres of Banner oats produced 37 bushels and 10 pounds per acre. This land had been used for cultural experiments in the past. Most of it was in various crops the previous year, but part was summer-fallowed. Another field of 3.2 acres of summer-fallow gave a yield of 32 bushels and 21 pounds per acre.

EXPERIMENTS WITH BARLEY (DRY LAND)

Thirteen varieties of barley were tested. These were sown on summer-fallowed land. Although some of the plots suffered from soil drifting, the yields as a whole were good, considering the season

The varieties which have been tested for five years are given in the following table.

BARLEY (DRY LAND)—TEST OF VARIETIES

Variety	1916		1917		1918		1919	1920		Average for 5 years	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush. Lbs.	Bush.	Lbs.	Bush.	Lbs.
Bark's	87	24	41	12	17	24	nil	29	8	35	4
Gold	73	6	40	..	20	..	nil	27	34	32	8
Invincible	88	28	33	46	15	30	nil	20	20	31	34
O.A.C. 21	61	12	35	30	12	24	nil	37	44	29	25
Manchurian	68	36	23	36	23	36	nil	30	30	29	18
Swedish Chevalier	65	30	40	..	17	24	nil	21	42	28	45
Duck Bill	75	30	39	28	16	12	nil	11	32	28	30
Early Chevalier	65	30	35	..	12	24	nil	24	38	27	28
Odessa	52	24	33	36	13	36	nil	35	..	27	
Guymalaye	70	..	26	12	2	24	nil	23	16	24	20

Swedish Chevalier barley gave a yield of 22 bushels and 28 pounds per acre on a field of 3·24 acres summer-fallow.

EXPERIMENT WITH PEAS (DRY LAND)

Seven varieties were sown on summer-fallowed land. The sweeping wind storm on the 8th of June cut the peas off the surface of the ground, with the result of a total crop failure.

The following table gives the yield of the varieties grown for the past seven years.

PEAS (DRY LAND)—TEST OF VARIETIES

Variety	1914		1915		1916		1917		1918		1919	1920	Average for 7 years	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush. Lbs.	Bush. Lbs.	Bush.	Lbs.
Prussian Blue	17	..	73	30	55	..	20	30	17	..	nil	nil	26	3
MacKay	18	30	74	30	46	..	23	30	17	30	nil	nil	25	48
English Grey	17	..	67	..	56	30	22	30	14	30	nil	nil	25	21
Chancellor	18	30	58	..	57	..	25	15	15	..	nil	nil	24	49
Solo	15	..	69	..	38	..	22	30	16	..	nil	nil	22	55
Golden Vine	19	30	33	15	49	30	23	..	15	30	nil	nil	20	6
Arthur Selected	19	..	29	..	22	..	23	30	14	30	nil	nil	15	26

EXPERIMENTS WITH FLAX (DRY LAND)

Three varieties of flax were grown. The yields are disappointing, owing to the June wind storm. The following table gives the results of the three varieties grown during the past six years.

FLAX (DRY LAND)—TEST OF VARIETIES

Variety	1915	1916	1917	1918	1919	1920	Average for 6 years
	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.
Common	31 4	10 10	9 36	6 24	Crop	.. 9	9 33
Longstem	21 24	10 25	10 10	9 36	total	.. 18	8 38
Novelty	17 38	12 33	10 40	8 32	failure	nil	8 15

2. The Irrigated Farm

CEREALS

All cereals on the irrigated land were sown on land which was in hoed crop the previous season. Two light irrigations were given during the growing season.

EXPERIMENTS WITH SPRING WHEAT (IRRIGATED)

Eight varieties of spring wheat were grown. Those having a seven-year average are given in the following table. While Huron heads the list in yield, from the fact that it is extremely low in milling quality it cannot be recommended. It is a bearded variety. Marquis is decidedly ahead of Red Fife. On account of the chaff holding the kernels so closely it is particularly adapted to windy sections.

SPRING WHEAT (IRRIGATED)—TEST OF VARIETIES

Variety	1914	1915	1916	1917	1918	1919	1920	Average for 7 years
	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.
Huron	43 30	86 ..	77 15	58 45	63 11	57 30	66 48	66 43
Marquis	53 45	94 ..	71 ..	48 30	61 38	51 ..	61 50	63 6
Red Fife	47 45	53 ..	61 45	57 45	53 19	33 ..	64 10	52 58
Pioneer	42 45	44 ..	49 15	51 30	41 38	52 30	38 4	45 40

EXPERIMENTS WITH OATS (IRRIGATED)

Seven varieties were tested, but only the four grown for the past six years are given in the following table.

OATS (IRRIGATED)—TEST OF VARIETIES

Variety	1915	1916	1917	1918	1919	1920	Average for 6 years
	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.
Danish Island	116 16	159 24	133 18	107 ..	163 8	132 27	135 16
Banner	81 6	157 17	128 28	104 19	134 4	135 30	123 23
Gold Rain	141 6	137 22	84 24	86 24	123 18	144 4	119 22
Daubeney	132 12	105 30	86 31	80 20	85 20	119 1	101 25

A field of 30 acres of Banner oats sown on spring ploughed stubble yielded 40 bushels and 13 pounds per acre. The crop received one irrigation.

EXPERIMENTS WITH BARLEY (IRRIGATED)

Twelve varieties were grown. Only those having a five-year average are given in the following table:

BARLEY (IRRIGATED)—TEST OF VARIETIES

Variety	1916		1917		1918		1919		1920		Average for 5 years	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Barks (6 row)	109	33	79	33	107	24	101	12	116	32	102	46
Swedish Chevalier (2 row)	78	36	82	9	91	20	85	..	76	45	82	41
Invincible (6 row)	99	3	70	15	83	44	86	12	74	18	82	38
Gold (2 row)	81	12	73	36	88	40	77	24	84	46	81	12
Guymalaye (6 row)	78	36	55	15	66	35	85	..	78	1	72	37
Early Chevalier (2 row)	78	36	41	12	63	25	63	..	75	23	64	19
Odessa (6 row)	54	33	39	3	87	17	62	24	73	31	63	22
Manchurian (6 row)	71	27	14	33	80	30	75	30	59	3	60	15
O.A.C. 21 (6 row)	69	3	23	21	81	35	69	18	57	29	60	12

A ¾-acre field of Bark's Excelsior barley on land summer-fallowed the previous year yielded 48 bushels 23 pounds per acre.

EXPERIMENTS WITH PEAS (IRRIGATED)

Seven varieties were grown. The varieties were affected with mildew which reduced the yields.

PEAS (IRRIGATED)—TEST OF VARIETIES

Variety.	1914		1915		1916		1917		1918		1919		1920		Average for 7 years	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush	Lbs.
MacKay..	51	..	40	..	38	..	56	30	66	..	24	30	7	..	40	26
Golden Vine....	47	30	56	45	20	..	61	..	58	..	28	..	10	30	40	15
Prussian Blue....	52	..	39	15	45	..	45	..	50	..	23	30	17	30	38	53
Arthur Select...	46	30	54	45	51	..	32	..	58	..	21	..	9	..	38	53
English Grey....	46	30	41	15	34	..	46	..	56	30	27	..	6	15	36	47
Chancellor.....	48	..	33	..	32	..	46	..	56	..	22	..	12	30	35	38
Solo.....	56	..	37	45	39	..	48	..	40	30	21	..	4	..	35	11

FORAGE PLANTS

VARIETY TESTS

EXPERIMENTS WITH CORN (DRY LAND)

Of the thirteen varieties tested, Compton's Early heads the list. All varieties were planted on June 4, on summer-fallow land, in rows three feet apart. The heavy June winds accompanied by the drought which followed, greatly reduced the yields. All varieties were cut for ensilage purposes on September 7.

The results given in the following table are of green fodder weighed as cut. The yield in each case is computed from one one-hundredth of an acre:—

CORN (DRY LAND)—TEST OF VARIETIES

Variety	Stand	Height	Stage of Maturity	Yield per acre	
	%	Inches		Tons	Lbs.
Compton's Early	70	66	Tasseled	6	1,000
Longfellow	70	66	Silked	5	1,600
Wisconsin No. 7	90	60	Tasseled	5	1,200
Improved Leaming	40	54	Tasseled	4	
Quebec 28	40	54	Kernels in milk	3	1,800
North Dakota	60	60	Tasseled	3	1,400
Penticton N.W. Dent	60	65	Silked	3	1,300
McConnell's Yellow Flint	40	60	Kernels glazed	3	200
W. C. Yellow Dent	20	66	Silked	3	100
Twitchell's Pride	30	48	Kernels glazed	3	
Ewing's Yellow Flint	50	60	Kernels in milk	2	1,600
Bailey	20	66	Silked	2	1,200
MacKenzie N. W. Dent	20	60	Silked	2	1,200

EXPERIMENTS WITH TURNIPS (DRY LAND)

Eleven varieties of strains of turnips were tested. They were sown on June 4 on summer-fallow land, in rows three feet apart. The stand was poor and the yields correspondingly light. They were pulled on October 16. It will be noted from the accompanying table that Steele Briggs' Jumbo heads the list:—

TURNIPS (DRY LAND)—TEST OF VARIETIES

Variety	Stand	Yield per acre	
	%	Tons	Lbs.
Jumbo (Steele Briggs)	60	4	1,400
Good Luck (")	40	4	
Select Westbury (")	60	3	1,500
Perfection (")	50	3	1,000
Canadian Gem (Experimental Station, Kentville)	25	3	400
Ditmars (" ")	30	3	
Green Top (" ")	20	2	1,200
Good Luck (Experimental Station, Ste Anne)	30	2	500
Champion (Experimental Station, Charlottetown)	15	2	400
Good Luck (Experimental Station, Fredericton)	20	2	
Monarch	25	1	1,500

EXPERIMENTS WITH MANGELS (DRY LAND)

Twenty-one varieties of mangels were sown on June 4 and pulled on October 16. They were sown on summer-fallowed land in rows three feet apart and thinned to about nine to twelve inches apart in the rows. The size of the plots from which the yields were computed were each one one-hundredth of an acre. As a result of the high June winds the stand obtained was very disappointing. The following table gives the yields obtained:—

MANGELS (DRY LAND)—TEST OF VARIETIES

Variety	Stand	Yield per acre	
	%	Tons	Lbs.
Giant White Sugar (Steele Briggs)	40	3	500
Sugar White (Experimental Station, Charlottetown)	15	3	300
Yellow Intermediate (" ")	10	3	200
Yellow Intermediate (Central Experimental Farm, Ottawa)	5	2	1,400
Mammoth Long Red (Steele Briggs)	30	2	600
Select (Experimental Station, Charlottetown)	10	2	500
Giant Yellow Globe (Steele Briggs)	40	2	500
Danish Sludstrup (Experimental Station, Summerland)	15	2	400
Danish Sludstrup (Experimental Station, Kentville)	20	2	400
Prize Mammoth (Steele Briggs)	35	2	200
Yellow Leviathan (Experimental Farm, Agassiz)	5	1	1,700
Giant Yellow Intermediate (Wm. Rennie)	5	1	1,200
Perfection (Wm. Rennie)	3	1	1,000
Yellow Intermediate (McKenzie)	1	1	600
Giant Yellow Intermediate (Steele Briggs)	30	1	300
Giant Yellow Globe (Wm. Rennie)	1	1	200
Giant White Sugar (")	2	1	200
Giant Red Eckendorffer (Harris McFayden)	2	1	200
Yellow Eckendorffer (")	2	1	200
Giant Long Red (McKenzie)	2	1	100
Manitoba Giant Yellow (")	1		1,500

EXPERIMENT WITH CARROTS (DRY LAND)

Four varieties were sown on June 4, on summer-fallowed land, in rows three feet apart. They were pulled on October 16. The stand was poor and the yields correspondingly light.

CARROTS (DRY LAND)—TEST OF VARIETIES

Variety	Stand	Yield per acre	
	%	Tons	Lbs.
White Intermediate (Experimental Station, Summerland)	5		1,100
Danish Champion	1		1,000
Large White Belgian (Steele Briggs)	1		1,000
Long Red Surrey (")	2		300

EXPERIMENT WITH SUGAR BEETS (DRY LAND)

Two varieties of sugar beets were sown on June 4 on summer-fallow land in rows three feet apart, and were pulled on October 16. The stand was so poor that the yield was almost negligible. Chatham-grown seed yielded at the rate of one ton 600 pounds per acre, and British Columbia grown seed one ton 400 pounds per acre.

PERENNIAL HAY CROPS

One of the most difficult problems confronting the dry land farmer in the drier parts of southern Alberta is the question of raising some kind of profitable hay or pasture crop.

By the use of summer-fallow, whereby storing of a certain amount of moisture in the subsoil is effected, it is possible to raise profitable crops of grain in medium dry seasons. Thus, the safest means of obtaining feed would be to cut grain green. This is, however, expensive, as it entails the necessity of ploughing and seeding for each crop raised.

In the case of a perennial crop, conditions are quite different. A perennial crop keeps on growing during the summer and late into the fall, using up all the available moisture. In the spring, when it continues its interrupted growth, there is, therefore, no reserve moisture in the subsoil to draw on, and to tide it over the dry periods. The perennial crop has consequently to depend entirely on the rains that come during its growing period.

The efforts made by the Station during a number of years to overcome the difficulty of raising profitable perennial hay crops on dry land have so far resulted in the development of a method which seems to be promising. The principle of this method is simply to plant the hay crops in rows, and cultivate.

By growing the hay crops in rows a sufficient distance apart the stand will be much thinner than if the seed is sown broadcast or in drills close together, but as the amount of moisture and nourishment awarded the plants in the rows is larger, the crop generally grows high enough to allow cutting. The cultivation also produces a mulch which aids in conserving the moisture. It also prevents weed growth.

There appear, at the present time, to be only three permanent forage crops worth considering for dry land farms. They are alfalfa, Western Rye grass, and Awnless Brome grass.

Of these, alfalfa, no doubt, is the superior one.

Western Rye, being of a bunch-grass nature, and not inclined to make a thick sod, is better for hay than is Brome grass. It should be cut soon after it heads out; otherwise, it is apt to become woody and unpalatable to stock.

For pasture, Awnless Brome grass is superior, it being of the same nature as couch or twitch grass, i.e., spreading from under-ground root stalks. It is, however, difficult to eradicate.

This is especially true on rich, moist soils where it is really a most serious pest when once it has established itself.

ALFALFA IN ROWS

On account of the reasonably good success obtained on the Station by growing alfalfa in rows, for hay, and more particularly with the object of raising seed, quite a few farmers in the district are beginning to sow small areas in this way. It has been found advisable not to have the rows less than thirty inches apart if grown for hay. If seed is to be raised, three feet or possibly three and a half feet apart is probably better.

In view of the fact that an increasing interest is being taken by many farmers in the question of sowing alfalfa in rows for the production of seed, it might be well to call attention to the importance of starting with seed of the Grimm variety, or some other equally hardy strain. Although, in the Lethbridge district, practically all varieties of alfalfa seem to be sufficiently hardy, it must be kept in mind that this is not the case in other districts of the province of Alberta. Consequently, from a general point of view, the importance of producing seed only from the strains that have proved to be particularly hardy is quite apparent.

The yield of seed is always uncertain, as it is governed to a very considerable extent by climatic conditions at the time the seed pods are forming. This year our yield of seed was very light.

WINTER RYE

Rye sown in the early fall is undoubtedly one of the safest annual spring pastures we can rely on.

Alfalfa and Timothy—First cutting.

Courtesy of Trade and Commerce Dept.

FORAGE PLANTS

All classes of forage crops did well on the irrigated land.

CORN (IRRIGATED)

While Longfellow heads the list in the variety test, Northwestern Dent is more generally grown for ensilage purposes. All varieties were planted on June 4 in rows three feet apart on spring-ploughed stubble land. They were irrigated twice, July 3 and August 13. One cultivation was given previous to irrigating and others after each irrigation. They were cut for ensilage on September 7.

CORN (IRRIGATED)—TEST OF VARIETIES

Variety	Stand	Height	Stage of maturity	Yield per acre	
	%	Inches		Tons	Lbs.
Longfellow	95	102	Silked	17	
MacKenzie N. W. Dent	80	102	Silked	16	
North Dakota	90	90	Kernels in milk	15	100
McConnell Yellow Flint	75	90	Silked	14	1,400
Penticton N. W. Dent	95	102	Silked	14	600
Compton Early	90	102	Silked	14	
Ewing Yellow Flint	80	96	Kernels in milk	14	
W. C. Yellow Dent	95	108	Silked	13	1,200
Improved Leaming	90	96	Kernels in milk	13	
Bailey	85	102	Kernels in milk	12	1,000
Wisconsin No. 7	80	102	Silked	11	800
Twitchell's Pride	95	78	Silked	10	1,500
Quebec 28	70	90	Kernels glazed	10	

SUNFLOWERS (IRRIGATED)

Only one variety of sunflowers was experimented with, viz.: Giant Russian.

The previous season a study of "Distance of Rows Apart" gave the following results:—

Rows 21 inches apart, 15 tons, 1,861 pounds per acre.

Rows 28 inches apart, 17 tons, 1,252 pounds per acre.

Rows 35 inches apart, 21 tons, 58 pounds per acre.

Rows 42 inches apart, 19 tons, 1,682 pounds per acre.

This season a further test was made, thinning plants 6, 9, 12, and 18 inches apart in the row, with the rows 3 feet apart. The highest yield was from the plants left 6 inches apart, which produced at the rate of 26 tons 1,760 pounds per acre; while the lowest yield was from the rows thinned to 18 inches apart, which produced 18 tons 1,128 pounds per acre, indicating that thinning to 6 inches apart in the row is advisable.

Sunflowers are of practically no value for fodder except when made into ensilage. It is not possible to cut the sunflower stalks and cure them in the stook to be fed in the dry state during the winter, as is the case with corn fodder. Undoubtedly sunflowers are coming to the notice of the farmer who puts up silage, on account of their greater yield over corn.

This season a field of 2·33 acres of Northwestern Dent corn yielded 6 tons 1,409 pounds per acre, whereas a field containing 4.6 acres of Russian Giant sunflowers produced 15 tons per acre. In both cases the corn and sunflowers were planted on spring-ploughed barley stubble. During the growing season the same number of cultivations were given, and two applications of water supplied.

TURNIPS (IRRIGATED)

A number of varieties or strains of turnips were sown June 4 on land which was in grain the previous season. All were seeded in rows three feet apart. Two irrigations were given July 3 and August 13. They were pulled on October 18.

TURNIPS (IRRIGATED)—TEST OF VARIETIES

Variety	Stand	Yield per acre	
	%	Tons	Lbs.
Good Luck (Experimental Station, Fredericton)	85	28	1,000
Bangholm (McKenzie)	60	25	1,000
Ditmars (Experimental Station, Kentville)	50	23	1,000
Good Luck (Steele Briggs)	40	20	
Jumbo (")	40	19	1,000
Yellow Tankard (Harris McFayden)	50	19	1,000
Select Westbury (Steele Briggs)	50	16	1,000
Jumbo (Wm. Rennie)	60	16	1,000
Hall's Westbury (")	50	15	
Monarch	60	14	
Canadian Gem Experimental Station, Kentville)	60	13	1,000
Green Top (" ")	70	13	1,000
Champion (" ")	70	13	
Bortfelder (Harris McFayden)	55	12	1,000
Hall's Westbury (McKenzie)	45	12	
Perfection (Steele Briggs)	50	12	
Good Luck (Experimental Station, Ste Anne)	85	12	
Bangholm (Wm. Rennie)	80	12	
Elephant (McKenzie)	60	7	1,000

OTHER ROOT CROPS

A number of varieties or strains of mangels, sugar beets and carrots were sown on the same kind of land as the turnips. The treatment during the growing season was the same for mangels, sugar beets, and carrots as that given the turnips. The turnips were lifted four days sooner than the other varieties of roots.

MANGELS (IRRIGATED)—TEST OF VARIETIES

Variety	Stand	Yield per acre	
	%	tons	lbs.
Perfection (Wm. Rennie)	60	13	1,000
Yellow Intermediate (McKenzie)	65	12	1,500
Select Yellow Intermediate. (Experimental Station, Charlottetown)	35	11	1,000
Giant White Sugar (Steel Briggs)	50	11	500
Sugar White (Experimental Station, Charlottetown)	65	11	—
Manitoba Giant Yellow (McKenzie)	65	9	500
Giant Yellow Globe (Steele Briggs)	80	9	500
Yellow Intermediate (Experimental Station, Charlottetown)	15	8	1,500
Danish Sludstrup (Experimental Station, Summerland)	50	8	1,500
Mammoth Long Red (Steele Briggs)	40	8	1,000
Danish Sludstrup (Experimental Station, Kentville)	55	8	500
Yellow Intermediate (Central Experimental Farm, Ottawa)	60	8	—
Giant White Sugar (Wm. Rennie)	30	7	1,500
Giant Leviathan (Experimental Farm, Agassiz)	50	7	1,500
Prize Mammoth (Steele Briggs)	40	7	500
Giant Yellow Intermediate (Wm. Rennie)	20	6	1,500
Giant Yellow Globe (Wm. Rennie)	25	6	1,500
Giant Red Eckendorffer (Harris McFayden)	45	6	1,500
Yellow Leviathan (Experimental Farm, Agassiz)	40	6	1,000
Yellow Eckendorffer (Harris McFayden)	40	5	1,000
Giant Long Red (McKenzie)	10	3	1,000
Giant Yellow Intermediate (Steele Briggs)	10	3	500

CARROTS (IRRIGATED)—TEST OF VARIETIES

Variety	Stand	Yield per acre	
	%	tons	lbs.
White Intermediate (Experimental Station, Summerland)	15	3	—
Red Surrey (Steele Briggs)	5	1	300
Danish Champion	1	—	700
Large White Belgian (Steele Briggs)	1	—	700

SUGAR BEETS (IRRIGATED)—TEST OF VARIETIES

Variety	Stand	Yield per acre		Average yield for two years	
	%	tons	lbs.	tons	lbs
B. C. Grown	25	4	1,000	7	1,500
Chatham Grown	30	5	800	6	1,400

ALFALFA

On the irrigated part of the farm there were 45.7 acres of alfalfa cut for hay. The average yield this season was 3 tons 1,160 pounds per acre. The highest yield on any of the alfalfa fields was 4 tons 460 pounds per acre on a field of 11.6 acres, while the lowest was 2 tons 1,797 pounds per acre from a field of 4.7 acres. This low yield was due to lack of sufficient irrigation.

MIXED HAY

Two acres of a mixture of alfalfa, red clover, alsike clover and grasses produced 3 tons 1,595 pounds of hay in two cuttings. The alfalfa and mixed hay received two irrigations.

POULTRY

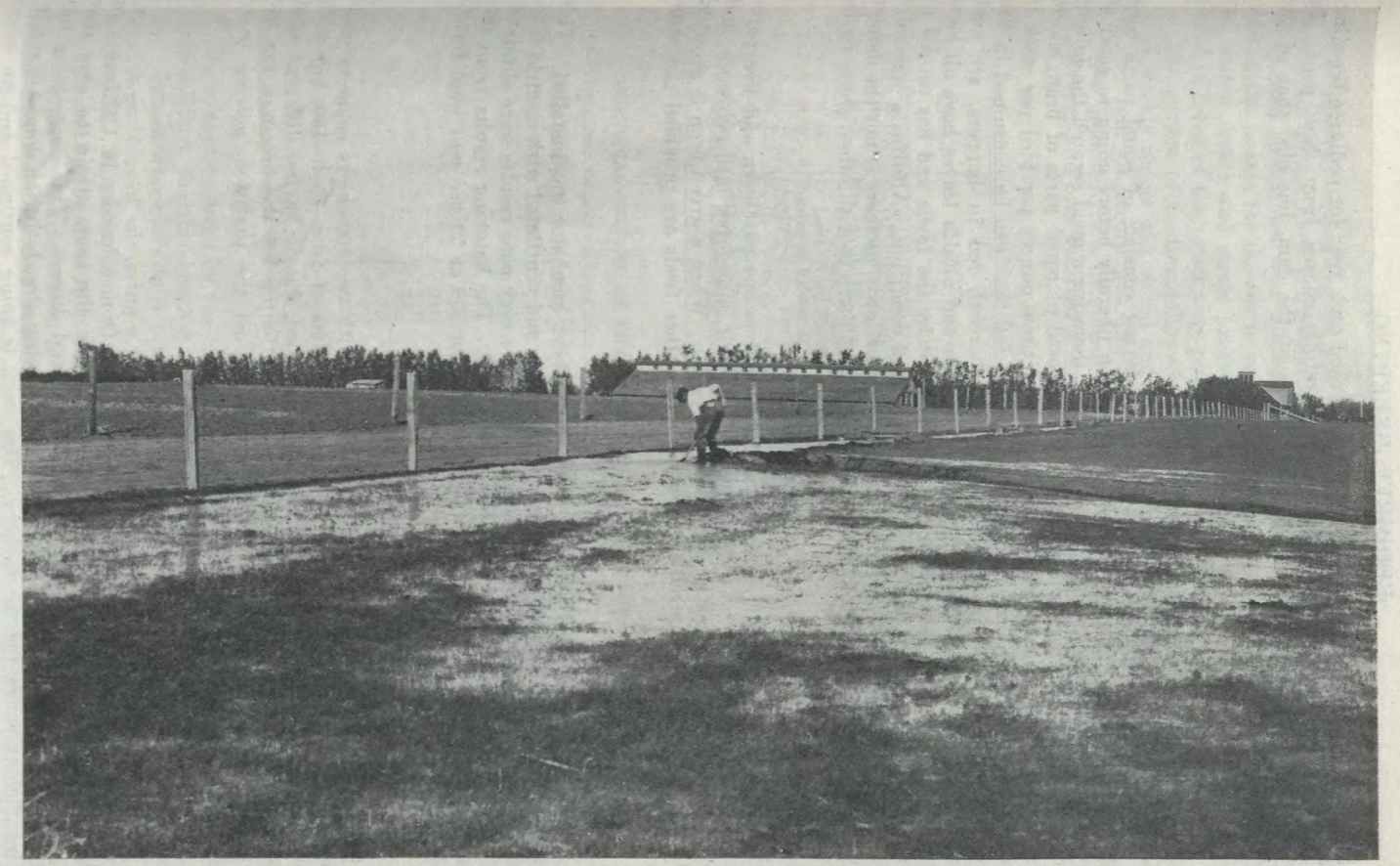
Only one breed of poultry is kept at this station viz., Barred Rocks. We have not only demonstrated their qualities as winter layers, but their adaptability to this changeable climate. Excellent hatching results have been obtained from this breed.

There were 78 hens and 182 pullets kept during the winter of 1919-20. Of the pullets, 49 laid 200 eggs and over, 71 varied from 150 to 200 eggs, and the remainder with poorer records were fattened and disposed of in the spring.

All pullets and hens were trapnested throughout the year and the pullets were selected for breeders after they had finished their first year's laying.

The table following gives the records of one pen of 55 pullets hatched in March and April, 1919. The first line gives the results from the 1st of November to the end of February, while the second line gives the results for the entire year from November to November:—

Period	No. of eggs	Average per bird	Value of eggs	Cost of feed	Profit over cost of feed	Profit per bird
			$ cts.	$ cts.	$ cts.	$ cts.
Nov. to Feb., inclusive	3,889	71	277 51	76 57	200 94	3 65
Year	11,160	203	600 61	221 65	378 96	6 71



Courtesy of Trade and Commerce Dept.

Irrigating permanent pasture grasses—First application of water in the spring.

PEDIGREE BREEDING

Several pens of specially selected hens are picked each year for pedigree breeding, and all males used the following season are carefully chosen from these pens. In selecting male birds not only the egg production of the dam, but also that of the sisters is considered.

FFEEDING

WINTER FEEDING

The scratch feed fed the pullets for winter laying consists of equal parts corn and wheat, fed in six to eight inches of straw, given liberally before going to roost at night. What remains in the litter is sufficient for them for a good scratch the following morning. At noon a moist mash is fed, composed of equal parts of bran, shorts and corn meal. Green cut bone to the amount of three ounces per bird per week is added to the moist mash. No more of the mash is fed than can be consumed in five minutes. Crushed oats, oyster shell, grit, and charcoal, fed in hoppers, are kept before them all the time. Mangels, cabbage, turnips and alfalfa leaves have all been fed as green feed. The latter seems to be liked best by the fowls and has proved to be the most satisfactory in keeping the birds in good condition. Alfalfa is especially valuable to the amateur poultryman as a green feed for fowls, as there is not the danger of scouring the fowls with an overfeed of alfalfa that there is with other green feeds.

SUMMER FEEDING

For summer feeding the scratch feed is changed to one part corn and five parts wheat. The green bone is reduced to one and one-half ounces per bird per week, and the wet mash is fed but three or four times per week. When a green crop is growing in the run, no other green feed is supplied. The other feeds are provided the same as in the winter.

INCUBATION

In the spring of 1919, a 2,400-egg capacity Buckeye incubator was installed. This incubator is heated by hot water and a coal oil burner and ventilated with electric fans, but owing to an irregular electric current for the fans very poor results were obtained. A 200-egg capacity Buckeye incubator was also used. The hatching results from this machine for the season showed that from 544 eggs set 308 or 59 per cent were fertile and of these 290 chicks hatched.

BROODING

The brooding of chicks has been done entirely with two 500-chicks capacity coal-stove brooders. These proved very successful with lots of from 75 to 150, but with more than this number very poor results were obtained, due to having different aged chicks running together. Our experience in partitioning off the brooders for the different ages has been that the chicks crowd against the partition, getting overheated and thus causing high mortality.

TURKEYS

Two wild Bronze Turkey poults were purchased from a breeder in California in 1918 for the purpose of introducing new blood into the tame strain to give new vigour and to endeavour to overcome the black head disease. This experiment has not been very successful chiefly due to the disease being already in the domestic strain and insufficient range for the turkeys. The work is being continued and an effort made to overcome both difficulties.

EGG LAYING CONTEST

The first egg laying contest was started on November 1, 1919, and completed on October 30, 1920. Each contestant was asked to send in ten pullets of a standard variety, and substitutes were allowed only if death occurred. These birds were confined in the houses for the entire year. The houses were well ventilated, having glass and cotton fronts and straw packed in the ceiling between rafters. Drop curtains placed in front of the roosts were put down on very cold nights.

The system of feeding followed was the same as that already described.

A weekly report was issued and sent to all contestants, giving the record of each bird and pen. A record was also kept of feed consumed. All pullets that laid 150 eggs were qualified for a Certificate of Record of Performance A.A., while those that laid 225 eggs and over received a certificate of Advanced Record of Performance A.A.

SUMMARY OF CONTEST

Pen No.	Breed	Owner and Address	Total number of eggs laid
1	B.R.	W. Northcott, Jr., Beddington, Alta	1,660
2	B.R.	Mrs. Jos. Woods, Brandon, Man	1,143
3	B.O.	Mrs. A. R. Rhodes, Zelma, Sask	950
4	W.W.	H. W. Gregory, Strathcona, Alta	1,113
5	W.W.	D. Lockerbie, Kerrobert, Sask	964
6	B.W.	Timms & Eastwell, Calgary, Alta	1,025
7	W.W.	Ideal Poultry Yards, Saskatoon, Sask	1,479
8	W.L.	E. H. Young & Sons, DeWinton, Alta	1,200
9	W.L.	S. H. Jones, Blaine Lake, Sask	1,415
10	G.C.	Kerr & McGuiness, Brandon, Man	1,188
11	S.S.H.	A. E. Hetherington, Kerrobert, Sask	1,230

INDIVIDUAL RECORDS OF THE BIRDS ENTERED IN EACH PEN FOR THE YEAR

Pen No.	1	2	3	4	5	6	7	8	9	10	Floor
1	237	138	180	133	170	106	204	181	77	205	29
2	143	34	56	121	102	107	138	137	130	160	17
3	95	133	67	97	107	108	34	60	95	128	26
4	113	76	137	84	225	68	126	149	75	35	.....
5	41	99	114	40	135	53	66	117	102	168	29
6	113	73	53	139	92	112	138	98	138	47	22
7	147	100	178	137	153	160	191	141	112	143	17
8	106	63	140	131	63	132	148	135	128	142	12
9	88	150	153	192	129	140	125	74	172	184	8
10	97	134	140	66	95	64	163	169	108	134	18
11	126	121	143	85	121	142	155	67	127	112	31

BEES

The honey produced by the bees during the past summer confirms the fact, now well established, that bee-keeping is a safe commercial venture in the irrigated areas in this district where alfalfa is extensively grown. Our long and often severe winters make the problem of wintering a real one which requires the exercise of care as well as some skill. However, when the colonies are brought through the winter in a strong condition, and spring dwindling can be avoided, the amount of honey gathered during the long honey gathering season is certain to be satisfactory.

The only real source of supply that we appear to have for honey is the alfalfa bloom. On this account an apiary should be located so as to have a reasonable acreage of alfalfa within a radius of from one to two miles.

WINTERING

In the fall of 1919 nine colonies were prepared for the winter. They were fed in October enough sugar in the form of syrup (two parts of sugar to one part of water) to bring the weights of each hive to between 65 and 70 pounds without covers. Four were packed in two colony wintering cases and left outside while five were put into a dugout cellar.

The wintering cases were merely rough boxes made large enough to accommodate two hives and leave a space of five or six inches on all sides of the hives to be packed with sawdust or planer shavings. The hives were also covered with six or eight inches of the same material. A tunnel about one-half inch high was left at the openings.

The colonies stored in the dugout cellar were put on swinging shelves to protect them from any possible attacks from mice.

In the spring of 1920 the colonies wintered outside appeared to be in much better condition than those wintered in the cellar. They averaged five combs well covered with bees, and each hive had about 12 pounds of stores. Of those wintered in the cellar, one colony was dead, and the remaining ones averaged only four combs well covered with bees, and had only about nine pounds each of stores. Excessive moisture and souring of the honey appeared to be the cause of death of the one colony. The others wintered inside suffered somewhat from the same cause. This was doubtless the result of faulty ventilation in the hives. If the covers had been removed and replaced by something that would have absorbed the moisture and still retained the heat, the trouble might have been avoided. Brood rearing started very slowly on account of the cold, late spring.

THE SUMMER'S RESULTS

The colonies did not build up very rapidly and on account of the late spring some feeding had to be done. The alfalfa came into bloom unusually late, and the honey flow did not really begin until about July 4. It continued, however, as usual until the first frost in the fall, which occurred this year on September 19. More trouble than usual was experienced in preventing swarming even when care was exercised to see that the queen cells were destroyed frequently and plenty of room and ventilation given. These precautions in the past have been sufficient to avoid this trouble. All colonies were re-queened early in August. No comb honey was produced. The following is a brief record of the summer's operations:—

Number of colonies in apiary, spring count	8
Total weight of extracted honey produced (pounds)	811.0
Average weight of extracted honey produced, per colony (pounds)	101.4
Greatest weight of extracted honey produced by one colony (pounds)	214.0
Selling price per pound of extracted honey, less cost of container	$ 0 33
Number of colonies lost, one, valued at	7 00
Value of sugar and honey fed preparatory for winter	17 20
Total value of production (honey and increase), less value of sugar and honey fed and losses of colonies from previous fall	243 43
Average net value of production per colony, spring count	30 43