DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

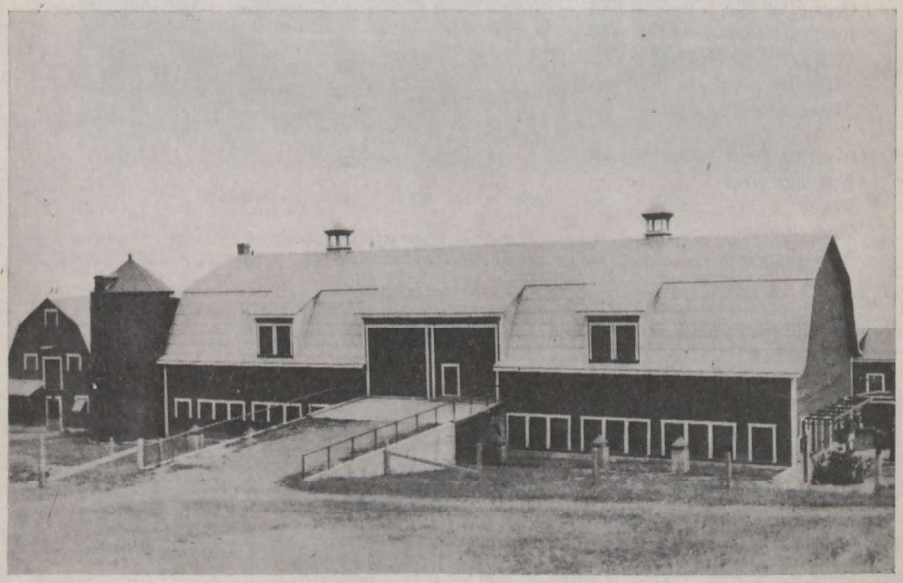
EXPERIMENTAL STATION

CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT

G. A. LANGELIER, D.Sc.A.

FOR THE YEAR 1924



Experimental Station, Cap Rouge, Que.
North side of cattle barn. Plenty of light and good ventilation are indispensable in a dairy barn.

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DOMINION EXPERIMENTAL STATION, CAP ROUGE, P.Q.

REPORT OF THE SUPERINTENDENT, G. A. LANGELIER

THE SEASON

The growing season, from May to September inclusive, was a little colder, wetter, and duller than the average of the last twelve years, the figures being respectively 58.76° and 59.25° Fahrenheit for mean temperature, 22.11 and 20.12 inches for precipitation, 969.9 and 1,007.7 hours for sunshine. The frost-free season extended only 117 days, from June 1 to September 25, which is 21 days less than usual.

Experimental Station, Cap Rouge, Que. Office building.

METEOROLOGICAL RECORDS AT CAP ROUGE, P.Q., 1924

Month	Temperature F.					Precipitation			Total sunshine
	Highest	Date	Lowest	Date	Mean	Rainfall	Snowfall	Total	
						inches	inches	inches	hours
January	38·0	17th	−27·0	27th	8·98	0·80	44·0	5·20	74·9
February	35·0	28th	−11·0	12th	7·62	.....	19·0	1·90	108·7
March	42·0	20th	− 6·0	16th	23·42	0·35	8·0	1·15	103·2
April	60·0	27th	−11·0	12th	28·57	2·94	26·5	5·59	162·4
May	75·0	18th	25·0	2nd	47·50	4·15	.....	4·15	165·6
June	82·0	23rd and 24th	32·0	1st	60·12	3·94	.....	3·94	234·4
July	83·0	8th and 9th	47·0	2nd	66·00	3·82	.....	3·82	236·0
August	81·0	6th and 16th	45·0	1st	64·80	3·02	.....	3·02	197·6
September	77·0	1st	32·0	25th	55·38	7·18	.....	7·18	136·4
October	72·0	4th	23·0	31st	46·27	2·13	1·0	2·23	186·5
November	60·0	1st and 2nd	2·0	17th	34·08	2·70	15·5	4·25	52·0
December	42·0	9th	−21·0	21st	13·10	1·08	15·5	2·63	50·2
Totals	.....	.....	.....	.....	.....	32·11	129·5	45·06	1,707·9
Average	.....	.....	.....	.....	37·99	2·67	10·8	3·75	142·3

PRECIPITATION AT CAP ROUGE, P.Q., 1912-1924

—	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	Average 13 years
January	3·75	6·96	3·70	2·84	4·84	5·07	3·40	3·51	3·50	2·46	2·20	3·70	5·20	3·93
February	2·15	2·70	3·26	3·50	3·00	2·70	3·55	2·25	3·40	0·80	2·05	1·90	1·90	2·55
March	2·40	5·10	2·98	0·32	0·90	4·17	2·75	5·05	3·71	4·53	1·65	3·67	1·15	2·95
April	2·98	2·26	1·87	2·04	1·72	1·29	1·92	3·11	6·92	1·98	3·47	4·85	5·59	3·08
May	8·08	3·27	1·56	3·14	6·36	2·65	4·33	3·49	2·03	0·80	1·78	5·46	4·15	3·62
June	3·01	2·53	3·28	2·63	5·47	8·56	6·77	3·20	4·76	1·94	8·97	1·60	3·94	4·36
July	0·92	5·36	1·66	•1·68	3·96	3·19	6·96	7·10	5·05	4·16	1·71	1·16	3·82	3·59
August	10·21	1·97	4·43	3·39	2·76	6·69	2·90	3·39	3·31	4·60	2·39	6·16	3·02	4·25
September	3·34	4·01	4·92	5·31	3·22	2·47	9·52	4·21	3·37	5·01	1·14	2·06	7·18	4·29
October	2·74	4·11	5·38	3·06	5·42	6·78	3·53	4·04	4·70	4·66	3·21	5·86	2·23	4·29
November	4·97	2·01	4·93	2·18	3·79	1·31	2·56	3·50	2·07	3·45	1·88	4·37	4·25	3·17
December	3·06	3·35	2·60	2·83	2·74	3·22	4·56	1·59	3·33	2·54	3·20	5·59	2·63	3·17
Totals	47·61	43·63	40·57	32·92	44·18	48·10	52·75	44·44	46·15	36·93	33·65	46·38	45·06	43·25

EXTREME HIGHEST, EXTREME LOWEST AND MEAN TEMPERATURES AT CAP ROUGE, P.Q., 1912-1924

Month	1924			1923			1922			1921		
	Highest	Lowest	Mean	Highest	Lowest	Mean	Highest	Lowest	Mean	Highest	Lowest	Mean
January	38	−27	8·98	37	−21	8·53	37	−17·9	9·50	39	−16·9	17·40
February	35	−11	7·62	33	−29	5·87	42	−22·8	12·30	40	−13·9	13·48
March	42	− 6	23·42	51	−13	15·16	49	− 9·0	25·43	52	− 2·1	28·50
April	60	−11	28·57	60	−1	31·73	67	23·2	40·00	79	16·2	40·07
May	75	25	47·50	76	28	49·68	80	30·2	55·32	85	30·2	55·71
June	82	32	60·12	88	36	61·32	88	42·2	63·48	88	38·2	50·86
July	83	47	66·00	87	42	64·08	85	44·2	66·53	96	46·2	72·20
August	81	45	64·80	85	41	62·03	87	43·2	64·07	85	45·2	63·30
September	77	32	55·38	76	35	55·68	87	26·2	57·94	87	36·2	58·20
October	72	23	46·27	70	23	46·58	74	19·2	44·64	79	25·2	44·83
November	60	2	34·08	51	10	33·00	51	12·2	31·72	62	5·2	27·58
December	42	−21	13·10	49	− 5	26·42	47	−21·0	13·64	41	−18·0	15·65
Average			37·99			38·34			40·38			40·64

Month	1920			1919			1918			1917		
	Highest	Lowest	Mean	Highest	Lowest	Mean	Highest	Lowest	Mean	Highest	Lowest	Mean
January	32	−29·7	1·93	37	−19·9	13·02	32	−31·7	5·12	37	−21·8	7·90
February	39	−25·8	18·51	34	− 7·0	16·88	44	−34·7	6·05	35	−21·8	6·00
March	55	−19·9	24·33	49	−10·0	24·82	44	−10·0	19·88	51	− 6·0	22·90
April	61	17·2	35·90	56	8·2	34·28	68	14·2	52·48	56	10·2	35·35
May	82	26·2	52·98	80	29·2	51·05	83	30·2	53·52	77	28·2	46·20
June	85	40·2	62·20	93	38·2	65·16	82	34·2	56·76	80	42·2	59·50
July	85	43·2	64·70	90	45·2	67·40	88	46·2	66·69	89	51·2	67·30
August	89	44·2	67·23	81	43·2	63·39	83	39·2	62·64	92	44·2	65·92
September	81	32·2	57·95	80	32·2	55·31	79	30·2	51·79	77	29·2	53·40
October	67	30·2	50·15	62	21·2	42·57	61	26·2	43·83	70	30·2	41·87
November	47	3·2	27·12	49	5·2	30·45	53	9·2	32·30	42	− 3·0	25·78
December	38	−18·9	19·14	39	−25·8	9·64	40	− 6·1	18·47	38	−34·7	8·36
Average			40·18			39·50			39·13			36·71

EXTREME HIGHEST, EXTREME LOWEST AND MEAN TEMPERATURES AT CAP ROUGE, P.Q., 1912-1924—*Con.*

Month	1916			1915			1914			1913			1912		
	Highest	Lowest	Mean	Highest	Lowest	Mean	Highest	Lowest	Mean	Highest	Lowest	Mean	Highest	Lowest	Mean
January	44	−16·9	12·56	45	−21·8	12·75	43	−24·8	7·07	43	−22·2	15·68	34	−24·2	0·97
Fsbruary	36	−26·8	10·40	34	−14·9	16·37	33	−30·7	−0·13	41	−19·9	4·85	35	−19·3	9·30
Manitoba	45	−10·0	15·31	40	5·2	22·30	45	− 2·1	23·86	52	−14·9	21·91	43	−14·2	15·27
April	63	17·2	40·05	71	20·2	40·18	54	6·2	30·12	83	15·2	39·35	60	5·2	31·33
May	75	31·2	51·15	76	31·2	48·20	86	26·2	52·78	85	25·2	48·95	80	26·2	51·31
June	79	44·2	60·48	85	33·2	60·54	86	32·2	57·37	84	36·2	57·31	83	35·2	56·18
July	91	45·2	70·00	85	46·2	64·65	89	45·2	64·45	88	45·2	65·19	92	44·2	66·81
August	89	45·2	66·34	87	35·2	63·71	92	40·2	61·93	83	40·2	61·58	77	39·2	59·24
September	77	32·2	57·10	84	32·2	56·95	84	27·2	55·78	82	28·2	54·57	74	31·2	53·37
October	72	24·2	43·70	68	27·2	45·11	69	24·2	44·37	73	24·2	48·96	72	28·2	44·94
November	63	− 4·1	28·00	50	19·2	32·60	52	− 1·1	25·39	61	13·2	33·42	59	10·2	30·92
December	40	−13·9	16·70	40	− 3·1	21·09	44	−22·8	13·72	37	− 1·1	21·19	47	−13·2	16·55
Average			39·32			40·45			36·39			39·41			36·35

THE CROPS

At this Station, peas and oats for silage, flax for fibre, apples, strawberries, garden peas and beans, cabbage, cauliflower, celery, sweet corn, cucumbers, onions, rhubarb, ornamental plants, bushes and trees were very good; hay, sunflowers, swede turnips, oats, wheat, field beans, currants, gooseberries, raspberries, asparagus, garden beets and carrots, musk and water melons, parsnips, potatoes, squash, tomatoes were good; pastures, corn for silage, barley, field peas, flax for seed, plums were medium; cherries and grapes were practically a failure.

ANIMAL HUSBANDRY

DAIRY CATTLE

At the end of 1924, there were seventy-three head of pure-bred French-Canadian cattle, or four less than the previous year. The herd has been fully, accredited for three years, and every female having had two calves has qualified for Record of Performance. Two of the herd bulls have also qualified. All the cows and heifers which finished a lactation period during the year averaged 7,441 pounds of milk testing 4.7, equivalent to 407 pounds of fat or about 475 pounds of butter.

BREEDING FRENCH-CANADIAN CATTLE

There are only pure-bred French-Canadian cattle at Cap Rouge. At the beginning of 1925, there were six bulls over one year, thirty-two cows, eleven heifers and twenty-four calves under twelve months, or a total of seventy-three. The herd, which has been fully accredited for the last two years, has been built up since 1911, only two bulls having been brought into it during fourteen years, all the others being bred on the Farm. Every cow or heifer with more than one period of lactation has qualified for Record of Performance, and more first prizes were won at the Quebec Provincial Exhibition in 1924 than by all the other breeders put together. Success is due mostly to unremitting care regarding the health of the animals, fairly close breeding, and generous feeding. The fact that young stock is usually sold before it is born shows that the herd is in high esteem amongst breeders of French-Canadian cattle. (Project A 505.)

DAIRY CATTLE BREEDING METHODS

The object is to compare in-breeding, line-breeding, and out-crossing. Nineteen French-Canadian heifers, bred at Cap Rouge between 1915 and 1920, qualified for Record of Performance as two-year-olds, and official figures are available for them. The three which were inbred averaged 7,082 pounds of milk, the four which were line-bred, 6,605 pounds, and the twelve which came from unrelated parents 6,367. A sane view of this question is that there should be no fear of close breeding as long as the sire and the dam have not the same defects, and if animals of poor constitution or of low vitality are rigidly culled. (Project A 265.)

INFLUENCE OF A PROVEN SIRE ON A DAIRY HERD

Many years ago, one of the best-looking French-Canadian bulls was placed at the head of the Cap Rouge herd, though nothing was known about the milking qualities of his ancestors. Not one of his heifers, over twenty-five in number, was good enough as a milch cow to be kept. When bulls which qualified for Record of Performance were used, an equal number of heifers by them, with the same feed, housing, and care, averaged over 2,000 pounds more milk per year. Moreover, cows which had produced poor heifers when bred to the first-mentioned

sire, produced heifers which easily qualified for Record of Performance when mated to the second. This shows that the whole future of a herd is at stake when chosing a sire, and two or three bad ones following each other may spell ruin for the dairyman. (Project A 263a.)

VALUE OF A PURE-BRED DAIRY BULL ON A GRADE HERD

The object of this project was to compare heifers with their grade mothers, for milk production, the heifers being sired by a pure-bred bull about whose dam nothing was known as to milk production.

Two heifers produced only 73 per cent of what was required to about equal their dams for the same period of lactation, probably because the pure-bred sire was out of a poor milker.

This experiment shows that a farmer who wishes to improve a nondescript or a grade herd of dairy cattle must get a bull with other qualifications besides the registration certificate. Unfortunately, there are too many pure-bred scrubs in the country. (Project A 263b.)

WHOLE MILK AND SKIM-MILK WITH COMMERCIAL AND HOME-MIXED MEAL FOR DAIRY CALVES

Three lots of French-Canadian calves, comprising thirty-eight different animals, were used for this experiment. One group received whole milk; the second, skim-milk and Royal Purple meal; the last, skim-milk and a home-mixed calf meal consisting of 6 parts corn, 3 parts oats, 1½ parts flax seed, by weight, all ground together. The results showed that the whole milk ration cost nearly three times more than the others, so that it should not be fed longer than about a month and then gradually replaced by skim-milk and a fat substitute. The home-mixed meal gave about as good results as the Royal Purple meal, and as it costs less, it should be used instead of the commercial article. (Project A 53.)

SKIM-MILK, POWDERED SKIM-MILK AND WHOLE MILK WITH BONE MEAL FOR DAIRY CALVES

It has been shown that whole milk is too costly to bring up calves, and this experiment is conducted to find out how the youngsters can be raised in the most economical manner when skim-milk is not available. Three lots of French-Canadian calves were used, comprising twelve animals. They were all started on whole milk and then fed the same basic ration, the only variance being the use of skim-milk or substitutes. The first bunch, receiving skim-milk from the separator, weighed, on an average, 263 pounds at twenty-four weeks when the cost of feed for each calf was $19.05; the second lot, receiving one pound of powdered skim-milk for each gallon of water, weighed 266 pounds and cost $49.54; the last bunch, receiving one quart of whole milk and one ounce of bone meal for each three quarts of water, weighed 259 pounds and cost $22.25. Some of the feed valuations were as follows: whole milk $2, skim-milk $0.25, powdered skim-milk $16 per 100 pounds. This experiment will be continued, but it seems evident that the price of powdered skim-milk is too high for calf feeding in a commercial way. (Project A 262.)

COST OF REARING DAIRY-BRED CALVES AND HEIFERS

All the feed which was consumed by eight French-Canadian heifers until calving was carefully weighed. At this time the average age was twenty-seven months eighteen days, and the weight 813 pounds. For each animal it took 536 pounds whole milk, 5,668 pounds skim-milk, 830 pounds meal, 3,164 pounds hay, 5,521 pounds corn silage, 4,235 pounds swede turnips, 377 pounds green

feed, and ninety-six days of pasture. Valuing these feeds respectively at $2, $0.25 and $2 per 100 pounds, and $15, $4, $4 and $6 per ton, with pasture at $2 per month, the total cost for each heifer was $93.25. It is probable that something like $24 should be added to this for labour, bedding, housing, service fee, interest, risks, etc., whilst $10 might be deducted for manure. This would bring the cost of the heifer to about $100 at calving time, according to the value of feed. If the heifer is well bred for milk production, the above figure is not too high. (Project A 59.)

FEEDING CONCENTRATES AT DIFFERENT RATES TO MILCH COWS

The object was to find out the effect of different quantities of concentrates on winter milk production, and especially on profits. Cows of about the same weight, the same capacity as milk producers, and having calved at nearly the same time, were chosen. The roughage was the same for each lot, while one got as much meal as it would clean up (one pound per 2·18 pounds of milk), the second one pound per 4 pounds of milk, and the third one pound per 8 pounds of milk. The results showed that more concentrates produced more milk, but it took more feed units per pound of milk, proportionately, as the quantity of concentrates was increased. During the experiment, which lasted five years and comprised twenty-seven cows, the price of concentrates per 100 pounds went to extremes, from $1.25 to $2.85. At the former figures, it paid best to feed heavily, while at the latter, the greatest profit came from the ration with the lowest quantity of concentrates. As a general rule, it may be said that heavy feeding of concentrates should be done by persons selling raw milk at high figures, while for the average dairyman going to the butter or cheese factory, it is better to be careful and to take into consideration the price of concentrates and the value of the milk. Probably one pound of meal per four pounds of milk will make a good average, and it is advisable to produce as much of the concentrates as possible on the farm. (Project A 36.)

WINTERING DAIRY CATTLE IN SINGLE BOARDED OPEN FRONT SHEDS

The cost of erecting extensive stabling is high nowadays and the subsequent yearly charges for interest, depreciation and insurance are heavy. This is why, since 1915, a number of dairy cattle have been wintered each year at Cap Rouge under single-boarded open-front sheds. Six bulls and sixty-nine heifers thus housed have done very well, and there seems little doubt that the exercise and pure air have been great factors in keeping them in perfect health, as the herd is fully accredited. Care must, however, be taken that the sheds face south, that there are no cracks for draughts, that no weakling calf less than six months old, nor cow in milk be thus wintered. Bulls, dry cows, and all young stock over six months of age will do very well during the coldest weather in these cheap sheds. (Project A 266b.)

INFLUENCE OF FEED ON DAIRY-BRED CALVES AND HEIFERS

Is a superior or inferior cow born or made? This is the question put by some of the leading investigators. It was to help find an answer that the present project was started. It was thought that feed might have some influence on size, type, and production, but it is yet too early to give definite results. However, an experiment conducted with twins, to minimize the chance of error due to breeding, is interesting. One of them was well fed, produced 11,392 pounds of milk testing 5.75 during her first two periods of lactation, and qualified for Record of Performance; her sister was not well fed and only produced 3,767 pounds of milk testing 4.45 during her first two periods of lactation. Both were

weighed just previous to dropping the first calf; the well-fed one, though sixty-one days earlier, tipped the scales at 185 pounds more than her sister. This is only the result of one test and should by no means be taken as conclusive. (Project A 264.)

HORSES

On January 1, 1925, there were seventy-four pure-bred French-Canadian horses at St. Joachim, where experimental work in breeding, feeding, housing, and management is carried on under the direction of the Superintendent of the Cap Rouge Station. This stud is recognized as the best of the breed in existence to-day. At Three Rivers, the Quebec Regional, and Provincial Exhibitions, more diplomas and first prizes have been won by animals from this herd during the last three years than by French-Canadian horses owned by all other exhibitors combined.

BREEDING FRENCH-CANADIAN HORSES

A special horse-farm, located at St. Joachim, county of Montmorency, P.Q., is under the management of the Superintendent of the Cap Rouge Experimental Station. Only French-Canadians are kept there. At the beginning of 1925, there were eleven stallions over a year old, thirty-six mares, eleven fillies, and eighteen foals, a total of seventy-four. This horse-farm is the largest east of Manitoba, and was started by the united efforts of the Dominion Department of Agriculture, the Quebec Department of Agriculture, and the French-Canadian Horse Breeders' Association. Out of thirty-eight different strains used since 1912, only eighteen are left, the others having been discarded because the mares could not produce offspring as good as, or better than, themselves. The aim is to produce a horse of about 1,200 pounds in ordinary condition, full of life but docile, strong and wiry, a fast walker, and of good appearance. Such an animal is constantly in demand, and far-seeing farmers who commence now to breed it, on a scale commensurate with individual conditions, cannot lose money by doing so. (Project A 529.)

COMPARING IN-BREEDING, LINE-BREEDING, AND OUT-CROSSING IN HORSES

Davenport has well said that close breeding is the only certain way to pass from possibility to probability and from probability to certainty. But the man who uses this method must be careful not to bring together animals capable of transmitting common defects as well as good qualities. Out of thirty-eight strains of French-Canadian horses, only eighteen are left at St. Joachim after eleven years of breeding, and it is probable that out of these eighteen, only half a dozen or so will ultimately be kept to continue the work of improving the breed, because results to date have shown that better headway is made by in-breeding followed by line-breeding, than by out-crossing. Dorothée de Cap Rouge, Gem de Cap Rouge, Jeff de Cap Rouge, the product of three mares bred back to their own sons, have won first prizes and diplomas, as best of the breed at Three Rivers and Quebec Provincial Exhibition in strong competition. The rule should be to mate the best individuals together, irrespective of relationship, if both mare and sire have a very strong constitution and if they possess no defect in common. (Project A 334.)

COST OF REARING HORSES

To find out how much feed is required to rear a horse until ready to work, the rations fed to seven fillies and two colts were weighed from the time they were weaned, at about five months, until their average age was thirty-three

months and 9 days and their weight 1,265 pounds. It took 4,018 pounds of oats, 4,506 pounds of bran, 10,326 pounds of hay and about six months of pasture for each of these French-Canadian horses. If there had been more pasture, these figures might have been cut down about 20 per cent. These results show that it cost a good deal of money to rear horses. Only the best of breeding animals should be used and the largest part of the feed be grown on the farm if a profit is to be realized. The cost of raising should not discourage horse breeding, as tractors have now been on test long enough to make it clear that these machines will only be used on a small percentage of the farms of Canada. (Project A 294.)

COST OF MAINTAINING WORK HORSES

Horse labour is a more costly item than most farmers believe. According to careful records made at Cap Rouge, with horses averaging 1,320 pounds in weight and working 2,130 hours during the year, it took about 1½ pounds of hay and 2 pounds of concentrates (about 5 of oats to 1 of bran) per 100 pounds of live weight per day. This quantity of feed seems high, but it inevitably happens that some of it, especially hay, is wasted, and this must be taken into account. Besides feed, a farmer must calculate bedding, care, shoeing, veterinary expenses, harnessing, blanketing, stable supplies, also interest and depreciation, not only on the horses, but on stable room, harness, blankets, and other equipment. Notes on how to winter idle horses cheaply are given in a section following, but feed should not be stinted during the crop season. Two ways to lower the cost of horse labour are to employ the work stock profitably as many hours as possible during the year, and to keep only the minimum number of animals required. (Project A 331.)

WINTERING IDLE WORK HORSES

When a farmer has efficient work horses he does not care to sell in the autumn the surplus above his winter requirements, because he is not sure of getting equally good animals in the spring. This means that many idle work horses must be kept for a number of months at as low a cost as possible. An experiment conducted at Cap Rouge for five winters with mares and geldings from five to eighteen years of age, showed that the animals did well on one pound of mixed hay, one pound of oat straw, and one pound of carrots or swede turnips for each hundred pounds of their weight. Horses worked hard in the autumn must be brought up to their normal weight before changing the feed, and this should be done gradually over two weeks. In the spring, the same gradual change of feed must be made as work is slowly increased. Two meals a day are sufficient during winter, and if the horses are turned out for a short while on fine days, or every day when protected from the wind, they will be all the better. (Project A 299.)

REARING HORSES IN CHEAP SHEDS IN EASTERN CANADA

Since 1913, weanlings to seventeen-year-olds, have been wintered in cheap sheds at Cap Rouge and at St. Joachim. These sheds are single-boarded, and the front, facing south, is always open. During all these years, scarcely a dozen animals had to be brought in, and these only because of injury. It was found that the proportion of horses with colds was greater among the stabled ones than among those kept outside. All young stock are thus wintered, but all horses must be turned out not later than the beginning of September so that there will be enough time for the protecting coat of hair to grow. Weanlings thus housed can be fed to the limit, if early and full growth is wanted, without danger of getting them top heavy, and ruining their legs. Some maintain that it takes a great deal more feed to winter colts and fillies in this

way. In theory, this is correct, but it should not be forgotten that feed seems to be better digested and assimilated out-of-doors than in badly ventilated stables, so that the difference in feed cost may not be as great as generally thought. (Project A 330.)

WORK FOR PREGNANT BROOD MARES

That pregnant mares should get exercise of some kind seems to be admitted by all and experiments conducted both at Cap Rouge and at St. Joachim have shown that the mode of exercising is not important. If a farmer is careful, especially in backing, and works an in-foal mare reasonably, at regular intervals, this method of exercising will be found satisfactory. However, the man who cannot do this, need have no fear about horse breeding. This was shown by a mare who raised six strong foals after receiving various kinds of exercise: two winters, she was worked quietly all the time until foaling, two others she spent outside with only a single-boarded open-front shed for shelter; during two other winters she did no work but was kept in a box-stall and turned out often for exercise. At St. Joachim, during the last four winters, thirty-four in-foal mares were stabled whilst forty-nine others were kept outside, in sheds, as previously described, and there was no appreciable difference in the percentage of foals saved or in their strength. (Project A 332.)

REARING FALL FOALS

Eight French-Canadian foals have been dropped in the autumn by seven different mares since 1916. One died, one developed bad hocks, four grew to be among the best of the breed, whilst two are still sucking and doing well. Care must be taken that youngsters, especially those having good milking dams, do not get too fat, as legs are liable then to go wrong. To obviate this, the feed of the mare should be cut down and both mare and foal turned out for exercise when weather permits. The hoofs of weanlings grow fast on moist bedding and must be pared down occasionally. The advantages of fall foals are that they may be weaned in the spring, thus allowing the mother to do a full season's work. They can be well developed, because three out of the four grown to maturity weigh more than their full brothers or sisters which were dropped in the spring. One of the troubles is that mares are hard to "settle" in the fall, and that even if they do drop their young in November or December, they will probably run until the following spring before they can be got in foal again. (Project A 333.)

FIELD HUSBANDRY

FIELD CROP AREAS AND YIELDS

Every load of corn, swede turnips, oats, and hay grown on the Cap Rouge Station has been weighed during the last thirteen years, so that the production per acre is well known. On 195·66 acres, Longfellow corn averaged 17,656 pounds; on 53·83 acres, Good Luck swedes averaged 23,972 pounds; on 273·46 acres Banner oats averaged 1,671 pounds (grain); on 266·11 acres, timothy hay averaged 3,964 pounds; on 248·17 acres, clover hay averaged 3,970 pounds. The average yield of dry matter per acre, in pounds, was as follows: Longfellow corn 3,867; timothy hay, 3,504; clover hay, 6,458; Good Luck swedes, 2,613; Banner oats (grain only) 1,517. Most of the land on which these crops were grown is a sandy loam of better than average fertility and in good tilth.

COMPARISON OF CORN, SUNFLOWERS, AND PEAS AND OATS FOR SILAGE

The object of the experiment is to find out which of the three crops will produce dry matter, and possibly digestible nutrients, at the lowest cost per ton. Half an acre of each is grown annually, side by side, an accurate record of all expenses also of weight of raw material is kept, and samples sent to the Dominion Chemist for analysis. The experiment has only been conducted for three years, and it is too soon to give results. In the meantime, the safest thing for the average farmer is to grow corn, unless the soil of his farm is not of the right kind to produce a good crop.

PLANTING SILAGE CORN IN HILLS OR IN DRILLS

The object of the experiment was to find out which method of planting corn for silage, in drills or in hills, gives the most dry matter per acre. For five years, Longfellow corn has been sown in four different ways: in hills, 36 inches apart in all directions, in hills 42 inches apart in all directions, in drills 42 inches apart with plants singled out at 8 inches, in drills 48 inches apart with plants singled out at 8 inches. All the corn from 57.3 acres was weighed,

Experimental Station, Cap Rouge, Que. The draining machine at work. Drainage is very important but also very costly.

with the following results: drills 48 inches, 20,759 pounds per acre; drills 42 inches, 20,185; hills 36 inches, 12,402; hills 42 inches, 12,358. This shows that drills were much superior to hills as far as tonnage goes. The composition of the corn from the four different lots was practically the same, according to analyses made by the Dominion Chemist. This experiment was conducted on a mellow sandy loam, fairly free from weeds. On a heavier soil infested with weeds, it is probable that the hills would have given better satisfaction.

RATES OF SEEDING OATS

Banner oats were used for this experiment on a well-tilled sandy loam of good fertility. Thirteen different densities were compared, from 1 to 4 bushels per acre, going up by quarter bushels, over a five-year period, after which the sowings giving the lowest yields were gradually discarded until only five were

left at the end of eight years. The results show that, after deducting the quantity of seed used, the rate of 2½ bushels per acre gave the highest yield of grain per acre. It is well to remember, however, that these results apply to Banner oats on a well-tilled sandy loam of good fertility, as they might differ with another variety on another kind of soil.

YIELD OF CLOVER HAY SOWN WITH VARIOUS NURSE CROPS

The object of this trial was to find out which of the ordinary grains would be followed by the largest crop of clover hay. The experiment was conducted for eight years with 440 plots of 1/60 acre each, on a sandy loam of good fertility and in high tilth. The results show that the average crop of clover hay was at the rate of 5,377 pounds after barley, 5,232 after wheat, 4,994 after oats, 4,095 after peas. The conclusions are that while barley and wheat are better nurse crops than oats for clover, every person should decide for himself what nurse crops to use, according to the relative yielding power and value of barley, wheat, and oats on his own farm.

RATES OF SEEDING TIMOTHY, RED CLOVER, AND ALSIKE

For nine years, 186 plots of 1/60 acre each have been used for this experiment, with Banner oats as a nurse crop, on a sandy loam of better than average fertility and in good tilth. On half the number of plots, 8 pounds of timothy, 12 of red clover, and 2 of alsike were sown per acre, while on the remainder of the plots, half of these quantities were used. The results show that the following crop of clover hay was not quite 8 per cent more for the heavy than for the thin seeding. At prices paid, the extra seed cost $2.81, so that the extra 314 pounds of hay would have had to sell at the rate of $17.90 per ton at the Farm, to pay for it. The conclusions are that on well-tilled and manured soil, it is not necessary to sow as much seed as generally advocated, but that on badly worked or poor land, the cost of an extra quantity of seed is probably a low premium to pay for the assurance of a better crop of hay.

HORTICULTURE

FRUITS

APPLE VARIETIES AND BREEDING

Since 1911, over 200 different varieties have been tested and there are only 86 left in the orchard, comprising 777 trees, at the end of 1924. Farmers of central Quebec should grow only a few hardy varieties producing fine-looking fruit of very good quality. As a general rule, 5 per cent of summer varieties, 10 per cent of autumn, 35 per cent of early winter, and 50 per cent of winter is a good proportion. Of the summer varieties, Rupert, a C.E.F. seedling, is the earliest, followed by Yellow Transparent; both of these are yellow whilst Lowland Raspberry is red. For autumn, Duchess is an old stand-by, but Okabena is a heavier yielder; Petrel, a C.E.F. seedling, has poor colour but very high quality. For early winter, Wealthy is hard to beat, but there are also two splendid C.E.F. seedlings, Joyce and Pedro. For winter, Fameuse and McIntosh cannot be surpassed, whilst Walton, a C.E.F. seedling, extends the season somewhat. (Project H 33.)

Over three hundred seedlings of Duchess, Fameuse, Milwaukee, Okabena, Wealthy, and Yellow Transparent have been grown since 1914, but not one of them was found of sufficient merit to be kept. (Project H 22.)

APPLE COVER-CROP EXPERIMENT

An orchard of over 350 trees, McIntoshes, with Wealthys as fillers, was planted in 1913 and 1914. Since that time, six different cover-crops have been compared: red clover sown every year, vetches sown every year, rape sown every year, clover followed by rape in a two-year rotation, permanent sod (hay taken away), and permanent sod (hay used as a mulch around trees).

It is yet too early to give figures for the McIntoshes, but it seems clear that, for the first ten years, Wealthys make a stronger growth with some kind of a cover-crop than with sod, as the average circumference of the trees, two feet from the ground, was 10.39 inches in the first case and only 8.94 inches in the other. The difference in the yield of fruit is very large, as the trees where a cover-crop was grown produced four times more fruit than those in sod. The question of what kind of a cover-crop is best will, of course, depend on many things, and a few years more are necessary before reliable conclusions can be reached. (Project H 26.)

COST OF ESTABLISHING APPLE ORCHARD

In 1913 and 1914, 378 trees, McIntosh with Wealthy as fillers, were planted 17½ feet apart in all directions. All expenses in connection with them were entered but, unfortunately, the records were burned in the autumn of 1921. Figures are, however, available for 1922, 1923, and 1924, when the expenditures were respectively $97.96, $128.92, $158.16, or a total of $385.04, for manual and horse labour, trees, seeds of cover-crops, insecticides and fungicides, etc. This was an average of about 34 cents per tree per year, not counting rent of land or use of machinery. In 1924, with $158.16 of expenses, there was a crop of 103 barrels of apples. (Project H 30.)

CHERRY VARIETY EXPERIMENT

Since 1911, 168 cherry trees of nineteen varieties have been planted and careful notes taken regarding hardiness, yield, size, colour, and quality of fruit.

The results show that sweet cherries are not hardy enough for central Quebec. Amongst the sour, for commercial purposes, Montmorency Large is possibly the best, followed closely by Griotte Morello and Griotte d'Ostheim. If hardiness and yield are prime requisites, rather than quality and size of fruit, Fouche Morello should be grown. For quality of fruit, nothing beats Vladimir, but it is rather small and very dark, like some of the choke cherries. Contrary to expectations, Early Richmond has been a disappointment. (Project H 35.)

BLACK CURRANT VARIETY EXPERIMENT

In 1911 and 1912, sixteen varieties of black currants were planted on very uniform-looking soil, and in 1924, the following had been pulled out because they were inferior in some respects to others which were kept: Black Champion, Clipper, Collins Prolific, Eagle, Eclipse, Kerry, Lee Prolific, Magnus, Ontario, Success, Topsy, Victoria Black.

Of the four varieties kept, Climax, Saunders, Buddenborg, Boskoop Giant, the first has shown decided superiority of yield, the average number of pounds of fruit per bush, for eleven years, being 5.84, which is at the rate of 8,478 pounds per acre. (Project H 397.)

BLACK CURRANT BREEDING

The object of this breeding work is to produce superior strains by selection from old sorts. After variety tests had shown that Climax was the heaviest yielder, seedlings were grown, also cuttings from the bushes which had shown up to be the best, so that in the new 1921 plantation, six strains were represented.

The results only take in the yields of two years, but they show two strains of Climax ahead of Boskoop Giant, Buddenborg, and Saunders, the only ones which survived the tests after eleven years' trial. (Project H 396.)

RED CURRANT VARIETY EXPERIMENT

In 1911 and 1912, twelve varieties of red currants were planted, and in 1924 the following had been discarded because they were inferior in some respect to others which were kept: Cumberland, Greenfield, Perfection, Pomona, Rankin Red, Red Dutch, Red Grape, Victoria, Wilder.

Of the three varieties kept, Fay (sometimes called Fay Prolific) is recommended. Cherry is a low yielder that has a very large fruit for a discriminating market. The average production of Fay, for eleven years, is 7.55 pounds per bush, or at the rate of 10,967 pounds per acre. (Project H 399.)

RED CURRANT BREEDING

The first thing accomplished was determining which was the best variety in the trial plots, and Fay (also called Fay Prolific) had this distinction. Out of the seedlings grown from it, not one was of sufficient merit to keep. In 1920, cuttings were made from each of the five bushes which had been on test since 1911, and four of each were put in the new plantation of 1921.

The results are only for the cropping years of 1923 and 1924, but every one of the five strains of Fay is ahead of Cherry and of Red Cross, the only other two varieties deemed worthy, after a test of eleven years, to be compared with them. There are very wide differences between strains, and it will be interesting to see if the best ones come from the highest yielders amongst the mother plants. (Project H 398.)

WHITE CURRANT VARIETIES AND BREEDING

In 1911, three varieties of white currants were put in the test plots, on a uniform-looking piece of ground, and after nine crops, in 1921, Large White was pulled out because it was a low yielder.

Of the two kept, White Cherry is the heaviest producer of fruit, but this is more than counterbalanced by the better quality of White Grape. To compare them with the blacks and reds, it may be said that for an average of eleven years, the yield of fruit for White Cherry was 4.08 pounds per bush, or at a rate of 5,935 pounds per acre, while White Grape produced 5,359 pounds. (Project H 401.)

In 1916, after it was found out that White Grape, though only the second highest yielder, was of such high quality that it should be recommended, fifty seedlings were grown.

Unfortunately, none were an improvement over the mother variety, so that by 1924 all of them had been discarded. (Project H 400.)

GOOSEBERRY VARIETY EXPERIMENT

In 1911 and 1912, twelve varieties of gooseberries were put in the trial plots, and in 1924, the following had been discarded: Gibb, Industry, Rideau and Saunders because of poor yield; Houghton because the fruit is too small and the bush has too many thorns; Josselyn because it closely resembled Red Jacket, which was kept; Queen Anne because its fruit was somewhat small and of a poor colour, yellow.

Of the varieties kept, Red Jacket is the heaviest yielder, with an average, for eleven years, of 11.16 pounds per bush, which is at the rate of 16,194 pounds per acre. Silvia, though only producing 15,461 pounds, is strongly recommended, because it has not nearly so many thorns on the bush and the fruit is larger and equally well coloured, red. (Project H 6.)

GOOSEBERRY BREEDING

When it was shown by variety tests that Silvia should be recommended, seedlings and cuttings were grown to isolate, if possible, one or more strains better than the mother bushes.

In the 1921 new plantation, five strains of Silvia were put in alongside of the best of the varieties, as found out by eleven years of careful testing, also three new varieties very much advocated. There are records for only two years, but two of the strains of Silvia are ahead. (Project H 5.)

GRAPE VARIETY EXPERIMENTS

Thirty-three varieties of grapes have been tested since 1912, and it is clear that the season of Central Quebec is too short to grow this fruit commercially, as twenty-five have been discarded either because they were too late or the quality not good enough.

Out of the eight which are still in the trial plots, three may be recommended for home use: Daisy, black, not quite as early as the two next, of good to very good quality, heavy bearer; Wyoming, red, earlier than Daisy, of medium quality, intermediate as a producer; Winchell (also called Green Mountain), green, the earliest of the three, better quality than the other two, rather poor yielder. The last mentioned is the most suitable for Central Quebec. (Project H 40.)

PEAR—VARIETY EXPERIMENT

Only four trees were living in 1924 of the fifty planted between 1911 and 1922, and none had produced a single marketable fruit, though ten varieties, six standards and four dwarfs, were tested.

It seems evident that pear culture should not be encouraged in Central Quebec, even for home use. If amateurs wish to try them, they can get either Clapp Favorite or Flemish Beauty, and the dwarfs would be the more likely to succeed. (Project H 44.)

PLUM—VARIETY EXPERIMENT

During the last thirteen years, 267 plum trees of forty-eight varieties were tested for hardiness and yield, also for colour, size, appearance, and quality of fruit. Though the Americana group might be recommended for inland localities, say fifteen to thirty miles from the St. Lawrence river, it seems better to grow the Europeans wherever there is an abundance of moisture in the air.

For the inland localities, probably Aitkin, Bixby, Brackett, Cheney, Mankato, and Omaha would do well. At Cap Rouge, which is near the river, the following have given very good satisfaction: Bonne Sainte Anne, blue, very hardy, large, fine quality, heavy yielder; Montmorency, yellow, hardy, medium size, good quality, heavy yielder, splendid for canning; Quackenboss, blue, very hardy, very large, good quality, very heavy yielder. Twelve years after planting, the average production per tree, for one season, was as follows: Bonne Sainte Anne, 19.12 gallons; Montmorency, 13.06 gallons; Quackenboss, 27.00 gallons. (Project H 48.)

RASPBERRY—BREEDING AND VARIETY EXPERIMENT

During the last twelve years, seventeen varieties of raspberries have been tested. Columbian, of the hybrid type or purple cane family, has been the heaviest yielder, but its fruit is very dark and it is only recommended for canning. Of the regular red raspberries, the two which have shown up best are Brighton and Newman Seedling No. 23. The first mentioned is the highest producer of its category, very early, firm for shipping, and has the advantage of

remaining for sometime on the cane after it is ready to pick. The Newman yields a little less than the Brighton, is about three days later, fairly firm for shipping, but the fruit falls off a couple of days after it is ripe, which is quite a disadvantage for the commercial grower. The old Cuthbert may now be classed among the discards, as its average production per acre, for twelve years, was only 1,203 pounds, while Brighton yielded 2,469 pounds. (Project H 11.)

Out of some five hundred seedlings of Herbert and King produced over a five-year period, from 1914 to 1918 inclusive, only one of Herbert has been found good enough to be propagated and it will go in the trial plots in 1925. (Project H 8.)

STRAWBERRY—VARIETY EXPERIMENT

Forty-one varieties and strains of strawberries have been tested since 1914 and twenty-five of them were left aside for poor yielding, because of the fruit being too small or not coloured enough, or being imperfect while other perfect varieties possessed all their qualities.

Leaving aside the imperfect varieties, which are often the cause of poor results, Valeria, a seedling from the Central Experimental Farm, Ottawa, is the highest yielder, but the fruit is not coloured enough and is too small for a commercial variety. The next heaviest producer is Dunlap (also called Senator Dunlap) which is strongly recommended for Central Quebec. If a very early berry is wanted, Excelsior is the best, though its quality is poor. (Project H 21.)

STRAWBERRY—BREEDING

Out of over 500 seedlings of Dunlap, Glen Mary, Uncle Jim, and more than 100 runner-set plants from splendid individuals, all of which were grown during the past few years, only some thirty looked promising at first, and the number was later cut to five, which were put in the trial plots with the 1920 plantation.

None from Uncle Jim were good enough to keep. There are three from Dunlap, all of them producing less than the parent, but one of which has very good quality. One of the two from Glen Mary, No. 410, has proved, during three years, to be a higher yielder than the parent variety, also better than Dunlap, and has a bright future. If it continues to show up well for at least two more seasons, it will probably be named and offered for sale. (Project H 13.)

STRAWBERRY—HILL SYSTEM VERSUS MATTED ROW

The object of this experiment is to compare different methods of planting strawberries. The variety used was Dunlap, on a well-fertilized sandy loam. The results are only for three cropping seasons and this writing should only be considered as a progress report. There was a tendency for the fruit to mature a little earlier in the hills, the average difference being two days, but the yield per plant was 22 per cent heavier in the matted rows. (Project H 16.)

ORNAMENTAL PLANTS

ANNUALS

Hundreds of varieties and strains of annual flowering plants have been tested since 1911, and there were 165 in 1924. Out of those grown from seed, between twenty and twenty-five can be recommended. The ones requiring to be started inside are herewith given by season of bloom and alphabetically rather than by merit: petunia, schizanthus, snapdragon, zinnia, for early summer; aster (China), phlox, stock, for middle summer; cosmos for fall. Following is the same information for those which can be sown outside; alyssum, clarkia, mignonette, poppy, sweet pea, for early summer; calendula, coreopsis, cornflower, helichrysum (everlasting), nasturtium, nigella, for middle summer; blue-lace flower, larkspur, for fall. (Project H 261.)

HERBACEOUS PERENNIALS

Hundreds of varieties and strains of herbaceous perennials have been tested during the past twelve years, and details were given about some of the best in the 1921 report from this Station. For a continuity of bloom over all the season, a choice could be made amongst the following standard sorts, the month referring to the period when the plants commence to flower: April, chionodoxa, crocus, scilla; May, pansy, narcissus, forget-me-not; June, Aquilegia, bleeding heart, lupine, iris, paeony; July, sweet william, delphinium, lilium, digitalis; August, hollyhock, globe-thistle, golden glow; September, hardy phlox, sedum, lilium auratum, hardy aster. (Project H 274.)

TREES AND SHRUBS, ORNAMENTAL AND SHELTER

Hundred of trees and shrubs, both deciduous and conifers, have been tested over a period of thirteen years. Among the deciduous trees, the following can be recommended: Cornelian Cherry (*cornus mascula*), Cut-leaved Maple (Wier), False Indigo (*Amorpha fruticosa*), Norway Maple, Rose Acacia (*Robinia hispida rosea*), Weeping Birch, Western Catalpa. In shrubs, the ones hereafter named are good: Holly-leaved Barberry (*Berberis aquifolium*), Honeysuckle (*Tartarican*), Hydrangea (Large-flowered), Lilac (Charles X, also Michel Buchner), Mock-Orange (Bouquet Blanc), Neillia *opulifolia aurea*, Snowball, *Potentilla fruticosa*, Spiraea (Van Houtte). Pretty conifers are Colorado Blue Spruce, Plumed Japan Cypress, Pyramidal Arbor Vitae. The above are given by alphabetical order rather than by merit. (Project H 307.)

HEDGES

Fourteen different kinds of hedges have been tried since 1912. For reasons hard to understand, White Spruce and White Pine have not done well. Irish Juniper did not prove hardy enough, Siberian Dogwood is badly subject to the attacks of kermes, and Alder Buckthorn, Josika Lilac, Amur Lilac, Cockspur Thorn have not enough bottom growth. Among the best deciduous kinds are Siberian Pea Tree, Thunberg Barberry, Wayfaring Tree, whilst American Arbor Vitae, Colorado Blue Spruce, and Norway Spruce were found the most suitable of the conifers. (Project H 298.)

LAWN—WEED CONTROL

The object of the experiment is to compare methods of destroying dandelions on lawns. A solution containing 25 per cent of iron sulphate in water is sprayed over the infested area at intervals of two weeks during the growing season. Pot 1 receives six applications, plot 2 four, and plot 3 none. This was started in 1923 and continued in 1924. Results are very promising, as the unsprayed plot showed a large number of dandelions, the plot sprayed four times a few at the end of the season, whilst there was not one on the plot sprayed six times. The sprayings did not at all affect the lawn and only the dandelions seemed to have been killed. (Project H 293.)

SIDNEY, B.C., BULBS VERSUS HOLLAND-GROWN

The object is to compare bulbs grown in Sidney, British Columbia, with others of the same variety imported from Holland. The experiment has only been carried out one year, with Duchesse de Parma tulips. No difference could be seen in the size nor in the appearance of the bulbs themselves, when they arrived, nor in the number, the height, or vigour of the plants grown in 1923. The intensity of colour of the flowers was about the same, but the size of those from the British Columbia bulbs was fully 25 per cent larger than from the Holland bulbs. Though the results of one year do not mean much, still there is a possibility that tulip bulbs may profitably be grown in some parts of Canada. (Project H 265.)

GLADIOLUS—VARIETY EXPERIMENT

Since 1916, thirty-nine varieties have been tested and twenty-nine of them remained on the trial grounds in 1924. The following would make a nice assortment of colours: Mrs. Francis King, scarlet; Prince of Wales, salmon; America, rosy lavender; Mrs. Frank Pendelton, jr., light pink to white, with red blotch; Niagara, cream and red. To these might be added Lady Byng of Vimy, a primulinus, of a nice shell-pink tint. If only one variety is required, Prince of Wales is probably the prettiest of all. (Project H 272.)

HYACINTH VARIETY EXPERIMENT

Twenty varieties of hyacinths have been tested since 1913 in the greenhouse. La Grandesse, white; King of the Blues, blue; Yellow Hammer, yellow; Moreno, pink; La Victoire, carmine; Gounot, porcelain blue, make as good a combination as any, with the preference for the first two mentioned when only a limited number can be grown. Hyacinths, in our cold climate, require much protection for the winter, and are not always a success outside. (Project H 275.)

IRIS VARIETY EXPERIMENT

Twenty-six varieties of iris have been tested during the last nine years. The choice of all of them is Kharput, ultramarine, with very large flowers. Coquette looks very much like an orchid. Other good ones are Madame Chereau, white and blue; Lord Seymour, lilac blue; Innocenza, ivory; Darius, yellow, orange, and lilac. (Project H 276.)

NARCISSUS VARIETY EXPERIMENT

Since 1916, nineteen varieties have been tested. The doubles are useless to sell as cut flowers, but may be used in pots, indoors, and as an ornamental flower in the garden; of these, Van Sion, yellow, is the best. Amongst the singles, there are good cluster-flowered ones such as Paper White Grandiflora, white, and Chinese Sacred Lily, white and yellow. The latter, which is a narcissus and not a lily, does very well when grown in water, inside. Then, there are the single-flowered ones, amongst which very pretty varieties are King Alfred, dark yellow; Emperor, yellow; Empress, and Victoria, both white and yellow. Of all the above, King Alfred is no doubt the choice. (Project H 278.)

GROWING NARCISSI COMMERCIALLY

The object of this trial to see if it is a paying proposition for farmers living within reasonable distance of a city to grow narcissi commercially. The project was started in the autumn of 1920 with one hundred bulbs of Victoria, planted eighteen inches apart in all directions.

The results of four years show a net profit of $20.55 on an area of about $\frac{1}{200}$ acre, as the 900 cut flowers could have been sold to retailers for $35.45 whilst the total expenditure was $14.90 for bulbs, manure, and manual labour. (Project H 392.)

PAEONY VARIETY EXPERIMENT

Forty-six varieties have been on test since 1916. Rubra, semi-double, dark crimson, stands by itself for earliness, but this is its only merit. If extra large flowers are wanted, Madame Geisler, double, dark pink, just fills the bill. Amongst the best are Festiva Maxima, double, white; Vierge Marie, semi-double, white; Marie Stuart, semi-double, white to light pink; La Tulipe, semi-double, pink; Emile Galle, also Auguste Dessert, double, pink; Félix Crousse, semi-double, carmine-Red. A very pretty one is Couronne d'Or, semi-double, white with yellow centre. (Project H 280.)

ROSES VARIETY EXPERIMENT

The main object is to find out the varieties or strains which will be hardy enough to withstand the rigours of winter in Central Quebec. Since 1911, 182 bushes of fifty-six varieties were planted so that a very good test has been made.

The Rugosas and their hybrids have, of course, shown themselves the hardiest, but they are not, as a rule, found as pretty as the doubles, because they have few petals, which fall quite soon after blooming. Amongst the others, only about 10 per cent have been hardy, and three varieties have shown decided superiority: Frau Karl Druschki, white, blooms continuously from June to first frosts, has long stems and keeps well in water when cut; Gruss an Teplitz, fine velvety red, very attractive bush, blooms same as the preceding, but flowers do not keep long after cut; Jules Margottin, pink, gives as many flowers as the two others, but bloom is of shorter duration. (Project H 302.)

SWEET PEA VARIETY EXPERIMENT

Since 1911, 195 varieties and strains of sweet peas have been tested. There were sixty in the trial plots, in 1924. The following are amongst the best for their respective colour: King White, white; Matchless, cream; Sapphire, blue; King Mauve, mauve; Radiance, also Daisybird, light pink; Chevalier, dark pink; Wonderful, scarlet; New Crimson King, carmine; Fordhook Orange, orange. If only a few are required, Sapphire, Radiance, and King White could be grown, with the merit in the order named. For something out of the ordinary, Helen Pierce, marbled, is hard to beat. (Project H 287.)

TULIP VARIETY EXPERIMENT

Sixty-five varieties of tulips have been tested since 1916, from the four groups, single early, single late, double early, and Darwin. In Central Quebec, the single early and the double early would do well for bedding, the double late for pot culture, and the Darwins for commerce as cut flowers. Cottage Maid (rose and white), Duchesse de Parma (red and yellow), Pottebakker Scarlet (scarlet), Pottebakker White (white) are the best of the single earlies. Picotee (white and rose), La Merveille (orange red) are the choice amongst the late singles. Couronne d'Or (yellow), Farncombe Sanders (rosy red), Imperator rubrorum (bright scarlet), Murillo (light rose) are fine in double earlies. Clara Butt (salmon rose), Rvd Ewbank (soft lavender violet), Pride of Haarlem (rosy carmine) are splendid Darwins. (Project H 290.)

TULIPS, COMMERCIAL GROWING

The object is to find out if a plantation of tulips will pay, selling cut flowers. In 1923, fifty bulbs each of Pride of Haarlam, Rvd Ewbank, Clara Butt, Baronne de la Tonnaye were put in, and all expenditure and revenue will be carefully recorded.

The results of only one year do not mean much, but the cut flowers could have been sold in 1924 for $11.16 whilst all the expenses to date, including cost of bulbs, manure, manual labour were $7.40. However, this is recommended only to persons living near cities and who sell produce there, as it would usually not pay to make special trips to market with limited quantity of cut flowers. (Project H 427.)

VEGETABLES

PRELIMINARY TESTING OF VARIETIES AND STRAINS

Varieties or strains either new, widely advertised, or of probable merit are tested in a small way in the nursery alongside of varieties recommended for the district, and everything is discarded the first season if it has obvious

defects. If promising, it is kept under observation for a year or two more, before being sent to the test plots where it has to remain at least five seasons before being definitely recommended or discarded. In 1923, twenty-seven strains or varieties were kept for future observation out of fifty-four tested, which means that just half of them were absolutely of no use for this district. From these twenty-seven, fourteen will be placed in the nursery in 1925, to decide finally how many of them will be sent to the trial plots in 1926. (Project H 393.)

FALL SEEDING VERSUS SPRING SEEDING

This work was commenced in the autumn of 1923 with beets, cabbage, carrots, lettuce, onions, radishes, and turnips which were sown on November 13. The next spring, seed from the same packages was put in on May 14. It is, of course, too early to give results, but it may be said that the spring-sown lot was very much superior to the other. (Project H 218.)

ASPARAGUS VARIETY EXPERIMENT

The object is to try the most promising varieties or strains in comparative tests. Seed was sown in 1913, plants put in during the spring of 1914, and the first crop harvested in 1916.

Eclipse, also called Dreer's Eclipse, Philadelphia Mammoth, sometimes named Barr's Philadelphia Mammoth, Palmetto, Connover Colossal, Columbian Mammoth White, Batavian, Argenteuil have been dropped because they were poor yielders. The varieties continued in the test are Donald Elmira (Dreer), Mammoth Emperor (or Mammoth), Donald Elmira (Johnson), Reading Giant, with the first mentioned producing over 24 per cent more than the next. Donald Elmira (Dreer) is recommended, especially the Cap Rouge selection (See next section). (Project H 54.)

ASPARAGUS BREEDING

The object is to produce superior strains by selection from old sorts. From 1913 to 1919, eleven varieties and strains were compared and Donald Elmira (Dreer) was found to be the heaviest yielder. Then the crop was weighed separately and the sex taken for each of the plants of this strain; afterwards, only the highest yielding male plant and the highest yielding female plant were allowed to bloom, so that the seed produced came from the best plants of the best variety.

This selection was put in alongside of Washington, now the most famed variety of asparagus in the United States, and has yielded for the same number of clumps, 32 per cent more in total pounds of marketable material. Washington, however, has larger spikes. (Project H 52.)

ASPARAGUS—DISTANCES OF PLANTING

The object is to find out at what distances it is best to set plants in an asparagus bed. One lot is planted 18 inches apart in all directions, another 24 inches, and still another 36 inches.

The results of five tests show that the yield per acre of marketable tips is higher when roots have been put in every 24 inches in rows 24 inches apart. With the plants set 18 inches apart in all directions, growth was checked, as for each pound produced per clump, there was 2.04 for the lot planted every 24 inches, and 2.97 for the lot planted every 36 inches. On the other hand, spacing every 3 feet lost too much ground, in proportion to the extra weight per clump. (Project H 53.)

GARDEN BEAN VARIETY TEST

Seventy-one varieties and strains of garden beans have been tested since 1911, and only ten judged worthy of being kept in the trial plots during 1924. The others were discarded for one or more of the following reasons: low yield, late, not attractive enough, poor quality, subject to disease, costly to grow. All the "limas" were left aside as being too late, and the "poles," because the stakes brought up the cost of growing. One desideratum is freedom from disease, which is the important factor governing yield, and care should be taken that not only seed but pods are free from blotches. Amongst the "bush," there are wax-podded and green-podded. Of the first mentioned, Pencil Pod is early, attractive, and the choice of all garden beans tested at Cap Rouge; Hodson Wax is a heavier yielder but is late and the pods are too large. Of the second-mentioned kinds, Stringless Green Pod is early and possibly has the best quality of all; Refugee, or 1,000 to 1, is late, but, as generally happens, produces more. (Project H 61.)

BREEDING GARDEN BEANS FOR YIELD

From 1911 to 1919, sixty-six varieties and strains of garden beans were tested with the result that Pencil Pod was found to be the best. Selections were made since then and there are now two left which will be compared with the mother variety for at least five years; after this one will be recommended and offered for sale, if it has sufficient merit. Between the highest and lowest-yielding strains, there were differences of 76 per cent in 1920, 89 per cent in 1921, 30 per cent in 1922, 21 per cent in 1923. (Project H 56.)

EXTENDING THE GARDEN BEAN SEASON

Garden beans are gaining in popularity and the grower has found that there is a demand for a much longer period than the length of time—generally about ten days—during which most varieties have pods well formed but still green. This experiment was started in 1915, and continued over five seasons, to compare the yield, also the length of time when marketable, of one variety, sown at four intervals of about a week, with that of four varieties of different seasons, sown the same day. There was only a difference of 5 per cent in the yield, which is negligible, in favour of the four varieties, but they produced marketable beans during an average of forty-nine days compared with forty-five days for the one variety sown at four intervals of about a week. If only one variety is used, it should be an early one, such as Pencil Pod; four varieties which would give good satisfaction if sown the same day, would be Pencil Pod, Stringless Green Pod, Early Red Valentine, and Refugee. (Project H 57.)

GARDEN BEET VARIETY EXPERIMENT

For highest yield, the choice of a variety depends on how deep a soil can be made rich and friable. Where it is shallow, the flats and globes only should be used, while as it gets deeper, the oval, turnip-shaped, tankard, half-long, and long have their places. At Cap Rouge, on a rather shallow sandy loam, Eclipse has been the heaviest producer, at the rate of 51,836 pounds per acre, for an average of eight years. This variety is thus recommended when yield is the main consideration. But quality and appearance count for a great deal in vegetables, and this is why Black Red Ball is the most popular on the Quebec market. Its yield, however, for the same test seasons as Eclipse, was only at the rate of 29,346 pounds per acre. (Project H 68.)

BREEDING GARDEN BEETS FOR TRUENESS TO TYPE

Since 1915, six careful selections of roots have been made of the Black Red Ball table beet for trueness to type, but also for dark colour of flesh,

which is an important market requirement. This variety is not the highest yielder at Cap Rouge, but it is very popular and can easily be sold when others, like Eclipse which produces more heavily, go begging for buyers. Seed of the Cap Rouge selection is now for sale in limited quantities. (Project H 64.)

GARDEN BEET THINNING EXPERIMENT

During five seasons, garden beets sown the same day were later on thinned respectively to 2, 3 and 4 inches in the row. The yields of roots per acre were at the rate of 36,221 pounds, 36,730 pounds, 30,899 pounds, so that, as for most other table vegetables, it is wasteful to give too much space. (Project H 67.)

CABBAGE VARIETY EXPERIMENT

The Savoy and Red cabbages are not very popular in the district, so that they may be left out of consideration. Among the others, as a general rule, the earliest are those which yield the least, the production per acre going up as the time required to be ready for use lengthens. The ones found best at Cap Rouge, after thirteen years of careful testing, are Jersey Wakefield, very early; Copenhagen Market, early; Succession, midseason; Danish Roundhead, late. The list may be cut down to two, for all practical purposes: Copenhagen Market, to sell before storing, and Danish Roundhead, to market until late spring. (Project H 77.)

BREEDING CABBAGE FOR TRUENESS TO TYPE

The original seed came from Hartmann, in the spring of 1915, and was of the Danish Roundhead variety. Since then, twelve cullings have been made, six in the autumn and six in the spring, so that not only type but keeping qualities have been improved. It happened that the type chosen is a good yielder, as the Cap Rouge selection is sometimes at the top of all varieties and strains for yield, and never far down. A limited quantity of seed is offered for sale. (Project H 71.)

PROTECTING CABBAGE FROM ROOT MAGGOTS

For five years, an experiment has been made comparing tar-paper disks with cheese-cloth covers as a protection for cabbage plants against root maggots. For every pound of crop from the unprotected plants there was 1.15 from the ones protected by tar paper disks, and 1.48 from the ones protected by cheese-cloth covers. The latter were very effective but as they cost more than the surplus crop was worth, they were left aside as not practical commercially. Since 1921, tar-paper disks have been compared with bichloride of mercury and it is expected that, after one or two more tests, definite information can be given upon the merits of the two. In the meantime, it is recognized that no risk should be run and some treatment given. (Project H 75.)

GARDEN CARROT VARIETY EXPERIMENT

Since 1911, twenty strains and varieties of garden carrots have been tested of the three different classes, long, half long, and short. When heavy production alone is taken into consideration, Hutchinson (long) is at the top; for general popularity, Chantenay (half long) beats them all, and is the one recommended; for forcing or a very early crop, Guérande, sometimes called Oxheart (short) is just the thing. The respective yields in pounds per acre for the above three named varieties, for an average of six years, were 47,747, 43,100, 36,421; this was on a well-manured and tilled sandy-loam. (Project H 83.)

BREEDING CARROT FOR TRUENESS TO TYPE

This work was started ten years ago and five good cullings of roots made since then, so that the crop is now commencing to show uniformity. The variety is Chantenay, because it is the best seller on the markets of the district. It is expected that in four or five years seed can be offered for sale of this strain. (Project H 78.)

CARROT THINNING EXPERIMENT

An experiment was conducted for five seasons, with Chantenay, on a well-manured and tilled sandy loam, to see at what distance garden carrots should be thinned growing in rows 30 inches apart. The average yield was at the rate of 25,178 pounds per acre when the roots were thinned to 1 inch; 24,192 pounds at 2 inches, and 23,067 pounds at 3 inches. These figures show that the yield decreased as the space between plants increased. (Project H 82.)

CAULIFLOWER VARIETY EXPERIMENT

There is practically only one type of cauliflower, the Erfurt, with two main groups, the early and the late. As lack of moisture and high temperatures cause heads to "bolt" or "button", the strains used must be either very early or late, so as to escape the heat of midsummer. An average of seven years shows that late so-called varieties such as Algiers, produce more and larger marketable heads than an early sort such as Snowball. Farmers could probably just as well leave cauliflowers alone, except for home use; ordinary truckers might only grow the late kinds; whilst the expert market gardener alone can afford to run risks with such a fickle crop as early cauliflower. (Project H 88.)

PROTECTING CAULIFLOWER FROM ROOT MAGGOT

Eight tests were made during four different seasons to see if cauliflower plants should be protected against root maggots and, by what method. The results show that some kind of protection gives a larger number of pounds of marketable heads per acre, the average yields being at the rate of 7,577 for the unprotected lot, 8,416 for the lot protected with tar-paper disks, and 8,985 for the lot protected with cheesecloth covers. As to the best of these two methods of protection, the reader is referred to the section describing the protection of cabbage against the root maggot. (Project H 86.)

CAULIFLOWER PROTECTION FROM WEATHER

For a vegetable like cauliflower, especially as long as it is sold by the head and not by weight, appearance is the greatest factor in influencing price. This is why, in 1923, representative samples were sent to three of the best retailers in Quebec City from four lots, the first of which had had no protection against the weather, the second, leaves broken over the head, the third, leaves held over the head with toothpicks, and the fourth, leaves tied over the head with twine. Every one of the merchants gave the preference to the lot which had leaves broken over the head for protection. The results of six years' tests, with Snowball, give the following percentage of marketable heads: leaves tied over head, 37; not protected, 42; leaves held with toothpicks, 44; leaves broken over head, 45. The last method would thus seem to be the most profitable. (Project H 87.)

CELERY VARIETY EXPERIMENT

Thirteen varieties and strains of celery have been tested since 1911, with the result that only three can be recommended: White Plume, very early and attractive; Golden Self Blanching, somewhat later; Giant Pascal, green, the best

keeper, but not so popular. The average yields per acre for these, in the order named, has been 17,501 pounds, 19,622 pounds, and 27,548 pounds. But weight is a second consideration in celery, and Giant Pascal, on account of its greenish colour, could not bring more than 75 per cent of the price of the others, bunch for bunch, in the Quebec market, though it is really of better quality. (Project H 94.)

BREEDING CELERY FOR TRUENESS OF TYPE

Attempts have been made to winter celery in pits, outside, for seed production, but they failed. When a well-ventilated cellar was built under the Horticultural Barn, it was thought that better results would be had, but no plant could be kept until spring which was vigorous enough to produce good seed. It is possible that by sowing late, better results could be had, but it is a question, even then, if celery produced from such seed would be of very good quality. Celery seed production is not recommended for central Quebec. (Project H 89.)

CELERY BLANCHING EXPERIMENT

Three methods of blanching celery, Paris Golden Yellow and Golden Self Blanching, have been compared for eight seasons. For every pound of crop from the lot banked with soil, there was only 0·86 of a pound for the lot banked with boards, and 0·84 of a pound for the lot banked with paper. To find out how the different methods influenced quality, samples of each were sent to three of the best retailers in Quebec City. Every one of them gave the preference to the lot banked with soil and placed on it a value of about 25 per cent more than the others. This would show that banking with soil has advantages over banking either with boards or with heavy roofing paper. (Project H 90.)

SWEET CORN VARIETY EXPERIMENT

Over eighty varieties and strains of sweet corn have been tested during the past thirteen years, and the most of them discarded because of their being too late, low yielders, or of poor quality. To get early on the market, there has been a tendency to use varieties of poor quality, such as Adams; but this is a mistake, when sweet varieties such as Malcolm and the Cap Rouge selection of Malakoff are ready to use from five to ten days before and produce more ears per acre. These two are strongly recommended for central Quebec where, on an average, they will be ready for use about ninety days after sowing; and if four or five seeds are planted in hills thirty-six inches apart, on good soil, the yield will probably be at the rate of at least 20,000 ears per acre. (Project H 102.)

BREEDING CORN FOR YIELD

From Malakoff seed sent to Cap Rouge in 1911 by the Central Experimental Farm, Ottawa, selections have been made continuously, and a strain is now grown which can be fully recommended to farmers of the district. It has as good quality as Golden Bantam, averages about twelve days earlier, and produces not only more ears, but larger ones. Only one other variety, Pickaninny, has been ready for use before this selection, but it is black, and a much lower yielder. (Project H 96.)

CUCUMBER VARIETY EXPERIMENT

Since 1911, thirty-six varieties and strains of cucumbers have been tested, and twenty-nine discarded because they turned yellow too soon, were not attractive, or were poor yielders. For pickling, Chicago is very good. For table use, it is hard to find something better than Davis Perfect which has produced at the rate of 27,482 marketable cucumbers per acre, for an average of seven years. (Project H 106.)

MUSKMELON VARIETY EXPERIMENT

From 1911 to 1918 inclusive, muskmelons sown directly out of doors only produced one crop so that it was decided in 1919 to start them under small individual cold frames as soon as the ground thawed out. Even then, only three varieties have been a success: Early Green Citron, which is the surest to succeed, Hackensack, which comes next, and Montreal Market, which has not given the satisfaction expected from it. Sowing in hotbeds and transplanting will now be tried. (Project H 122.)

WATERMELON VARIETY EXPERIMENT

Eighteen varieties and strains of watermelons have been tested during ten years, with the result that only four are found early enough. Red Citron has given marketable fruit about three times out of four. The culture of watermelons is not recommended in this district, with its rather short frost-free season. Even when fruits mature, they are ready late when there is practically no demand for them. (Project H 125.)

ONION VARIETY EXPERIMENT

Since 1911, onions of different shape,—flat, oval, globular—and of various colours, from dull white to dark red, have been tested. There is not much difference in the time it takes to get them ready for market. Yields have differed somewhat, but it was noticed that high production practically always came from seed grown by a well-known breeder. In general, Red Wethersfield (flat) has given satisfaction, because it is such a good keeper. For a very good-looking bulb, it is hard to beat Prizetaker (yellow), and for pickling, Barletta (white) is unexcelled. If a round, red variety is wanted, Red Globe will just fill the bill. (Project H 138.)

BREEDING ONION FOR TRUENESS TO TYPE

From Dupuy & Ferguson seed procured in 1912, six careful cullings of bulbs have been made, so that the crop is now showing much more uniformity. The Cap Rouge strain will be placed in the trial plots for at least five years, after which it will be offered for sale if it shows decided superiority over the old variety. (Project H 128.)

ONION—SEED VERSUS SETS

This project is to compare (a) sowing the seed directly in the field, (b) sowing the seed in hotbeds and transplanting, and (c) planting sets. The experiment was made eight times, through five seasons. The earliest crop came from the sets, but they only yielded at the rate of 13,715 pounds per acre, while sowing gave 24,977 pounds, and transplanting 44,622 pounds. With hotbeds and manual labour at a reasonable price, there is no doubt that transplanting is the best method to follow. (Project H 134.)

ONION—BEST SIZE OF SETS FOR PLANTING

There is no doubt that sets will produce an earlier, though a smaller, crop than sowing or even transplanting. But what size of set should be used? Eleven tests, made during five different seasons, with five varieties, have given the following results: ½ inch sets, 9,324 pounds per acre: ¾ inch sets, 13,767; 1 inch sets, 14,274 pounds. This was contrary to expectations, but tops were cut before they developed too much, which might have influenced results. (Project H 135.)

ONION THINNING EXPERIMENT

An experiment has been conducted thirteen times, over five seasons, with four varieties of onions, to see which was the best distance (1, 2, or 3 inches) to thin plants in rows one foot apart, on a well-manured sandy loam in practically perfect tilth. The yields were at the rate of 24,462 pounds of bulbs per acre when plants were thinned at 1 inch, 24,585 at 2 inches, 22,039 pounds at 3 inches. It seems that with onions, as with practically all other garden vegetables, the yield is lower when the space between plants increases. In this case, about two inches between plants has given the best results. (Project H 136.)

BREEDING PARSNIP FOR TRUENESS TO TYPE

With Graham seed of Hollow Crown procured in 1914, five cullings of roots have been since made. There seems more difficulty, however, with producing parsnip, in this district than with beets, carrots, or turnips, as an insect destroys the seed-bearing plants. But this trouble can be overcome, and it will be very useful work, as it is hard to find strains producing uniformly well-shaped roots. (Project H 141.)

PARSNIP THINNING EXPERIMENT

This project is to find out at what distance (2, 3, or 4 inches) it is better to thin Hollow Crown parsnips grown in rows 30 inches apart on a well-manured and tilled sandy loam. The results of five years give the following yields per acre: 2 inches, 34,947 pounds; 3 inches, 30,198; 4 inches, 29,825 pounds. This shows that the crop decreased as the distance between plants increased. (Project H 144.)

GARDEN PEA, VARIETY EXPERIMENT

Leaving aside the edible-podded kinds, which are not popular in this country, some seventy varieties and strains have been tested since 1911, comprising smooth and wrinkled, climbing, semi-dwarf, and dwarf, early, midseason and late, green and light-coloured. The wrinkled have varieties as early as the smooth and should be grown on account of their better quality. The climbing are too costly to grow and should be left aside, commercially, at least. The green are much more attractive than the lighter-coloured ones. For an average of twelve years, Gregory Surprise has been the earliest, being ready for market 53 days after sowing, while Juno has been the heaviest yielder, with 1,669 quarts of green, shelled peas per acre. (Project H 154.)

PEA BREEDING FOR YIELD

The object in view is the production of superior strains by selection from old sorts. From 1911 to 1919 inclusively, sixty-four varieties and strains of garden peas were tested and Juno was found the heaviest yielder. In 1920, a selection was started and continued until 1924, the number of plants, of pods, and of peas being accurately counted in each case.

After examining 903 individual plants, one strain proved superior to all others and will now be sent to the trial plots for a few years, after which it will be offered for sale if it shows superiority over other varieties and strains. (Project H 147.)

LENGTHEN THE GREEN PEA SEASON

Green peas remain at their best only a short while, so that the grower who wishes to have them on the market during a comparatively long period must either sow an early variety at intervals, or varieties of different seasons

at the same time. During five seasons, Thomas Laxton sown at intervals of about one week was compared with Thomas Laxton, Gradus, Advancer, and Stratagem sown the same day. The four varieties yielded about 12 per cent more and lengthened the season some five days on an average. If four varieties are used and give satisfaction, it is advisable to grow seed of each every year, as one is not always sure of getting the same strains from the seedsmen from season to season. (Project H 150.)

POTATO VARIETY EXPERIMENT

Some eighty varieties of potatoes have been tested during the last thirteen years and only eight are deemed worthy of being kept for further consideration. Of the early ones, Irish Cobbler, round, white, of medium size, has been found the best. Among the late ones, Green Mountain, oblong, white, large, has been the heaviest yielder for a number of years. It would be much better for growers, who wish to sell potatoes, to stick to these two varieties only, or to a few others of the same type, so that buyers could find in a locality carloads of uniform stock when required. (Project H 186.)

POTATO—HILL SELECTION FOR SEED

During the last ten years, a great deal of work has been done at Cap Rouge to isolate a heavy producing strain of Green Mountain potato. One thing has been found out, that the most important factor is resistance to disease. For instance, if one would start with a certain number of heavy producing plants, one year when conditions were such that there was no disease, all these strains might be useless another year with disease prevalent. And now that it seems proven that to isolate disease-free strains, plants must be grown in the greenhouse, it makes all this work more complicated. No. 613 strain which has shown disease resistance during the last four years, will be propagated, but with no great hopes, it is admitted, of having anything much out of the ordinary. (Project H 171.)

POTATO—DIFFERENT SIZES OF SETS

What is the best size of seed-piece to use when planting potatoes? It was to throw light on this question that an experiment was started in 1915 and continued for five seasons. The average production in pounds per acre was as follows: Cut to three eyes, 14,783; cut to two eyes, 13,313; small potatoes, 12,639; cut to one eye, 11,996. As the small, whole potatoes weighed more than the pieces cut to one eye and less than those cut to two eyes, the larger the weight of seed used the greater was the crop. (Project H 164.)

POTATO SEED TREATED WITH LAND PLASTER

Does it pay to dust land plaster on potato seed pieces before planting? The results of an experiment conducted during five years answer in the negative, as the crop not treated averaged 12,493 pounds per acre while the one from seed which had been rolled in land plaster was only 12,071. This small difference may of course fairly be attributed to experimental error. The conclusion is that it does not pay to thus treat potato seed-pieces when they are put in the ground very soon after being prepared. This last condition should, however, not be forgotten. (Project H 180.)

PUMPKIN VARIETY EXPERIMENT

Twelve varieties and strains of pumpkins have been tested for a period of ten years. The heaviest yielder has been Large Field, at the rate of nearly 30

tons per acre, but it is too large and can hardly be given away in the autumn. Sweet Sugar, also called Small Sugar, and Sugar, does not yield quite 20 tons per acre, but it produces a larger number of smaller fruits which sell more easily than the ones from Large Field. (Project H 188.)

RHUBARB VARIETY EXPERIMENT

Monarque, Linnæus, Prima Donna, Victoria have been dropped after, at least, five years of careful testing, because they produced much less than St. Martin and Hobday Giant.

St. Martin is by far the heaviest yielder, with much larger stalks, and less propensity to come to seed early. It is green, while Hobday Giant is red. Cooking tests, however, have shown that Hobday Giant does not keep this colour and is practically as pale as St. Martin. The last mentioned is strongly recommended until something better is found. (Project H 192.)

RHUBARB FORCING

The object is to compare methods of forcing rhubarb in a warm, dark cellar. Roots are brought in before the ground freezes, whilst others are dug and left out to freeze thoroughly before being brought in. Each lot is divided in two, part of which is planted in soil and part placed between layers of straw.

The results of three tests show that for every pound of crop produced from the roots brought in early, 15.61 pounds were producted from the roots left to freeze thoroughly before being brought in. The difference between the lots planted in soil and those placed between layers of straw was not large. (Project H 194.)

SQUASH VARIETY EXPERIMENT

Twenty-nine varieties and strains of squash have been tested over a period of ten seasons. The heaviest yielder is Long Vegetable Marrow, at the rate of over 16 tons per acre, but it is hard to sell on the Quebec market where the Hubbards are in demand. These produce only about 9 tons per acre, but bring more money than the Long. The Bush Marrows do not spread out as the others and are recommended where garden space is at a premium. The Crooknecks and the Scalloped are odd, but it is practically their only merit, as they are low yielders and have a rather small proportion edible. (Project H 201.)

TOMATO VARIETY EXPERIMENT

Over eighty varieties and strains of tomatoes have been tested since 1911 inclusive. For Central Quebec, where growers have to contend with the rather short frost-free season, earliness is the main consideration. Furthermore, a strain is required, to be profitable, that will produce the largest possible quantity of ripe fruit in the earlier part of the season when prices are high. Only four came up to the mark for these important qualities, and they are here given in order of merit: Capiana, a Cap Rouge selection of Earliana; Alacrity, an Ottawa selection of Earliana; Prosperity; and Burbank Early. Capiana, for an average of eight years, has shown decided superiority, and a limited quantity of seed is offered at 25 cents per hundred. (Project H 211.)

TOMATO—BREEDING FOR EARLINESS

From Burpee seed of Earliana, procured in 1911, selections were made for twelve years, always having in mind a strain which would produce a large quantity of mature fruit early in the season, as this is where the money really comes from. The selection was placed in the trial plots with many others, and it

has averaged better than all for the last eight years. In 1913, this strain, No. 17, was placed on the market under the name of Capiana and is for sale at 25 cents per packet of 100 seeds. It has done well wherever sent, even in the Yukon. (Project H 204.)

TOMATO—TRANSPLANTING ONE OR MORE TIMES

An experiment has been conducted through seven seasons to see how different methods of starting tomato plants affected the yield of ripe, which means merchantable, fruit. The lot pricked out three times produced at the rate of 32,763 pounds of ripe tomatoes per acre; pricked out twice, 32,270; pricked out once, 30,515; not pricked out, 31,158 pounds. The difference between the lot pricked out three times and the one not pricked out is about 5 per cent, not more than the probable experimental error. This would tend to show that if plants not pricked out are thinned to the same distance in flats as the pricked-out ones would be planted at, the procedure of the experiment, pricking out may be dispensed with. (Project H 210.)

TOMATO—METHODS OF TRAINING

An experiment conducted for six years has shown that, commercially, and with a variety having scant foliage like the Earliana, there is no advantage in training the plants, as the crop of both green and ripe tomatoes has been larger when nothing was done. But it may be advisable to use some kind of a support, for conditions out of the ordinary, such as on rich land, or with tall varieties having a superabundance of foliage, or again where space must be economized in the home garden. When plants were trained to individual stakes, they produced at the rate of 9,015 pounds of ripe and 14,981 of green fruit per acre, while the figures were respectively 10,050 and 16,545 pounds when plants were trained to horizontal wires held by strong posts 15 feet apart. (Project H 207.)

TOMATO—METHODS OF PRUNING

This experiment was conducted for seven seasons with strains of Earliana. The average yield per acre, in pounds of ripe fruit, was as follows: not pruned, 27,301; pruned to two stems, foliage intact, 13,178; pruned to two stems, part of foliage removed, 10,750; pruned to one stem, foliage intact, 10,915; pruned to one stem, part of foliage removed, 7,885. This shows that the more pruning done, the smaller was the crop. The results, which were practically the same for the crop of green tomatoes, are probably due to the fact that the foliage is the manufacturing part of the plant, and that it cannot manufacture as much if part of it is removed. (Project H 402.)

TOMATO—METHODS OF ARTIFICIALLY RIPENING

In the northern parts of Canada, there is always a large proportion of the tomato crop which is still only half ripe or even green when danger from frost is imminent. This project was started to compare methods of artificially ripening the fruit. One lot of green fruit was simply placed on a shelf in a warm building, another in a box covered with glass, and the last in a wooden box tightly closed. Three other lots, but of half-ripe tomatoes, were treated in the same way. It took from eight to nineteen days to bring from 82 per cent to 95 per cent of the fruit to maturity, and the difference was slight between the different methods. (Project H 206.)

GARDEN TURNIP VARIETY EXPERIMENT

During ten seasons, twenty-six varieties of garden turnips have been tested and twenty of them were discarded because of poor quality or of low yield. On the Quebec market, with few exceptions, swedes are preferred to the real garden turnip. Among the latter, Early Purple Top Milan is the best tried. It has produced at the rate of 33,986 pounds per acre, and was ready to use fifty-three days after sowing, for an average of seven years. (Project H 214.)

TURNIP GARDEN—THINNING EXPERIMENT

Turnips grown for human consumption should, of course, be smaller, smoother, more tender, and have less fibre than those intended for live stock. This is why they can and should be grown much closer in the rows. The results of three years show that, in rows 30 inches apart, the crop was at the rate of 52,395 pounds per acre when thinned to 2 inches; 52,676 pounds at 3 inches; and 41,047 pounds at 4 inches. (Project H 191.)

CEREALS

BARLEY

TEST OF VARIETIES OR STRAINS

Careful tests made at Cap Rouge for twelve years show that barley, on an ordinary clay loam, does not yield enough grain, compared either with oats or with peas, to make it profitable to grow it here for live stock feeding. It does produce a little more carbohydrates per acre, but it contains very much less protein. Of the twenty varieties and strains tested, the six-rowed, as a rule, have shown decided superiority, both for yield and earliness, but Early Chevalier, a two-rowed kind, has consistently been near the top. Success, a so-called hooded variety, has been the earliest of all, but is not a heavy producer. The best six-rowed varieties are O.A.C. 21, which averaged 1,735 pounds per acre during six years, and Manchurian C. R. 14, which averaged 1,829 pounds during the same seasons. The one recommended for the district is Manchurian, with a preference for the C.R. No. 14 selection, which has outyielded the parent variety by over five bushels. (Project Ce 6.)

PRODUCTION OF SUPERIOR VARIETIES OR STRAINS BY SELECTION FROM OLD SORTS

In the 1921 report of this Station, complete details were given of the experimental work done since 1913 to isolate a heavy yielding strain from Manchurian. It should be stated that the work was done on an ordinary clay loam so that this strain will probably be better adapted to this kind of soil than to a heavier or a lighter one. Compared with the three varieties standing at the head for grain production, in the test plots, this selection stands above them, as follows, for an average of six years: Manchurian, Cap Rouge 14, 1,829 pounds per acre; O.A.C. 21, 1,735; Early Chevalier, 1,661; Manchurian, 1,580 pounds. It is seen that the Cap Rouge selection outyielded the mother variety by over five bushels per acre. The time to reach maturity was as follows: Early Chevalier, 87 days; Manchurian Cap Rouge 14, 89 days; O.A.C., 89 days; Manchurian, 91 days. Seed of Cap Rouge 14 selection can be had at a reasonable price, in sealed bags, from the Superintendent, Experimental Station, Cap Rouge, Que. (Project Ce 18.)

BEANS

TEST OF VARIETIES OR STRAINS

Compared with peas, beans do not produce enough digestible nutrients per acre to be profitably grown for live stock feeding. There was money a few years ago in growing them for human consumption, but importations at low prices from foreign countries pulled down profits. The heaviest yielder has been Norwegian, Ottawa, 710, yellowish brown, with an average of 1,650 pounds per acre, but its colour is a disadvantage in this district. The highest producer amongst the whites is Navy Ottawa 710, with 1,507 pounds per acre. One of the important factors affecting yield is freedom from disease, and it is recommended that beans to be used for seed should not only themselves be free of blotches, but that none be taken from pods showing the least sign of disease. (Project Ce 8.)

FLAX

TEST OF VARIETIES OR STRAINS

Repeated trials, on acre plots, have shown that conditions of climate and soil are favourable to the production of flax for fibre in Central Quebec, and that Longstem, with plants averaging nearly 50 per cent longer than those of varieties grown for seed, and with very few branches, is the most suitable to sow for this purpose. For seed production, it has been compared with two others, Premost and Novelty Ottawa 53, and the latter has far out-yielded the two others. Thus, Longstem is recommended for fibre and Novelty for seed production. Machines are now tested which, it is hoped, will cut down manual labour in the production of this crop. In the meantime, farmers of the district should move cautiously in the matter, as it is believed that the same amount of manual labour will generally bring higher profits in other lines. (Project Ce 9.)

OATS

TEST OF VARIETIES OR STRAINS

The first trials at Cap Rouge were to see how very early, early, and mid-season varieties would compare. The results, for an average of five years, showed that Eighty Day (very early) produced at the rate of 1,991 pounds of grain per acre, Daubeney (early) 2,191, Banner (midseason) 2,384, which would seem to show that a midseason variety is the best to grow in Central Quebec. A comparison was then made between "side" oats and open-head ones, with the result that Leader (side) only yielded at the rate of 1,823 pounds per acre, for an average of five years, whilst Banner (open-head) gave 2,036. During another five years, a hulless variety was compared with a hulled one, with the result that Liberty (hulless) yielded at the rate of 1,119 pounds per acre whilst Banner (hulled) gave 2,264; as Banner would have to contain more than 50 per cent hulls to be lower in digestible nutrients than Liberty, it is clear that it was superior to it. This leaves the field practically clear to open-head, hulled varieties of midseason, and Banner, in so far as the varieties compared are concerned, for an average of thirteen years, having been shown to be a heavier yielder than Gold Rain and Victory, its nearest competitors, is strongly recommended. Other varieties of the same class, with a lower percentage of hulls, may ultimately show more merit, but farmers would do well to stick to Banner until another variety has conclusively shown superiority over it. (Project Ce 5.)

PRODUCTION OF SUPERIOR VARIETIES OR STRAINS BY SELECTION FROM OLD SORTS

Details were given in the 1921 report about this project. In 1916, work was started to isolate a heavy yielding strain of Banner, and results, to date, are very encouraging. For an average of three years, the production of grain per acre has been as follows: Banner, Cap Rouge 31, 2,475 pounds; Victory, 2,092; Banner, 1,933; Gold Rain, 1,908. The time to reach maturity was practically the same, there being only three days between the earliest and latest of the four. The Cap Rouge selection will be planted two more years in the variety tests and will then be offered to the trade if it continues to show superiority. (Project Ce 17.)

DETERMINATION OF PERCENTAGE OF HULL IN OAT VARIETIES

It is not enough to find out which variety of oats yields the largest quantity of grain, but it is also necessary to find out the percentage of hull in each, so as to get at the really important question, that is, which oat produces the most "meat" per acre. The following results are for two years, 1922 and 1923, so that they must not by any means be taken as conclusive: Banner, 2,475 pounds of grain, with 30.39 per cent of hull, giving 1,723 pounds of kernel per acre; Gold Rain, 2,325 pounds of grain, with 27.08 per cent of hull, giving 1,695 pounds of kernel per acre; Victory 2,362.5 pounds of grain, with 30.23 per cent of hull, giving 1,648 pounds of kernel per acre; Alaska, 1,987.5 pounds of grain, with 22.54 per cent of hull, giving 1,539.5 pounds of kernel per acre. This shows that Banner is ahead, both for total quantity of grain and for number of pounds of kernel, or "meat", per acre. (Project Ce 52.)

PEAS

TEST OF VARIETIES OR STRAINS

The field pea is one of the most valuable crops for Central Quebec, as it may be used for so many different purposes; human consumption and live stock feeding, in the form of dried seed, besides being grown for soiling, hay, or silage. For human consumption, it has a good market in Central Quebec, but only white varieties are acceptable, and of these Arthur has been the highest yielder. For live stock feeding, Solo is the heaviest producer. Field peas give nearly as many pounds of digestible nutrients per acre as oats, both of them outdistancing barley and wheat, but it has the great advantage of furnishing more protein, which is the costly part of most rations. Farmers of the district should grow more peas, wherever conditions are favourable. (Project Ce 7.)

PRODUCTION OF SUPERIOR VARIETIES OR STRAINS FROM OLD SORTS

From ninety plants of Arthur, carefully chosen in 1921, a gradual elimination was made until, at the end of 1924, only one is left to be multiplicated in 1925 and placed, in 1926, in the test plots for five years; after this it will either be discarded or offered for sale, according to its performance in comparison with the mother variety and others. (Project Ce 19.)

COOKING TESTS OF PEAS GROWN ON DIFFERENT SOILS AND AFTER DIFFERENT CROPS

Field peas are grown in the district of Quebec, especially to make soup. Some lots cook well in a short time while others will not become edible through cooking. What is the reason? It is to help answer this question that Arthur peas were grown one season both on a clayey and on a sandy loam. Three samples were tested at two different places, and it took about the same time

to cook lots from each kind of soil. For three seasons, three lots of Arthur have been grown respectively after a hoed crop, after grain, and after hay or pasture. Samples were tested at two places, two years, and at three places, one year. Each of the tests showed that peas grown after grain became soft before the other two samples, and the average showed that peas grown on hoed land of the previous year came next in rank, and those on hay or pasture land last. This experiment will be continued. (Project Ce 78.)

WHEAT

COMMON SPRING WHEAT—TEST OF VARIETIES AND STRAINS

Wheat cannot compete with oats or with peas when grown for feeding live stock, and whether it is profitable to grow it will depend upon the price it can command for milling purposes or for seed. Careful tests have shown that very early kinds, such as Prelude, do not yield enough in Central Quebec, also that the Fifes are not adapted to our conditions. Of all the varieties tested, Huron has been the heaviest yielder and is strongly recommended, especially the Cap Rouge selection mentioned in the following section (Ce 13). Marquis has not done as well as Huron, and should be left to districts more suited to it. For an average of fourteen years, Huron has yielded at the rate of 1,458 pounds of grain per acre. (Project Ce 1.)

PRODUCTION OF SUPERIOR VARIETIES OR STRAINS OF SPRING WHEAT BY SELECTION FROM OLD SORTS

The work of isolating a heavy yielding strain of Huron was started in 1913, and readers are referred to the 1921-1922 report of this Station for details. During five of the years when it was in the test plots, Huron Cap Rouge 7 averaged from 124 to 282 pounds more grain per acre than Bishop Ottawa 8, Chelsea Ottawa 10, Huron Ottawa 3, Marquis Ottawa 15, and Ruby Ottawa 623. From 1918 to 1924 inclusive, it has yielded at the rate of 1,649 pounds per acre compared with 1,467 for Huron Ottawa 3, a difference of more than three bushels. Seed of this selection is offered at a reasonable price, in sealed bags. Apply to the Superintendent, Experimental Station, Cap Rouge, Que. (Project Ce 13.)

MIXTURE FOR GRAIN PRODUCTION

TESTS OF BARLEY'S AND OATS IN COMBINATION FOR GRAIN

The object of the experiment was to see if mixtures of barleys and oats would give better yields than when each was grown separately. Daubeney oats and Manchurian barley averaged 1,368 pounds of grain per acre during the same five years that Daubeney oats alone produced 1,563, whilst Banner oats and Duckbill barley averaged 1,740 pounds of grain per acre during the same five years that Banner oats alone produced 2,155. Admitting that barley has more total digestible nutrients than oats, it is still clear that oats alone in this district at least, have the advantage, on account of the much higher yield. A disadvantage, in growing this mixture, or others, is that farmers are likely to feed the threshed grain as it comes from the machine, even if the proportion of each grain is not what it should be for a proper ration. (Project Ce 60.)

TESTS OF BARLEY, OATS, AND WHEAT IN COMBINATION FOR GRAIN

This project was started to discover if a mixture of barley, oats and wheat would yield more than when each grain was grown separately. In a test of three years, Banner oats and Huron wheat had averaged 1,800 pounds per acre to only 1,100 for Daubeney oats and Prelude wheat, so that Duckbill barley was added to the two first mentioned. For another three seasons, this mixture of Duckbill barley, Banner oats, and Huron wheat averaged 1,790 pounds whilst Banner alone gave 2,110 pounds. Even from the point of view of total nutrients, Banner alone is at the top. The higher production of grain per acre of Banner alone is easily understood from the fact that oats yield more, in central Quebec, than either barley or wheat, and that it must necessarily suffer when competing for growing room with others producing a lesser yield. (Project Ce 61.)

TESTS OF PEAS AND OATS IN COMBINATION FOR GRAIN

The object is to find out if mixtures of peas and oats will give better yields than when each is grown separately. During the same four seasons, a mixture of Arthur peas and Banner oats was compared with Arthur peas alone, and with Banner oats alone. Both of them were, according to many years' tests, the heaviest producers in their respective classes, and have matured within one day of each other, which makes them an ideal combination. Results have shown that the mixture does not produce as much as either of the components alone, the average in pounds of grain per acre being 1,807 for Arthur peas and Banner oats, 2,122 for Arthur peas alone, 2,167 for Banner oats alone. If, however, a farmer wishes to grow grain in mixture, the above is certainly the best combination, better than oats and barley or oats and wheat, on account of the comparatively high protein content. (Project Ce 59.)

MISCELLANEOUS

IMPORTATION AND TESTING OF FOREIGN VARIETIES OF CEREALS

The object of this experiment is to try out in a preliminary way varieties or strains which are widely advertised, new, or of probable merit, comparing with those varieties recommended for the district. Everything with obvious defects is immediately rejected, whilst others are kept under careful observation for a year or two more before being placed in the trial plots where they must remain at least five years before they are either definitely discarded or recommended. Out of twelve tested in 1923, three only were kept in 1924, and will be retested in 1925. In 1924, two new things were tried and one of them was discarded. (Project Ce 51.)

SEED SELECTION—COMPARISON OF SELECTED AND UNSELECTED SEED

In 1923, a sample of No. 1 feed oats was taken from the bins in the horse barn, and put in the trial plots, alongside a few supposedly-pure strains from different sources, and the commercial sample gave a higher yield than most of its competitors. This, of course, is the result of only one test at one place, and is very far indeed from conclusive. But a lesson was learned from this experiment that in buying seed grain, a farmer should use the same plan as when purchasing a pure-bred animal, get it where he is sure that the stock is pure. Registered seed of approved strains can now be had in sealed bags, and it would be better to start with a smaller quantity, pay the price to get something good, and then be careful to keep up the purity. (Project Ce 76.)

PRODUCTION OF REGISTERED GRAIN

The work of finding out the varieties best adapted to a district and, sometimes, of isolating a specially good strain from a variety, would be practically lost if means were not taken to multiply the seed which possesses such great potential possibilities. This is why, each year, all the area devoted to grain, which can be put in fine tilth and which is free of weeds on the Cap Rouge Station is used to grow Manchurian barley, Banner oats, and Huron wheat, the varieties which have done best in their respective classes. Seed is offered at reasonable prices, in sealed bags, and farmers should take advantage of this to improve their crops, as much as they do of pure-bred sires to improve their live stock. (Project Ce 50.)

INVESTIGATION OF METHODS OF OBTAINING ACCURATE DATA IN VARIETY TESTING

This project was started to get at a method of variety testing which would minimize experimental error. In 1923 and in 1924, the question of border effect was looked into, as it is generally thought that this is not the same for all varieties. The weight of the grain was taken separately for the two outside rows, the two rows next to the outside ones, and the inside rows. As a general rule, the yield was comparatively much higher for the two outside rows, and higher for the two rows next to the outside ones, than for the inside rows. It was also found out, both in 1923 and in 1924, that the border-effect was not the same for all varieties, but as there was practically as much difference between two plots sown with the same variety as between different varieties, the solution of the problem does not yet seem to be very near. It is probable that the inequalities of soil, or the possible different cultivation given to the alleys between plots, have as much effect as the variety itself. (Project Ce 74.)

FORAGE PLANTS

ENSILAGE CROPS

INDIAN CORN—VARIETY TESTS FOR ENSILAGE

Foty-four varieties and strains of Indian corn have been tested during the last twelve years for ensilage purposes. After a few seasons, Canada Yellow, Early Malcolm, Free Press, Gehu, Ninety Day, Quebec Yellow, Twitchell Pride, and Yellow Flint (?) were left aside because they did not produce enough tonnage. Of the varieties tested for at least eight years, the following, by alphabetical order, have shown up the best for tonnage or raw material: Bailey, Compton Early, Leaming, Longfellow, North Dakota, White Cap Yellow Dent, Wisconsin No. 7. Two analyses made by the Dominion Chemist, for corn grown in 1922 and in 1924, give an average percentage of dry matter ranging from 18.33 to 20.46, so that the heaviest yielder of green corn is not necessarily the highest producer of dry matter per acre. Until more data are gathered, it is well to stick to Longfellow. (Project Ag 1.)

INDIAN CORN—VARIETY TESTS FOR THE PRODUCTION OF SEED

After testing varieties of corn for silage purposes for eight years, it was found out that some of them, though not producing enough bulk, matured ears every year, and it was decided to start an experiment to find out if corn could profitably be grown for grain in Central Quebec. The results of three years with five varieties and strains have given an average of 34 bushels of grain, which is encouraging. In 1924, Howe's Alberta Flint yielded at the rate of over 39 bushels of shelled corn per acre. (Project Ag 2.)

INDIAN CORN—ACCLIMATIZATION EXPERIMENTS

During the spring of 1923, seed was procured from the Wisconsin Agricultural Experiment Station of cold-resistant Golden Glow corn which had been obtained by germinating in an ice-box. This corn is supposed to give a good crop if planted from ten days to two weeks before ordinary corn. The results of an experiment of two years' duration, comparing it with a Cap Rouge selection of Longfellow, have not shown germination to be better, even when sown as early as May 2, or some three weeks before the usual time. This trial will be continued for at least three more years, before any definite information can be given. (Project Ag 6.)

INDIAN CORN—BREEDING

Since 1917 inclusive, Longfellow corn has been selected by the ear-to-row method, and from six strains which at first showed superiority, there are now only two left. Starting in 1924, individual plants of these two strains have been self-fertilized and this will be continued for two or three years more to stabilize growth habit. Later on, these two strains will be crossed to regain hybrid vigour. Of course, this kind of work is too costly to be attempted by farmers, who would do well to keep selecting in the field, instead of in the crib, the best ears, especially from plants producing an average of two such ears. (Project Ag 7.)

SUNFLOWERS—VARIETY TESTS FOR YIELD AND PURITY

Where corn can be grown successfully, sunflowers are not as desirable for ensilage purposes. But there are districts where corn will not yield enough, or in good districts there are pieces of land where sunflowers will do better, so that it is important to find out the heaviest producing kinds. For an average of two seasons, on a sandy loam of average fertility in good tilth, two strains of what is called the Giant or Mammoth Russian have been at the head, as follows: Giant Russian (Disco) 38,117 pounds of raw material with 16.89 per cent dry matter giving 6,438 pounds of dry matter; Mammoth Russian (McDonald) 35,249 pounds of raw material with 13.70 per cent dry matter giving 4,829 pounds of dry matter. Mixed Mennonite (Rosthern) only produced 20,660 pounds of raw material with 13.01 per cent dry matter giving 2,688 pounds of dry matter per acre, or less than half what Mammoth Russian yielded. (Project Ag 76.)

ROOTS

CARROTS, FIELD—VARIETY TESTS FOR YIELD AND PURITY

Experiments at Cap Rouge have shown that field carrots yield less dry matter per acre than mangels or swede turnips, so that they are not recommended except where required for horses, which seem to like them better than other roots. Twenty varieties and strains have been tested, since 1911, of different types—long, intermediate, short; and of various colours, white, yellow and orange. On a rather shallow sandy loam of good fertility and in high tilth, for an average of twelve years, the short whites have done the best, as the following figures show: Short White, 24,667 pounds of roots per acre, 10.37 per cent dry matter, 2,556 pounds dry matter per acre; White Intermediate, 23,306 pounds of roots per acre, 8.99 per cent dry matter, 2,095 pounds dry matter per acre; White Belgian (long) 21,343 pounds of roots per acre, 9.49 per cent dry matter, 2,025 pounds dry matter per acre. In 1923, according to actual measurements and careful observation, only 73.4 per cent of the seventeen varieties and strains were found true to name. (Project Ag 36.)

MANGELS—VARIETY TESTS FOR YIELD AND PURITY

Except for very limited areas of naturally-drained, rich, alluvial soils, mangels are not recommended to farmers of Central Quebec, as tests at Cap Rouge show that the cost of a ton of dry matter in them is higher than in swede turnips. Since 1911, forty-four varieties and strains have been tested of different types, long, intermediate, tankard, globe; of varying colours, orange, red, reddish-yellow, yellow; also of the so-called "half sugars". On a rather shallow sandy loam of good fertility and in high tilth, for an average of seven years, the Yellow Intermediate has done the best from the point of view of yield of dry matter per acre, with 2,619 pounds, followed by 2,286 for Half Sugar White, 2,227 for Long Red, 1,980 for Golden Tankard, and 1,343 for Yellow Globe. In 1923, actual measurements and careful examination showed that, for the twenty varieties and strains tested, only about 70 per cent of the roots were true to name, ranging from 34 per cent purity to 94 per cent purity for different varieties. (Project Ag 16.)

MANGELS—SEED TREATMENT TO INCREASE GERMINATION

What is called mangel seed is really a hard envelope containing one or more true seeds. Before germination takes place, this hard envelope must break and this is why germination is so bad in dry seasons on ridged land. Fifteen different tests were made in the greenhouse through five winters with nine different methods of aiding germination, as follows: soaking seed-envelope in water, soaking seed-envelope in water and liquid manure, packing the soil, packing the soil and watering, watering unpacked soil, applying fertilizers broadcast, applying fertilizers in seed rows, applying common salt broadcast, applying common salt in seed rows. The most efficient method, which fortunately happens to be the easiest, was to soak the seed-envelope just before sowing. It is recommended that they be left for at least fifteen hours in water kept around 60° F. (Project Ag 18.)

SUGAR BEETS—VARIETY TESTS FOR YIELD AND PURITY

The object of this experiment is to determine the productiveness, the purity, and the factory value of different varieties and strains. Sugar beets have not done well at Cap Rouge, on a rather dry sandy loam of average fertility in good tilth, and the yield of roots, under such conditions, is certainly too low to warrant anybody growing them for commerce. The last report from the Dominion Chemist, at time of writing, is for roots grown in 1923 when the co-efficient of purity ran from 80.61 to 86.50, and the percentage of sugar in juice was from 17.59 to 19.04. (Project Ag 66.)

SWEDES—VARIETY TESTS FOR YIELD AND PURITY

Swede turnips have produced more dry matter per acre, at Cap Rouge, than carrots or mangels and are recommended to those who wish to grow roots in Central Quebec for live stock feeding. Since 1911, eighty-one varieties and strains have been tested of the different types, purple top round, purple top oval, bronze top round, bronze top oval, green top round; and, as a rule, the purple top ovals have given the best satisfaction. The two highest yielders, for an average of ten years, have been Bangholm and Good Luck, the first with an average of 39,200 pounds of raw material having a percentage of 13.33 of dry matter giving 5,225 pounds of dry matter per acre, whilst Good Luck produced 40,208 pounds of roots with a percentage of 12.31 of dry matter giving 4,950 pounds of dry matter per acre. As only two determinations of dry matter were made in the ten years, it might be as well to look upon the two varieties as of about equal merit. (Project Ag 51.)

SWEDES—BREEDING OF PURE STRAINS

Good Luck is used for this work because it is one of the two varieties which have shown, for a large number of years, decided superiority as a heavy yielder of dry matter per acre. As there are different types in Good Luck produced from commercial seed, four of these types are chosen each year to produce seed the next, to find out which will give the most pounds of dry matter per acre. As swedes cross, each strain has to be grown under cotton when producing seed. It is yet too early to say which type will be best, but in 1924, the Cap Rouge selection was sixth, for yield, among the thirty-nine varieties and strains of swedes tested, beating the commercial seed by about 7 per cent. (Project Ag 52.)

FIELD TURNIPS VARIETY TESTS FOR YIELD AND PURITY

Field, or fall turnips, as they are commonly called, are generally used from late summer to early winter only, because they are poor keepers. Fourteen varieties have been tested, and as there are records for only a few of them and but for two seasons, no definite recommendations can be made. It may be said, however, that the highest yielders have produced more than any of the swedes. Variety tests are hard to make because commercial seed, as a general rule, is badly mixed, the results of actual measurements and careful examination having shown in 1923 that only 37 per cent of the roots were true to name, with a range from 1 per cent to 92 per cent in trueness. (Project Ag 46.)

RED CLOVER

RED CLOVER—VARIETY TESTS FOR YIELD AND GENERAL SUITABILITY

The value of hay in Eastern Canada is about 30 per cent of the total crops, so that red clover, which is used practically everywhere in the seed mixture, is very important. No doubt, proper fertilization and tilth have a great influence on the yield of hay, but the use of a suitable strain of red clover should not be overlooked, especially one late enough to be in the best stage for cutting when timothy is just right. Three so-called varieties were tested for three years and it was found that for every ton of hay produced by a strain from the Central Experimental Farm, Ottawa, only 1,249 was given by the commercial seed, and 1,224 by seed imported from Sweden. The wise farmer should exercise all possible precaution to buy clover seed grown under conditions about the same as those under which it will be sown on his farm. (Project Ag 146.)

RED CLOVER—SEED GROWING VERSUS HAY FOR PROFIT

Will it pay better to cut clover for hay or to grow seed? Of course, this will depend upon many factors, but it was thought advisable to conduct an experiment at Cap Rouge where the plan of cutting two crops for hay would be compared with that of cutting one crop for hay and another one for seed. The valuations of hay and seed were the current ones, whilst the Dominion Chemist, after analysing samples, came to the conclusion that the threshed straw was worth about 57.5 per cent of the hay. The results show that on a well-tilled sandy loam of fair quality, the two crops of hay were worth $1.07 for every $1 for crop of hay followed by one of seed. The difference is small and it is probably better to wait two or three years more before coming to any definite conclusion. (Project Ag 151.)

RED CLOVER—ROWS VERSUS BROADCAST FOR SEED PRODUCTION

The object is to determine whether broadcast or row seeding is productive of heaviest seed yields. Four methods were tested during two seasons on a sandy loam of rather poor quality but in good tilth. The results show that for every 100 pounds of seed produced when sown broadcast and the first crop cut for hay, there were 132 pounds when sown broadcast and the first crop cut for seed, 111 pounds when sown in drills twelve inches apart, 90 pounds when sown in drills 24 inches apart. The average value per acre of the products, however, was respectively $62.10, $58.06, $51.52, $41.10, taking current prices of seed and hay, and valuing straw according to analysis, compared with hay. Out of the extra $4.04 from the plot where a crop of hay was taken should be deducted what it cost to cut, cure, and store 2,300 pounds of hay. This experiment has not been conducted long enough to warrant drawing conclusions. (Project Ag 148.)

MISCELLANEOUS

TESTS OF GRAIN VARIETIES FOR YIELD AND SUITABILITY AS ANNUAL HAY CROPS

When meadows and pastures fail, or even only one of the two, farmers sometimes sacrifice live stock at very low prices while they could have made substantial profits if more feed had been available. Growing an annual hay crop from grains will, of course, cost more per ton of dry matter than cutting and storing hay, and should only be resorted to when circumstances demand it. An experiment conducted for five seasons at Cap Rouge showed that a mixture of Banner oats and Arthur peas, sown at the rate of about sixty pounds each per acre, gave a crop which would be most valuable for live stock feeding, containing 2,980 pounds of digestible nutrients compared with only 2,162 for clover and timothy hay. The advantage of this mixture of peas and oats is that it makes splendid ensilage, or can be left to produce grain, if too large an area has been sown for hay. (Project Ag 241.)

HAY AND PASTURE MIXTURES (MIXED CLOVERS AS A BASIS)

The object is to determine the best combination of grasses and clovers for hay and pasture purposes. A preliminary trial with grasses showed that perennial rye grass, western rye grass, Kentucky blue grass and red top could be left out of the mixtures, for the sandy loam of the district, so that only orchard grass, meadow fescue, and tall oat grass were used for the project, which was started in 1920. To these last three were added timothy, red, alsike, and white clovers. Notes were taken for the first cut (hay) and the second (pasture). The experiment has not been conducted long enough to warrant drawing conclusions, but it looks as though the addition of other grasses to timothy in the mixtures would give a greater yield of hay and more pasture. A difficulty, in this country, is that the quality of these grass seeds, which are seldom used, is poor, whilst the price is comparatively high. (Project Ag 258.)

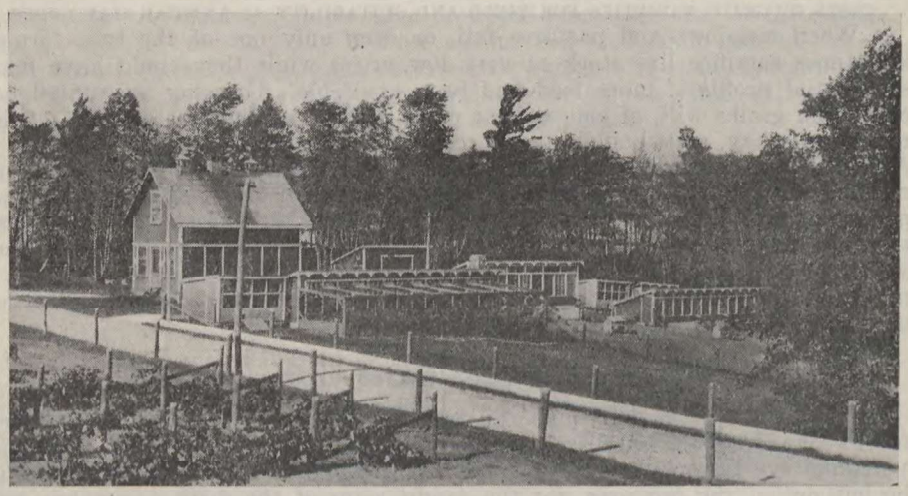
POULTRY

Barred Rocks exclusively are bred. At the beginning of 1925, there were 336 birds—34 males and 302 females. The principal projects relate to breeding, feeding, housing and management, but the main one is certainly the pedigree work by which it is expected that good producing strains will be isolated which will reproduce heavy layers.

BREEDING

PEDIGREE BREEDING FOR EGG PRODUCTION

The object of this work is to increase the egg production of a flock of Barred Rocks. There is no doubt that this has been accomplished over a period of five or six years, but the question is whether the results are due to the culling out of poor layers found out by the trap-nests, or by pedigree breeding. However, a few good lines seem to have been isolated, and if they continue to reproduce heavy layers, improvement will soon be noticeable. For instance, hen G 8 gave in 1924 four pullets which had respectively laid 61, 64, 69, and 79 eggs before February 1, 1925; and hen G. 132, two pullets with 84 and 89 eggs at that date. Cockerels from these two hens will be bred back to their mother, to one of their sisters, and to a few of the highest layers from unrelated lines. It is expected that good to very good pullets will be bred from these matings, and with rigorous selection regarding constitution, a step in advance should be made. (Project P 56.)



Some of the buildings on the poultry plant of the Experimental Station, Cap Rouge, Que.
With the aid of trap-nests, pedigree trays in the incubators, and sealed bands which go through the wings of chicks, the genealogy of fowls can now be traced as exactly as that of horses, cattle, swine and sheep.

BREEDING FOR FERTILITY, HATCHABILITY AND LIVABILITY—HENS VERSUS PULLETS

The object of the experiment is to find out whether hens or pullets will produce the largest percentage of fertile and hatchable eggs, and chicks living at three weeks of age, at which time they are practically saved. The results of three years, with a total of 5,343 eggs, show that the percentage of fertile eggs was respectively 88.4 for hens and 91.4 for pullets; the percentage of chicks hatched from fertile eggs 36.5 for hens and 47.4 for pullets; the percentage of chicks hatched, alive at three weeks, 83.8 for hens and 80.3 for pullets. For each chick living, at three weeks, it took 3.83 eggs from hens and only 2.90 from pullets, which gives the advantage to the latter. The conclusion is that when well-matured, early pullets are used, they will give satisfaction. (Project P 111a.)

BREEDING FOR FERTILITY, HATCHABILITY AND LIVABILITY—GOOD VERSUS POOR LAYERS

The object of the experiment is to find out whether, good or poor layers will produce the largest percentage of fertile and hatchable eggs and chicks living at three weeks of age, at which time they are practically saved. The dividing line may be arbitrary, but all birds laying less than 175 eggs during the twelve months following the first egg were classed as poor layers, and those laying more than 175 eggs were classed as good layers. The first lot averaged 154 eggs and the second 195. The percentage of fertile eggs laid, of fertile eggs hatched, and of chicks living at three weeks was 84.8, 43.6, 61.2 for the good layers, and 88.7, 43.1, 56.2 for the poor layers, in their pullet year; it was 87.6, 39.1, 77.9 for the good layers and 87.5, 43.7, 74.7 for the poor layers, for all the time, that is from one to four years, during which they were kept as breeders. A general summary shows that, for each chick living at three weeks, it took 3.75 eggs from the good layers and 3.51 from the poor layers. Data will be gathered during the next few years to throw more light upon this subject. (Project P 111b.)

FEEDING

SKIM-MILK VERSUS BEEF SCRAP FOR WINTER EGG PRODUCTION

The object was to determine the relative values of skim-milk and beef scrap as a source of animal protein for layers. The experiment was conducted during five winters with a total of 250 birds. Two equal groups were housed, handled, and fed the same, except that one received skim-milk to drink and mash containing no beef scrap, whilst the other got water to drink and beef scrap in mash or in hoppers. The birds receiving skim-milk not only laid a larger number of pounds of eggs, but also gained more weight than the others. The results showed that beef scrap, weight for weight, is only worth nine times more than skim-milk whilst analysis would show it to be worth eighteen times more. At the usual price of scrap, a poultryman can afford to pay from 35 to 45 cents per hundred pounds for skim-milk. (Project P 81.)

SKIM-MILK COMPARED WITH BEEF SCRAP, RAW MEAT, GREEN BONES AND POWDERED SKIM-MILK FOR LAYERS

In the experiment just reported it was shown that skim-milk was more advantageous than beef scrap. In this, three other sources of animal protein were compared. The results of three seasons, with a total of 280 birds, show that the cost per pound of egg was as follows: skim-milk, 18.1 cents; meat meal, 20.7; raw meat, 20.8; green bones, 33.4; powdered skim-milk, 46.2. This experiment will be conducted during two or three more winters but, in the meantime, farmers who have skim-milk to spare cannot use anything better, as long as they will give all that the fowls will drink. Powdered skim-milk would probably be as good but its price is much too high. (Project P 83.)

ROOTS VERSUS CLOVER LEAVES FOR WINTER EGG PRODUCTION

The experiment was conducted during five seasons with a total of 234 birds. Two groups of birds were housed and fed exactly the same except that one lot received roots (swede turnips or mangels) and the other dry clover leaves. Contrary to expectations, the group getting the clover leaves gained more weight and produced eggs at a lower cost per pound than the other. As this happened four out of the five seasons, it seems fairly conclusive. Possibly, green feed is valuable, in the case of roots, on account of its beneficial effect

on the digestive tract, and it may have happened that the birds in this experiment were kept in such a shape that they did not require any such succulent feed. The conclusion is that if roots are available, they may be given; if not, they can well be replaced by clover leaves when the ration, as a whole, is conducive to the best health of the flock. (Project P 93.)

ROOTS, CLOVER LEAVES, SPROUTED OATS, AND EPSOM SALTS

Green feed of some kind has for a long time been considered necessary for laying hens and, with the newer knowledge of nutrition, its good effects were ascribed to the vitamines it contains. An experiment conducted at Cap Rouge (see project P 93—Roots versus clover), during five years, showed that birds receiving dry clover leaves produced more eggs and gained more weight than others getting roots. In the present experiment, which has been conducted during three winters with a total of 280 birds, a pound of eggs cost 26.2 cents when dry clover leaves were fed, 26.4 when roots were fed, 27.8 when Epsom salts were fed, and 31.8 when sprouted oats were fed. It seems probable that the value of green feed is mostly due to its good effect on the digestive tract. (Project P 95.)

GOOD GRAIN VERSUS SCREENINGS FOR WINTER EGG PRODUCTION

The object was to ascertain whether screenings were a satisfactory substitute for good grain as scratch feed for layers. The experiment was conducted during five winters with a total of 244 birds. Two equal groups were handled, housed, and fed alike except for scratch feed, one lot getting commercial grain while the other received screenings. The good grain feed was made up of an equal amount by weight of oats, barley and wheat as sold by dealers for feed purposes. The screenings mixture was composed of what was secured from fanning the farm grain when about half only was kept for seed purposes. One-third of the mixture was from oats, one-third from barley and one-third from wheat. The grain fed was equal in weight to the amount of dry mash, with a value of $1.50 per cwt. put on the good grain and $1 per cwt. on the screenings. The screenings gave the greatest return. (Project P 77.)

STANDARD (HOME-MIXED) VERSUS COMMERCIAL GRAIN FOR LAYERS

The object is to compare home-grown and mixed grain with commercial mixtures as scratch feed. Two equal groups of birds are handled, housed, and fed alike except for scratch grain, one lot getting a home mixture of equal parts, by weight, of barley, buckwheat, cracked corn, oats, wheat, and the other a commercial article, Full'O'Pep, in this case. The results of four years' tests with a total of 200 birds, do not show much difference. As another experiment (see project P 77—Good grain versus screenings) has shown that the home-mixture may be made up of screenings from the fanning mill, it is probable that it is cheaper to use this home-mixture, when available, than to buy the commercial article. (Project P 76.)

WATER VERSUS SNOW FOR WINTER EGG PRODUCTION

The object was to determine whether snow was a satisfactory substitute for water as drink for layers. Both pens were fed, housed, and cared for the same way, the only exception being that one group received water and the other snow. The experiment lasted five winters and comprised a total of 228 birds. The results show that the pens receiving snow gained 11 per cent less weight than those getting water, but, on the other hand, they laid 28 per cent better, which gives them the advantage from a profit point of view. The safest

conclusion is probably to give water to laying hens in winter when possible, but if this cannot be done, a plentiful supply of clean snow may be used without any fear either as to the effect on the stock itself or on the production of eggs. (Project P 106.)

HOUSING

TEMPERATURE OF POULTRY HOUSES OF DIFFERENT DEPTHS

The object of the experiment is to determine temperature variations in poultry houses of different depths compared with outside temperatures. The general way of ventilating is simply to let in fresh air through open windows or cotton fronts, and it is important to see with what kind of building the range of temperature is the lowest. Thermometers registering the highest and the lowest temperature were kept for nine consecutive winters outside, also in houses respectively 8, 12, and 16 feet wide. All these buildings were exactly of the same type and were placed so as to get practically the same amount of wind and sun. The average range of temperature was 37.58 degrees outside, 27.3 in the house 8 feet wide, 26.9 in the house 12 feet wide, and 25.8 in the house 16 feet wide. It is seen that the range of temperature is much greater outside and that it decreased slightly as the width of the house increased. (Project P 74.)

MANAGEMENT

PULLETS VERSUS HENS FOR WINTER EGG PRODUCTION

In this experiment early pullets, late pullets, yearling hens, and old hens were compared as winter layers. For details, the reader is referred to the Cap Rouge report for 1921. The results of five seasons, comprising nearly 500 birds, have shown conclusively that early pullets are the cheapest producers of winter eggs. By early pullets, for Barred Rocks, in Central Quebec, is meant those hatched previous to May 1, and the ones which come out in April seem to give the best satisfaction. The figures show that when it cost $1 for early pullets to produce a certain weight of eggs, it cost $2.35 for yearlings to produce the same weight, $2.92 for late pullets, and $8.10 for old hens. Even when yearling hens were the same birds as used in the experiment as pullets the preceding year, they showed a higher cost of production as yearlings than they had as pullets. (Project P 60.)

TIME TAKEN FOR TRAP-NESTING

The object is to determine the time taken to trap-nest a given number of birds. The actual time was recorded during ninety days, from November 17, 1924, to February 14, 1925, in a house containing one hundred birds, and it took a total of 912 minutes, or about ten minutes per day per 100 birds, or one minute per day per ten birds. This will be continued during the other seasons of the year. No account was taken of the time to come to the poultry house, but only of the time taken to trap-nest, once in the poultry house. (Project P 154.)

MARKETING

BROILERS VERSUS FRYERS VERSUS ROASTERS

The object is to determine whether it is preferable to sell surplus cockerels as broilers, or to hold them longer for fryers or roasters. Three equal groups of birds of broiler age are taken, one is sold immediately when weighing a little

less than two pounds per bird, another when weighing around four pounds per bird, and the last about the middle of November. The results of two years, with ninety cockerels, show that, contrary to expectations, it paid better to kill only in the autumn. The average respective prices per pound were 55 cents for the broilers on July 11, 32 cents for the fryers on August 25, and 26 cents for the roasters on November 15. The experiment should be conducted at least three years more before definite conclusions are reached. (Project P 44.)

EGG PRESERVATIVES

Everybody keeping hens which produce more eggs than can be consumed during spring, should preserve some of these eggs for the next fall and early winter when there is sure to be a scarcity. The object of this experiment, begun in 1916 and continued every year since, is to determine the most satisfactory method of preserving summer eggs for winter use. Of the eight methods tried, the following have been found unsatisfactory: (1) wrapping in paper and leaving alone, (2) wrapping in paper and turning daily, (3) putting away in oats, (4) putting away in sawdust, (5) Composé Gaulin, (6) Armstrong paste. The two best methods have been lime-water, and waterglass. For details regarding these preparations, the reader is referred to Circular 31, which may be had from the nearest Experimental Station. (Project P 150.)

GENERAL FARM NOTES

EXCURSIONS.—The Field Day of the French Canadian Cattle Breeders' Association took place at Cap Rouge and was very well attended. Hon. J. E. Caron, Minister of Agriculture for Quebec, Dr. J. H. Grisdale, Dominion Deputy Minister of Agriculture, Mr. E. S. Archibald, Director of Experimental Farms, were present.

A special poultry excursion took place in the autumn. The meeting was addressed by Messrs. Lee and Riordon, of the Poultry Division of the Dominion Experimental Farms, Messrs. Barbeau and Chevrier, of the Quebec Department of Agriculture, also the Superintendent of the Dominion Experimental Station, Cap Rouge, and was a great success.

Over 400 farmers of the county of Quebec came in August and were shown over the Farm and through the buildings by the superintendent, who explained most of the experimental work going on.

MEETINGS ATTENDED.—The superintendent attended meetings of the directors of the French Canadian Cattle Breeders' Association, of which he is president; of the Quebec Seed Board, of which he is a member; of the Quebec Breeders' Syndicate, of which he is a director. He was present and took part in the discussion, at the meetings of F. C. Horse, F. C. Cattle, Quebec Swine, Quebec Sheep, and General Breeders' Associations which took place in Montreal. He also presided at the meeting which closed the Quebec Seed Fair.

EXHIBITIONS.—Twenty-nine French-Canadian horses and about as many French-Canadian cattle were shown at the Regional and the Provincial Quebec exhibitions, whilst the horses alone went to Three Rivers. All the cups and diplomas, besides about three-fourths of the first prizes were won by this stock. At the Quebec Seed Fair, an educational display was made.

CORRESPONDENCE.—Nearly 10,000 pieces of mail were received and about as many sent. This correspondence is steadily increasing.

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