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 1925

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DOMINION EXPERIMENTAL STATION, CAP ROUGE, P.Q.

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THE SEASON

The growing season, from May to September inclusive, was a little colder and drier, but much duller, than the average of the last thirteen years, the figures being respectively 54.98 degrees and 56.29 degrees Fahrenheit for mean temperature, 22.08 and 24.98 inches for precipitation, 977.1 and 1,118.6 hours for sunshine. The frost-free season extended 129 days, from May 25 to September 29 inclusive, some nine days less than usual.

THE CROPS

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

METEOROLOGICAL RECORDS AT CAP ROUGE, P.Q., 1925[1]

Month	Temperature					Precipitation				Total sunshine
	Highest	Date	Lowest	Date	Mean	Rainfall	Snowfall	Total	Average 14 years	
	°F		°F		°F	Inches	Inches	Inches		hours
January	36·0	22nd	−26·0	28th	6·45	.....	39·0	3·90	3·93	73·3
February	40·0	10th	−10·0	3rd	18·36	2·72	40·0	6·72	2·85	60·4
March	45·0	25th	− 6·0	3rd and 16th	26·58	1·06	25·0	3·56	3·00	99·7
April	70·0	26th	15·0	5th and 19th	38·05	1·77	1·5	1·92	2·99	198·6
May	73·0	20th	27·0	24th	48·70	2·97	.....	2·97	3·58	174·1
June	85·0	4th	40·0	17th and 24th	61·00	2·52	.....	2·52	4·23	146·4
July	81·0	12th 15th and 20th	47·0	6th	64·53	4·39	.....	4·39	3·65	189·1
August	84·0	17th	40·0	27th	65·00	1·91	.....	1·91	4·08	239·5
September	81·0	11th	31·0	30th	52·91	6·56	.....	6·56	4·45	142·9
October	59·0	1st	20·0	30th and 31st	37·78	2·98	7·5	3·73	4·24	85·1
November	59·0	23rd	− 7·0	30th	30·66	2·17	6·5	2·82	3·15	77·2
December	38·0	6th	−11·0	10th	15·04	0·68	17·5	2·43	3·12	36·1
Totals	.....	.....	.....	.....	.....	29·73	137·0	43·43	43·25	1,522·4
Average	.....	.....	.....	.....	38·75	2·48	11·41	3·61	.....	126·9

[1] Full records for the period 1912-1924 will be found in the Report for 1924—Cap Rouge Experimental Station.

ANIMAL HUSBANDRY

French-Canadian cattle, French-Canadian horses, and Yorkshire swine, all pure-bred, are kept on the Cap Rouge and Saint Joachim Stations which are under the same superintendent. Details are given further regarding experimental work with the two first mentioned classes of live stock, but as the herd of swine has only been established one year, no data are available yet.

DAIRY CATTLE

The main points brought out by experimental work with dairy cattle, during the last fifteen years, are that the milking-qualities of the dam of a bull must be known if a farmer is to be sure of improving his herd, also that on advancement can be made unless great attention is paid to constitution and vitality. Feeding experiments have shown that whole milk given to calves after they are a month old is too costly, that a home-mixed meal is just as profitable as some of the best advertised calf meals, and that powdered skim-milk, though as good as the genuine article from the separator, sells at too high a price to be used with advantage. It has also been noticed that feed, though not influencing the size of the heifer as much as it was thought, has a very marked effect on milk production, and that concentrates, on the average farm, may be fed at the rate of about one pound per four pounds of milk, more or less, according to the price at which this product sells.

BREEDING FRENCH CANADIAN CATTLE

The dairy herd at Cap Rouge, fully accredited since 1922, is composed entirely of pure-bred French-Canadians and generally numbers 75 head. During the last fifteen years, only two bulls were brought in, all the others having been bred at the Farm. One of these sires was a costly acquisition, as all his heifers, about thirty all told, were poor milkers and had to be sent to the butcher: a lesson for those who would buy a bull without fully investigating the milking qualities of his dam. The sires now used for service are entered in the Advanced Registry for pure-bred dairy-bulls either class AA or A, and all the females with more than one period of lactation have qualified for R. O. P. At the Quebec District and at the Quebec Provincial Exhibitions, in 1923, 1924, and 1925, the Cap Rouge herd won more first prizes than the herds of all other exhibitors combined, showing that the elusive combination of function and form has been attained to a fairly high degree, This success is due to a strict process of weeding, especially in regard to strength and vitality; to fairly close breeding; and to reasonable feeding, care and management. There has been nothing done even from the purely business and money-making point of view which a good breeder could not do.

DAIRY CATTLE BREEDING METHODS

Taking twenty-five two-year-old French-Canadian heifers bred at Cap Rouge, and which have qualified for Record of Performance, it is seen that the six which were in-bred average 318 pounds fat per year, the line-bred ones 314, and the out-crossed 307. Admitting that the advantage is not marked for any method of breeding, it seems probable that the more closely bred females, if mated to the right kind of sires, will be better reproducers than the others. In cases of in-breeding, especially, and also of line-breeding, the main requisite is the use of animals of high vitality having no defects in common.

INFLUENCE OF A PROVEN SIRE ON THE DAIRY HERD

When the herd of French-Canadain cattle was started at Cap Rouge, a very good-type bull was chosen to place at its head. This animal turned out to be such a fine exhibition subject that a comparatively high price could have been

obtained for him from one of the best breeders of French-Canadian cattle. However, nothing was known about the milking qualities of the dam. All his heifers, over twenty-five in number, had to be sent to the butcher because they were low producers. The sire which followed this one was bred at Cap Rouge and out of a cow which qualified four times in the Record of Performance. This turned the tide in the right direction, as this bull later on qualified for R. O. P. and also his son which now has fifteen of his daughters with the same distinction, two of which made world records for the breed. But this son was also out of a cow which had qualified three times for R. O. P. This is a clear case showing that great care should be taken in choosing a herd-header.

VALUE OF THE PURE-BRED DAIRY BULL IN GRADE HERD

Many believe that a pure-bred dairy bull is a panacea for all the ills of a grade herd. There is no doubt that in most cases the introduction of such an animal will be a paying proposition, but there are exceptions which it is better to note to avoid disappointments. The best way of determining the improvement is to compare the milk-yield of heifers with that of their dams at the same age. This was done at Cap Rouge, and the heifers produced only 73 per cent of the milk required to about equal the milk-yield of their dams at the same age. But, in this case, nothing was known about the ancestry of their sire, which is unfortunately what happens in too many cases. The conclusion is that a pedigree is not by any means the only qualification which a herd sire should have, and when a farmer replaces his grade bull for a registered one, without knowing at least the milking qualities of the dam, he makes what has well been termed a " blind swap."

WHOLE MILK, SKIM-MILK AND ROYAL PURPLE MEAL, SKIM-MILK AND HOME-MIXED MEAL FOR DAIRY-BRED CALVES

This experiment was conducted with thirty-eight French-Canadian calves. One group received whole milk; a second, skim-milk and Royal Purple meal; the last, skim-milk and a meal composed of 6 parts ground corn, 3 parts ground oats, 1½ parts ground flax seed, by weight. At the end of 24 weeks, the calves weighed an average of 293, 276, 266 pounds respectively. When the cost of feed per pound of gain was calculated this showed a feed cost of 21 cents for the lot receiving whole milk, 7 cents for the lot receiving skim-milk and Royal Purple meal, and 6 cents for the lot receiving skim-milk and home-mixed meal. The conclusions are that whole milk is too expensive a feed on which to raise calves, after they are about one month old, and that it is cheaper to use a home-mixed meal, as described, than to buy a commercial article such as Royal Purple Meal.

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

This project was started to find substitutes for skim-milk in raising calves. The same ration was fed in all cases, with the exception that lot I received skim-milk from the separator; lot II, one pound of powdered skim-milk per gallon of water; lot III, one quart whole milk to three quarts of water and one ounce of bone meal. The experiment has been conducted with eighteen French-Canadian calves which, on an average, gained 206.7, 199.3, and 205.4 pounds respectively, during twenty-four weeks. This shows that there is not much difference between the three feeds as far as growth is concerned. But when the important point of cost is looked into, it is found that the average feed cost for each calf receiving skim-milk to which oilcake was added, was $18.98 at about six months of age; for each receiving whole milk, water, and bone meal, $22.33; and for each receiving powdered skim-milk, $49.29. There is no doubt

that powdered skim-milk is practically as good as skim-milk from the separator, but it will be out of the question until it can be bought at a much lower price that at present.

FEEDING CONCENTRATES AT DIFFERENT RATES TO MILCH COWS

This experiment extended over five periods of 143.5 days each and was conducted with twenty-seven cows divided into lots of about the same weight, the same capacity as milk-producers, and the same point in their lactation period. All housing, care, and feed were alike, with the exception that group I received one pound of meal per eight pounds of milk; group II, one of meal per four pounds of milk; and group III, all the meal these cows would eat—one pound per 2.18 pounds of milk produced. It is seen that when hay was worth $7, and roots and ensilage $2 per ton, meal $1.25 per cwt. and butter 28 cents per pound, the lot receiving all it would eat gave a profit over feed of $15.26 per period, the lot receiving one pound of meal per four pounds of milk, $14.22, the lot receiving one pound of meal per eight pounds of milk, $14.19. The general rule therefore, should be to feed concentrates heavily when milk is selling at a high price, with one pound of meal per four pounds of milk making a good average.

WINTERING DAIRY CATTLE IN SINGLE-BOARDED OPEN-FRONT SHEDS

Nine bulls and eighty-six heifers have been wintered under single-boarded open-front sheds since 1915, and have done well. It is thought that the exercise and pure air were conducive to good health and helped in getting the herd fully accredited. Only in a very few cases was it necessary to bring in animals which had become injured. There are, however, a few points which it is well to remember. The sheds should face south so as to get all the sun possible, and the three closed sides should not have any opening through which a draft might enter; no cow in milk, no weak, emaciated animal should be wintered in this manner; calves should be at least six months old before severe weather sets in; all stock must be turned out before the weather gets very cold, and then left out, instead of being brought in and out.

This is an important project, as the interest, depreciation and insurance on a stable considerably increases the cost of barn-room for each occupant.

INFLUENCE OF FEED ON DAIRY-BRED CALVES AND HEIFERS

The best investigators admit that size, type, and production can be affected by the way the calf, and later on the heifer, is fed. It is probable that unless a young animal is really stunted by the lack of appropriate food, it will show, compared with the highly fed one, a great difference in size at first, but this difference will have nearly disappeared at maturity. The effect on type is harder to judge and may be left out of consideration in this instance. As regards production, an experiment conducted at Cap Rouge with twins, to minimize the effect of breeding, is interesting. The heifer that was well kept produced over three times the quantity of milk, and this milk tested 5.75 per cent compared with 4.45, produced by the one which was poorly kept. This is probably an extreme case, and it may be well to await further results before coming to a definite conclusion, but it seems that the surest way of raising heifers is to feed them well, though pampering should be avoided at all times.

HORSES

BREEDING FRENCH-CANADIAN HORSES

This project was started by the united efforts of the Dominion Department of Agriculture, the Quebec Department of Agriculture, and the French-Canadian Horse Breeders' Association. A special farm is used for the purpose at Saint Joachim, county of Montmorency, P.Q. where from seventy to one hundred horses, all pure-breds, are kept. The object is to breed a race of horses weighing around 1,200 pounds in ordinary condition, sound, hardy, full of energy but docile, fast walkers, of good appearance, and equally at home on the plough or on the surry. Out of thirty-eight strains with which work was started, only 11 are left, the others having been discarded because they did not produce as good offspring as themselves. Though colour is not the most important consideration, still it is thought that uniformity in this regard is advisable, when nothing else is sacrificed, and about 80 per cent of the horses at Saint Joachim are blacks. That breeding operations have been successful is shown by the fact that, at Three Rivers, Sherbrooke, and Quebec, under eleven different judges, during the last four years, 302 prizes were won, comprising three times as many diplomas and firsts as were won by all other exhibitors combined. Horses have been shipped to New Brunswick, Nova Scotia, and Ontario where they have given satisfaction, under conditions suitable for a dual-purpose animal.

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

At Cap Rouge and at St. Joachim, 153 foals were classified, 19 in-bred, 28 line-bred, and 106 from out-crossings. From the in-breds, the percentage of very good was 31.6, of good 63.1, of medium 5.3, of culls 0; from the line-breds, the percentage of very good was 28.6, of good 32.1, of medium 28.6, of culls 10.7; from the out-crossings, the percentage of very good was 28.3, of good 24.5, of medium 25.5, of culls 21.7. Of course, the closer the relationship between the animals mated together, the more care should there be taken that both have not the same defects in common, and especially, that the two are strong and healthy, because no headway can be made in any kind of breeding work if constitution is not used as a solid foundation on which to start.

WINTERING IDLE WORK-HORSES

The object is to find out if the surplus of work-horses necessarily kept on farms during winter can be fed satisfactorily on a cheap ration. The experiment was conducted during five seasons, from November 1 to March 31, with six animals (two were used in 1915-16), geldings and mares, ranging in age from six to nineteen years; some animals being of a quiet nature and others nervous. During the first two weeks feed was gradually cut down until it consisted of one pound of mixed hay, one pound of oat straw, and one pound of carrots or swede turnips for each hundred pounds of horse. A fortnight before using the animals on the farm, in the spring, the ration was gradually increased until the horses were again on full feed. Only two meals a day were given and the horses, which were in box-stalls, did no work with the exception of an occasional very short drive at a medium pace. The results were that every one was in good shape to start work in May. The average gain in weight was 28 pounds, and the cost of wintering was low. Certain things, however, are essential to success. If the animals are in poor condition in the fall they must be brought up to normal before the feed is cut down; if box-stalls are not available, the horses should be turned out for exercise when weather conditions permit, in which case it is possible that a little more feed may be required. Naturally nervous and restless animals will require a somewhat heavier ration than quieter ones; and

the changes in cutting down feed in the autumn, also in increasing it in the spring, must be gradual, so that there may be no derangement of the digestion.

REARING HORSES IN CHEAP SHEDS IN EASTERN CANADA

During the last nine years, a total of 303 winter periods have been spent by horses of different ages, from weanlings to eighteen-year-olds, under single-boarded sheds, with doors facing south and opened all the time. Out of this number, very few indeed, possibly not a dozen all told, had to be brought in, and this as a rule was because they accidentally had been hurt. It is thought that more feed is required to supply heat when fed outside, but this is not absolutely certain, as it is only the digested part of what is eaten which is assimilated, and it is probable that the digestion and assimilation of food may not be as complete inside, where ventilation oftentimes is poor. This possible extra feed, however, is certainly more than counterbalanced by the better health of the animals. Another advantage is that young stock can be highly fed to develop it well without fear of the legs going wrong. Of course, all horses to be wintered outside should not be stabled after cold weather commences, as they will otherwise catch colds due to the changes of temperature.

WORK VERSUS NO WORK FOR PREGNANT MARES

During the past five years, forty-six pregnant mares were wintered inside and given light work at as frequent intervals as possible, whilst sixty-three were kept outside, with single-boarded sheds as a shelter. No difference could be seen in the vitality of the foals, so the conclusion arrived at is that, though exercise is no doubt necessary, the mode of exercising is not important. It is practically impossible to know, simply by outward appearances, if a mare is in the same condition one year as she was the previous one, but the case of Black Princess is given here for the benefit of those who believe that the same animal should be used for this comparison. Two winters this mare was kept outside under a single-ply shed; two others she was kept inside in a box-stall, not worked, but turned out for exercise as often as weather permitted; and two seasons she was stabled and worked reasonably but regularly until foaling. In each of the six cases she raised a strong healthy foal by the same stallion. Evidently, in this case the mode of exercising did not have any great effect.

REARING FALL FOALS

During the last nine years, ten foals were dropped in the autumn by seven different mares. It is impossible yet to say what two rather young ones will do, but six grew to be very good breeding stock, one developed bad hocks, and another died. There are advantages and disadvantages in rearing fall foals. Among the advantages is the fact that the dam can be worked during all the cropping season, and among the disadvantages that it is oftentimes difficult to get the mother in foal at this time of the year. If mares drop their young in the autumn, care must be taken that they are not overfed on very nutritious rations, as the offspring are then liable to get heavy in the body and go wrong in the legs. The hoofs of the weanlings grow fast on moist bedding, and the paring of them is another thing which should not be lost sight of. But that the rearing of fall foals is practicable has been amply shown at the St. Joachim Horse Farm, and it is for each breeder to decide what should be done, according to circumstances.

FIELD HUSBANDRY

A review of the work done in Field Husbandry at Cap Rouge during the last fifteen years will no doubt interest farmers of central Quebec.

Rotation experiments have shown that the six-year gives more immediate profit per acre than the five, four, or three-year. However, the rotations have been established for only ten years, and no consideration was taken of the increasing number of weeds on the longer rotations. Another set of experiments was planned and started in 1924.

An important cultural project is the one comparing summer, autumn, and spring ploughing for silage corn. Where the growing season is short, as in this district, it seems better to plough in the autumn, and where weeds are troublesome, resort must probably be made to the old summer-fallow or slight modifications of it. On very heavy land, autumn ploughing would be better, but corn does not usually give the best results on this type of soil.

Experiments have shown that hay will produce digestible dry matter much cheaper than oats, corn, or swede turnips, and hay will probably for a long time yet continue to be the main crop of central Quebec. A comparison of swede turnips with three ensilage crops, corn, sunflowers, peas and oats, has placed the roots at the bottom of the list for the cheap production of dry matter.

Corn for silage grown in drills spaced 42 and 48 inches, with plants spaced about 8 inches in the row, has produced more ray material than when sown in hills 36 and 42 inches apart, and chemical analysis has shown practically no difference between the different lots in feeding value.

On a sandy loam of better than average fertility and in good tilth, Banner oats yielded more when the rate of seeding was around 2½ bushels per acre than when it was much lower or higher. On the same kind of soil it was found that a seeding of 4 pounds timothy, 6 pounds red clover, and 1 pound alsike was just as good, from the profit point of view, as twice these quantities. On the same kind of soil, barley, spring wheat, oats and field peas proved to be the best nurse-crops, in the order named.

ROTATION EXPERIMENTS

From 1911 to 1920, different rotations were compared, and figures are available for three of them which ran side-by-side for a period of nine years, 1912-1920 inclusively. Rotation D consisted of a hoed crop, a cereal, and clover hay; rotation C of a hoed crop, a cereal, hay, and pasture; rotation K of a hoed crop, a cereal, hay, hay, pasture, and pasture. Short rotations had strongly been recommended by most agricultural workers, and it was anticipated that they would do much better than the longer ones. However, the longer rotations, owing to the larger percentages in hay, which has been a fairly profitable crop, and to the smaller percentage in roots, which have usually been produced at a loss, have given more satisfactory results than the shorter rotations. On the other hand, weeds have increased more on the longer rotations, and this has to be taken into consideration. A new set of rotations has been started which will continue for many years. From time to time progress reports will be made.

COST OF PRODUCING FARM CROPS

For fifteen years, every load was weighed of each of the four most important crops of central Quebec, at the Cap Rouge Station, with the following results: on 55.28 acres, Good Luck swede turnips averaged 23,639 pounds of raw material per acre; on 216.16 acres, Longfellow corn grown for silage, 17,823 pounds; on 299.41 acres, Banner oats (grain only), 1,712 pounds; on 271.4 acres, clover and timothy hay, 4,083 pounds. For a period of eight years, careful

records were kept for each of these crops of man and horse labour, manure, seed, twine, depreciation on machinery, and interest on land. With these figures the average cost of dry matter per ton were secured, calculated on the same basis of digestibility, and the figures are herewith given: Good Luck swede turnips, $35.32; Banner oats (straw neglected) $28.13; Longfellow corn for silage, $25.75; clover and timothy hay, $8.04. It is seen that hay, for which a deduction of 11 per cent was made for digestibility, is still by far the cheapest producer of dry matter. The question is whether the higher cost of corn or of swedes is balanced by succulence for milking-production, and by the residual value of the extra cultivation given to produce these crops.

PREPARATION OF LAND FOR SILAGE CROPS

The object of the experiment is to find out whether summer ploughing followed by fall ploughing, fall ploughing only, or spring ploughing only will produce silage corn at the lowest price per ton. There is not enough data yet regarding the summer ploughing followed by fall ploughing, but it is probable that this practice will bring up the cost, though it may be necessary where special work has to be undertaken to check weeds. The results of seven years show an average yield of 9.16 tons of green corn per acre and a cost of $2.96 per ton for autumn ploughing whilst the figures were respectively 9.51 tons and $2.66 for spring ploughing. The land on which the experiment was conducted is a sandy loam of average fertility, fairly well manured, and in very good tilth. Even with the advantage of 10 per cent in favour of spring ploughing, it may be more advantageous to plough in the autumn where the season is short and all farming operations must be done in a limited time. The question was well summed up in the following extract: "A great many people prefer spring ploughing for corn, but very few ever made a mistake by getting their ploughing done in the fall."

YIELD AND PROFIT FROM ROOT AND SILAGE CROPS

The object is to determine the comparative yield and cost of producing swede turnips, corn, sunflowers, and peas and oats. This experiment has been conducted four years. During three of these half an acre of each crop has been grown on sandy loam of about average fertility but well manured and in very good tilth. Every load was weighed, and samples were sent to the Dominion Chemist for determination of dry matter. It is probably yet too soon to draw definite conclusions, but it is clear that on sandy loam soil of average fertility in central Quebec, a ton of dry matter costs a great deal more in swede turnips than in corn, sunflowers, or peas and oats. Averaging the three silage crops, a ton of dry matter in swede turnips cost more than twice what it did in the other crops. The two main factors seem to be the low percentage of dry matter in roots, 12.30 (which however was higher than usual in this experiment) compared with 22.64, the average of the other three crops, also the cost per acre, $69.38 for roots, as compared with $46.37 for the others. Where the farm herd is large enough to warrant the erection of a silo, or where all manual labour has to be paid for, roots cannot economically replace silage crops, at least not until machines can be introduced to do most of the work now done by hand, or strains are found and multiplied which will be heavier yielders and will possess a larger percentage of dry matter.

COMPARISON OF CORN, SUNFLOWER, PEAS AND OATS FOR SILAGE

The object of this experiment is to find out which of the three silage crops, Longfellow corn, Giant Russian sunflowers, or a mixture of Arthur peas and Banner oats produce dry matter and digestible nutrients at the lowest cost per

ton. An accurate record is kept of all expenses, also of the weight of raw material, and samples are sent to the Dominion Chemist for determination of dry matter. The results of four years show that sunflowers and the peas and oats mixture, produce dry matter and digestible nutrients at a lower cost per ton than corn. It will be advisable to await further data before making definite conclusions on this project.

GROWING SILAGE CORN IN DRILLS AND HILLS

Having in view the highest production of dry matter per acre, is it better to grow silage corn in drills or in hills? The project was conducted for five years, and all the corn from 57.3 acres was weighed, with the following results: drills, 48 inches apart, plants thinned to about 8 inches in the row, 20,759 pounds of green material per acre; drills 48 inches apart, plants thinned to about 8 inches in the row, 20,185 pounds; hills 36 inches apart in all directions, 12,402 pounds; hills 42 inches apart in all directions, 12,358 pounds. Samples were sent to the Dominion Chemist who reported that the composition was practically the same for each lot. The results therefore, on the sandy loam of Cap Rouge, were decided in favour of the drills. They might not have been the same, however, on weedy clay land.

KIND OF NURSE-CROP

With what kind of nurse-crop (barley, oats, peas, spring wheat) will the clover and grass seeding do best in central Quebec, on a sandy loam of average fertility in very good tilth? It was to help answer this question that the present project was started in 1913. The experiment was made on 440 plots of one-sixtieth (1/60) acre each, during eight seasons, so that the following conclusions should have some weight. The results show that for each 100 pounds of clover hay after barley there were only 97 after spring wheat, 93 after oats, and 76 after field peas. Whether barley or wheat should be used as a nurse-crop in the place of oats in this district, where the latter grain comprises more than 75 per cent of all the grain sown, can only be determined by each individual grower, according to his own circumstances. But there is no doubt that oats cannot be considered the best nurse-crop for clover on the sandy loams of central Quebec.

RATES OF SEEDING GRAIN CROPS

The object is to find out the best rate at which to seed Banner oats on a sandy loam of better than average fertility and in good tilth. For this experiment, which was conducted during eight years, ninety-six plots of one-sixtieth (1/60) acre were used, and thirteen densities were compared, from 1 to 4 bushels per acre, going up by quarter bushels. A summary of five seasons showed four of the six best average yields from densities ranging between 2½ to 3¼ bushels, which are about the same as the ones used in the district. Three more tests, however, showed that, after deducting the quantity of seed used, the yield of grain per acre was at the rate of 2,001 pounds for 2½ bushels, 1,998 for 3¼ bushels, 1,882 for 2¾ bushels, 1,836 for 3 bushels. The rate of 2½ bushels is thus recommended when sowing Banner on a sandy loam of better than average fertility and in good tilth. If another variety is used, or the soil is different, this density may not be the best.

RATES OF SEEDING HAY CROPS

The object is to find out if heavy seeding of timothy and clover is necessary for a large crop of hay. For nine years, 160 plots of one-sixtieth acre each were used in the trials, which should give weight to the conclusions. The results show that after what was called the thick seeding (8 pounds timothy,

12 pounds medium red clover, 2 pounds alsike per acre), the average was at the rate of 4,410 pounds of hay per acre, whilst it was 4,096 pounds when half these quantities of seed was used. The extra seed cost $2.81, and the extra 314 pounds of hay would have had to sell at $17.90 per ton, at the farm, to pay for it. It thus seems that on a well-tilled and manured soil, it is not necessary to sow as much seed as has been generally advocated. However, farmers who have very poor soil, or who work their land indifferently, will be surer of a good crop of clover hay if they use the larger quantity of seed.

HORTICULTURE

FRUITS

After fifteen years of experimental work with fruits, it may be permitted to draw a few conclusions. Among the tree fruits, it seems clear that it is useless to try and mature pears commercially in central Quebec. None of the sweet cherries have been hardy and it is a question whether it is wise to grow any of the sour varieties for market; but if it is done, Montmorency Large would, in general, be the most likely to be remunerative. It has conclusively been proven that the European plum will succeed better near the St. Lawrence, where there is lots of moisture; the varieties having shown up best being Bonne Sainte Anne, Montmorency, and Quackenboss. The American plum does well in inland localities where Bixby and Mankato might be tried, also perhaps Cheney of the Nigra group. For apples, unless one is near a good market for early fruit, it is recommended to grow about 5 per cent of summer, 10 per cent of autumn, 35 per cent of early winter, and 50 per cent of winter. The best selection for this is probably yellow Transparent, Duchess, Wealthy, and McIntosh, though there are splendid seedlings from the Central Experimental Farm at Ottawa which are bound to forge ahead in popularity with time on account of their many good qualities.

In the small fruits, none of the grapes have shown enough quality, combined with earliness, to be recommended for commerce, but Early Daisy, Green Mountain or Winchell, and Wyoming may be used in the home-garden. Currants are generally over plentiful on the market and should certainly not be grown in any quantity. Blacks will sell better than reds and whites. Climax (black), Fay (red), and Grape (white), have clearly out-classed the other varieties tested. Gooseberries will not be in great demand until better sorts are offered that may be eaten as a dessert, and no large plantation should be made. Silvia will certainly give satisfaction if well taken care of. The raspberry always sells for a high price but one should be exceedingly careful to get disease-free plants when starting planting, and to heavily cull out afterwards anything that shows signs of anthracnose. Brighton and Newman 23 have done best, whilst the old Cuthbert can now safely be discarded. The strawberry continues to be the most popular small fruit and no variety has done quite as well as Dunlap. The everbearing is a failure from the commercial standpoint, and a good recommendation is to plant only perfect varieties, as none of the imperfect ones has qualities enough to warrant using it.

APPLE—VARIETY EXPERIMENT

More than 200 varieties of apples have been tested since 1911 inclusively, and about three-fifths of them have been discarded for one reason or another. Out of the rest, probably one dozen show decided superiority for central Quebec, and the commercial grower might cut the number down to six and still have too many. As a general rule, 5 per cent of summer, 10 per cent of autumn, 35 per cent of early winter, and 50 per cent of winter is a good proportion. This would

of course vary according to local conditions, the man near a city wishing to have more early fruit, and the one far from large centres desiring less. Of the summer varieties, Rupert, a C. E. F. seedling, is the earliest, followed by Yellow Transparent, two yellow varieties; Lowland Raspberry, a red. For autumn, Melba, one of the finest C. E. F. seedlings of McIntosh, is the earliest, followed by Duchess, an old stand-by; Okabena, which is a very heavy yielder, and Petrel, a C. E. F. seedling of the very highest quality but of poor colour. For early witner, Wealthy is hard to beat, but Pedro, a C. E. F. seedling, may successfully challenge it some day. For winter, Fameuse and McIntosh cannot be surpassed, whilst Walton, another C. E. F. seedling, would come later. Out of these, Rupert, Yellow Transparent, Melba, Duchess, Wealthy, Pedro, Fameuse, and McIntosh are recommended.

APPLE ORCHARD—COST OF ESTABLISHING

Some 380 McIntosh and Wealthy were planted in 1913. Record was kept of all expense such as trees, seeds for cover-crops, fertilizers, insecticides and fungicides, and manual and horse labour. Unfortunately, these records were destroyed by fire in the autumn of 1921, but figures for the years following are available. The total expense and total crop for each year was as follows: 1922, $97.96, sixteen barrels of fruit; 1923, $128.92, eighty barrels of fruit; 1924, $157.46, one hundred and three barrels of fruit, 1925, $196.72, two hundred and eighty barrels of fruit. Commencing with the ninth season after planting, the average expense per year, for four seasons, leaving aside rent of land, interest, taxes, and use of machinery, was $145.26, whilst the average crop was one hundred and twenty barrels of apples.

APPLE—COVER-CROP EXPERIMENT

Six different cover-crops were compared in an orchard of some 350 McIntosh and Wealthy planted in 1913 and in 1914: red clover sown every year, vetches sown every year, rape sown every year, clover and rape in a two-year rotation, permanent sod with the hay taken away, permanent sod with the hay used as a mulch around the trees. To date, it is clear that some kind of a cover-crop is much better than sod, because for every bushel of fruit produced per tree in sod there were 1.56 bushels per tree with a cover-crop; the growth of the trees was also affected, as for every inch of circumference in the case of trees in sod there were 1.14 inches in the case of trees where a cover-crop was grown. Clover and rape in a two-year rotation have given the best results. It may be premature yet to come to a definite conclusion in regard to the best kind of cover-crop to use.

CHERRY—VARIETY EXPERIMENT

Since 1911, 174 cherry trees of nineteen varieties have been planted, and none of the following were living in the autumn of 1925: Bruseller Braun, Empress Eugénie, Homer, Koslov Morello, Minnesota Ostheim, Montmorency Ordinaire. For quality of fruit, Vladimir stands highest, but it is small and dark, and the tree is only moderately hardy; for yield and for hardiness of tree, Fouche Morello is first, but both the size and quality of fruit are about the lowest of all varieties tested; the largest fruit came from Griotte d'Ostheim, Griotte Morello, and Montmorency Large, but the first two are not hardy enough, only one tree out of seven of the first, and two trees out of eight of the second, being alive at the end of 1925. A great disappointment has been Early Richmond which has only proved 38 per cent hardy and has been the lowest yielder of the whole lot. Everything considered, Montmorency Large is the best for conditions such as exist at Cap Rouge.

BLACK CURRANT—VARIETY EXPERIMENT

Out of sixteen varieties tested during the last fourteen years, the following have been discarded because they were inferior in some respect, especially in yield, to others which were kept: Black Champion, Clipper, Collins Prolific, Eagle, Eclipse, Kerry, Lee Prolific, Magnus, Ontario, Success, Topsy and Victoria Black. The average yield of fruit per acre, for the thirteen years during which they were tried together, is as follows: Climax, 7,962 pounds; Saunders, 6,627 pounds; Buddenborg, 5,773 pounds; Boskoop Giant, 5,278 pounds.

BLACK CURRANT—BREEDING

Three hundred and sixty seedlings and cuttings were grown of Climax, the variety which has proved decidedly superior to all others in the trial plots. After twelve years, only seven strains are left and they are compared with Boskoop, Buddenborg and Saunders, which were the heaviest yielders after Climax. The results of three seasons show one strain as much better than the rest, and if it continues to be so for at least two more crops, it will be propagated and put on the market. In the meantime, a limited quantity of bushes is offered at one dollar for three, delivered anywhere in the province of Quebec.

RED CURRANT—VARIETY EXPERIMENT

Out of twlve varieties of red currants tested since 1912. the following have been discarded because they were inferior in some respect to others which have been kept: Cumberland, Greenfield, Perfection, Pomona, Rankin Red, Red Dutch, Red Grape, Victoria and Wilder. For size and appearance of fruit, there is nothing to compare with Cherry, but it does not yield half as much as Fay, which averaged 10,897 pounds per acre for thirteen years. There is very little demand for red currants and they should be grown in very limited quantities unless one is sure of getting a good market for them.

RED CURRANT—BREEDING

From eighty seedlings and cuttings grown of Fay, the variety which has outyielded all others in the trial plots, five are left as worthy of further consideration. For three years every selection has produced more than Cherry and Red Cross, the commercial varieties which come next to Fay as good producers. If they thus continue for two more crops, the best of them will be propagated and put on the market. Pending this, bushes are offered at three for a dollar, delivered anywhere in the province of Quebec.

WHITE CURRANT—VARIETY EXPERIMENT

For nine years, three varieties of white currants have been tested. In 1921, Large White was discarded because of lack of superior quality and yield. The average yield for twelve crops was at the rate of 5,843 pounds for White Cherry and 5,632 for White Grape, but the latter is of much better quality and is recommended. There is practically no demand for this kind of fruit and a bush or two is enough for the home-garden.

GOOSEBERRY—VARIETY EXPERIMENT

Since 1911, fourteen varieties of gooseberries have been tested and the following have been discarded: Gibb, Houghton, Industry, Josselyn, Queen Anne, Rideau and Saunders. Out of those now in the trial plots, Charles and Poorman have not been long enough under test for comparison. Silvia, which is recommended, has averaged 15,665 pounds per acre for an average of thirteen years, whilst Red Jacket gave 15,206 pounds and Downing 13,748. The market for

gooseberries is easily glutted and no large plantation should be made, unless one is sure of a good demand for the fruit.

GOOSEBERRY—BREEDING

After Silvia had shown decided superiority, 390 seedlings and cuttings were grown of it. Only six of these were deemed worthy of further consideration and they were put in the trial plots where they commenced to fruit in 1923, at the same time as four varieties which had previously shown up well and two new ones from the New York Agricultural Experiment Station at Geneva. The results of three years show that two of these strains of Silvia have outyielded all others.

GRAPE—VARIETY EXPERIMENT

Out of the thirty-three varieties of grapes tested at Cap Rouge for fourteen years, the following have been discarded because of lack of quality and early maturity: Beta, Brant, Brighton, Campbell Early, Canada, Champion, Colerain, Cottage, Delaware, Early Victor, Florence X. Potter, Hartford, Janesville, Lindley, Manito, McTavish, Merrimac, Moore Early, Moyer, Pattison, Peabody, Starr Early, Telegraph, Wilkins, and Worden.

Of the eight varieties left in the trial plots, five have not been in long enough to warrant giving an opinion about them. The three which have done best are Early Daisy, black; Winchell (sometimes called Green Mountain), green; and Wyoming Red, red. Though the second will probably give satisfaction for the home-garden, experiments to date clearly show that the season of central Quebec is, in general, too short to grow this fruit commercially. In 1925, for instance, not a variety matured.

PEAR—VARIETY EXPERIMENT

Sixty-four pear trees were planted between 1911 and 1923, of the following varieties: Bessemianka, Clapp Favorite (both standards and dwarfs), Dempsey, Doucet, Duchess, Duchesse d'Angoulême, Flemish Beauty, Seckel and Winter-Nelis. Not a single marketable fruit was produced and only three Clapp Favorites, one standard and two dwarfs planted in 1923, were living in the autumn of 1925. It seems evident that until varieties are found which are more suitable to conditions such as exist at Cap Rouge, pear culture cannot be recommended in central Quebec—even for the home-garden.

PLUM—VARIETY EXPERIMENT

Since 1911, 266 plum trees of forty-six varieties have been tested, and none of the following were living in the autumn of 1925: Admiral Schley (A),[1], Aitkin (N), Bixby seedling (A), Climax (H), Coe Golden Drop (E), Cottrell (A), Don (A), Fitzroy (A), Gloria (A), Grand Duke (E), Hawkeye (A), Imperial Epineuse (E), Imperial Gage (E), Lester (A), Lombard (E), Niagara (E), Odegard (N), Reine Claude de Bavay (E), Swift (A), Togo (H), Waneta (H), Washington (E), Wolf (A), Yellow Egg (A). The percentages living in the autumn of 1925 were the following, for the main classes: European, 48 per cent; American, 23 per cent; Hybrids, 18 per cent; Nigra, 7 per cent. There seems no doubt that the Europeans will do better wherever there is an abundance of moisture in the air, as in localities near a large body of water, whilst the Americans may succeed well in places further inland. Among Europeans, the best were: Bonne Ste. Anne, blue, 92 per cent; hardy, large fruit of high quality, early bloomer and very early ripener, with an average yield, in 1925, of 19.5 gallons per tree planted in 1911; Montmorency, yellow, 61 per cent, hardy, medium-sized fruit of good quality, early bloomer and ripener, with an average

[1] (A)-American; (N)-Nigra; (H)-Hybrid; (E)-European.

yield, in 1925, of 15 gallons per tree planted in 1911; Quackenboss, blue, 100 per cent hardy, very large fruit of good quality, early bloomer and late ripener, with an average yield, in 1925, of 38 gallons per tree planted in 1911.

RASPBERRY—VARIETY EXPERIMENT

Seventeen varieties of raspberries have been tested during the last thirteen years. The following, compared with others, have shown decided inferiority in same point or other: Cuthbert, Eaton, Golden Queen, Heebner, Loudon and Marlboro. Columbian has been a very heavy producer, but it is of the purple cane family, too dark, and only recommended for canning. Of the regular red raspberries, Brighton has been the best yielder, followed by Newman 23. The first mentioned is about three days the earlier, somewhat more firm for shipping, and has the great advantage of remaining on the cane for some time after it is ready to pick, whilst the fruit of Newman 23 falls off a couple of days after it is ripe. That there is quite a vast difference in the yielding power of varieties is shown by the fact that Brighton averaged 2,689 pounds for thirteen years, and Cuthbert only 1,338 pounds.

RASPBERRY—BREEDING

Out of some 500 seedlings of Herbert and King grown since 1914, only one, Herbert 90, has been deemed good enough to be placed in 1925 in the trial plots. It must remain on trial for at least five years and show decided superiority before it is propagated and put on the market.

STRAWBERRY—VARIETY EXPERIMENT

Forty-one varieties and strains of strawberries have been tested during the last twelve years and the following discarded: Bederwood, Brandywine, Buster, Coeur de Boeuf, Cordelia, Desdemona, Enhance, Gandy, Haverland, Julia, Mariana, Mead, Nettie, New Globe, Ophelia, Parson Beauty, Pocomoke, Ridgeway, Ruby, Splendid, Steven Late Champion, Valeria, Virgilia, Warfield, Williams, Wm. Belt and 3 W. S. Of those remaining Dunlap is the highest yielder, with an average production of 8,520 pounds per acre for eleven years, and it is strongly recommended. For a very early berry, Excelsior fills the bill, but it only gives a relatively small quantity of a poor quality fruit.

STRAWBERRY—BREEDING

Out of more than 600 plants from runners and seedlings from Dunlap and Glen Mary, just five remain at the end of 1925 that give promise of being better than the mother variety in some respect. Glen Mary C. R. 408 is earlier and a heavier yielder than Glen Mary, but is a poor shipper, produces less plants, is a little more subject to disease, and is of a paler colour; Glen Mary C. R. 410, is a much higher yielder, a better shipper, though a little below the parent variety in earliness, size of fruit, resistance to disease, and plant-producing qualities. Dunlap C. R. 419, and Dunlap C. R. 420 are very much like Dunlap though lower yielders, but as they are somewhat later, they may be useful; Dunlap C. R. 421 is also a lower yielder than the parent variety and a little later. but it is of such superior quality that it has a good future.

ORNAMENTAL PLANTS

Over one thousand varieties and strains of annuals, bulbs, herbaceous perennials, shrubs, and trees have been tested since 1911. The survival of the fittest has left the ones which are adapted to conditions of central Quebec, but a great number also have been eliminated because others of the same class are prettier or more generally suitable. The best annuals, of those to be started inside, seem to be, by alphabetical order, petunia, schizanthus, snapdragon,

zinnia, for early summer; aster (China), phlox, stock, for middle summer; cosmos, for fall. Of those which may be started outside, a choice can be made between alyssum, clarkia, mignonette, poppy, sweet pea, for early summer; calendula, coreopsis, cornflower, helichrysum (everlasting), nasturtium, nigella, for middle summer; and blue-lace flower, larkspur, for fall. Amongst herbaceous perennials, the following may be planted for a continuity of bloom over all the season: April—chionodoxa, crocus, scilla; May—forget-me-not, narcissus, pansy; June—aquilegia, bleeding heart, iris, lupine, pæony; July—delphinium, digitalis, lilium, sweet william; August—globe-thistle, golden glow, hollyhock; September —hardy aster, hardy phlox, lilium speciosum, sedum. Good deciduous hedges can be made with Siberian Pea Tree, Thunberg barberry, Wayfaring tree, whilst suitable conifers for this purpose are American Arbor Vitæ, Colorado blue spruce, and Norway spruce.

CROCUS—VARIETY EXPERIMENT

The crocus gives the first bloom in the spring and a few bulbs should be planted during October in every garden. Two varieties have been tested, Cloth of Gold and King of the Whites. Both do very well and give a profusion of flowers. In 1925, Cloth of Gold, which is the best of the two for the garden, was in bloom from April 10 to 30, and at places was surrounded by snow. King of the Whites, the best of the two for the production of cut flowers, which are larger than those of the preceding variety, was in bloom from April 17 to May 5.

GLADIOLUS—VARIETY EXPERIMENT

During the last fourteen years, 110 varieties of gladiolus have been tested and seventy-four have been left aside. In making recommendation as to the best, it seems advisable to give two lists; one for persons to whom the cost of corms is a secondary matter, and another list for those who like something good at a comparatively low price. Tastes differ, of course, but the varieties are here placed in order of merit, according to the gardners at the Cap Rouge Station: For the first class—American Beauty, Groff Majestic, Rose Ash, Byron I., Smith, Rose Glory, Dream, Maine, Anna Eberius, Hendale, Golden Measure: for the second class—Prince of Wales, Marechal Foch, Herada, Niagara, Alice Tiplady, Schwaben, Lady Byng, America, Mrs. Francis King, Red Emperor, Peace and Baron J. Hulot.

GLADIOLUS—GROWING FLOWERS COMMERCIALLY

This project was started in 1925 to see if the gladiolus would be a paying proposition, grown commercially near a city like Quebec. As early as possible in the spring, fifteen corms of each of the following varieties were planted, and fifteen others about a couple of weeks later so as to spread out the time when flowers would be ready to sell: America, Halley, Mrs. Francis King, Mrs. Frank Pendleton jr., Niagara, Panama, Prince of Wales, Red Emperor and Schwaben. The total expense was $20.90, including $14.75 for the purchase of corms. The revenue was $8.30, that is, 166 flowers at 5 cents, which is a couple of dollars more than the running expenses. The total number of flowers was 214, or 79 per cent of the number of corms; out of the 214 flowers only 166 were good enough to sell, which is 78 per cent of the total number of flowers and 61 per cent of the number of corms. Some of the varieties produced a much larger percentage of marketable flowers than others, but it does not seem advisable to give detailed information on these from the results of just one year of testing.

HYACINTH—VARIETY EXPERIMENT

Leaving aside Muscari, commonly called Grape Hyacinth, there are two different types, the Roman and the Dutch. Certain catalogues mention Dutch Romans but these are only small-sized bulbs of the ordinary Dutch. The Roman

is only grown inside where it may be forced to produce cut flowers as early as Christmas. The Dutch can be grown both inside and out-of-doors, but in the latter case it should receive ample protection against the rigors of winter; it is only sold in pots or boxes when in bloom, but never as a cut flower; and it cannot be forced as early as the Roman. The Dutch Hyacinth is divided into singles and doubles, the first mentioned only being used when grown outside; in colours it comes as white, different shades of blue, red, and yellow. Twenty varieties of single Dutch Hyacinths have been tested at Cap Rouge and the ones which have given the best satisfaction for indoor forcing are the following: La Grandesse, L'Innocence, pure white; King of the Blues, dark blue; Queen of the Blues, light blue; Enchantress, Gounot, porcelain; Moreno, pink; La Victoire, carmine; General Pélissier, carmine red; Yellow Hammer, and City of Haarlem, yellow.

IRIS—VARIETY EXPERIMENT

Leaving aside the group of bulbous irises, including Anglica and Hispanica, we have the widely known group of those with creeping stems. Amongst the latter, German irises comprise most of the varieties tried at Cap Rouge, though there are some Japanese, a dwarf, and orientalis gigantea. Of the Germans tested for five years or more, Kharput (ultramarine) was the prettiest, followed by Coquette which looks very much like an orchid but has not the size of bloom of Kharput. Then come Madame Chereau (white and blue), Lord Seymour (lilac-blue), Innocenza (ivory), and Darius (yellow, orange, and lilac).

LILY—VARIETY EXPERIMENT

Out of fifteen varieties tested since 1916, Henryi, lancifolium rubrum, longiflorum, Willmottiæ have not been hardy enough, whilst Hansoni and Philadelphicum were not found particularly good. The four which gave the best satisfaction are, in alphabetical order: auratum (Gold-banded Lily), which gave as many as eight blooms of about six inches on the same stem in 1925; candidum, the well-known St. Joseph's Lily, which is sweet-scented and should be in every garden; regale, with its splendid flower, pale-rose at the interior, pearl-grey and yellow at the exterior, certainly a royal-looking one as its name implies; and speciosum rubrum, which has the advantage of blooming very late when there is not much left to gladden the eye.

NARCISSUS—VARIETY EXPERIMENT

Narcissi have been divided into long-nosed, short-nosed and snub-nosed, according to length of petal; into flat-leaved and rush-leaved; into narcissi proper and jonquils; into singles and doubles; into spring and fall. Only the spring-flowering kinds have much interest for the average person and, with the exception of Van Sion, a large double trumpet, only singles receive much attention. The main kinds are: large trumpets, also called Ajax (pseudo-narcissus); lesser trumpets, also called star (incomparabilis); poets, also called pheasant's eye (pœticus), which are all flat-leaved; hoop petticoats (bulbocodium); Tazetta, also called cluster-flowered narcissus (polyanthus) some of which are tender and only used for forcing, whilst others, like Pœtaz, are hardy; cyclamen-flowered, also called angel's tears (triandrus); jonquil (jonquilla). Only the single large trumpets were given a long and careful test. Amongst the bicolor, Victoria has been found superior to Empress but is not liked for commerce as a cut flower; in all yellows, Emperor is in favour with dealers in Quebec City who prefer it to Golden Spur, King Alfred, and Glory of Leiden. Much has been written in favour of the last named but it is not found in any way superior to Emperor.

NARCISSUS—GROWING COMMERCIALLY

Commercial floriculture is now a large industry near big cities and this project was started to see if narcissi would be a paying proposition around Quebec. In the autumn of 1920, 100 bulbs of Emperor were planted eighteen inches apart in all directions. The cost of bulbs, the value of manure, and all labour amounted to $17.85 at the end of 1925. Each year the selling value of the cut flowers, also the number which could have found a market, was ascertained. For the five seasons, 1,515 cut flowers could have been sold for $63.55, which would have left a total profit of $45.70, or an annual one of $9.14, on a piece of ground about ten feet square. To succeed with narcissi, a variety must be chosen with a long stem, and it is well to remember that singles only are in demand, the doubles having practically no market, at least in Quebec city.

PAEONY—VARIETY EXPERIMENT

Forty-seven varieties have been tested during the last ten years. None of the singles nor of the Japanese which were tried have shown up better than some of the semi-doubles and doubles. For earliness, Rubra, semi-double (dark-crimson) is in a class by itself. Madame Geisler, double, (dark-pink) has by far the largest flowers of any grown at Cap Rouge. The ones which were found the best are Festiva Maxima, double (white), Marie Stuart, semi-double, light-pink), La Tulipe, semi-double (pink), Félix Crousse, semi-double (carmine-red), Couronne d'Or, semi-double (white with yellow centre).

PHLOX, PERENNIAL—VARIETY EXPERIMENT

During the last nine years, thirty-seven varieties of perennial phloxes have been tested. This flower is very useful, coming as it does at a time of the year when bloom is getting rather scarce. Perennial phloxes do well on a mellow sandy loam, with southern exposure, such as is given to them at the Cap Rouge Station, and first prize was won with them at the Three Rivers exhibition in 1925. The varieties which have given satisfaction are Selma, rosy-pink with purple-crimson eye; Jeanne d'Arc, a very late pure white; Le Printemps, carmine-rose; Rynstorm, rose-pink; Admiral Jaure, white and carmine; Viking, rose; and Nuée, purple.

TULIPS—GROWING COMMERCIALLY

In 1923, fifty bulbs each of Pride of Haarlem, Reverend Ewbank, Clara Butt, Baronne de la Tonnaye were planted at distances of six inches in rows one foot apart. All expenditure and all revenue have been carefully recorded, and a profit has been shown of $3.61 for two years. In 1925, most of the flowers were blotched and were not marketable, but Pride of Haarlem stood up much better than the others. It was also found that Baronne de la Tonnaye produced blooms which were too small for the trade. This project, which will be continued for at least three years more, was started to find a paying flower coming soon after the narcissus.

TULIP—VARIETY EXPERIMENT

Seventy-six varieties of tulips have been tested during the last ten years from six groups—single early, double early, cottage, Darwin, breeder, Parrot, named here according to their earliness. In central Quebec, the first two mentioned would do well for bedding; the next three for cut flowers; and the last as a garden flower. Amongst the single early, Duchesse de Parma (red and yellow) holds the palm, followed by Pottebakker Scarlet (scarlet). In the double earlies, the two at the head were tested for the first time in 1925; Golden

King (yellow), and Vuurbaak (carmine red, striped black). A new one for Cap Rouge, Mrs. Moon (yellow) was the prettiest of the cottages, but no collection would be complete without the old standbys, Picotee (white and rose) and La Merveille (orange-red). The Darwins are justly the most popular of tulips, and Pride of Haarlem (rosy-carmine) is the best of them, with Clara Butt (salmon-rose), Reverend Ewbank (soft-lavender), Valentin (purplish-mauve) Margaret (blush-white), about equal for second choice; whilst La Noire (very dark-blood-red) is odd, and the much spoken of Painted Lady nothing extraordinary. In breeders, Jaune d'œuf (yellow) is very good, and the greatly advertised Louis XIV is not particularly good. Among the Parrots, Chamoisic Brillant (carmine-red, striped black) and Lutea Major (yellow, striped green) are pretty.

VEGETABLES

Hundreds of varieties and strains of garden vegetables have been tested during the last fifteen years. It is clear that most of them were not suitable for conditions such as exist in central Quebec, also that a great many were alike, differing only in name. Amongst those which are practically sure to give satisfaction are the following: asparagus, Donald Elmira (Dreer); bean, Pencil Pod; beet, Black Red Ball; early cabbage, Copenhagen Market, late cabbage, Danish Ballhead or Roundhead; carrot, Chantenay; early cauliflower, Snow-ball, late cauliflower, Algiers; early celery, White Plume, main crop, Golden Blanching, late, Giant Pascal; corn, Malakoff or Malcolm; cucumber, Davis Perfect; muskmelon, Montreal Market; onion, for forcing, Prizetaker, to sow outside, Wethersfield, for pickling, Bartletta; early pea, Gregory Surprise, main crop, Juno; early potato, Irish Cobbler, main crop, Green Mountain; pumpkin, for tonnage, Jumbo, for quality, Sugar; rhubarb, St. Martin; squash, for tonnage, Vegetable Marrow, for quality, Hubbard, for small gardens, Bush Marrow; tomato, Earliana, and especially Capiana; turnip, white, Milan, swede, Skirving; watermelon, Red Citron, and Cole Early. Out of these vegetables, asparagus, cauliflower, muskmelon, and watermelon should not be grown except by specialists.

Selections have been made of asparagus, bean, beet, cabbage, carrot, corn, onion, pea, tomato, and good seed of most of these is available each year at a reasonable price.

The cultural experiments have shown that, within reason of course, the closer in the rows are such vegetables as beet, carrot, onion, parsnip and turnip sown, the larger is the crop of marketable stuff. Sowing one variety of early bean or of early pea at four intervals of about one week has given about the same results as sowing on the same day four varieties of different seasons. As a protector of cabbage or of cauliflower plants against root-maggots, bi-chloride of mercury has been found the most practical. Blanching celery with soil has proven superior to blanching it either with boards or with special heavy roofing-paper. To protect cauliflower heads against the weather, simply breaking the leaves over them is an efficient method. With onions, sets have given the earliest but the smallest crop, whilst transplanting has produced a great deal more than sowing outside. Contrary to expectations, one-inch sets have yielded more than smaller ones, but tops must be cut before they shoot to seed. With potatoes, the larger the seed-piece was, up to three eyes, the larger the crop. Seed-pieces planted soon after being cut produced as much as others which had been dusted with plaster. In forcing rhubarb, much better results were had when the divided roots were left outside to freeze hard before being brought in. With a variety of tomato having scant foliage, like Earliana, it was a loss of time and of money to stake and to prune. Transplanting tomatoes three times did not produce better results than thinning out the plants, in the flats, to the same

distance as the transplanting was done. To artificially ripen green or half-ripe tomatoes, simply putting them on shelves, in a warm building, gave as good results as more costly methods.

Before choosing a variety, the grower should find out what is most popular on the market where it is intended to be sold, as one variety may produce a great deal more fruit than another but bring less money for the same area planted if there is no or very little demand for it.

FALL SEEDING VERSUS SPRING SEEDING OF VEGETABLES

This experiment has only been conducted twice so that it is yet too early to draw definite conclusions. To date, however, with Detroit Dark Red beet, Copenhagen Market cabbage, Chantenay carrot, Grand Rapids lettuce, Large Red Wethersfield onion, Scarlet White-tipped radish, and Extra Early Purple Top Milan turnip, it is clear that the spring seeding has been much superior. The only time when this was not the case being for carrots sown in the autumn of 1923. Until further data are available, it is recommended to continue sowing the vegetables named in the spring.

ASPARAGUS—VARIETY EXPERIMENT

In 1913, seed was sown in the nursery of eleven varieties and strains; plants were put in during the spring of 1914, and the first crop harvested in 1916. On a warm, naturally drained but rather poor, light sandy loam, the following did not do well: Argenteuil, Barr Philadelphia Mammoth, Batavian, Columbian Mammoth White, Conover Colossal, Donald Elmira (Johnson), Eclipse, Palmetto, Reading Giant. The importance of a suitable strain was well shown in the case of Donald Elmira: for every pound of marketable asparagus from the Johnson lot there was 1.32, or practically one-third more, from the Dreer lot. Of everything tested to date, Donald Elmira from Dreer has been the heaviest yielder; the spikes are green and rather small, however, which may be against it on some markets, but the quality is as good as that of the largest white.

ASPARAGUS—BREEDING

After the trial plots had conclusively shown that Donald Elmira (Dreer) was the heaviest yielder of the eleven varieties and strains tested, cuttings from each plant were weighed separately to find out which male and which female would produce the most. As the weights ranged from 0.5 to 17.0 ounces, the importance of having done this may easily be realized. The following years, only these two champion plants were allowed to produce spears in the whole plantation, all the others being cut early and marketed. This Cap Rouge selection has now been grown two years alongside of Washington, the famous variety produced at the special Asparagus Experiment Station of Concord, Mass., U.S.A., and has produced 1.43 pounds for every one given by the last mentioned, for exactly the same number of clumps. A limited quantity of seed and of plants is offered for sale by the Superintendent of the Experimental Station, Cap Rouge, P.Q.

ASPARAGUS—DISTANCES OF PLANTING

During six seasons, with two varieties of asparagus, Conover Colossal and Washington, three different distances of planting have been tested. When yields are calculated on an acre basis, 24 inches in all directions gives the greatest weight, followed by 18 inches, and by 36 inches. But when the yield per clump is taken into consideration, the more space there is, the larger is the crop, as for each pound produced by plants spaced 18 inches in all directions, there was 1.95

for plants spaced 24 inches in all directions, and 2.84 for plants spaced 36 inches in all directions.

BEAN—VARIETY EXPERIMENT

Only seven out of the seventy-one varieties and strains of garden beans tested since 1911 have been found worthy of further trial. The limas and poles have been discarded because the first were not early enough, and the second were too costly to grow on account of the stakes required. This does not mean that they may not be grown in the home garden, but rather that they will not be a success commercially. Amongst the bush sorts, for nine years Refugee has been the heaviest yielder of the green-podded, but it was only ready seventy-six days after sowing, whilst stringless Green Pod produced from 10 to 15 per cent less crop and was eleven days earlier. Hodson was the highest yielder of all the varieties tested and was ready in seventy-eight days, whilst Pencil Pod, amongst the wax-podded kinds, produced only about four-fifths the yield but was eleven days earlier and was the best liked of all by the dealers and consumers. The most important point to remember is that to make money with garden beans, it is necessary to start with disease-free stock and afterwards to take the utmost care that not only the seed but also the pods have no blotch on them.

BEAN—GARDEN-BREEDING

In breeding garden beans, the experience of fourteen years has been that no lasting success can be attained if the main consideration is not freedom from disease. An exceedingly early strain of Challenge Black Wax was isolated a number of years ago, but not enough attention had been paid to this important point, with the result that the selection later became badly diseased and had to be discarded. Pencil Pod was afterwards chosen, as it had shown much merit, with the result that strains 1 and 12, during the two years 1924 and 1925, when they were in the trial plots, were respectively first and third for yield, though they lost about a week in earliness compared with the mother variety. After three years more, the best of these selections will be put on the market, if it continues to show decided superiority in respect to yield and freedom from disease.

BEAN—METHOD OF SEEDING

The object of this experiment, which was conducted for five seasons, was to compare the yield and the length of time when marketable of one variety, Pencil Pod, sown at four intervals of about a week, with that of four varieties of different seasons, Pencil Pod, Stringless Green Pod, Early Red Valentine, and Refugee, sown on the one day. The results showed a difference of only about 5 per cent for yield, which is negligible, in favour of planting the four varieties, and of four days for length of season in favour of the one variety sown on different dates. This means that both methods of seeding give practically the same results.

BEET, GARDEN—VARIETY EXPERIMENT

Twenty-four varieties and strains of garden beets of different types have been tested since 1911. On a rather shallow loam, Eclipse has outyielded Crosby Egyptian, Long Red, Half Long Red, Detroit Dark Red, and Black Red Ball, which were the only ones deemed worthy of being in the trial plots during 1925. It seems probable, however, that in a deeper soil, the half long and long types would do better. Though Eclipse has given 60 per cent more pounds of roots than Black Red Ball, it would probably have brought less money on the Quebec market, as it is not popular there on account of its comparatively large size and rather dull colour. The best seller of the lot has been

Black Red Ball, as the biggest demand is for a dark-fleshed beet of about two inches in diameter. With market vegetables, yield is not the only thing to have in view.

BEET, GARDEN—IMPROVEMENT BY SELECTION

As Eclipse had proved the heaviest producer in the trial plots, work was commenced with it, but when, aftrewards, it was found out that a small, smooth, dark-fleshed variety like Black Red Ball brought more money for the same area planted, though a lower yielder, it was substituted. From roots selected in 1915, seed was grown in 1916, roots in 1918, seed in 1919, roots in 1921, seed in 1922, roots in 1924, roots and seed in 1925. This means that five selections of roots have been made, and it is clear that the strain is now more uniform than it was at the start. A small quantity of seed is offered each season at a reasonable price, quality considered.

BEET, GARDEN—SEED-PRODUCTION

The beet is a biennial which produces a root the first year and seed only the second year. As varieties freely intercross, only one should be used in seed-production. At Cap Rouge, garden beet seed has been grown for eight seasons from Eclipse at first, but later from Black Red Ball, as it was found that the latter variety was in much greater demand on the large markets of central Quebec. It would be quite easy for any farmer to put aside half a dozen of the best-shaped roots, in the autumn, to cut a small piece from each in the spring so as to find the darkest-coloured, and to plant two or three for seed-production. Packets of seed can be secured at a very low figure of the Cap Rouge selection of Black Red Ball. Special circular No. 12 gives directions as to growing the seed, and can be had for the asking.

BEET, GARDEN—THINNING EXPERIMENT

For five seasons, either Black Red Ball, Detroit Dark Red, or Eclipse garden beets, sown the same day, were later on thinned respectively to 2, 3, and 4 inches, to find out which was the best distance as far as tonnage was concerned. The yield was at the respective rates of 36,221 pounds, 36,730 pounds, and 30,899 pounds per acre. There is nothing gained in giving too much space, and market demand calls for a beet of two inches diameter.

CABBAGE—VARIETY EXPERIMENT

Leaving aside the Savoy and Red cabbages, which are not very popular in central Quebec, the others are generally divided by growers into four groups, very early, early, medium and late. Thirty-six varieties and strains have been tested since 1911, with the result that four have shown unmistakable superiority over the others for an average of 15 years: Jersey Wakefield, ready for use 117 days after sowing and yielding at the rate of 38,262 pounds per acre; Copenhagen Market, 120 days and 40,850 pounds; Succession, 132 days and 52,012 pounds; Danish Roundhead, 150 days and 55,127 pounds. It will be remarked that the production goes up as the time required to be ready for use lengthens. For all practical purposes, Copenhagen Market, to sell during the autumn, and Danish Roundhead, from then until spring, are a very good combination.

CABBAGE—BREEDING

There is no doubt that of all the varieties tested, the roundheads, or ball-heads, as they are generally called, have been the heaviest yielders and best keepers during winter. From seed which originally was supplied by Hartmann,

a crop of Danish Roundhead was raised in 1915, since which time selection has gone on practically every year. As the heads are culled for uniformity both in the autumn and in the spring just before planting, not only type but keeping qualities have been improved. It happened that a good strain was isolated for superior yield, as the average production, during the last four years when it was grown alongside of the well-known Danish Ballhead from Reed Brothers, was a little higher. Seed of this Cape Rouge strain is for sale at a reasonable price each year.

CABBAGE—SEED PRODUCTION

It is perfectly feasible and quite easy to produce cabbage seed in central Quebec, because it has been done at Cap Rouge practically every year during the last ten seasons. The main points are to pull the roots with the heads in the autumn, and to keep in as good condition as possible until planting-time the next spring. It is better to put in at least two cabbage varieties, so that the flowers of one may be crossed with those of another. Whoever is interested will find full directions about growing cabbage for seed in special circular No. 12 of the Dominion Experimental Farms. Any farmer or market gardener can get all the seed he requires on a very small piece of ground and at practically no extra cost. And he would most naturally soon evolve a strain better suited to his particular conditions.

CABBAGE—PROTECTION FROM ROOT-MAGGOTS

For five years three lots of cabbages have been compared, one not protected, the other protected with tar paper disks, and the last one with cheese-cloth covers. The last mentioned were the most affective, saving 118 plants to every 100 for the tar paper disks. The disks cost more than the surplus crop was worth, so that they were left aside as not practical commercially. Then, during five other seasons, tar-paper disks were compared with the bichloride of mercury treatment which was beginning to be widely advocated. Both were practically perfect protectors as 100 per cent was saved with the bichloride and 99 per cent with the disks. Before using the bichloride, people should understand that it is a deadly poison, all the more dangerous because it is colourless in water; also that it should be carried in wooden or earthern vessels, as it will eat through metal. An ounce should be dissolved in ten gallons of water, or, for small quantities, an ordinary tablet per pint. Half a cup should be applied around each plant three or four days after they are set in the field, and one or two more applications made at intervals of about a week.

CARROT, GARDEN—VARIETY EXPERIMENT

Twenty-five varieties and strains of garden carrots have been tested since 1911 of the three groups, long, intermediate, and short, with the result that the following have been discarded. Coreless, Danvers, French Horn, Nantes, New York Market, Scarlet Horn, Scarlet Intermediate and St. Valery. The ones which have given the best satisfaction are the following, for which average figures are given covering a period of eight seasons when they were compared in the trial plots: Hutchison, long, yielding at the rate of 41,146 pounds per acre and ready for use in 73 days after sowing; Chantenay, half long, 37,206 pounds, 72 days; Guérande (sometimes named Oxheart), short, 32,761 pounds, 72 days. If yield only is considered, Hutchinson is the best, but it is found too long and too large on the big markets of central Quebec; for forcing or very early use, Guérande just fills the bill, but it is a low yielder; Chantenay, half long, is intermediate as a producer, but as its shape and appearance make it a favourite with most consumers, it is recommended.

Chantenay has been selected at Cap Rouge (six cullings of roots having been made) and a certain improvement is shown. A small quantity of seed is available for sale.

CARROT GARDEN—SEED PRODUCTION

Garden carrot seed has been produced on five different occasions at Cap Rouge, and the same thing can be done practically every year by anybody in central Quebec. Half a dozen of the best shaped and more uniform roots, not trimmed too close, may be stored in a box of sand in the cellar of the house, and three or four of them planted as early as possible the next spring. As seed of carrot ripens quite unevenly, one should watch the plants and gather it as soon as each head ripens. It takes so little time to be assured of a strain suited to local conditions, that it is a wonder the practice of growing seed required for the garden is not more widely practised.

CARROT—THINNING EXPERIMENT

An experiment conducted for five seasons with Chantenay, a half-long garden carrot, on a sandy loam of average fertility but in very good tilth, has shown that the yield decreased as the space between plants increased. The production was at the rate of 25,178 pounds of roots per acre when plants were thinned to one inch in rows 30 inches apart, 24,192 pounds when thinned to two inches, and 23,067 pounds when thinned to three inches.

CAULIFLOWER—VARIETY EXPERIMENT

Since 1911, ten varieties and strains of cauliflower have been tested, and the results clearly show that for conditions such as generally exist at Cap Rouge (that is a comparatively short season with a more or less long period of dry weather during summer) the late ones will give much the better satisfaction. For instance, the two early ones for an average of four seasons have done as follows: Erfurt, 26 per cent of marketable heads averaging 0.54 pound each; Snowball, 37 per cent of marketable heads averaging 0.64 pound each, whilst the figures for the late ones were 65 per cent of marketable heads averaging 1.05 pound each, for Algiers, and 67 per cent of markeable heads averaging 1.31 pound each for Monarch. This is one of the most difficult vegetables to grow profitably, and only the expert should go into it on a large scale.

CAULIFLOWER—PROTECTION FROM ROOT-MAGGOT

During five seasons, eight different tests have been made, five times with Snowball and three times with Erfurt, and the results unmistakeably show that it pays to protect cauliflower plants from root-maggots. What kind of protection to give is the main question. The three lots compared averaged as follows: not protected, 34.84 per cent of the plants saved, with a production at the rate of 8,387 pounds of marketable heads per acre; protected with tar-paper disks, 35.97 per cent saved; 9,693 pounds; protected with cheesecloth covers, 50.25 per cent saved, 10,652 pounds. The cheesecloth covers seemed to cut down size of heads which averaged 1.66 pounds, whilst those from the unprotected lot went up to 2.07 pounds, which lowers considerably the advantage gained by saving more plants. The reader is referred to the same experiment with cabbage, and it is recommended that bichloride of mercury also be used in this case.

CAULIFLOWER—PROTECTION FROM WEATHER

Seven tests with Snowball, during as many seasons, show that it is well to protect cauliflower heads from the weather, if a merchantable article is expected. Yield, with vegetables, is only a second consideration, whilst quality and appearance are necessary to make a profit. In this case, large, dark, buttony heads would not be marketable at any figure whilst a less number of white and smooth heads would bring a good price. There did not seem to be much difference in the percentage of marketable plants from any of the protected lots, with leaves broken over the head, leaves tied over the head with twine, and leaves held over the head with tooth picks, and as the first mentioned method is the easiest and least costly, it is recommended.

CELERY—VARIETY EXPERIMENT

Out of the thirteen varieties and strains tested since 1911, the following have been discarded. Evans Triumph, French Success, Noll Magnificent, Paris Golden Selected, Paris Golden Yellow, Rose-Ribbed Paris, Winter Queen. The three outstanding ones have been: White Plume, for use early in the season, with an average production at the rate of 21,376 pounds per acre during nine years; Golden Self-Blanching, to be sold before January, as it will not last much longer, 23,025 pounds; Giant Pascal, a green one, the best keeper, 29,917 pounds. When samples were sent to the largest retailers of Quebec city, they invariably placed White Plume first, Golden Self-Blanching second, and Giant Pascal third.

CELERY—BLANCHING EXPERIMENT

Blanching celery may have an effect on yield and on appearance. During ten seasons, two with Paris Golden Yellow and eight with Golden Self-Blanching, three methods were compared: with soil, with boards, with heavy roofing-paper. For every 100 pounds of crop from the lot banked with soil, there were only 88 pounds for the lot blanched with boards, and 84 pounds for the lot blanched with paper, which is quite decisive as regards yield. The question of appearance was left to three of the best retailers in Quebec city, and every one of them gave the preference to the lot banked with soil. This method has the further advantage of protecting against light frost in the autumn better than the two others.

CORN—VARIETY EXPERIMENT

Practically all the well-known varieties and strains of corn have been tested at Cap Rouge during the last fifteen years and the proportion of discarded ones is about seven to each one kept for further trial. The ones which have some outstanding merits, each in its own sphere, are Early Malakoff (since superseded by Early Malcolm) which was ready for use ninety-one days after sowing and produced ears at the rate of 25,429, for an average of thirteen years, whilst for the same seasons the figures were 104 days and 23,083 ears for Golden Bantam, and 124 days and 14,557 ears for Country Gentleman. When a splendid variety of sweet corn can be had which will be ready for the table, on an average, three months after sowing, it seems folly to grow tasteless corn like Adams which is about five days later.

CORN—BREEDING FOR YIELD

Selections have been made practically each year, from Malakoff seed sent to Cap Rouge in 1911 by the Experimental Farm at Ottawa, with the result that the present strain is at head of all tested on the central Quebec Station. There is only another variety which is earlier, Pickaninny, but it is black, which

is strongly against it on most markets, and it has only yielded at the rate of 1.7 ear per stalk, weighing 0.19 pound each. The figures for Malakoff were 2.1 ears weighing 0.35 pound each. The Cap Rouge selection of Malakoff is fully as good as Golden Bantam for quality, is about twelve days earlier, and produced an average of 2.1 ears with a total of 0.73 pound per stalk compared with 1.5 ears with a total of 0.55 pound per stalk. This means that Malakoff is the equal of Golden Bantam for quality, and its superior for earliness and yield.

CUCUMBER—VARIETY EXPERIMENT

Practically all the well-known varieties and strains of cucumbers have been tested during the last fifteen years, but only one out of five judged good enough for further trial in 1925. For pickling, Chicago is good, but it will grow much too large if not picked often. An average for five years shows varieties yielding at the following rates per acre: Giant Pera, 30,086 pounds: Cool and Crisp, 28,069 pounds; Fordhook Famous, 24,924 pounds; Davis Perfect, 24,117 pounds. The last named was the best-liked on the Quebec market and would probably have brought the most money per acre though producing the least.

MUSKMELON—VARIETY EXPERIMENT

From 1911 to 1918 inclusively, when muskmelon seed was sown directly outside, only one crop was produced, so that it is certain that this method does not suit most of central Quebec conditions. Since that time, plants have been started earlier under individual cold-frames, but even from this treatment the results have not been encouraging. Beginning with 1926, plants from these cold-frames will be compared with others started in hot-beds. In the meantime, nobody should go into the growing of melons for commerce in central Quebec, unless he is an expert at the work. The results at Cap Rouge have shown the little Early Green Citron to be the surest of producing a good crop, but it will not bring much money. Amongst the real commercial varieties, Hackensack and Montreal Market have given the best satisfaction.

WATERMELON—VARIETY EXPERIMENT

Out of the varieties of watermelons tested since 1911, the following have been discarded because others, which were kept, possessed the same qualities in a higher degree, or were positively superior in some respect: Harris Early, Monte Christo, Phinney Early, Salzer Earliest. The culture of watermelon is not recommended in central Quebec because the season is too short, and even if matured fruit could be had in fair quantity, by starting in hotbeds, it would come on the market after the season for watermelons is normally passed, when there would be very little demand for the crop. For the home garden, or for the expert with a special clientele, Red Citron, Cole Early, Ice Cream, Florida Favourite are recommended, in the order named.

ONION—VARIETY EXPERIMENT

During the last fifteen years, twenty-four varieties and strains of onions have been tested, comprising the different shapes, flat, oval, globular, and the various colours, from dull white to dark red. When seed is started directly in the field, and taking into consideration the keeping quality of the bulbs during winter, Red Wethersfield will give the most satisfaction, that is, it will probably bring more money for the same area of ground than any of the others. But it was found that two things influenced production very much: the source of seed, and the transplanting. The Red, White, and Yellow Globes have averaged

more per acre than Red Wethersfield, because seed of these was produced by a master breeder whilst that of the latter was just ordinary commercial stuff. Prizetaker heads the list for production, and this is perhaps due to the fact that seed was started in hotbeds and plants were later on put in the field, but if all sown directly outside, the season would have been too short for it. The varieties recommended are Red Wethersfield, for the ordinary grower, Prizetaker for the special market gardener, and Barletta for pickling.

ONION—BREEDING

Work at this project was begun in 1912, since which time seven careful selections of bulbs have been made in the autumn, and as many more in the spring before planting time. The results are that a strain has been isolated which is more uniform than the average crop from commercial seed, and possibly has very good keeping qualities, because only the bulbs which have wintered well are used as future seed-bearers. The variety used was Red Wethersfield and it is fortunate that the trial-plots have shown it to be the best for central Quebec. However, yield is a prime requisite in onions, and the Cap Rouge selection will have to show not only uniformity but productivity before it is offered for sale.

ONION—SEED PRODUCTION

Onion seed has been produced seven different times at Cap Rouge during the past few years and there is no doubt that this may be done practically every season by farmers, truck-growers, and market-gardeners. An advantage in growing one's seed of onion is that a more uniform strain will gradually be evolved. Another important point is that, possibly, the selection of the best bulbs in the spring will have some effect on the keeping qualities of the crop. Detailed information about growing onion seed will be found in special circular No. 12 of the Dominion Experimental Farms, which circular may be had from the Publications Branch, Department of Agriculture, Ottawa.

ONION—SEED VERSUS SETS

An experiment was conducted eight times, during five seasons, with Prizetaker, Red Wethersfield, and Yellow Danvers, to find out which would give the earliest crop, also the largest yield, of the three following methods: Sowing directly in the field, sowing in hotbeds and transplanting, planting sets. There is no doubt about which method gives the earliest crop, as that from the sets was ready for use, on an average, on August 7, whilst it was not before the middle of September that marketable onions could be had from the sown or from the transplanted lots. When it came to yield, however, the sets only produced at the rate of 13,715 pounds per acre, whilst sowing gave 24,977 pounds, and transplanting 44,622 pounds. With hotbeds, and manual labour at a reasonable price, transplanting will give the best results, but every grower must decide for himself, according to his own special conditions, which will bring the most profit.

ONION—BEST SIZE OF SETS FOR PLANTING

By referring to the last section it will be seen that sets will produce less but will give a much earlier crop of onions than either sowing or transplanting. But the question is what size of set to use. The results of eleven tests, made during five seasons, with Early Red, Prizetaker, Red Wethersfield, and Yellow Danvers, give an average production at the rate of 14,274 pounds of onions per acre for 1-inch sets, 13,767 pounds for ¾-inch sets and 9,324 pounds for ½-inch sets.

This was as not expected as generally onions run to seed when grown from sets over ½ inch in diameter. But, with this project, the tops of plants were cut before they developed too far, which prevented the production of seed.

ONION—THINNING EXPERIMENT

This experiment was conducted thirteen times, during five seasons, with Early Red, Prizetaker, Red Wethersfield, and Yellow Danvers, on a naturally poor but well-manured sandy loam in practically perfect tilth. In rows one foot apart, the average yield was at the rate of 24,462 pounds of bulbs per acre when plants were thinned at 1 inch, 24,585 pounds at 2 inches, and 22,039 pounds at 3 inches. With onions, as with practically all other garden vegetables, the yield decreases when the space between plants increases, of course within reasonable limits.

PARSNIP—BREEDING

In general, it is hard to find a uniform strain of parsnip and this is why the present project was started in 1914 with seed from Graham. There has been a difficulty in growing the seed, however, as an insect very often destroys seed-bearing plants, and only five selections have been made to date. It must be admitted that there has not been much improvement yet, but the work will be continued. The variety chosen is the well-known Hollow Crown.

PARSNIP—THINNING EXPERIMENT

This experiment was conducted during five seasons with Hollow Crown parsnips grown in rows thirty inches apart on a rather poor but well-manured and well-tilled sandy loam. The average yields of roots were at the rate of 34,947 pounds per acre when plants were thinned to 2 inches, 30,198 when thinned to 3 inches, and 29,825 at 4 inches. As for most other garden vegetables, the crop decreased as the distance between plants increased.

PEA, GARDEN—VARIETY EXPERIMENT

The edible-podded sorts are not well enough known in this country to be taken into consideration. During the last fifteen years, more than seventy varieties and strains have been tested, including the different colours of pea, the smooth and wrinkled, the various classes of climbing, semi-dwarf, dwarf; also the early, midseason, and late. For colour of pea, the greens are much more attractive than the lighter ones and should be grown instead of the latter. The smooth have not the flavour of the wrinkled and as there are varieties of these which are as early, the former should be left aside. Commercially, it costs too much to grow the tall pea and this sort should be discarded. Amongst the very early, Gregory Surprise is recommended; for an average of eight years, it has been ready to use in fifty-eight days compared with sixty days for Sutton Excelsior. For the main crop, Juno has been the heaviest yielder, producing, for an average of fourteen years, at the rate of 1,763 quarts of shelled peas per acre and being ready in seventy-three days, compared with 1,578 quarts and seventy-three days for Stratagem.

PEA, GARDEN—BREEDING

During five years, 903 individual plants of Juno, which had proved the highest yielder in the trial plots, were examined, and after progeny tests had shown one strain to be the best, it was multiplied. In 1925 it was the highest yielder, and if it continues to show superiority for production during at least the next four years, it will be offered for sale. That this progeny test eliminated

low-yielding strains, which would have brought down the average, is shown by the fact that the first year, the lowest strain, compared with the highest, was as 100 to 251, the second year, 100 to 179, the third year, 100 to 155, the fourth year, 100 to 117. As selection advanced, the difference between the yielding power of different strains decreased.

PEA, GARDEN, OF DIFFERENT SEASONS VERSUS ONE VARIETY SOWN AT DIFFERENT DATES

To have green peas ready for market during a comparatively long period means that an early variety must be sown at various intervals or that varieties of different seasons must be sown the same day. This experiment was conducted during five seasons to find out which was the best way to plant. Thomas Laxton, Gradus, Advancer and Stratagem, put in the same day, yielded around 12 per cent more green-shelled peas and lengthened the season some five days, on an average, compared with Thomas Laxton sown at four intervals of about one week. If four varieties are used, and give satisfaction, it is safer to save seed of each of them, as one is not always sure of getting the same strains year after year, and a difference of a few days in the time to get ready for use would make quite a gap in the constant supply of green peas for market.

POTATO—VARIETY EXPERIMENT

During the last fifteen years, more than eighty so-called varieties of potatoes have been tested and only seven had been deemed worthy of further trial in 1925. The highest-yielder amongst those which have been tried at least five years is Dooley. In general, too many sorts are grown in a district, and this keeps away buyers who want to get at least a carload of the same class of tuber. The varieties recommended, up to the present, have been Irish Cobbler for an early crop, and Green Mountain for a late one. The first is roundish, white, and of medium size, whilst the second is oblong, white, and large. The main point is to start with disease-free tubers and to afterwards keep disease away, as this is probably the main factor affecting the yield of potatoes.

POTATO—HILL SELECTION FOR SEED

During eleven years, a vast amount of work has been done to isolate a heavy-yielding strain of Green Mountain potato, and though the results have not been great, a great deal of light has been thrown on the question of selection. One thing has been ascertained; that for conditions such as generally exist at Cap Rouge (a rather light warm soil, a usual drought during midsummer, and occasional periods of "muggy" weather) potatoes are very subject to disease, and the hope of getting a heavy-yielding strain is probably in isolating a disease-resistant one. In certain quarters it is said that the rather cool moist air of eastern Quebec is more congenial to the growing of the potato plant, and this is in part corroborated by the fact that selections made at Cap Rouge, grown for a year or two about 100 miles down the St. Lawrence, yield more for a season or two when brought back than the same selection continuously grown at Cap Rouge. But the problem is not solved yet.

POTATO—SEED TREATED WITH PLASTER VERSUS NOT TREATED

It is a custom with some growers to dust land-plaster on potato seed-pieces before planting them, and many believe that this is essential for the production of a good crop. An experiment conducted at Cap Rouge for five seasons has proved that it is not necessary to go to this trouble if the potatoes are planted soon after they are cut. The results showed that the lot treated with land-

plaster yielded, on an average, at the rate of 12,071 pounds per acre whilst the lot not treated gave 12,493 pounds. As the difference is not more than probable experimental error, it shows that the treatment was useless.

POTATO—DIFFERENT SIZES OF SETS

An experiment has been conducted for five years on a naturally poor but well manured sandy loam in a very good tilth to discover (under these conditions in central Quebec) the best size of seed-piece to use in planting potatoes. The average production in pounds was at the following rates per acre: cut to three eyes, 14,783; cut to two eyes, 13,313; small potatoes, 12,639; cut to one eye, 11,996. The results were that the crop increased with the weight of seed-pieces, as the small potatoes were not as heavy as the pieces cut to two eyes, but heavier than those cut to one eye. Small potatoes may be used for seed if from healthy plants that also produce large tubers, but small potatoes should not be planted if from diseased plants that yield all small tubers. When one does not know from what type of plant they come from, it is safer not to use small potatoes for seed.

PUMPKIN—VARIETY EXPERIMENT

After testing all the best-known varieties, it has been found that the ones giving the highest yields can hardly be given away and that there is no money in growing them for market. Large Field, Jumbo, and Mammoth will produce around 25 tons to the acre but a very small number can be sold even on the markets of Quebec, with a population around 120,000. Varieties like Small Sugar, or Sugar, will only average 15 tons per acre, perhaps less, but there is a demand for them and they will pay more acre for acre than the larger ones.

RHUBARB—VARIETY EXPERIMENT

There is a great difference in the producing capacity of different varieties on the rather dry sandy loam of the Cap Rouge Station. For an average of five years, Monarque yielded at the rate of 11,815 pounds of marketable rhubarb per acre; Linnæus, 14,729; Victoria, 19,793; Prima Donna, 19,929; Hobday Giant, 28,868; and St. Martin, 36,463. Only the last two are now tested. St. Martin is strongly recommended because it is a heavy yielder, has large stalks, and does not come to seed early. It is a dull green, and this is against it; but tests have shown that some red varieties, like Hobday Giant, for instance, do not keep their colour and are of the same tint as St. Martin when cooked.

RHUBARB—FORCING

The object is to compare, for forcing, roots of rhubarb brought in the cellar before heavy frosts with others left outside until frozen hard. Each lot is forced in two different ways, planted in soil, and placed between layers of straw. The results of four tests show that for every pound of crop produced from the roots brought in before freezing and forced in soil, there were 3.09 pounds from the lot brought in before freezing and placed between layers of straw, 14.17 pounds from the lot left to thoroughly freeze before being brought in and placed between layers of straw, and 17.29 pounds from the lot left to thoroughly freeze before being brought in and forced in soil. There is no question but that roots of rhubarb should be left to freeze hard out-of-doors before being brought into force.

SQUASH—VARIETY EXPERIMENT

During eleven seasons, twenty-nine varieties and strains were tested, with the result that the Crooknecks and the Scalloped were left aside, because they are low yielders, have only a small proportion which is edible, and have nothing to recommend them except that they are odd. Amongst the other kinds, the heaviest yielders have been the Long Vegetable Marrows, followed by the Hubbards, the latter with a production of a little over half of the first mentioned, and the Bush Marrows on about equal terms with the Hubbards for yield. If tonnage alone is required, the Long Vegetable Marrow is the best; if grown for a market like Quebec City, the Hubbards will sell much better and bring more money than anything else for the same area; if the space is limited in the garden, nothing equals the Bush Marrow which grows erect and does not trail like the other sorts.

TOMATO—VARIETY EXPERIMENT

To be profitable in central Quebec, where the frost-free season is rather short, a variety or strain of tomatoes must not only be very early but should give a comparatively large proportion of ripe fruit in the first part of the season, when prices are high. Out of some eighty which have been tested during the last fifteen years, the ones which have done best have been strains of Earliana. This variety, as is well known, does not produce as smooth a fruit as one would like to see, but there is nothing known at the present time which can compare with it for a profitable tomato where the season is short. The Cap Rouge selection, which has been named Capiana, has given more money per acre than any of the others, because it yields a large proportion of its ripe crop in the first part of the season.

TOMATO, BREEDING

In 1911, seed was procured from Burpee, and the work of selection has been kept up ever since. An idea of the work entailed in isolating a strain suited to districts with short seasons may be had when it is known that in just one out of the fifteen seasons 260 different weighings were made. This Cap Rouge selection has averaged about 10 per cent more ripe fruit than Alacrity during the last five years, and has given a larger proportion of marketable crop early in the season when prices were high. It has been named Capiana and has given satisfaction wherever the frost-free season is short—even in the Yukon. The price is 25 cents per packet of 100 seeds.

TOMATO—TRANSPLANTING ONE OR MORE TIMES

This experiment was conducted during seven seasons with two strains of Earliana. Seed was sown in flats, and plants grown in the greenhouse until the weather permitted to transfer the flats to hotbeds where plants were hardened before being set out in the field. The results show that the lot not pricked out yielded at the rate of 29,741 pounds of ripe fruit and 26,161 of green, forming a total of 55,902 pounds per acre; pricked out once, ripe, 29,792, green, 28,027, total 57,819; pricked out twice, ripe, 31,374, green, 26,662, total, 58,036; pricked out three times, ripe, 30,299, green, 27,310, total, 57,609. These figures show that the difference, either for total crop or, which is very important, for the crop of ripe fruit, was never much above 5 per cent in favour of one or more transplantings, which is not more than the possible experimental error.

TOMATO—METHODS OF PRUNING

This experiment was conducted during seven seasons with strains of Earliana. When the plants were not pruned the average yield was at the rate of 27,301 pounds per acre of ripe fruit and 21,601 of green; pruned to two stems, foliage intact, 13,178 ripe and 8,898 green; pruned to two stems, part of foliage removed, 10,750 ripe and 6,656 green; pruned to one stem, foliage intact, 10,915 ripe and 5,858 green; pruned to one stem, part of foliage removed, 7,885 ripe and 4,417 green. The results show that the crop, both of ripe and of green fruit, decreased as the amount of pruning increased. The reason, probably, is that the foliage is the manufacturing part of the plant and that it cannot manufacture as much if part of it is removed.

TOMATO—METHODS OF TRAINING

An experiment conducted during seven years has shown the crop of both ripe and green fruit to be heavier when a variety of tomato having scant foliage, like Earliana, is not trained. Thus, it may be said that training does not pay. But if conditions are not the same as at Cap Rouge, that is if the land is very rich, if a tall variety is used having lots of foliage, or if space must be economized in the home garden, training may be advisable. This is why two methods were compared, with the following results: trained to individual stakes, plants produced, on an average, at the rate of 9,015 pounds of ripe and 14,981 pounds of green fruit per acre, whilst the figures were respectively 10,050 and 16,545 for plants trained to horizontal wires with posts every fifteen feet or so.

TOMATO—METHODS OF ARTIFICIALLY RIPENING

Where the season is short, as in central Quebec, there is always a large proportion of the tomato crop which is still half ripe or even green when danger from frost is imminent. The present project was started to compare different methods of artificially ripening this fruit, and has been conducted during seven seasons with two strains of Earliana. The results show that, with half-ripe tomatoes, 95.3 per cent were ripened when simply placed on a shelf in a warm building, 95.3 per cent when put in a box covered with glass, 93.3 per cent when put in a box tightly closed with a wooden lid; with green tomatoes, the respective percentages were 91.3, 88.3, 94.9. This means that one need not go to any more trouble than simply to put the fruit, be it green or half ripe, on a shelf in an ordinary warm building.

TURNIPS, GARDEN—VARIETY EXPERIMENT

The regular garden turnip such as Purple Top Milan is not liked on the Quebec market, but for those whom it will interest it may be said that, for an average of nine years, it yielded at the rate of 33,751 pounds per acre and was ready for use fifty-two days after being sown. Amongst the purple-top swede turnips, Skirving is well liked but it is not yet well known in the district. Either Bangholm or Good Luck would do very well, if care be taken to pull them before they get too large and woody.

TURNIP—THINNING EXPERIMENT

This experiment was conducted during four years, with Favorite, Good Luck, Purple Top Milan and Sutton Purple Top, on a sandy loam of average fertility but well manured and in good tilth. The average production was at the rate of 58,988 pounds when plants were thinned at 2 inches, in rows 30 inches apart, 51,558 pounds at 3 inches, and 39,170 pounds at 4 inches. Of course, garden turnips are sold during the summer, when about 1½ inches in diameter, and if the purple-tops are grown with the idea of keeping them for winter, they should be left longer in the ground and given more space.

CEREALS

Practically all the best known varieties of small grains, flax, beans, and peas which might have a chance of doing well in central Quebec were tested carefully at Cap Rouge during the last fifteen years. The ones which have shown decided superiority are the following: barley, Manchurian; bean, coloured, Norwegian, white, navy; flax, for fibre, Longstem, for seed, Novelty; oats, Banner; pea, coloured, Solo, white, Arthur; wheat, Huron. Selections have been made of Manchurian barley, Banner oats, Huron wheat, and Arthur pea.

The mixtures of barley and oats, barley, oats and wheat, and peas and oats have yielded less, for averages of three and five years than any one of the components of the mixture sown alone.

With oats, the percentage of hulls was taken of the varieties which were at the top so as to arrive at the yield of kernels in pounds per acre. The old Banner stood its ground well, as varieties with a lower percentage of hulls, such as Alaska, produced so much less grain per acre that the total number of pounds of "meat" was lower.

For live stock feeding, barley and wheat cannot successfully compete with oats or peas in this district, because they do not yield enough digestible nutrients per acre. There may be special cases, as where a farm has soil specially adapted to these, or if a farmer has a good market for seed, when it will pay to grow barley or wheat in central Quebec, but it is probable that oats will for a long while yet, continue to be the main cereal of the district. Peas produce so much protein, by far the most costly part of rations, that they should be grown on a much larger scale for live stock feeding.

BARLEY—TEST OF VARIETIES OR STRAINS

Barley does not yield enough, in central Quebec, on the average farm, compared with other grains, to make it profitable to grow for live stock feeding. For an average of thirteen years, it has only yielded at the rate of 1,541 pounds of grain per acre, whilst wheat gave 1,596, field peas 2,158, and oats 2,307. It has approximately the same percentage of crude protein as oats and wheat, but not half that of field peas; and though it contains about 3 per cent more digestible nutrients than peas, and 9 per cent more than oats, this slight advantage still leaves it far behind when it comes to total digestible nutrients per acre. Of course, there are exceptions to all rules, and each farmer must decide for himself if the soil of his farm is specially adapted to barley, or if he can get a good price for it for malting purposes; or again if he requires this grain for swine-feeding. With the exception of Early Chevalier, the six-rowed varieties have been earlier and have yielded more. Amongst these, O.A.C. 21 and Manchurian have done the best, being beaten only by the Cap Rouge selection of the latter, details on which are given in the next section.

BARLEY—PRODUCTION OF SUPERIOR VARIETIES OR STRAINS BY SELECTION

In 1913, selection was started with Manchurian which was then probably the best six-rowed barley which could be recommended for central Quebec. A uniform and high-producing strain has been isolated which has outyielded for seven years the best varieties tested alongside of it, as will be seen by the following figures: Manchurian Cap Rouge 14 gave, on an average, 1,849 pounds of grain per acre, Early Chevalier, 1,776, and O.A.C. 21, 1,763. Seed of the Cap Rouge selection is offered for sale each year in sealed bags of 2 bushels each, or 96 pounds, at a reasonable price.

BEANS, FIELD—TEST OF VARIETIES OR STRAINS

Beans did not produce at Cap Rouge as much digestible nutrients nor protein per acre as peas, so that they may only be considered as a crop for human consumption. Importations at rather low prices from foreign countries have

pulled down profits until every farmer must now decide for himself whether he should grow them or not. Care should also be taken to have a variety which will suit the market of the district, as coloured beans may not sell in one place or white ones in another. For an average of five years, the yield has been at the following rates per acre. Norwegian, yellowish brown, medium size, 1,996 pounds; Navy A, white, medium to large, 1,800; Large White, white, large, 1,532; Beauty, white with yellow spots, medium to small, 1,389.

FLAX—TEST OF VARIETIES OR STRAINS

Until machines are used to cut down manual labour in the production of flax, it is believed that this crop cannot compete for profit with others now generally grown in central Quebec. However, repeated trials at Cap Rouge, on acre plots, have shown that conditions of climate and soil are favourable to the production of flax for fibre in this part of the country. Longstem, for an average of six years, has only yielded seed at the rate of 601 pounds per acre, compared with 880 for Novelty, but as the plants are about 50 per cent longer, with very few branches, it is recommended for fibre. During the last six years, Premost has been compared with Novelty for seed-production, but has only averaged 1,181 pounds per acre to 1,453 for the latter, which is thus the better in this respect.

OATS—TEST OF VARIETIES OR STRAINS

For an average of thirteen years, at the Cap Rouge Station, on soils varying from a sandy to a clayey loam, oats yielded at the rate of 2,307 pounds of grain per acre compared with 2,158 for peas, 1,596 for wheat and 1,541 for barley. For digestible nutrients it is thus about equal to peas and much higher than wheat and barley, and there is no doubt that it will, for a very long time, continue to be the main grain crop of central Quebec. Tests of five years' duration have shown that the yield diminishes with the number of days it takes for the crop to mature, a very early variety like Eighty Day averaging only 1,991 pounds of grain per acre compared with 2,191 for an early sort like Daubeney, and 2,384 for a later one like Banner. Another test of five years has proved that the side oat, Leader, produced about 15 per cent less than an open-headed kind like Banner. Still another test of five years showed that a hulless sort like Liberty will only give about half the quantity of grain produced by a hulled one like Banner, and there is certainly not this difference in the hulls of the latter. Amongst the midseason varieties of the hulled, open-headed kind, the three which have shown decided superiority are Banner, Gold Rain, and Victory, in the order named. Banner is strongly recommended, and it is hoped that it will one day be grown to the exclusion of all others, not only in central Quebec, but in most of the province, unless decidedly better sort be introduced.

OATS—PRODUCTION OF SUPERIOR VARIETIES OR STRAINS BY SELECTION

In 1916, the work of selection commenced, and in 1921, Banner Cap Rouge 31 was placed in the trial plots for the first time alongside the best varieties. For an average of four years, it has yielded at the rate of 2,408 pounds per acre, whilst Victory gave 2,115, Banner Ottawa 49, 2,002, and Gold Rain, 1,959. This Cap Rouge selection will be in the trial plots in 1926, and if it continues to show such decided superiority over the best sorts, it will be placed on the market at a reasonable price.

DETERMINATION OF PERCENTAGE OF HULL IN OAT VARIETIES

It is possible that varieties best suited to certain conditions of climate and soil will develop their kernels better and thus have a lower per cent of hulls in a certain district than they would in another where the environment is different

This is why the relative proportion of hulls, for different varieties, may not be the same all over the country. At Cap Rouge, for an average of five years, the percentage of kernel and the pounds of kernel per acre have been as follows, for five of the best known varieties: Banner, 71.28 per cent, 1,784 pounds; Gold Rain, 73.52 per cent, 1,746 pounds; Victory, 71.59 per cent, 1,730 pounds; Alaska, 77.78 per cent, 1,477 pounds; and Longfellow, 69.55 per cent, 1,443 pounds. Banner is at the head for yield of "meat" per acre, which is the most important thing, and it is hoped that for the present, farmers will grow this variety to the exclusion of all others in central Quebec, unless some special conditions prevent them from doing so.

PEA, FIELD—TEST OF VARIETIES OR STRAINS

For live stock feeding, field peas are no doubt the most profitable of the grains generally grown in central Quebec as, for an average of thirteen years, they yielded at the rate of 2,158 pounds per acre whilst oats gave 2,307, wheat 1,596, and barley 1,541. When it is considered that protein is by far the most costly part of the ration and that field peas contain 19 per cent, compared with 9.0, 9.2 and 9.7 per cent respectively for barley, wheat, and oats, it is easy to see how valuable this legume is for feeding live stock. In central Quebec, there is a good demand for peas for human consumption, but the pea must be white, without any black spot if possible. The variety which has shown decided superiority over all others is Arthur. There is a good selection of this at Cap Rouge and seed is available in reasonable quantities.

PEAS, FIELD—PRODUCTION OF SUPERIOR VARIETIES OR STRAINS

As Arthur had proven the highest yielder amongst the white varieties, which are the ones commanding the best prices in central Quebec, selection work was started with it in 1921. In 1926, enough seed is available to put this strain in the trial plots where it will have to show decided superiority for at least five years over other well-known sorts before it is placed on the market.

WHEAT, COMMON SPRING

For an average of thirteen years, spring wheat averaged only 1,596 pounds of grain, or 1,278 pounds of digestible nutrients per acre, whilst the figures were respectively 2,158 and 1,644 for field peas, and 2,307 and 1,624 for oats. It thus seems clear that, in central Quebec, it may be profitable to grow spring wheat for milling purposes or for seed, but not for feeding to live stock. Careful tests have shown that for spring wheat as for oats none of the very early varieties thus far tested have yielded enough in the district, and this is why Prelude has been left aside. Neither the Fifes, nor Marquis, seem to be adapted to our conditions. Huron has consistently been at the head as a yielder and is strongly recommended.

COMMON SPRING WHEAT—PRODUCTION OF SUPERIOR VARIETIES OR STRAINS

In 1913, this project was started with Huron, which has proven to be the variety best adapted to conditions of central Quebec. This selection, for an average of seven years, has produced at the rate of 1,649 pounds per acre, compared with 1,486 for the mother variety, and 1,472 for Marquis. It has done well at the Central Experimental Farm, Ottawa, also at Macdonald College, and is sure to give satisfaction, especially in central Quebec. Seed of Huron Cap Rouge 7 is for sale each year, in limited quantities, at a reasonable price.

IMPORTATION AND TESTING OF FOREIGN VARIETIES OF CEREALS

A variety or strain must be at least five years in the trial plots before it can be recommended or rejected, so that it would be practically impossible to test on the usual trial-plot acreage all the new or widely advertised varieties. For this reason these are tried out in a preliminary way on smaller areas, alongside of the variety of the same class which has shown up the best for the district. Since 1923 seventeen of these novelties have been tested and only four are deemed of sufficient probable merit to be continued in 1926; the thirteen others being clearly of comparatively little value for central Quebec.

TESTS OF BARLEYS AND OATS IN COMBINATION FOR GRAIN

The object of the experiment is to see if a mixture of barley and oats will give more grain than when each grain is grown separately. The results show that, for an average of five years, Manchurian barley and Daubeney oats yielded at the rate of 1,368 pounds of grain per acre whilst, for the same seasons, Daubeney oats alone produced at the rate of 1,563 pounds, also that for another five years, Duckbill barley and Banner oats yielded at the rate of 1,740 pounds of grain per acre, whilst Banner oats alone produced at the rate of 2,155 pounds. With an equal number of pounds of each, in the crop, there is a gain of 4.5 per cent digestible nutrients, but even with this slight advantage, it is clear that oats alone, in central Quebec at least, will produce the larger number of pounds of digestible nutrients per acre. This is explained by the fact that, at Cap Rouge, for an average of thirteen years, barley has only averaged 1,541 pounds of grain per acre whilst oats gave 2,307, so that the latter necessarily suffers when competing for room with a class of grain which yields much less.

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

The object of the experiment was to see if a mixture of Duckbill barley, Banner oats, and Huron wheat would produce more grain than one grain sown singly. The results are only for three years, but they show that the mixture averaged only 1,790 pounds per acre whilst Banner oats alone gave 2,110 pounds. The difference is so large that Banner is still much in the lead from the standpoint of digestible nutrients. This is not surprising, as at Cap Rouge, for an average of thirteen years, oats has yielded at the rate of 2,307 pounds per acre, during which time the figures were respectively 1,541 pounds for barley and 1,596 for wheat.

TESTS OF PEAS AND OATS IN COMBINATION FOR GRAIN

This experiment has been conducted during four seasons with Arthur peas and Banner oats. Both of these are the heaviest yielders in their class, and as an average of over ten years has proved that they mature within one day of each other, it is no doubt an ideal combination. However, results have shown that the mixture only yielded at the rate of 1,807 pounds of grain per acre whilst, for the same seasons, the figures were 2,122 pounds for Arthur peas alone, and 2,167 pounds for Banner oats alone. If a mixture is grown, in central Quebec, peas and oats are probably superior to any other, because they can be used for soiling, for hay, for ensilage, or for grain, as desired, and the percentage of protein, the most costly part of the ration, will be very high.

FORAGE PLANTS

A great deal of work has been done with forage plants at Cap Rouge, because it is believed that they are of the greatest importance in a district where live stock is one of the surest sources of revenue. Among the ensilage crops, Indian corn, sunflowers, also peas and oats, have received great attention. The first mentioned, though still holding its ground, is hard pressed by the others when the cost of dry matter per ton is taken into consideration. Nothing has yet been found amongst sunflowers to produce more than some of the various strains of Russian, whilst Longfellow, which for a long while reigned supreme amongst the varieties of Indian corn, may have to cede its place to one or two others in the not distant future.

Very carefully conducted experiments have conclusively shown that roots require too much costly manual labour to successfully compete with Indian corn, and more especially with hay, in the cheap production of dry matter and of digestible nutrients. But there is no doubt that they have their place where herds are too small to warrant the erection of a silo, or where the manual labour of the family is not calculated. Amongst roots, carrots have been at the tail end for yield and are only recommended in very special cases, for horses; mangels have not done as well as swedes and should only be grown on the deeper, naturally-drained soils of the district; swede turnips have shown decided superiority over the other classes of roots, and Good Luck is one of the very best varieties.

Timothy and Red Clover will no doubt, for a long while yet, continue to form the bulk of what is sown for meadows and pastures, but an experiment is in progress to find out if the addition on land lacking drainage, timothy and clover have been partly and advantageously, it is believed, replaced by Red Top and Alsike which seem to thrive better under such adverse circumstances. Amongst the interesting projects is the one comparing different grains and mixtures to be used as annual hay crops, when meadows fail, and the mixture of peas and oats was found to be the best.

INDIAN CORN—VARIETY TESTS FOR ENSILAGE PURPOSES

For a period of twelve years, forty-four varieties and strains of corn have been tested for silage. It was soon found that small varieties like Free Press, Gehu, Ninety Day, Quebec Yellow, and Twitchell Pride, though producing well-glazed ears each year, did not give enough tonnage to bring up to a profitable point the number of pounds of digestible nutrients per acre. Samples have been sent to the Dominion Chemist for a number of years past, for the determination of dry matter, and figures are herewith given for an average of the last four seasons: Eureka, 39,416 pounds of raw material, 17.94 per cent dry matter, 7,071 pounds dry matter per acre; Wisconsin No. 7, 35,714, 19.04, 6,800; Compton Early, 37,230, 17.45, 6,497; North Dakota, 35,895, 17.77, 6,378; Leaming, 32,895, 18.10, 5,954; Longfellow, 32,746, 18.12, 5,933; Bailey, 32,530, 17.91, 5,826; White Cap Yellow Dent, 31,996, 17.83, 5,705; Stowell Evergreen, 31,217, 16.64, 5,194. Longfellow stands sixth out of the ten, and if it does not stand up better during the next two or three years, it will have to be dropped for higher-producing varieties.

INDIAN CORN—VARIETY TESTS FOR THE PRODUCTION OF SEED

When testing varieties and strains of corn for silage, it was found that some of them did not give enough tonnage but produced ears which matured practically every season. These varieties and strains were then placed in the trial plots to find out if it would be possible and profitable to grow Indian corn for grain production in central Quebec. Nine varieties have yielded

at rates of from 18 to 39 bushels of shelled grain per acre, with an average of about 33 bushels, which shows that, with the best of them, it may pay to grow corn for grain in the district for live stock feeding. However, it is well for farmers to start in a very small way, with a variety like Quebec 28, and first to see if their particular conditions of soil and climate are favourable.

INDIAN CORN—BREEDING

During the past six years, Longfellow corn has been selected by the ear-to-row method and the production of shelled grain per acre has risen from 1,458 to 2,385 pounds. In 1924 and again in 1925, the two highest-yielding strains found by previous work were inbred, that is each ear was enclosed in a paper bag so that it could not receive pollen from any other ear. This will be continued until growth habit is stabilized. There will no doubt be a dwarfing of plants, but it is expected that when these genetically purer strains are crossed, hybrid vigour will be regained, and that if they "nick" well, the yield of grain may be increased. In the meantime, farmers who wish to select corn can do so by the well-known ear-to-row method.

INDIAN CORN—ACCLIMATIZATION EXPERIMENTS

During the last three years, the Wisconsin Experiment Station has furnished us with a strain of cold-resistant Golden Glow corn which was obtained by germinating in an ice-box. The growing season of central Quebec is so short that it would be a great boon to find a variety that could be sown a couple of weeks before the right time for Longfellow or other varieties suited to the district. Unfortunately, the results for three seasons have not been very encouraging, as the average percentage of germination was only 83 for the Wisconsin strain whilst it was 91 for a Cap Rouge selection of Longfellow. Even when seed was put in during the very first days of May, the latter variety had the advantage. This experiment, however, will be continued for two or three more years before definite conclusions are drawn.

SUNFLOWERS—VARIETY TESTS FOR YIELD AND PURITY

Sunflowers will not give as good results as Indian corn, for silage, in districts where the latter can be grown to the glazed stage, but elsewhere, they are preferable, and on certain soils of all districts they certainly have their place. The results to date from experiments at Cap Rouge show that Giant Russian is the heaviest yielder of dry matter per acre, and until better sorts are found, the main endeavour should be to get a good strain of this variety. For an average of three seasons, the figures are as follows: Giant Russian (Disco), 38,668 pounds of raw material, with 19.23 per cent dry matter, giving 7,436 pounds of dry matter per acre; Mammoth Russian (McDonald) 35,954, 16.07 per cent, 5,778; Manteca (C.P.R.) 23,302, 19.16, 4,465; Giant Russian (C.P.R.) 26,490, 15.98, 4,233. The Mennonite is a low producer, not yielding half as much as Giant Russian (Disco seed), and should not be used.

CARROTS, FIELD—VARIETY TESTS FOR YIELD AND PURITY

Field carrots, on sandy loam, have not given as much dry matter per acre as mangels or swede turnips at Cap Rouge, and are not recommended except for horse-feeding in special cases. The three types, long, intermediate, and short, have been carefully tested, including white and coloured. The four varieties which have done best, for an average of six years are White Belgian, long, with a production at the rate of 30,004 pounds of roots, having 11.34 per cent of dry matter, and giving 3,402 pounds of dry matter per acre; Short White, 31,988 pounds of roots, 10.29 per cent dry matter yielding 3,286 pounds

of dry matter; White Intermediate, 38,907 pounds of roots, 9.56 per cent, 2,763 pounds of dry matter; Danish Champion, intermediate, yellow, 23,860 pounds of roots, 11.32 per cent, 2,700 pounds of dry matter.

MANGELS—VARIETY TESTS FOR YIELD AND PURITY

Mangels do not produce as much dry matter per acre as swede turnips on the light and shallow sandy loams of central Quebec, and are not recommended except for naturally-drained rich alluvial soils. Over fifty varieties and strains of the different types have been tested during the last fifteen years, and results are given here for an average of eight seasons: Yellow Intermediate, 26,258 pounds of roots, with 14.06 per cent dry matter, giving 3,692 pounds of dry matter per acre; Mammoth Long Red, 25,503 pounds, 13.63 per cent, 3,476; Half Sugar White, 23,953, 14.20 per cent, 3,401; Tankard, 20,958, 12.81 per cent, 2,685; Yellow Globe, 22,325, 10.42 per cent, 2,326.

MANGELS—SEED TREATMENT TO INCREASE GERMINATION

What is generally called the mangel seed is a hard envelope containing one or more seeds. This hard envelope must break before germination takes place, which explains the trouble experienced during dry springs, especially on ridged land. This experiment was conducted during five winters, in the greenhouse, and the results are herewith given: taking the germination of the seed in the plot not treated as 100, applying salt in the row would have given a germination of 14; mixing salt with the soil as could be done in harrowing, 48; applying a complete fertilizer in the row with the seed, 55; mixing a complete fertilizer with the soil as in harrowing, 84; packing the soil and watering, 95; packing the soil without watering, 99; watering without packing the soil, 99; soaking the seed ball in a mixture of liquid manure and water for fifteen hours, 104; soaking the seed ball in water for fifteen hours, 106. The last method is the easiest and is recommended. Farmers would also do well to sow immediately after the land is prepared, and as early as possible in the spring, when the moist condition of the soil is conducive to quick germination.

SUGAR BEETS—VARIETY TESTS FOR YIELD AND PURITY

Though the soil, a rather dry sandy loam of average fertility and little depth, available for the trial plots of sugar beets at Cap Rouge is not suited to this class of roots, the results of fifteen years show that this crop could be made a paying one if factories were started. When well-bred strains were used, the yield went up as high as 26,585 pounds per acre, which is at least three tons more than the average for the States of Colorado and Michigan where the industry flourishes. The report from the Dominion Chemist for the crop of 1925 shows a coefficient of purity ranging from 88.94 to 90.28, and a percentage of sugar in juice ranging from 19.77 to 20.49. These figures are decidedly high and show the great possibilities of sugar beets as a cash-crop in districts where a heavier and deeper soil than that of Cap Rouge would certainly make the growing profitable.

SWEDES—VARIETY TESTS FOR YIELD AND PURITY

For dairymen who cannot grow ensilage crops profitably, swedes will be more profitable, on the light sandy loams of central Quebec, than either carrots or mangels, as they have produced more dry matter per acre during the fifteen years that they have been tested in Cap Rouge. Over eighty varieties and strains have been tried since 1911, and Good Luck has been the heaviest yielder. In the seven years that they have been in the trial plots together, the following varieties

have produced as follows: Good Luck, 46,814 pounds per acre; Perfection, 46,517; Hall Westbury, 41,744; Hartley Bronze Top, 41,381; Magnum Bonum, 40,775; Elephant (also called Jumbo and Monarch), 40,101; Bangholm, 39,549; Halewood Bronze Top, 38,415; Mammoth Clyde, 38,173. Determinations of dry matter have shown variations between 10.85 per cent and 12.74 per cent which may later change the position of some of the varieties.

TURNIPS, FIELD—VARIETY TESTS FOR YIELD AND PURITY

The field, or fall, turnip is a poor keeper and must be fed before winter. At Cap Rouge, the highest yielders have done better than the best swedes, but variety tests have been hard to conduct, as commercial seed is generally badly mixed, actual measurements and careful examination having shown, in 1923, only 37 per cent of the roots true to name. Out of the fourteen varieties tried, four have given results as follows: Pomeranian White Globe, 36,368 pounds of raw material, with 10.15 per cent dry matter, averaging 3,691 pounds of dry matter per acre; Yellow Aberdeen Green Top, 29,819, 12.10 per cent, 3,608; White Globe, 35,220, 9.86 per cent, 3,473; Aberdeen Purple Top, 26,569, 11.32 per cent, 3,008. A remarkable thing is the great difference in the percentage of dry matter between two of the varieties.

ALFALFA—VARIETY TESTS FOR HARDINESS, YIELD AND SUITABILITY

In 1915, a small quantity of Grimm was procured from the Dominion Agrostologist and sown in an unprotected spot where not much snow remains on the ground early in the season. In 1916, seed was gathered, and on April 12, 1917, it was sown in flats which were placed in hotbeds. On June 7, 600 plants were set out, leaving enough space between them so that they could easily be examined. Afterwards, seed was gathered from the best plants—from a hay production point of view—of those which were hardy enough to withstand the rigours of winter. Since then, three other so-called varieties have been sown on small plots to see if they will do better than the Grimm which has been grown at Cap Rouge. In the meantime, farmers should understand that, from the standpoint of hardiness, it is useless to sow alfalfa seed unless it has been produced in their district or in one where the conditions of temperature and rainfall are very similar.

RED CLOVER—VARIETY TESTS FOR YIELD AND GENERAL SUITABILITY

The object of the experiment is to ascertain the comparative value of various strains and varieties. It has been clearly shown at Cap Rouge that clover seed from southern Europe does not produce plants hardy enough for this district, also that the so-called perennial strains do not yield enough hay after two seasons to make them profitable. Out of the fourteen sorts tested in 1925, the four best yielders were from seed produced either in Quebec or in Ontario—the yield of these being quite high, ranging from 5,335 to 6,191 pounds of dry matter per acre. The fact that the percentage of dry matter was from 28.80 to 37.59 shows that certain strains are probably much better than others in this respect. What is required, for central Quebec, is a variety which will be at its best, from a live stock feeding point of view, at the same time as timothy, so that when they are cut, both of them may yield the highest quantity possible of digestive nutrients.

RED CLOVER—SEED-GROWING VERSUS HAY FOR PROFIT

The object is to determine the relative profit obtained by cutting the second crop of red clover for hay as against harvesting it for seed. This experiment has been conducted for four years, with as many different seedings, and it will be

continued in 1926. The soil was a sandy loam of just ordinary fertility but which had been well manured with the hoed crop two years previously, and was in very good tilth when the clover seed was put in. The results show that the two crops of hay were worth $1.09 for every $1 from the crop of hay with the following cut for seed. The price placed on the hay and on the seed were the current ones for the year, and a value of 57.5 per cent of that of hay was placed on the straw by the Dominion Chemist to whom samples of each cutting were sent for analysis.

RED CLOVER—BROADCAST VERSUS ROW SEEDING FOR THE PRODUCTION OF SEED

This experiment has only been conducted for three years, so that results cannot be taken as conclusive but only as a progress report. The soil was a sandy loam of only average fertility but in very good tilth, and though not the very best for this crop, is representative of a very large area of territory covered by the Cap Rouge Station. If the yield of seed for the part sown broadcast, where the first cutting was used for hay and the second for seed, is taken at 100, it would be 116 for the part sown broadcast where the first cutting was used for seed, 110 for the lot sown in rows twelve inches apart, and 95 for the lot sown in rows twenty-four inches apart. The acre value of the products were respectively $56.83, $50.40, $45.83, $40.31, current prices of the year being placed on hay, also on seed, whilst the straw was analyzed by the Division of Chemistry before a valuation was set on it. This project will be continued at least two years more before making definite recommendations.

TIMOTHY—VARIETY TESTS FOR YIELD AND PURITY

Five strains or varieties were sown in triplicate plots, with oats as a nurse-crop, in 1924, and the first crop of hay was taken in 1925. The soil is a sandy loam of average fertility, but it had been well manured in 1923 and was in very good tilth to receive the seed the following year. This kind of soil is not the best for timothy but it is representative of a very large area of land in the district covered by the Cap Rouge Station. The following results are given only as a progress report: strain No. 3937 yielded at the rate of 7,630 pounds of green material with a dry matter percentage of 35.74, and a total of 2,727 pounds of dry matter per acre; Boon-1923 (a selection made at the Central Experimental Farm, Ottawa), 6,630, 39.45 per cent, 2,616 pounds dry matter; sample from Co-opérative Fédérée, Sainte Rosalie, P.Q., 6,360, 39.45 per cent, 2,509 pounds dry matter; Ohio Commercial, 6,200, 39.64 per cent, 2,458 pounds dry matter; Gloria, 6,830, 35.35 per cent, 2,414 pounds dry matter.

HAY AND PASTURE MIXTURES, WITH MIXED CLOVERS AS A BASIS

The object is to determine the most suitable combination of grasses, with mixed clovers as a base, for hay and pasture. This experiment was conducted only for three seasons, on a sandy loam of only average fertility but well manured and in very good tilth. The results, which should by no means be considered as final, are as follows: 8 pounds red clover, 2 pounds alsike, 1 pound white clover, 12 pounds timothy averaged 3,413 pounds cured hay, with 44.14 per cent dry matter, giving 1,506 pounds dry matter per acre; 8 pounds red clover, 2 pounds alsike, 1 pound white clover, 6 pounds timothy, 12 pounds meadow fescue, 3,261, 44.23 per cent, 1,442 pounds dry matter; 8 pounds red clover, 2 pounds alsike, 1 pound white clover, 6 pounds timothy, 12 pounds orchard grass, 3,464, 41.50 per cent, 1,437 pounds dry matter; 8 pounds red clover, 2 pounds alsike, 1 pound white clover, 6 pounds timothy, 12 pounds tall oat grass, 3,340, 42.67 per cent, 1,425 pounds dry matter; 8 pounds red clover, 2 pounds alsike, 1 pound white clover, 6 pounds timothy, 6 pounds orchard grass, 6 pounds tall oat grass,

3,386, 41.69 per cent, 1,412 pounds dry matter; 10 pounds red clover, 1 pound white clover, 12 pounds timothy, 3,483, 40.42 per cent, 1,408 pounds dry matter; 8 pounds red clover, 2 pounds alsike, 1 pound white clover, 6 pounds timothy, 6 pounds meadow fescue, 6 pounds orchard grass, 3,660, 38.18 per cent, 1,397; 8 pounds red clover, 2 pounds alsike, 1 pound white clover, 6 pounds timothy, 6 pounds meadow fescue, 6 pounds orchard grass, 3,583, 36.91 per cent, 1,322 pounds dry matter. The addition of other grasses to timothy is no doubt an advantage in certain circumstances, but the price of seed is generally high and the quality low in this country, so that it is well to move slowly before further experimental work has thrown more light on the subject.

ANNUAL HAYS—VARIETY TESTS OF GRAIN VARIETIES FOR SUITABILITY

Meadows, for one reason or another, sometimes fail, and there is a rush to send to market live stock to be sold at a low price due to flooded markets. An emergency hay crop may then be profitable, though it is admitted that the digestible nutrients will come up to a higher cost per ton than in clover or timothy. It is to find out the relative suitability of grain varieties and mixtures that this experiment was started. The following figures are for an average of five years: Banner oats and Arthur peas, 6,108 pounds of raw material, 2,981 pounds of digestible nutrients, 507 pounds of crude protein per acre; Banner oats and vetches, 7,044, 3,317, 486; Victory oats, 7,608, 3,530, 342; Gold Rain oats, 7,392, 3,430, 333; Banner oats, 6,228, 2,890, 280; mixed hay, clover and timothy, 4,680, 2,162, 187. An important point to note is the much larger amounts of both digestible nutrients and crude protein in the annual hays than in mixed clover and timothy. From the standpoint of profitable live stock feeding, the mixture of peas and oats is to be recommended on account of its high content of crude protein which is generally the most costly part of the ration. An advantage of this mixture is that it is suitable for soiling, for hay, for silage, and for grain.

POULTRY

The flock of Barred Rocks kept at Cap Rouge was started with very ordinary birds bought from a man who dealt in poultry, buying from farmers, fattening, and selling to wholesalers. This is mentioned to show that, with time and perservance, a good laying strain can be evolved without disbursing too much money at the start.

From a breeding point of view, it is interesting to see that no outside stock has been used, with the exception of a male bird, during the last nine seasons. At the start, only four females were found, out of 300, with records over 150 eggs per year: last year, twenty reached 200 eggs and one went up to 251.

Feeding experiments have shown that when skim-milk can be had by the birds at all times, it will advantageously replace beef-scrap; that dry clover leaves are as good as roots, for winter egg-production, if the digestive tract of the layers is kept in good condition; that screenings consisting of half of the grain passed through the fanning mill, if not composed of more than one third oats, are worth practically as much as commercial grain; and that snow may replace water, when the latter cannot conveniently be given.

A comparison of houses of the same shape but of different widths has shown that the range of temperature, that is the difference between the highest and the lowest, increases as the width decreases so that the temperature is more equable in a house 16 feet wide than it is in one 12 feet wide.

Early pullets have in every instance produced winter eggs at a cheaper cost than have late-hatched pullets, yearling hens, or old hens. When the pullets that had led in egg-production one season were kept over as yearlings, they were beaten by pullets.

Different egg-preservatives were tested, but only two showed decided merit, waterglass and lime-water, with the advantage in favour of the latter.

Nineteen experiments are in progress in addition to the ones reported but it has not been deemed advisable to give details until more data are gathered.

PEDIGREE-BREEDING FOR EGG-PRODUCTION

This project was started in the spring of 1919. Out of a flock of 300 Barred Rocks, about the same number as now kept, only four birds were found by the trap-nest of sufficient merit to act as foundation stock. Their records were respectively 158, 163, 175, and 180 eggs. Without having secured any outside blood, there were on hand, as breeders, in the spring of 1926, forty females with records of over 210 eggs, and eight others with records of over 200 eggs. For 1923-24, only twelve pullets reached 200 eggs, with the highest at 220, whilst for 1924-25, twenty pullets reached 200 eggs, with the highest at 251. A few good lines have been isolated which continue to produce good layers, and it is expected that with close breeding, followed by line-breeding, these figures can be beaten, and this by an increasingly larger number of birds each year. The most rigorous selection has been made and will be continued.

BREEDING FOR FERTILITY, HATCHABILITY, AND LIVABILITY—HENS VERSUS PULLETS

The present project was started to see whether Barred Rock hens or pullets would produce the largest percentage of fertile eggs, hatchable eggs, and chicks living at three weeks (when they are practically saved). The results of four years show the average percentage of fertile eggs to have been 88.5 for hens and 90.8 for pullets, of hatchable eggs 33.9 for hens and 43.5 for pullets, of chicks living at three weeks of age 85.2 for hens and 80.9 for pullets. The total number of eggs used was 7,346, and it is interesting to note that it took 3.46 hen eggs for a chick alive at twenty-one days whilst it took only 2.86 pullet eggs for this same result. This project will be continued for at least one more year, but, in the meantime, it may be said that if pullets are early hatched, well grown, in good health, there is no great harm in using them for breeders. This, also, is the opinion of other investigators, such as Professor Graham, of the Ontario Agricultural College, and Professor Richardson, of the New Hampshire College of Agriculture. There may, however, be a decrease of vitality in breeding from pullets year after year, and it is recommended that hens be used now and then to forestall trouble in this regard.

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

The main object of the experiment is to develop strains of Barred Rocks giving a high percentage of fertility, hatchability, and livability, and at the same time, to throw light on the question whether good layers will produce, from the same number of eggs, less chicks living at three weeks than will poor layers. Records have been tabulated for all females laying more than 175 eggs per year, averaging 202.2, and for all those producing less than 175 eggs per year, averaging 157.1. The results show that the percentage of fertile eggs was 87.7 for the good layers and 87.2 for the poor layers; of hatchable eggs, 36.2 for the good layers and 38.4 for the poor layers; of chicks living at three weeks of age, 82.4 for the good layers and 77.3 for the poor layers. For every chick alive at twenty-one days it took 3.35 hen eggs and 3.36 pullet eggs. Though 4,290 eggs were used for this project, it will be continued for two or three years more.

SKIM-MILK VERSUS BEEF-SCRAP FOR WINTER EGG-PRODUCTION

The egg-yield in most flocks of the country could no doubt be easily brought up if more protein from animal sources was fed. This project was started to determine the relative values of skim-milk and beef-scrap as a source of animal

protein. The experiment was conducted with a total of 250 birds, for an average of 117 days, during five winter seasons. Both lots were fed alike, with the exception that one had skim-milk continually to drink, and the other had only water to drink but received beef-scrap both in the mash and in hoppers. The pens getting skim-milk gained more weight and laid a larger number of eggs than the ones receiving beef-scrap, with the result that the latter, weight for weight, according to this carefully conducted experiment, is only worth about nine times more than skim-milk, whilst analysis shows it to be worth eighteen times more. The equivalent values would thus be: beef-scrap, $50 per ton; skim-milk, 27.0 cents per 100 pounds; beef-scrap, $60 per ton; skim-milk, 32.4 cents per 100 pounds; beef-scrap, $70 per ton; skim-milk, 37.8 cents per 100 pounds; beef-scrap, $80 per ton; skim-milk, 43.2 cents per 100 pounds. It must not be forgotten, however, that skim-milk should be before the layers all the time, and that the supply must not be cut off by allowing the milk to freeze, because, to take in enough protein, the birds must have all they will drink.

SKIM-MILK VS. BEEF-SCRAP VS. MEAT-MEAL VS. GREEN BONES VS. POWDERED SKIM-MILK FOR LAYERS

The results of five years of careful work have shown the superiority of skim-milk over beef-scrap, but the present project was started to compare other sources of animal protein with these two. Some 430 birds were used for this experiment which has run for three seasons of an average of 122 days each. All pens were fed alike, with the exception that each received a different protein-feed. The results should not yet be taken as conclusive, but they point to the fact that powdered skim-milk, though giving fair results, is too high-priced at 17 cents per pound; they also tend to show that skim-milk, fed always sweet or always sour, in such quantity that birds may have it to drink all the time, produced eggs at a lower cost than any of the other protein feeds. This experiment will be continued for two more seasons.

ROOTS VERSUS CLOVER LEAVES FOR WINTER EGG-PRODUCTION

Is vegetable feed in a succulent form absolutely necessary for good winter egg-production? It was to throw light on this question that the present project was conducted throughout periods of four months for five seasons, using a total of 234 Barred Rocks. Both lots were fed the same, with the exception that one received swede turnips or mangels and the other dry clover leaves. The latter lot not only gained more weight but laid more eggs during four of the five years, which is fairly indicative that dry clover leaves may replace swede turnips or mangels for winter egg-production. The beneficial effect of roots on the digestive tract is no doubt a factor which must not be lost sight of, and wherever roots can be had it may be safer to use them. But, according to this experiment, they can be replaced by dry clover leaves, fed in shallow boxes or troughs, when the ration is such that the flock is healthy and not constipated.

ROOTS VS. CLOVER LEAVES VS. SPROUTED OATS VS. EPSOM SALTS FOR WINTER EGG-PRODUCTION

In the report of an experiment conducted during five winter seasons at Cap Rouge, it is seen that clover leaves were just as good as roots for egg-production. The present project was started to see if sprouted oats or Epsom salts would not do as well. As it only covers four periods of an average of about four months each, it is probably better to wait another year or so before coming to definite conclusions. But the figures gathered to date show that there is not much difference between any of these feeds. The cost per pound of eggs was respectively 19.4 cents with roots, 20.2 with sprouted oats, 20.6 with clover hay, and 23.9 with Epsom salts. The greatest number of eggs laid was by the pen receiving dry clover leaves, but as these eggs averaged smaller, it slightly brought up the cost per pound.

GOOD GRAIN VERSUS SCREENINGS FOR WINTER EGG-PRODUCTION

The object of the experiment was to ascertain if screenings of the grains generally grown in central Quebec (barley, oats, wheat), are a satisfactory substitute for grain of the ordinary commercial grades for winter egg-production. The experiment was conducted for five seasons, with a total of 244 Barred Rock hens and pullets, and lasted an average of 124 days each year. Two lots of birds received the same feed, with the exception that one got screenings and the other commercial grain in practically equal quantities. The pens receiving the commercial grain gained an average of 30 pounds in live weight whilst the other gained 19 pounds. The number of eggs laid by both groups was practically the same, there being only a difference of 2 per pen per season in favour of the commercial grain. Calculating 30 cents per pound live weight for poultry, and 5 cents per egg, the difference in favour of the commercial grain is only 14 cents per bird per season of 124 days, which shows that it certainly pays to feed mixed screenings of barley, oats, and wheat when they form about half of what comes out of the threshing machine. Care should however be taken that not more than a third of these screenings are from oats, as these are more liable to contain too large a proportion of fibrous material.

STANDARD (HOME-MIXED) VERSUS COMMERCIAL GRAIN FOR LAYERS

The project was started to find out if when part of the ration is a home mixture of grains, the winter laying will be as good as when a commercial article of high repute is used. During an average of 122 days of five seasons, with a total of 250 Barred Rock hens and pullets, two pens of birds under test received the same feed, with the exception that one got a mixture of equal parts, by weight, of barley, buckwheat, cracked corn, oats, wheat, and the other pen Full O' Pep, for scratch grain. The gain in weight averaged 24.2 pounds per pen per season for the home-mixed grain and 25.4 pounds for Full O' Pep, whilst the latter pen averaged about four eggs more per bird per season of 122 days. The results show that a mixture of grains will produce eggs at less cost per dozen when the price is $2 per hundred pounds than Full O' Pep at $2.75.

WATER VS. SNOW FOR WINTER EGG-PRODUCTION

With cold poultry houses, it is sometimes difficult to keep water unfrozen before the birds all the time, especially when it is impossible to attend to the birds many times each day. This project was thus started to see if water could not be replaced by snow. The experiment was conducted with a total of 228 Barred Rocks during five winters, both lots being treated, housed, and fed alike, with the exception that one received water and the other snow. The lot receiving snow had the advantage from a profit point of view, though gaining 11 per cent less in weight, they laid 28 per cent better, on an average. At the Dominion Experimental Farm, Indian Head, in 1923, snow also gave better results than water. It is not recommended that winter layers be deprived of water when conditions are such that this can be given.

TEMPERATURE OF HOUSES OF DIFFERENT DEPTHS

Though cold poultry-houses have now been advocated for many years, it seems that it is well to find in what kind of building the temperature will be most equable, as some contend that great variations may have a worse effect on egg-production than the intensity of the cold itself. During ten winters, thermometers registering the highest and the lowest temperature were kept outside, not far from the poultry plant, and about the middle of the poultry-houses taking length, width, and height into consideration, using poultry-houses of the same type, placed to receive about the same amount of wind and sun, and respectively 8, 12, and 16 feet wide. The average range of temperature

was 37.7 degrees Fahrenheit outside, 29.1 in the 8-foot house, 27.8 in the 12-foot house, and 26.4 in the 16-foot house. The conclusion is that the wider type of house has a less range of temperature, and that this range of temperature increases as the width of the house decreased.

PULLETS VS. HENS FOR WINTER EGG-PRODUCTION

The object of the experiment is to compare early pullets (hatched before the end of April), late pullets (hatched after the beginning of May), yearling hens, and hens over a year old, for egg-production. During about four months of five winters, a total of 490 Barred Rocks were used for this project. As aged birds generally lay a larger egg than younger ones, the results are herewith giving in pounds: for the same weight of eggs, when it cost $1 to produce them with early pullets, it cost $2.35 with yearling hens, $2.92 with late pullets, and $8.10 with old hens. When early pullets which had laid eggs at the lowest cost in their pullet-year were kept the next year or two, the cost per pound went up with their age. The conclusion is that early-hatched pullets, probably April for Barred Rocks in central Quebec, are the most profitable for winter egg-production.

TIME TAKEN FOR TRAP-NESTING

Constructive breeding work with poultry can, of course, only be done when the records of the female are known, and trap-nests are an absolute necessity in this case. This project was started in the autumn of 1924. During two winter seasons, in a poultry house 32 feet by 16 feet, containing 100 Barred Rocks, the actual time of trap-nesting was taken for 189 separate days, and came to a total of 1,879 minutes, or practically ten minutes per day for the flock, or one-tenth of a minute per hen per day. The birds laid well, and any person having in mind to do some trap-nesting may be guided by these figures. In the above, no account was taken of the time to come to the poultry-house, but simply of the time spent in actual trap-nesting.

PREVENTION OF FROZEN COMBS

The object of the experiment is to find a prevention against the combs of male birds freezing during extreme weather. Two methods were used during two winters, cotton fronts dropped before roosts, and combs and wattles painted with collodion. The first season, none of the birds, including the control ones, were frostbitten, so that no comparison could be made. The second year, the points of the combs of two Barred Rocks out of eight protected with cotton fronts were frostbitten, whilst the same thing happened to one of the four protected with collodion, and to two of the four control birds. Both kinds of protection were thus exactly twice as effective as no protection. It is yet premature to draw final conclusions.

BROILERS VS. FRYERS VS. ROASTERS

The object of this test is to see whether it pays better to sell surplus cockerels as broilers, as fryers, or as roasters. During the last three years, forty-five cockerels of broiler size, from 1½ to 2 pounds each, were put aside each season for this experiment. Fifteen of these were sold immediately; another fifteen were kept over until the birds averaged about four pounds; and the last lot were only disposed of around the middle of November. Contrary to expectations, the fryers and the roasters respectively gave, for the fifteen, 80 cents and $5.43 more profit than the broilers. Though it is yet too early to come to definite conclusions, it must not be forgotten that, in the above figures, no account was taken of housing room, nor of the poultryman's labour, also that the average price of 48 cents per pound for broilers, on July 12, was low, compared with 31 cents for fryers on August 27, and 26 cents for roasters on November 15. Until more data are gathered, farmers would probably do better to sell all surplus cockerels at as early a date as possible.

BEST DATE FOR MARKETING CULLED HENS

Should hens not any longer required for breeding purposes be sold just after the incubation season or kept longer? It was to get information on this subject that the present project was started, but as data are only available for two seasons, no definite conclusions can yet be arrived at. It is interesting to note, however, that when the birds were kept until about June 16 instead of being disposed of a month earlier, they averaged 14 cents more profit per head, and when they were kept until about July 16, they averaged 42 cents more profit per head. The prices obtained for the meat were practically the same in the three cases, and the profit came from the value of the eggs laid over the cost of feed. But no account was taken of housing room, the poultryman's time, the possible neglect of chicks due to extra work entailed in caring for the hens.

Final deductions cannot be made until further data are collected.

EGG PRESERVATIVES

It is an easy matter to preserve eggs when they are plentiful in the spring for use from October to February, when prices are high. But what preservative should be used? It was to throw light on this subject that the present project was started in 1916 with eight different methods: (1) Wrapping in paper and leaving alone; (2) Wrapping in paper and turning daily; (3) Putting away in oats; Putting away in sawdust; (4) Composé Gaulin; (5) Armstrong paste; (7) Waterglass; (8) Lime-water. The first six methods were later on left aside, as it was evident that the two latter were the most effective. Each year, samples are tested by the Division of Chemistry, the Poultry Division, and the Superintendent of the Cap Rouge Station. The results show, after eleven years of testing, that lime-water may be used with a certainty that it will give satisfaction if the eggs are perfectly fresh when put in, and if they come from flocks having no male bird in them. For full details regarding the way to preserve eggs, the reader is referred to Circular 31, The Household Preservation of Eggs, available at the Publications Branch, Department of Agriculture, Ottawa.

GENERAL FARM NOTES

EXCURSIONS.—Two excursions of farmers of the district came to Cap Rouge during August, one from the county of Lotbinière and another from the county of Portneuf. Over 600 persons were present, with members of the clergy and of parliament. The Superintendent explained experimental work. Both excursions were a success.

A special poultry excursion took place in October. The meeting was addressed by the Dominion Poultry Husbandman, Mr. F. C. Elford, the Chief of the Poultry Division of the Provincial Department of Agriculture, Mr. J. D. Barbeau, Mr. W. W. Lee, of the Central Farm, Ottawa, Mr. Crevier, of Quebec, and by the Superintendent of the Cap Rouge Station. This excursion is such a success that it will be made an annual event.

EXHIBITIONS.—Some thirty French-Canadian horses were exhibited at Three Rivers, Sherbrooke and Quebec, winning all cups (amongst which one offered at the Quebec show for the best lot of horses of any breed), and twice as many diplomas and first prizes as all other competitors combined. About the same number of French-Canadian cattle were exhibited at the Quebec District and Quebec Provincial Exhibitions, winning more first prizes than all competitors combined.

MEETINGS.—The Superintendent attended twenty-one meetings during the year, amongst which of the French-Canadian Cattle Breeders' Association of which he is president; of the French-Canadian Horse Breeders' Association of which he is director; of the Quebec Swine Breeders' Association, and of the Quebec Seed Board of which he is a member.

CORRESPONDENCE.—The correspondence is increasing at a rapid rate.

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