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 1929

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DOMINION EXPERIMENTAL STATION, CAP ROUGE, P.Q.

REPORT OF THE SUPERINTENDENT, G. A. LANGELIER

THE SEASON

Compared with the average of the last seventeen years, the growing season, May to October inclusive, was slightly cooler, a little wetter, with less sunshine. The last spring frost was on May 23 and the first one in the autumn on September 21, giving a frost-free season of 121 days, which is 14 days shorter than the average since 1912.

METEOROLOGICAL RECORDS AT CAP ROUGE, 1929

	Temperature F.						Precipitation				Sunshine	
	Highest	Date	Lowest	Date	Mean	Average 18 years	Rain-fall	Snow-fall	Total	Average 18 years	Total	Average 18 years
	°	°	°	°	°	°	in.	in.	in.	in.	hours	hours
January	45·0	18	−27·0	11	12·80	9·92	1·03	35·00	4·53	3·80	99·1	63·8
February	39·0	18	−17·0	14	15·43	10·98	.....	12·50	1·25	2·67	95·3	86·0
March	44·0	19	−16·0	11	24·64	22·09	1·07	7·00	1·77	2·78	137·1	134·8
April	63·0	28	10·0	3	35·25	36·27	2·05	6·00	2·65	2·81	173·9	170·5
May	86·0	29	30·0	20	49·42	50·36	4·26	.....	4·26	3·51	164·0	194·7
June	85·0	23	39·0	2–3	60·54	59·00	3·86	.....	3·86	4·03	173·9	195·7
July	86·0	28	41·0	30	63·37	65·69	5·33	.....	5·33	4·07	267·5	230·8
August	81·0	11	42·0	30	61·59	62·77	5·12	.....	5·12	3·86	189·1	209·2
September	81·0	6	31·0	21	56·63	54·87	2·67	.....	2·67	4·17	142·9	151·0
October	61·0	6–21	24·0	30	44·11	44·79	3·73	.....	3·73	4·26	91·0	104·1
November	59·0	1	− 2·0	23	30·68	30·58	3·30	11·50	4·48	3·60	52·1	60·8
December	36·0	27	−14·0	23	14·51	16·75	0·11	30·25	7·00	3·17	32·8	49·0
Total	.....	.....	.....	.....	.....	.....	32·53	102·25	46·65	42·73	1,618·7	1,650·4
Average	.....	.....	.....	.....	39·08	38·67	2·71	8·52	3·89	3·56	134·9	137·5

THE CROPS

At this Station, hay, pasture, potatoes, apples, cherries, plums, strawberries, gooseberries, cabbage, garden beans, garden beets, onions, ornamental plants, bushes and trees were very good; oats, spring wheat, field peas, swede turnips, mangels, raspberries, asparagus, cauliflowers, garden carrots, parsnips, squash, sweet corn, tomatoes, turnips, were good; corn, sunflowers, peas and oats for silage, field beans, celery, muskmelons were medium; barley, grapes and garden peas were poor.

ANIMAL HUSBANDRY

DAIRY CATTLE

From sixty-five to seventy-five head of pure-bred French-Canadian cattle are kept for experimental work in breeding, feeding, housing and management. The herd has been fully accredited since 1922, and has passed three consecutive tests for abortion without a single reaction. Every female with over two periods of lactation has qualified for Record of Performance.

SELECTION OF SIRES FIRST MILESTONE ON ROAD TO IMPROVEMENT

It has been rightly said that the selection of sires is the first milestone on the road to improvement, and this proved to be true at the Cap Rouge Station. A bull bought to use on the original grade cows gave heifers who only yielded 73 per cent of their dam's production. This is explained by the fact that nothing was known about his ancestry along production lines, and the result was what too often happens throughout the country. But when bulls out of the best cows in the herd were used on the same females which had given heifers worse than themselves, an immediate change took place and the daughters yielded more than their dams. The following table is interesting:—

INFLUENCE ON A DAIRY HERD OF A BULL OUT OF A GOOD MILCH COW

Orange Blossom

Bred to	Dam of bull	Gave	Daughter at two years		Increase in fat
			lb.	lb.	
Denis Lord	Production unknown	Henriette	4,163 milk	193 fat	61%
Elégant	R. O. P. cow	Irénée	6,162 milk	311 fat	

Princesse du Sable

Bred to	Dam of bull	Gave	Daughter at two years		Increase in fat
			lb.	lb.	
Denis Lord	Production unknown	Corneille	3,039 milk	159 fat	84%
Delphis	R. O. P. cow	Fortune	6,373 milk	293 fat	

TESTING CATCHES CULPRIT COWS

From the very first it was decided to test every cow in the herd, so as to catch the culprits which might be robbing the profits, and this has been done during the last nineteen years. All were really tested, and the production not guessed at, which is a big difference.

THE GREATEST RANGE OF POSSIBILITIES LIES WITH CONCENTRATION OF BLOOD

After it was shown that the selection of two sires out of high producing cows was a move in the right direction, the next question was how to keep up this improvement. Would outside bulls be bought to replace the ones which had started the herd on the upward grade of production, or would sons of the latter be used, and even the old sires themselves? The first method meant out-crossing, and the other in-breeding and line-breeding. Intensification of blood was thought the most advisable and has given very good results indeed.

But it must not be forgotten that close breeding will intensify defects as well as good qualities, which is shown by the following figures:—

CLOSE BREEDING INTENSIFIES DEFECTS AS WELL AS GOOD QUALITIES

Cow	Qualifications	Bred to	Gave	Daughter at two years	
				lb.	lb.
Finette	R. O. P.	Her son	Gougou	7,992 milk	313 fat
Corneille	Poor milker	Her sire	Florence	1,250 milk	53 fat

This shows that good or evil results from consanguinity through the inheritance received, and thus not only vitality but production must be carefully looked into.

A sane method would seem to be the concentration of desired qualities by close breeding, followed by the out-crossing of related types to retain vigour. Animals from such strains, if used as foundation stock, will no doubt build up profitable herds throughout the country.

A COUPLE OF GOOD FOUNDATION COWS ARE BETTER THAN A DOZEN POOR ONES

At the time of writing this report, three out of the four champion producers of the breed, in the 305-day class, are in the Cap Rouge herd. At different times, champion producers in the 365-day class were bred at the Station, and most of these heavy yielders came from two foundation cows.

SEVEN CHAMPION PRODUCERS FROM TWO FOUNDATION COWS

Foundation cow	Daughter			Grand-daughter		
	Name	Champion when	Class	Name	Champion when	Class
Eglantine.....	Hérodiade.....	Two years old....	365 days....	Lumina.....	Two years old..	365 days
Eglantine.....	Jacqueline.....	Four years old....	365 days....	Lucette.....	Three years old	305 days
Finette.....	Gougou.....	Two years old....	365 days....	Jeanne.....	Mature.....	305 days
Finette.....	Hénédine.....	.....	.....	Mariette....	Four years old.	305 days

The above table shows that two foundation cows, Eglantine and Finette, are the head of strains which gave seven champion producers of the breed, in both classes and in each of the four ages. Out of forty-two females of breeding age, twenty-nine come from these two families.

COMMERCIAL MILK SUBSTITUTES ARE GENERALLY GOOD BUT TOO COSTLY

The fast increasing demand for milk and milk products for human consumption has greatly affected the problem of calf raising. Whole milk is no doubt the best feed for the very young animal, but it is extremely expensive and completely out of question to raise calves solely on it. Moreover, calves can be raised as well on skim-milk with the addition of a suitable mixture of meals. Though they may not look as well at six months, they often look better at one year, because they have commenced to eat hay and grain at an earlier age and the change did not cause a set back in growth.

Entire elimination of milk for calf feeding cannot be recommended, so that the problem is not to find a complete substitute for it but to use the least possible amount, and still get desired results. A good plan is to use whole milk for a couple of weeks, and then to gradually replace it, during another two weeks, by skim-milk and meal.

A commercial calf meal was compared with a home mixed one composed of six parts corn, three parts oats, one and a half part flax seed, by weight, all ground together. The experiment was conducted during 4 years with thirty-eight calves, and all feeds were calculated at the then existing prices. The following table gives results:—

MILK AND MILK SUBSTITUTES FOR CALVES

—	Whole milk	Commercial calf meal	Home-mixed meal
Number of calves in experiment	12	13	13
Average gain per calf during 168 days	236 pounds	214 pounds	266 pounds
Cost of feed per calf	$49 03	$15 95	$12 53
Cost of feed per pound of gain	20·7 cents	7·4 cents	6·2 cents

In general, it may be said that commercial milk substitutes are good, but their prices are often too high to give economical returns. In the above mentioned experiment, the home mixed meal produced gains at practically 20 per cent lower cost. Their supposed effect as a tonic is rather vague, as no means have yet been discovered whereby the digestive power of a healthy animal can be materially increased.

IS A SUPERIOR OR INFERIOR COW BORN OR MADE?

Feed is supposed to affect type, size, and production. Some have the opinion that heifers fed a scant ration, especially one not containing enough of the necessary mineral elements, will develop a faulty bony framework, will have a tendency to drooped rumps, and will lack the wedged shaped body. There is no question but that an animal needs an adequate supply of mineral matter, but it seems more reasonable to believe that when rations lack this, there will be no material effect upon the general outline of the animal, but rather a tendency to develop small bones and to become too refined.

There is no doubt that a heifer fed a heavy grain ration will develop into a somewhat larger cow than one reared on roughage alone, but the difference is much more marked during the first few years than at maturity. Experiments conducted in Missouri showed the height at the withers of an eighteen months old heavy fed heifer to be 3·5 inches more than for the poorly fed one, whilst at maturity the difference was only 1·0 inch.

But the following table shows that the manner of rearing a heifer may have quite an influence on her future milk production:—

MILK PRODUCTION OF TWINS REARED DIFFERENTLY

Cow	Feed up to first calving	Age at first calving		Age at second calving		Production during two first lactation periods	
		years	days	years	days	lb.	lb.
Eglantine	Plentiful	2	22	3	95	11,392 milk	655 fat
Elégante	Scant	2	83	3	26	3,767 milk	168 fat

The above case may be an extreme one, though it was considered that chances of error were minimized by choosing twins.

The most profitable course to follow is probably an intermediate one, between the two extremes: one very good pasture, no concentrate, and at other times, all the clover hay heifers will consume, with silage and roots when available, and a grain allowance of from 2 to 3 pounds per animal per day, according to size, age and necessity for same.

PROFIT IS NECESSARILY THE EXCESS OF PRICE OVER COST OF PRODUCTION

An experiment was conducted with 27 cows, for five consecutive winters, the animals chosen each year being about of the same weight, the same capacity as milk producers, and having calved at nearly the same time. The care, housing, and feed given to each of the three lots were alike, except that group I received all the meal it would eat clean, which came to one pound per 2·16 pounds of milk, group II one pound of meal per 4 pounds of milk, and group III one pound of meal per 8 pounds of milk. The following table gives a few details:—

INFLUENCE OF FEEDING CONCENTRATES AT DIFFERENT RATES TO MILCH COWS

Concentrates fed	Milk production	Cost of feed per 100 pounds milk	Profit over feed when product is sold as	
			Butter at 40 cents per pound	Milk at 5 cents per pint
	pounds	$ cts.	$ cts.	$ cts.
1 lb. per 8·00 pounds milk	100	1 00	1 00	1 00
1 lb. per 4·00 pounds milk	125	1 16	1 03	1 19
1 lb. per 2·16 pounds milk	160	1 45	1 03	1 38

It has been said that if a man has good cows he can afford to give them all they can eat of the best feeds, but this is certainly not correct in all cases, as a glance at the above figures readily shows. It is seen that the quantity of milk and the cost of fed per 100 pounds of milk both increased, though not quite in the same proportion, with the quantity of meal fed. But the net profit depends on the market which can be had for the product. For instance, if butter fat had been sold at 40 cents per pound, there would not have been much to gain by heavy feeding, whilst if milk had been sold at 5 cents per pint, the heaviest fed cows would have shown a larger profit.

The cow, as any other manufacturing plant, must be run economically. It is not the cost nor the return per animal that is of most importance, but the relation beween the two.

RUNNING A BUSINESS WITHOUT RECORDS IS LIKE RUNNING A CLOCK WITHOUT HANDS

When a project was started to determine the feed cost of rearing dairy bred heifers until calving time, it seemed that such an easily conducted experiment was practically useless. But after a careful record was kept of all feed given to eight French-Canadian heifers until they dropped their first calf, it was seen that the feed cost was much higher than had been thought. On an average, they weighed 813 pounds at calving time and had received, up to 27 months and 9 days, 636 pounds whole milk, 5,668 pounds skim-milk, 830 pounds meal, 3,164 pounds hay, 5,521 pounds corn silage, 4,235 pounds swede turnips, 377 pounds green oats, and had been 96 days on pasture. The quantity of roughages would no doubt have been lower if more pasture had been available.

At prices current when the experiment was conducted, the feed of each heifer was worth $93.25, and it is interesting to note, in an editorial of Hoard's Dairyman for April 28, 1922, that the figures there given are $91. The total cost of rearing would, however, have to include loss by discarding heifers not fit to remain in the herd or by death, interest and depreciation on buildings and equipment, labour, bedding, service fee of sire, whilst manure would be credited.

These figures show the importance of being careful to breed only from first-class stock if money is to be made from the dairy later on.

BIG BARNS ARE FINE BUT COSTLY

This is not written against large barns, but simply to show both sides of the question. There is no doubt that these imposing structures are the pride of their owners, and that they make a farmer feel that his lot in the world is as good as that of any other member of society. But, on the other hand, there is no getting out of the fact that when interest, repairs, depreciation and insurance are taken into consideration, these barns are costly propositions. And since agriculture, like other industries, has its ups and downs, the above fixed charges are liable in lean years to eat nearly all the profit from the place.

During sixteen years, ten different bulls and over one hundred heifers have been wintered outside, at the Cap Rouge Station, in single-boarded sheds fronting south, and the doors have not been shut a dozen times in all this period. It is thought that the exercise and pure air which they thus had was conducive to good health. As the herd has been accredited for seven years, has passed three consecutive tests for abortion without a single reaction, and is gradually going up in average production per cow, it seems plausible that cold has not weakened it.

Milking cows must of course be stabled, but bulls, dry cows, and young stock at least six months old on November 1 can be wintered in cheap sheds, so that the barn may not take too large a proportion of the capital.

IT IS EASY TO DO ELSEWHERE WHAT HAS BEEN DONE AT CAP ROUGE

The idea that only Government institutions or wealthy people can do what is recommended above is a fallacious one.

There is no secret formula required to weigh and test milk so as to be able to keep the heavy producers and eliminate the boarders, in using sires of known productive ancestry, and in concentrating the blood of these good cows and bulls by in-breeding followed by line-breeding. There is no magic in mixing an efficient calf meal instead of buying a high-priced commercial one, nor in giving enough of the proper kinds of feed to heifers so that they will develop into profitable cows, nor in using judgment as to feeding concentrates according to price received for milk. And similarly it seems the elementary part of average wisdom to spend for a dairy barn only what is absolutely necessary to make the milking cows comfortable.

HORSES

From seventy to ninety head of pure-bred French Canadian horses are kept for experimental work in breeding, feeding, housing, and management. This stud has won more first prizes at the leading exhibitions of the province, Quebec, Sherbrooke, and Three Rivers, than all the other studs combined.

BLENDING GOOD QUALITIES

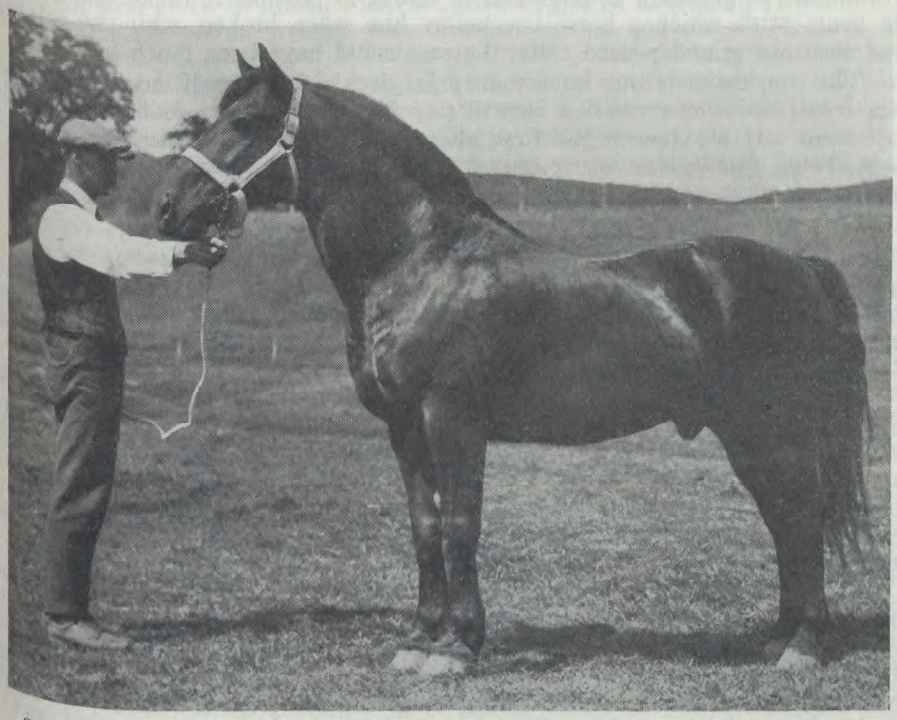
The object at the St. Joachim Horse Farm is to breed a race of horses weighing around 1,200 pounds in ordinary condition, sound, hardy, full of energy but docile, fast walkers, good lookers, and as much at home on the plough as on the surrey.

Four strains were isolated, each of good quality and development, which breed fairly true. One of them has the typical, low set, thick conformation of the breed, lacking somewhat, though, in appearance and gait; another has weight, a four-year-old stallion tipping the scales at over 1,500 pounds, but lacks finish; another has splendid action and gait, nearly as good as that of a Hackney, with a little less of the excessively high action, but this family is somewhat longer in the body and higher from the ground than is desirable; still another has all the finish of a Morgan or a fancy Standard-bred, but lacks in size.

The next effort was towards the blending of all these qualities in one family, in a reasonable degree, of course. This can be done in time, and there will then be a larger and better looking edition of what has rightly been called "The Little Horse of Iron."

A PEDIGREE IS NOT A CRUTCH ON WHICH INCOMPETENCE CAN LEAN

This blending of qualities, or crossing, no doubt hastened the appearance of new strains, and gave individuals of very good, good, medium, and poor quality, but did not produce a uniform and especially a constant type. The next step was thus to concentrate the blood of the strains which came nearest to the goal sought, that is to improve through the perfection of family lines, and the most effective system seemed to be close breeding.



Seventeen year-old French-Canadian stallion "Albert of Cap Rouge," winner of more first prizes and diplomas than any other stallion of the breed.

No stallion except Albert and his sons were used during the last fifteen years, and size was increased during that time. From 1913 to 1919 the average weight at birth of thirty youngsters was 118 pounds. From 1922 to 1926 inclusive, the average weight at birth of eighty-four youngsters was 126 pounds, and the fifty foals out of mares from the strains kept for breeding purposes averaged 129 pounds at birth, a gain of eleven pounds on the weights of earlier years.

This has meant a rigid selection and the throwing out of animals, sometimes, which seemed to be the best bred of the stud. But it was decided from the first that a pedigree, though most helpful, would mean nothing if the animal to which it referred did not reproduce the qualities we were looking for.

WHICH—RAISE OR BUY HORSES?

Tractors are replacing comparatively few horses in Central Quebec and the latter will no doubt continue to do the bulk of the work on the land. This brings us to the perennial inquiry: "Will it pay me to raise horses or is it cheaper to buy them?", to which question it is impossible to give a specific answer. That a young horse, ready to work, costs a good deal of money was shown by an experiment conducted at Cap Rouge.

Feed given to fifteen French-Canadian colts and fillies was weighed from weaning time until they reached an average of 32 months and 26 days when they weighed 1,240 pounds and were ready to work. Each of them received 9,992 pounds of hay, 4,632 pounds of oats, 4,178 pounds of bran, and was 216 days at pasture. At then current prices, feed alone amounted to more than $200, besides service fee, loss of time by the dam, barn room, bedding, care, and risks of accidents or death. Of course, these youngsters were fed practically to the limit, to get them as large and as strong as possible to tackle the average ten years work which a horse has before him when broken, while by stinting feed and raising under-sized colts, the cost could have been much lower.

The conclusion is that each man must decide for himself, according to his own local conditions, whether it will pay him better to raise horses than to buy them. If he chooses the first alternative, the most elementary common sense should decide him to use only good stallions and mares, to minimize the number of culls.

REARING FALL FOALS IS PRACTICABLE

There are advantages and disadvantages in having foals come in the autumn. The main advantage is that the mare can do more work during the cropping season, and the principal disadvantage is that some mares are hard to breed at that time of the year.

The advantage is so obvious that it is useless to insist about it here. As to the disadvantage, experiments at the Cap Rouge and St. Joachim stations have shown that, contrary to expectations, mares were "settled" more easily in the autumn than in the spring. Out of eight mares used for this project, six conceived in the autumn though they were not in foal to the previous spring service of the same stallion. And there is always the chance of getting the mare in foal the following spring if she misses in the autumn.

The weights of the fall colts, at six months, were more than those of full brothers, at the same age, dropped in the spring, which shows that however good grass may be as a source of vitamines and as a producer of milk, it is not absolutely necessary during the first half year of the youngster's life. But one should be careful not to overdo things by giving too great a quantity of nutritious feed to the mother, as the foal may get top heavy and go wrong in the legs. Too close confinement and lack of exercise should also be shunned. The hoofs of the youngsters should be pared when necessary, as they will grow fast on moist bedding.

EXERCISE FOR THE BROOD MARE

There seems no doubt that exercise is necessary for the brood mare to insure strong foals. The main point is how to give this exercise. When a farmer keeps few horses and has something for them to do practically all winter, the solution of the problem is easy. But if a man has a comparatively large number of horses and very little for them to do, it is not the same thing.

During nine years, at the St. Joachim Horse Farm, over eighty in-foal mares have been wintered in single-boarded sheds and not harnessed once, whilst about as many were kept in the barn, some in box-stalls without doing any work, and others at moderate work. No difference was found in the livability or vitality of the offspring. The same mare, to the service of the same stallion, gave six foals. She was kept in shed and not harnessed when carrying two of them; she was in a loose box and turned out now and then for exercise when carrying two others; and she was stabled and worked moderately when carrying the other two. The six foals were strong.

This shows that though exercise for the brood mare is no doubt important, the mode of exercising is not. Thus, farmers who cannot work their brood mares need not be deterred from raising horses as, with some judgment, they can be successful.

WORK MUST BE WELL PLANNED TO LESSEN COST OF HORSE LABOUR

All feed given to fifteen French-Canadian mares, averaging 11 years of age and 1,260 pounds in weight, was recorded during 264 days. Each of these animals received 4,341 pounds of hay and 3,705 pounds of oats and bran, which was about 1·27 pound of hay and 1·11 pound of concentrates per 100 pounds live weight of horse per day. They averaged 4·5 hours of work per day, and at the then current prices, it cost 8 cents per hour of work just for feed.

As this does not include labour, bedding, doctoring, shoeing, harnesses, blankets, stable supplies, interest and depreciation on buildings and equipment, it is evident that no more horses should be kept than absolutely necessary, also that work stock should be profitably employed as many hours as possible during the year.

The last question is no doubt a very important one which each farmer must settle according to his local conditions. Two ways of helping to solve the problem are to try and hire extra horses during busy spells, and to feed as economically as possible during the winter when there is not much to do.

CUT DOWN COST OF FEED WHEN HORSES ARE IDLE

It is not always possible to get a good team at a reasonable price in the spring nor to sell at a decent figure in the autumn, so that when work on the farm ceases, after the ground freezes, it is advisable to lay aside for the winter all horses which are not absolutely required and feed them as cheaply as possible without impairing their future usefulness.

An experiment conducted at Cap Rouge during six winters with a gelding and three mares, some of them quiet, others nervous, aged 5 to 18 years, showed that they did well on a daily ration of 1 pound mixed hay, 1 pound oat straw and 1 pound swede turnips for each 100 pounds of their weight. They did not only show, the next season, that they had lost no energy nor vitality, but also gained an average of more than 28 pounds in weight per winter.

Feed and work should however be cut down in the autumn and increased in the spring very gradually, taking a couple of weeks to make the change in each case. And it should be well understood that idle horses do not work; if they do, they are not idle and should be fed otherwise.

TURN HORSES OUT FOR THE WINTER AND KEEP THEM HEALTHY

Since 1913, more than four hundred winters have been passed outside by horses of different ages, from weanlings to 24-year-olds, with only single boarded sheds, facing south, as shelters. The well known vitality and ruggedness of the St. Joachim stock shows that the system is good, as far as health is concerned. Some believe that more feed is required but this has not been proven by careful experimental work, and as the assimilation of food is no doubt better when pure oxygen is inhaled, there is probably not much difference between the two systems of housing.

SWINE

If only working stock, sick or weak animals, and foals dropped after June are stabled, it naturally takes less barn room, more exercise is taken, and the youngsters can be fed high without fear of limbs going wrong.

Everything which is to be wintered in the open should be turned out early and not brought in after September, so that a heavy coat may be grown for protection against cold.

A small herd of pure bred Yorkshires is kept, generally a dozen brood sows and a couple of boars. From the very first, it was thought advisable to keep only families producing good size litters of easy growing pigs. Out of six strains, only two are left whose blood will be blended with that of a good imported strain. The goal kept in mind all the time is to produce pork at the least possible cost per pound.

Piggery at the Cap Rouge Station.

ADVANCED REGISTRY POLICY

The object is to obtain information on the breeding qualities of sows and boars through the feeding and slaughter test of their progeny. Five pigs are nominated from each litter entered, and are fed up to market weights of 190 to 230 pounds. Four of these are submitted to a carcass examination, so as to ascertain the more desirable strains for the home and export trade. Thus the quality and reproductive capacity of the parents are judged through the performance of their offspring.

RECORDS ON SEVEN YORKSHIRE SOWS ENTERED UNDER ADVANCED REGISTRATION POLICY

Name and number of sow	Weights of 5 feeder pigs				Feed consumption and cost of gains of 5 feeder pigs				
	At weaning	At shipping	Gains		Skim-milk at 25 cents per cwt.	Meal at $2.11 to $2.14 per cwt.	Clover hay at 53 cents per cwt.	Total cost of feed	Cost per 100 pounds of gain
	Days	Days	lb	Days	lb.	lb.	lb.	$	$
Alexandra, 102772	166	1,073	907	188	2,608	3,286	138	77 24	8 52
Amanda, 105552	131	1,072	941	204	2,166	3,325	148	77 23	8 21
Anna, 105548	122	1,032	910	184	2,175	3,125	152	73 09	8 03
Charlotte, 123345	124	977	853	198	2,646	3,141	130	73 44	8 61
Colombelle, 123881	123	1,061	938	211	2,174	3,659	147	83 69	8 92
Constance, 126767	82	1,021	939	179	2,181	3,111	147	72 58	7 73
Delphine, 133208	114	1,111	997	197	2,451	3,219	138	74 77	7 50

FIELD HUSBANDRY

In Central Quebec, there seems no doubt that farmers will continue to derive most of their income from live stock, but to make animal husbandry profitable a farmer should produce those crops which will yield him the largest net returns in dollars and cents. This means a better choice of crops adapted to the district, better methods of soil management, and better rotations.

RECORDS DETERMINE PROFITS

Short rotations have been advised for a long time. There seems no doubt that if the hoed crop is well taken care of, the average yield per acre of a short rotation will be higher than that of a long one, and that weeds will be better kept in check. But these questions, for the majority of farmers, are of minor importance, the main point being which will be the most profitable. And records at Cap Rouge show that the long rotation, six year for instance compared with three or four years, is the most profitable. In analyzing the data, it is found that a ton of digestible nutrients in hay only costs from 29 to 47 per cent of what it costs in the ordinary hoed crop, corn for silage or swede turnips, which explains the advantage of the long rotation. Moreover, keeping the land free of weeds by the use of hoed crops is, according to the writer, probably the most costly way of tackling the job.

KEEP DOWN PRODUCTION COSTS BY GROWING CROPS OF HIGHER VALUE TO REPLACE THOSE OF LESS VALUE

During seven seasons, swede turnips, corn, sunflowers, peas and oats were put in alongside of each other, on uniform looking soil, and a record kept of all costs. Every load of the crops were weighed, and samples were sent to the Dominion Chemist for determination of dry matter. This dry matter cost $13.40 per ton in the silage crops and $30.62 in the roots. There is no evidence available to indicate that the dry matter in roots is twice as valuable as the dry matter in corn, sunflowers, or peas and oats, which it would have to be to make it profitable to grow roots instead of the above mentioned crops. Moreover, the Dominion Animal Husbandman, at page 48 of his 1926 report, writes: "It will be noted that while the root ration gave the greatest yield in milk, the

cost of production of roots was so much higher than that of corn silage that the latter crop gave the lowest cost of production and the greatest profit over feed with milk and fat." It may be all right for the man with a few cows, and disposing of labour for which he has not to pay, to grow roots. But the average dairyman should cut down the cost of milk production by growing crops of higher value to replace those of less value.

PRODUCERS DEFRAUDING THEMSELVES

This was the title of a recent editorial of "The Farmer's Advocate." The trend of the article is to show that in calculating cost of production we charge seed, labour, taxes, interest, but we leave out of consideration the fertility which the crop extracts from the soil. Manure enters into the production cost of digestible nutrients in corn, sunflowers, peas and oats for silage, but there seems no doubt that the latter are not so "hard" on the land as the two former, and when results of seven years show that a ton of digestible nutrients costs less in peas and oats than in corn or in sunflowers, it is time to make a change. This is why more than half the land devoted to silage crops will in future be put in peas and oats at Cap Rouge. Another good point in their favour is that they contain more than twice the percentage of protein found in the other two.

BRING DOWN PEAK LOAD OF WORK AT CERTAIN SEASONS

Theoretically, it may be better to do certain things at certain times, but in practice it is not always possible or even profitable to do so. Where the crop growing season is long, there is a great advantage in being able to accomplish most of the work in due time, but the same does not apply where the season is short. During eleven years, all costs were entered for the production of silage corn on 78·88 acres, about half the land being ploughed in the spring and the rest in the autumn. The cost per ton was practically the same, so that in Central Quebec, where the season is rather short, ploughing in the autumn will generally be more advantageous than waiting until spring. Where weeds bother, summer ploughing will still be better, enabling the cultivation of the land at different intervals.

HORTICULTURE

FRUITS

The apple and the strawberry are the only two fruits of economic importance in Central Quebec. The raspberry would be a paying proposition if growers understood the importance of starting with disease free stock, but as matters stand now, it is generally grown at a loss. Pears are out of consideration until a hardy variety is found with enough quality to sell it. The demand for currants and gooseberries is so limited that farmers are not advised to start commercial plantations. The plums, which generally do well, are small and not attractive enough to compete with fruits from outside, though the quality is fine.

VEGETABLES

For experiments with vegetables, the reader is referred to the 1925 report of this Station. In that report, the following projects are treated: Fall seeding versus spring seeding of vegetables; asparagus, variety experiment, breeding, method of seeding; beet, variety experiment, improvement by selection, seed production, thinning; cabbage, variety experiment, breeding, seed production, protection from root maggot; carrot, variety experiment, seed production, thinning; cauliflower, variety experiment, protection from root maggots, protection from weather; celery, variety experiment, blanching; corn, variety experi-

ment, breeding; cucumber, muskmelon, watermelon, variety experiment; onion, variety experiment, breeding, seed production, seed versus sets, best size of sets, thinning; parsnip, variety experiment, thinning experiment; pea, variety experiment, breeding, of different seasons versus one variety sown at different dates; potato, variety experiment, hill selection, seed treated with plaster versus not treated, different sizes of sets; pumpkin, variety experiment; rhubarb, variety experiment, forcing; squash, variety experiment; tomato, variety experiment, breeding, transplanting one or more times, methods of pruning, methods of training, ripening artificially; turnips, variety experiment, thinning.

ORNAMENTALS

For experiments with ornamental plants, the reader may look up the 1926 report where the following projects are treated: annuals, everlasting flowers, wild flowers, herbaceous perennials, trees and shrubs, ornamental and shelter, hedges, variety experiment; lawn, weed control; gladiolus, variety experiment, producing from bulblets, growing commercially; narcissus, tulip, variety experiment, growing commercially; antirrhinum, crocus, hyacinth, iris, lily, paeony, perennial phlox, roses, climbing roses, sweet peas, syringa, variety experiment.

For experiments with fruits the reader, in consulting the 1927 report, will get details regarding the following projects: apples, variety experiment, fertilization, cover crops, cost of establishing orchard; cherries, white currants, grapes, pears, plums, variety experiment; black currants, red currants, gooseberries, raspberries, variety experiment, breeding; strawberries, variety experiments, breeding, hill system versus matted rows.

APPLES

More than two hundred varieties of apples have been tested at Cap Rouge during the last eighteen years. Only twelve varieties have shown real outstanding merit such as is required to make their growing profitable. Out of these twelve varieties, possibly three would be sure to make a money making proposition of commercial apple growing. Duchess can very well be replaced by Melba for early autumn, followed by Wealthy or Pedro, for early winter, and by McIntosh for winter. It seems too bad that an attractive coloured picture will often induce farmers to buy apple trees which are not hardy enough for their district, or which will give fruit of such poor appearance and quality that it will sell for a very low price and induce consumers to buy citrus fruit latter on. In this case, the producer and not the consumer is to be blamed as he not only hurts himself but really hurts all other producers of apples.

GRAPES

Out of thirty-three varieties of grapes tested during 17 years, twenty-five have been discarded because they did not come to maturity. Amongst the other eight, only three have a chance of being early enough, but there seems no doubt that they will be too late in a short frost-free season. Champion does well every year but is of such poor quality that it should be left aside. The conclusion is that grapes should not be grown commercially in Central Quebec.

PEARS

Though sixty-four pear trees of nine varieties have been planted since 1911, only three trees were living in 1927, and not one had given a single marketable fruit. Well known varieties such as Clapp Favourite and Flemish Beauty were tested, and it is evident that commercial pear growing in Central Quebec cannot be recommended.

VARIETY TESTS OF GOOSEBERRIES AND CURRANTS

Tests of fourteen years duration have shown that the average number of pounds of fruit per acre was 14,001 for gooseberries, 7,249 for red currants, 5,585 for white currants, 5,165 for black currants, and that the best varieties were Silvia gooseberry, Perfection red currant, Climax black currant, Cherry white currant. This will help the man who wishes to grow fruit for home consumption. But the person who wants to go into commercial bush fruit culture should first find out if he can have a market for what he produces. In the present case, there are nine chances out of ten that he will not have a good market, as it does not exist in Central Quebec, with very rare exceptions. We often know too little about market requirements and this is the very first thing to look into.

VARIETY TESTS OF STRAWBERRIES

Variety and strain tests of strawberries have been going on at Cap Rouge for fifteen years. There are now so many good perfect varieties that the planting of imperfect ones should be discouraged. A total failure or poor results may be due to having only one imperfect variety which needs another one for pollenization. Out of forty-one varieties and strains tested, Dunlap is the one which best combines the most desirable qualities of colour, size, quality and yield.

Certain varieties have been recommended which the canners want, but none of them are suitable to the district, and though they may look well and be firm in the can, they will not yield enough to be profitable to the producer. Even if tempting prices are offered, it is better to go slow as the probabilities are that as soon as the supply will be increased, the demand and the prices will go down.

Most growers lose money at times, and some growers lose money all the time, by mixing good looking fruit with bad, by using old boxes, or by offering berries packed in a slovenly way. And these men are the very first to complain that they lose money. It is really too bad that they do not lose enough money to get them out of the business, as they are a detriment to others as well as to themselves.

The best and only monopoly, against which there are no anti-trust laws, which the farmer has, is the absolute control of the quality of his product. And he should invariably take advantage of this.

VARIETY TESTS OF VEGETABLES

Every year many seedsmen offer what they claim to be new varieties and, unfortunately, it happens too often that what is widely advertised has already been on the market for a long while under different names, or has very little merit if it is a novelty. During the last seven years, most of the so-called new varieties have been tested in a preliminary way, at Cap Rouge, alongside of the variety or strain, of the same class or season, which has here given the best satisfaction. Everything with obvious defects, such as poor quality, inclination to disease, bad appearance, evident low production, or which is clearly about the same as a well known variety, is discarded after the first year. Others are grown in the nursery another year, either to be definitely put aside or sent to the trial plots for five seasons. Of 224 varieties or strains thus tested, 97 were rejected the first year, and 93 the second year. Of the 34 promising varieties, only 7 were judged good enough to be placed in the trial plots in 1929. This means that 217 varieties were rejected because it is obviously useless to try to develop a market for what may in this instance be termed mongrel crops.

THE BIGGEST JOB IN MARKETING IS TO WIN AND HOLD THE TRADE

The testing of varieties and strains of vegetables brought out clearly the fact that the highest yielders are not always the most profitable, for the good reason that they sometimes go begging for buyers whilst others which do not produce as well are quickly disposed of. For instance, "butter" beans are readily sold when a higher yielding green variety has to be brought back home; a "sugar" pumpkin weighing less than half of a large "field" finds a buyer when the big one has to be fed to hogs; a supposed "self-blanching" celery goes like hot cakes when a green variety does not sell. This means that truck growers and gardeners must study their market, win it, and then hold the trade. If varieties and strains found to be the highest yielders happen to be liked on their market, so much the better; if not, it is more profitable to grow what will win and hold the trade.

POTATOES

More than eighty so-called varieties of potatoes have been tested at Cap Rouge during the last nineteen years. The two which are recommended are Irish Cobbler for an early sort and Green Mountain for a late one, though Dooley is coming to the fore as a main crop. The usually warm dry summers and shallow soil of the district are not favourable to the production of potatoes, so that growers who have a profitable market are advised to change seed every two or three years. Certified seed should be procured, as the above mentioned adverse conditions are not favourable to the production of disease-free tubers, and buying from a neighbour in most cases would not be a profitable change of seed. It does not seem advisable to go into potato growing on a large scale in this district, and it should be remembered that a good crop generally always results in lower prices of potatoes.

PRODUCE SOMETHING THAT IS WORTH SELLING

A time was when practically any kind of vegetable could easily be sold on such markets as Quebec, Levis, Three Rivers, but it is not so now. Facility of rail transportation has brought vegetables from such far distant points as Florida and even California to our doors, letting alone competition from Ontario. Advantages of climate and possibly of soil have more than counterbalanced freight and express charges. The goods are generally of good quality, well graded and packed so that the wholesale dealers eagerly buy them; the retailers also ask for them, as they can be had regularly with great uniformity. How can the local grower meet such competition? By producing something that is worth selling, which means quality and appearance. This is why, in making selections of vegetables, the Cap Rouge Station has not only looked to yield, but also to quality and appearance. Samples were sent each year to leading retailers in Quebec city and valuable information was thus gained as to what was really worth while producing on account of being easy to sell profitably.

THE COUNTRY HOME, THE COUNTRY SCHOOL, AND THE COUNTRY CHURCH SHOULD HAVE ATTRACTIVE SURROUNDINGS

Though there is certainly great improvement in recent years, it must frankly be admitted that the surroundings of the country homes are not as attractive as they should be. No doubt, the important question of first making a living has kept a number from working at something which did not give an immediate return in cash, but negligence must be admitted in a great number of cases. The Cap Rouge Experimental Station has tested hundreds of ornamental trees, shrubs and plants and is always ready, in fact eager, to furnish all information regarding the beautifying of home surroundings.

CEREALS

For detailed information regarding results of experiments with cereals, the reader is referred to the 1927 report of this station. The main projects are: barley, variety and strain tests, production of superior varieties or strains by selection, determination of percentage of hull; beans, variety and strain tests; oats, variety and strain tests, production of superior varieties or strains by selection, determination of percentage of hull; peas, variety and strain tests, production of superior varieties or strains by selection, cooking tests, cooking tests when grown on different soils and after different crops; spring wheat, variety and strain tests, production of superior varieties or strains by selection; grain mixtures, barley and oats, barley, oats and wheat, peas and oats; comparison of selected and unselected seeds; production of registered grain; and importation and testing of foreign varieties of cereals.

A complete and up-to-date account of the cereal work conducted at Cap Rouge will appear in one of the future reports of this station.

SUPPLY THE PUBLIC WITH RELIABLE INFORMATION

The time is past when primitive methods were used to produce everything which the farmer required. Sentimentalists may deplore the fact that our forebears grew all the wheat necessary for the family, but the modern tiller of the soil is looking for profit, which means that the capital invested must earn a normal rate of interest, with enough left to pay for labour, depreciation, repairs, insurance and taxes. It is thus obvious that an acre of land should not be used to grow a crop which can be replaced by another one giving more profit. The following table shows the comparative yield at Cap Rouge of the highest producing variety of each of oats, peas, barley, and wheat during fifteen years:—

COMPARISON OF OATS, PEAS, BARLEY, WHEAT FOR DIGESTIBLE NUTRIENTS

Crop	Yield of grain per acre	Digestible nutrients							
		Crude protein		Carbohydrate		Fat		Total	
		In 100 pounds	Per acre	In 100 pounds	Per acre	In 100 pounds	Per acre	In 100 pounds	Per acre
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Banner oats	2,322	9·7	225	52·1	1,210	3·8	88	70·4	1,635
Arthur peas	2,124	19·0	403	55·8	1,185	0·6	12	76·2	1,618
Manchurian barley	1,572	9·0	141	66·8	1,050	1·6	25	79·4	1,248
Huron wheat	1,545	8·7	134	67·5	1,043	1·4	22	79·4	1,227

A careful study of the above figures shows that it will not pay farmers of the district of Quebec to grow wheat for live stock feeding. For special cases where oats would lodge, the best variety of wheat to use is Huron.

HIGH PRODUCING UNITS ARE SOMETIMES A BETTER ANSWER OF THE INDIVIDUAL FARMER TO THE PROFIT-MAKING QUESTION THAN ARE HIGH PRICES

For an average of thirteen years, barley has yielded quite a bit less grain, less digestive nutrients, and less protein per acre than either oats or peas, so that, in general, it is not profitable to grow it in Central Quebec. But there are exceptions, such as when hogs are a specialty and barley is a better feed than oats, where the soil of a certain farm is particularly well adapted to this cereal, or when there is a special demand, such as for malting. In the latter case, farmers are advised to go slowly, as temporary high prices may induce them to use certain varieties which may not be the best when overproduction

will have brought prices down. This is an instance when it would seem better to be on the look out for new varieties or selections which will raise production, rather than to depend on higher prices to bring in a profit. Where barley is grown, Manchurian will do well.

LET THE INDIVIDUAL PRODUCE MORE PER ACRE AND HIS INDIVIDUAL OVER-PRODUCTION MAY MAKE A PROFIT FOR HIM

Oats require less heat units to come to maturity than wheat or barley, and are naturally well adapted to the rather cold district of Central Quebec. They have also the advantage of making a good mixture, with peas, for hay, grain, soilage or silage. They are the best concentrate for horses, and, ground, are fine for dairy cattle, sheep, swine, poultry. Finally, careful tests at Cap Rouge during many years have shown that they produce more digestible nutrients per acre than either barley or wheat.

Sowing trial plots.

Unfortunateley, the yield per acre in the province of Quebec is very low and this should be remedied. It can easily be done by choosing the right variety. Tests have shown that Banner, a late spreading hulled variety, will give more "meat" per acre than anything else, as may be seen by the following figures which represent the average of five years:—

COMPARATIVE YIELD OF KERNEL FROM DIFFERENT KINDS OF OATS

Kind	Variety	Pounds of kernel
Hulless		
Side	Liberty	71
Early spreading	Longfellow	84
Late spreading	Alaska	85
	Banner	100

To arrive at the above figures, the percentage of hulls was calculated for the last three, so that they are all placed on the same basis.

There is no fear of overproduction of oats in Central Quebec and farmers who produce more per acre will make more money.

ON CERTAIN FARMS SOME CROPS CAN BE BOUGHT CHEAPER THAN THEY CAN BE GROWN

To make the most profitable use of agricultural land involves the use of good crops for live stock, good methods of soil management, good control of plant and animal diseases and pests, and good methods of disposing of products. Good crops, to be profitable, should be the ones that will leave the greatest net profit, and it is a question if flax can return as much net profit, in Central Quebec, as other crops. It requires a lot of manual labour which is the main factor in calculating profit. Persons who wish to grow it will probably find Longstem the best for fibre, and Novelty, the best for seed.

Tests at Cap Rouge during fifteen years show that field beans do not produce as much digestible nutrients per acre as field peas, so that they cannot be taken into consideration for live stock feeding. The demand for human consumption is rather limited, and importations from foreign countries at low prices are liable to pull down prices. Farmers are thus advised to go into bean growing on a limited scale, and to find out if their market wants a white or a coloured bean. Navy, amongst the former, and Norwegian amongst the latter, are good varieties. Freedom from disease is one of the important factors for high production. The grower therefore should use seed from pods which are free from blotches.

MORE FIELD PEAS SHOULD BE GROWN

Field peas are no doubt the most profitable of the grains generally grown in Central Quebec, as they yield much more protein per acre than any of the others, and protein is the costly part of most rations, especially for milk production. There is also a good demand for human consumption, in the district, and it happens that Arthur, the variety which has done best at Cap Rouge, is a good "cooker." Farmers are advised to use this variety, or at least a white one, without any black spot, if they wish to sell for human consumption.

FORAGE CROPS

CORN—VARIETY AND STRAIN TESTS FOR ENSILAGE PURPOSES

Some sixty varieties of Indian corn have been tested for silage production during the last fifteen years. It has been found that small early maturing kinds such as Quebec Yellow and Twitchell's Pride do not give enough tonnage, and though the percentage of dry matter may be high, the total production per acre is too low to make them profitable for silage production.

The following table gives details about the yield of raw material, and, which is much more important, of dry matter per acre of varieties which are the most promising for Central Quebec:—

VARIETY TESTS OF CORN FOR SILAGE—5 YEARS

Name	Class	Yield of corn per acre	Per cent dry matter	Dry matter per acre
		lb.		lb.
Burr-Leaming	Dent	38,615	14·75	5,696
Sweepstakes or Excelsior	Dent	38,007	14·92	5,671
Eureka	Dent	43,367	12·80	5,551
North Western Red Dent	Dent	32,647	16·42	5,361
90 Days White Dent	Dent	34,107	15·56	5,307
Hybrid (Wimplo)	Dent	35,138	14·80	5,200
Minnesota 13	Dent	30,448	16·95	5,161
North Dakota	Flint	35,080	14·69	5,153
Longfellow	Flint	34,876	14·61	5,096
Wisconsin No. 7	Dent	32,062	15·87	5,088

Contrary to the general impression that flints would give better satisfaction because they generally come to the glazing stage earlier than the dents, seven varieties of the latter top the list of the ten heaviest yielders of dry matter. Another noteworthy detail is that the average per cent of dry matter of the eight dents is a little higher than that of the two flints.

Longfellow corn was compared with a mixture of Arthur peas and Banner oats for silage production, and results are herewith given:—

PEAS AND OATS COMPARED WITH CORN FOR PRODUCTION OF DRY MATTER—7 YEARS

Crop	Raw matter per acre	Per cent dry matter	Dry matter per acre
	lb.		lb.
Peas and oats	17,249	31·22	5,385
Corn	26,098	18·14	4,734

The variety of corn used was Longfellow which yields around 12 per cent less than Burr Leaming as seen in the table comparing varieties. Even if this 12 per cent is added to the 4,734 pounds of dry matter in the preceding table, corn will not quite come up to peas and oats, and the advantage will be very much in favour of the latter for protein.

It may thus be said that corn cannot now be recommended for silage production in a district such as Central Quebec where the frost-free crop growing season is too short.

CORN—VARIETY AND STRAIN TESTS FOR GRAIN

In testing varieties and strains of corn for silage purposes it was soon found out that some of them did not give enough tonnage, though they came to the glazing stage much earlier. A new project was then started to see if it would be profitable to grow corn for grain in Central Quebec. The following figures give details:—

VARIETY AND STRAIN TESTS OF CORN FOR GRAIN—NINE YEARS

Variety or strain	Yield of shelled corn, per acre					Average of 5 years
	1925	1926	1927	1928	1929	
	lb.	lb.	lb.	lb.	lb.	lb.
Howe's Alberta	1,731	1,745	3,119	1,642	841	1,816
Gehu	1,911	101	3,586	1,352	487	1,487
Northwestern Dent	1,719	145	3,596	1,342	345	1,429
Quebec 28	1,682	126	3,774	910	185	1,335
Twitchell's Pride	1,498	164	2,963	1,110	782	1,303

Quebec 28 used to be the standard variety for grain production in this district, but it is much inferior to Howe's Alberta which is strongly recommended for this purpose. A great advantage of the latter is that it matures every season; the figures for 1926 show that when all others gave practically nothing, in a bad year, Howe's Alberta yielded well.

The average production of the best variety was over 30 bushels of grain per acre, which is equivalent to more than 50 bushels of oats, so that under certain circumstances it may be profitable to grow corn for grain in Central Quebec.

CORN—ACCLIMATIZATION EXPERIMENT

This district has a rather short season during which temperature is suitable to growth in the corn plant, so that yields are generally low. It was thought that a cold resistant variety might be sown earlier, or if sown at the same time as a standard variety for Central Quebec, it would make quicker growth. This is why seed was procured from the Wisconsin Station of Golden Glow which had been obtained by germinating in an ice box. It was sown at the same time as Longfellow, much earlier than is the custom here, and the following table gives details:—

ACCLIMATIZATION EXPERIMENT WITH CORN—4 YEARS

Cold-resistant Golden Glow			Longfellow		
Seeding	Germination		Seeding	Germination	
	Date	Per cent		Date	Per cent
May 1	May 25	55	May 1	May 27	78
May 11	May 31	64	May 11	June 1	74
May 21	June 7	79	May 21	June 7	79
Average		66	Average		77

Contrary to expectations, the cold-resistant strain of Golden Glow did not do as well as Longfellow, and, what is more surprising, fell down when it was expected it would lead, that is for the early seedings. This shows that it will not stand usual adverse conditions better than Longfellow. Germination tests made before seeding were about the same for the two varieties, so that neither had the advantage in this respect.

SUNFLOWERS—VARIETY AND STRAIN TESTS FOR YIELD

After it has been decided to grow some crop for ensilage, the next thing to find out is what will give the best results. The following figures show that, under conditions similar to those at Cap Rouge, a suitable variety of sunflowers will yield more dry matter per acre than corn:—

SUNFLOWERS AND CORN COMPARED FOR PRODUCTION OF DRY MATTER—7 YEARS

Crop	Raw matter per acre	Per cent dry matter	Dry matter per acre
	lb.		lb.
Sunflowers	29,735	21·03	6,253
Corn	26,098	18·14	4,734

The percentage of dry matter looks abnormally high for sunflowers and low for corn, but samples were carefully taken and analysed at the Division of Chemistry, Ottawa. Henry gives 12·6 for the total digestible nutrients in 100 pounds of dry matter of sunflower silage, and 13·3 for immature corn silage, so that the difference is negligable from this standpoint. It can thus be said that sunflowers may advantageously replace corn for silage purposes in Central Quebec, although peas and oats or green clover may still be more profitable on account of the high proportion of protein.

The table which follows gives details about varieties of sunflowers tested at Cap Rouge:—

VARIETY TESTS OF SUNFLOWERS—5 YEARS

Variety or strain	Source	Green matter per acre	Per cent dry matter	Dry matter per acre
		lb.		lb.
Giant Russian	Disco	37,177	18·09	6,725
Mammoth Russian	McDonald	36,480	15·99	5,833
Ottawa 76	C.E.F.	25,550	13·75	3,513
Mixed Mennonite	Rosthern	21,446	12·40	2,659

The years during which the varieties and strains of sunflowers were compared are not the same as the ones when sunflowers and corn were compared, which explains the difference in per cent of dry matter in sunflowers for the two projects.

Russian is the best variety to use, and the main point is to get the best possible strain of it.

MANGELS—VARIETY AND STRAIN TESTS FOR YIELD AND PURITY

Averaging all varieties and strains of mangels tested at Cap Rouge during thirteen years, the yield was at the rate of 26,164 pounds of roots per acre, and the fifty-six analyses gave 13·43 for the percentage of dry matter which amounted to 3,514 pounds per acre. During the same period, the figures for swede turnips were respectively 38,613, 12·20, and 4,711. It is thus seen that, except on a very limited area of naturally drained alluvial soils, it is more advantageous to grow swede turnips than mangels in Central Quebec.

The following table gives details about the ten best:—

COMPARISON OF VARIETIES AND STRAINS OF MANGELS—5 YEARS

Variety or strain	Source	Type	Raw matter per acre	Per cent dry matter	Dry matter per acre
			lb.		lb.
Stryno Barres	H. Hartman	Intermediate Orange	41,228	13·39	5,520
Elvetham Mammoth	H. Hartman	Long Red	35,565	14·67	5,217
Yellow Intermediate	C. E. Farm	Intermediate Orange	31,973	15·07	4,818
Giant White Sugar	Ralph Moore	Half Long White	34,893	13·68	4,773
Ferritslev Barres	H. Hartman	Intermediate Orange	36,450	12·90	4,702
Mammoth Long Red	Dupuy & Ferguson	Long Red	31,800	14·76	4,694
Giant Yellow Intermediate	Steele, Briggs	Intermediate Orange	33,921	13·76	4,668
Barres Sludstrup	H. Hartman	Intermediate Orange	33,907	13·71	4,649
White Green Top Half Sugar	H. Hartman	Half Long White	30,565	15·21	4,649
Danish Sludstrup	K. McDonald	Intermediate Orange	34,897	13·32	4,648

The most striking features in the above table are that half of the best varieties and strains came from Europe, and that the first five are either from Europe or from sources where it is known that particular attention was given to breeding and selection.

SWEDE TURNIPS—VARIETY AND STRAIN TESTS

Of the three main field roots grown at Cap Rouge, Swede turnips are easily leading for the production of dry matter per acre, as will be seen in the following table:—

SWEDE TURNIPS, MANGELS AND CARROTS COMPARED FOR PRODUCTION OF DRY MATTER—13 YEARS

Crop	Raw matter per acre	Number of analyses	Per cent dry matter	Pounds of dry matter per acre
	lb.			
Swede turnips	38,613	57	12·20	4,711
Mangels	26,164	56	13·43	3,514
Carrots	24,975	45	11·62	2,902

Anybody wishing to grow roots should therefore use swede turnips in Central Quebec, and the next thing to find out is what variety or strain will produce most. This is shown below:—

COMPARISON OF VARIETIES AND STRAINS OF SWEDE TURNIPS—6 YEARS

Variety or strain	Raw matter per acre	Per cent dry matter	Dry matter per acre
	lb.		lb.
Bangholm	42,851	12·87	5,515
Good Luck	41,490	12·74	5,286
Perfection	40,631	12·41	5,042
Ditmars	42,646	11·81	5,036
Invicta	40,141	12·49	5,014
Favorite	41,188	12·15	5,004
Hall's Westbury	38,135	13·07	4,984
Sutton's Champion	34,464	14·41	4,966

The above figures, compared with some of those of the preceding table, show the importance of choosing a high yielding variety or strain, as the first table shows the average for all varieties. Carefully gathered data covering 4 years indicate that the trueness to type of 32 varieties and strains ranged from 10·6 to 93·6, with an average of 58·6, which brings out the fact that the source of seed should receive careful attention.

The cost of a ton of digestible nutrients in roots is so much higher than that in silage and in hay, that only farmers having small herds and disposing of very low priced labour should grow them.

TURNIPS—VARIETY AND STRAIN TESTS

Field turnips have yielded less dry matter per acre than either mangels or rutabagas, at Cap Rouge, as will be seen by the following table:—

RUTABAGAS, MANGELS, AND TURNIPS COMPARED FOR DRY MATTER—TEN HIGHEST YIELDERS OF EACH DURING SAME FIVE SEASONS

Kind of roots	Raw material per acre	Per cent dry matter	Dry matter per acre
	lb.		lb.
Rutabages	40,413	12·59	5,071
Mangels	34,520	14·05	4,834
Turnips	35,128	9·28	3,241

If only the yield of roots was taken into consideration, field turnips would compare advantageously with mangels, but the per cent of dry matter is so low, that they are way down at the bottom for the feeding value of the crop per acre:—

DETAILS FOR A FEW OF THE BEST YIELDERS

Variety or strain	Source	Raw matter per acre	Per cent dry matter	Dry matter per acre
		lb.		lb.
Pomeranian	Steele, Briggs	37,892	9·07	3,437
Red Paragon	Sutton	38,833	8·83	3,429
Purple Top Mammoth	Sutton	38,150	8·90	3,395
Greystone Devonshire	Briggs, Steele	36,312	9·12	3,312
White Globe	Ewing	36,666	8·92	3,271

As a rule, commercial seed is badly mixed, the per cent of purity for eleven lots during four years averaging only 45·6 and just 36·0 if two from England are taken out. It is thus hard to recommend a variety or strain when one is not sure of getting seed of this strain or variety.

Field turnips are poor keepers and should be fed from late summer to early winter. They do not seem to have a place in Quebec agriculture and are not recommended, except to farmers whose work has been unduly delayed and who may sow them as late as the first week in July.

ALFALFA—VARIETY AND STRAIN TESTS FOR YIELD AND SUITABILITY

A high protein roughage will greatly help to produce milk more cheaply, and alfalfa is the roughage which fills the bill as far as this point is concerned. There has been a tendency, however, to sing its praise without looking at the requirements for success. Among these, hardiness is the main consideration, as it is useless to get 90 per cent germination if most of the plants die the first winter. The following figures explain the matter:—

TEST OF ALFALFA FOR HARDINESS AND YIELD—5 YEARS

Variety	Source	Yield per acre	
		Green matter	Hay, 15 p.c. moisture
		lb.	lb.
Variegated	Peel County	17,987	5,824
Grimm	Lyman	16,815	5,368
Medicago falcata	Paramount, Alfalfa Farm	Practical failure	Not enough to pay harvesting

A farmer buying seed of medicago falcata might have condemned alfalfa, whilst, with one of the others, the results would have been very good indeed.

But, besides a hardy variety, it must not be forgotten that alfalfa requires a deep, dry, reasonably rich, well tilled, inoculated soil with enough line, also that it should not be cut or pastured too closely or late. A good plan is to add a couple of pounds per acre of alfalfa seed to the usual quantity of timothy and red clover, so as to gradually inoculate the land, and find out if results are as anticipated. If it grows well, one may later on sow only alfalfa. The main point, however, is to learn to walk before trying to run.

RED CLOVER—VARIETY AND STRAIN TESTS FOR YIELD AND GENERAL SUITABILITY

In Eastern Canada, the value of hay alone is about 30 per cent of the value of all field crops, and in Central Quebec, timothy and clover are grown exclusively for hay. By far too much timothy is fed to live stock, especially to milch cows, and farmers of the district would certainly be better off financially if they grew more red clover. The source of seed, however, makes a great difference in the crop, as the following figures show:—

TEST OF RED CLOVER FROM DIFFERENT SOURCES—4 YEARS

Variety or strain	Source	Season	Height at harvest	Hay per acre, 15 p.c. moisture	Digestible nutrients per acre
			in.	lb.	lb.
Late Swedish	Sweden	Late	31·6	7,047	3,622
Dauphine	South Eastern France	Early	25·4	6,851	3,521
St. Clet	Quebec	Early	25·6	6,791	3,491
Medium Late Swedish	Sweden	Late	31·5	6,666	3,426
Chateauguay	Quebec	Early	26·1	6,579	3,382
Ottawa	C.E.F., Ottawa	Early	26·2	6,543	3,363
Altaswede	Alberta	Late	31·2	6,469	3,325
Spadone	North Italy	Early	25·6	6,366	3,272
Kenora	Ontario	Late	31·7	6,218	3,196
March	North Central Italy	Early	24·4	5,204	2,675
Umbria	North Central Italy	Early	22·2	3,667	1,885

The deduction which would generally be made is that the lots from North Central Italy lacked hardiness because they were grown too far south, but there is some other factor besides hardiness, as one lot from Southeastern France has consistently done well.

The best thing to do is to get domestic seed. The next best, to buy imported seed recognized as suitable for the district.

RED CLOVER—SEED GROWING VERSUS HAY FOR PROFIT

It is admitted that red clover seed grown in Canada is generally sure to gives a good crop of hay, and with the colouring process of foreign seed, farmers should know exactly what they are buying. But all districts in Canada are not equally suitable for the production of red clover seed, so that it was thought advisable to start an experiment at Cap Rouge to determine the relative profit obtained by cutting the second crop for hay as against harvesting it for seed. The following table gives details:—

RED CLOVER—SEED GROWING VERSUS HAY FOR PROFIT—6 YEARS—ONE ACRE

Two crops of hay						One crop of hay and one crop of seed						Total
First crop		Second crop		Total		Hay		Seed		Straw		Value
Yield	Value	Yield	Value	Yield	Value	Yield	Value	Yield	Value	Yield	Value	$
lb.	$	lb.	$	lb.	$	lb.	$	lb.	$	lb.	$	
4,809	36 91	2,747	24 79	7,556	61 70	2,488	18 51	93·5	32 03	2,056	9 17	59 71

Samples of the straw, after the seed was threshed, were sent to the Dominion Chemist who came to the conclusion that it was worth about 57·5 per cent of the hay. As Dr. Shutt wrote, this figure is somewhat higher than would probably have been arrived at if comparative digestibilities of the two classes of hay could have been accurately gauged, on account of the undoubtedly higher fibre content of the more fully ripened threshed hay.

There is not much difference in the revenues, but the expenses would be higher where seed is grown, on account of the generally greater difficulty to make the early crop of hay and also of the cost of threshing. Under the circumstances, it seems better for the farmer of Central Quebec to buy red clover seed and to make hay.

TIMOTHY—VARIETY AND STRAIN TESTS

Figures are now available comparing two varieties of timothy with the commercial article, and the following table gives results of five years:—

TESTS OF TIMOTHY—5 YEARS

Variety or strain	Source	1925		1926		1927	
		Green matter	Hay 15 per cent moisture	Green matter	Hay 15 per cent moisture	Green matter	Hay 15 per cent moisture
		lb.		lb.	lb.	lb.	lb.
Gloria	Sweden	6,830	2,776	10,885	4,155	8,700	3,673
Commercial	Seedsmen	6,360	2,885	8,900	3,964	8,570	3,580
Boon	C. E. F.	6,630	3,008	8,485	4,285	7,800	3,328

Variety or strain	Source	1928		1929		Average	
		Green matter	Hay 15 per cent moisture	Green matter	Hay 15 per cent moisture	Green matter	Hay 15 per cent moisture
		lb.	lb.	lb.	lb.	lb.	lb.
Gloria	Sweden	12,383	4,317	9,920	4,016	9,744	3,787
Commercial	Seedsmen	10,750	4,312	8,590	3,737	8,634	3,696
Boon	C. E. F.	9,470	3,762	9,465	3,950	8,370	3,667

The above figures show that the commercial seed of timothy, bought from four different dealers, in this case, was of very good quality.

Determining the cost of using hay caps, and the quality of the hay cured in cocks with and without caps.

For this project, the seed was sown in triplicate plots, with oats as a nurse crop, and two crops taken for each seeding. The soil is a sandy loam of average fertility, probably not the best for timothy but representative of a large area of land in the district covered by the Cap Rouge Station, and, to all outward appearance, very uniform.

According to this experiment, farmers are safe in getting the highest quality of seed from a reliable dealer.

POULTRY

There is more interest taken in poultry, in Central Quebec, than in any other branch of agriculture, especially around Quebec city, where quite a few farmers now keep from 100 to 200 layers. Requests for information are numerous, and sales of eggs for incubation, chicks, and breeding stock are heavy.

The following projects were reported on in detail in the Cap Rouge reports for 1924, 1925, 1928, and the reader is referred to them: pedigree breeding for egg production, hens versus pullets for fertility, hatchability, and livability, good layers versus poor layers for fertility, hatchability, and livability, breeding for egg size, percentage of fertility in different years of laying, skim-milk versus beef scrap for winter egg production, skim-milk versus beef scrap versus meat meal versus green bones versus powdered skim-milk for layers, roots versus clover leaves for winter egg production, roots versus clover leaves versus sprouted oats versus epsom salts for layers, good grain versus screenings for winter egg production, home mixed versus commercial grain for layers, water versus snow for winter egg production, temperature of poultry houses of different depths, pullets versus hens for winter egg production, time taken for tending trap nests, prevention of frozen combs, broilers versus fryers versus roasters for profit, best date for marketing cull hens, comparison of egg preservatives.

In future reports, results will be given in detail and up to date for the projects which are still being investigated.

HIGH PRODUCERS COMPARATIVELY EASY TO FIND, NOT SO WITH GOOD REPRODUCERS

With the aid of trapnests, good feeding and proper care, it is comparatively easy to find the high producers in a flock, but this does not mean that they will all be good reproducers, that is, that they will give pullets laying more eggs than they do themselves. This is not written to discourage the use of trapnests, but to show the importance of progeny testing. The total record alone does not mean everything, and a careful analysis should be made of such production characters as early maturity, non-broodiness, intensity, and high persistency.

Some thirteen years ago, only 4 per cent of the Barred Rocks in the Cap Rouge flock were laying more than 150 eggs of 24 ounces or over per dozen, while the mating lists of 1929 show 60 per cent with eggs of 24 ounces or over per dozen, with an average yearly production of 191 for the hens.

During all that time, not more than a dozen birds were brought into the flock, so that the results were achieved through in-breeding followed by line breeding, with the aid, of course, of whatever improvement was gradually made in feeding and management.

FERTILITY, HATCHABILITY OF EGGS, AND LIVABILITY OF CHICKS

Practically everybody believes that hens will give more fertile eggs and more chicks than pullets, also that good layers lose strength and will not be as good breeders as poor producers. It was to throw light on these two subjects that experiments were conducted, and the results will be found in the following table:—

HENS VERSUS PULLETS, AND GOOD VERSUS POOR LAYERS, AS BREEDERS

Kind of stock	Duration of experiment	Average yearly production	Number of eggs set	Fertility	Total eggs hatched	Total eggs for one chick alive at three weeks
				%	%	
Hens	7 years		7,630	89·5	40·4	3·04
Pullets	7 years		8,547	92·4	47·3	2·60
Good layers	10 years	203	7,800	89·6	40·5	3·05
Poor layers	10 years	157	1,960	88·8	44·3	3·09

In the case of pullets, it must not be forgotten that they should be old enough and in fine shape, as it is probably the good condition of the organs that has influence on their value as breeders. It should be noted here that professors Graham and Richardson, at the Ontario and New Hampshire Colleges of Agriculture, came to the conclusion that pullets were at least as good as older birds for breeding purposes.

For the other experiment, the good layers, strong and healthy, gave as good satisfaction as the poor ones. As 425 birds were used for this project, the results should mean something.

BREEDING FOR SIZE

To develop high producing strains laying eggs of 24 ounces or more to the dozen, the procedure of one project has been to use male birds whose dams laid eggs of 24 ounces or more to the dozen, and it is expected that the pullets will show an increase of egg size over that of their dams. But it is also probable that there is more than one factor responsible for egg weight, as the following figures show:—

INFLUENCE OF MALES OUT OF DAMS LAYING LARGE EGGS ON SIZE OF EGGS OF DAUGHTERS

Male bird	Out of dam	Weight per dozen, in pullet year, of eggs of dam	Average weight per dozen, in pullet year, of eggs of mothers	Average weight per dozen, in pullet year, of eggs of daughters
L 12	J 155	26 ounces	23·7	22·8
L 14	J 143	25 ounces	22·7	20·8

It is seen that, in these cases, male birds out of hens laying eggs over normal size produced daughters laying eggs averaging smaller than their dams. This shows that while choosing a male bird out of a hen laying heavy eggs is probably one of the good ways to increase the weight of eggs of his daughters, it is not the only way.

Atwood found that a ration composed only of whole grain reduced the weight of eggs about 12 per cent. Parkhurst says that body weight influences the size of eggs, the smaller birds laying smaller eggs than the larger birds. Jull and Lippincott report that the earlier the pullets lay the lower will be the mean egg weight of the total production.

Hens of fair size, having commenced to lay at the normal time for the breed, receiving mash with whole grain, mated to males out of dams laying large eggs, should improve egg size if their daughters are similarly managed.

WHEN IS FERTILITY HIGHEST?

During ten years not a single bird was found which was non-fertile from year to year, out of more than 1,500 different individuals. And the following table shows that there is no laying year when fertility is highest or lowest:—

PERCENTAGE OF FERTILITY IN DIFFERENT YEARS OF LAYING

Number of birds	Percentage of fertility				Average	Year when fertility was	
	Pullet year	Second year	Third year	Fourth year		Highest	Lowest
5	74·2	93·4	76·1	83·6	81·8	Second	Pullet
9	80·8	90·5	90·9	.....	87·4	Third	Pullet
23	89·5	84·5	.....	.....	87·0	Pullet	Second
27	.....	88·1	83·6	.....	85·8	Third	Second
10	.....	77·8	86·2	89·1	84·4	Fourth	Second

From the above it seems that it is not safe to discard a well bred bird after one year of low fertility. In 1923, fifteen eggs were set from G 4 and not one was fertile; in 1924, 37 of her eggs were set and 36 were fertile. In

Pedigreed Barred Rock. A strong constitution is the only sound foundation on which to build a heavy laying strain of poultry.

the case of G 28, the percentage of fertility was 3·7 in the pullet year, 93·5 the second year, 95·8 the third year, and 84·6 the fourth year, which shows that eggs of what is generally called an old hen may have a high percentage of fertility. For E 41, the percentage of fertility rose from 7·7 in the second year to 100 the third year.

COMMERCIAL GRAIN VERSUS GOOD SCREENINGS FOR WINTER EGG PRODUCTION

The object of this experiment was to find out if good screenings of the ordinary grains grown in Central Quebec, oats, barley, wheat, comprising about half of what comes from the threshing machine, are a satisfactory substitute for grain of the ordinary commercial grades, for winter egg production.

During five years, November to February inclusively, an average of 24 birds in two pens received practically the same quantities of animal and green feed, meal, grit and shells, the only difference being that one group got screenings of the above mentioned kind, and the other, commercial grain. The following table gives results:—

COMMERCIAL GRAIN OR GOOD SCREENINGS FOR WINTER EGG PRODUCTION

Kind of feed	Weight gained during experiment	Value at 30 cents per pound of weight gained	Eggs laid during experiment	Value at 60 cents per dozen of eggs laid	Total value of products	Total value of feed	Gain per pen
	lb.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Commercial grain.....	30	9 00	200	10 00	-19 00	18 91	0 09
Good screenings.....	19	5 70	198	9 90	15 60	15 16	0 34

The screenings were valued at two-thirds the price of commercial grain and gave as good results. As the quantity of feed was practically the same for both lots, screenings may well replace commercial grain, when composed of about half of what comes from the threshing mill. It will, of course, not be the same if only tail ends, bits of straw, and small shrunken kernels are used.

ROOTS VERSUS CLOVER LEAVES FOR WINTER EGG PRODUCTION

Vegetable matter in a succulent form is known to be beneficial to laying hens during winter, but can anything more easily available replace it with advantage? It is to help answer this question that an experiment was conducted during five seasons with a total of 234 birds. The two groups were housed and fed exactly the same, with the exception that one lot received either mangels or swede turnips and the other dry clover leaves. Results are given below:—

MANGELS OR SWEDE TURNIPS VERSUS DRY CLOVER LEAVES FOR WINTER EGG PRODUCTION

Kind of feed	Weight gained during experiment	Value at 30 cents per pound of weight gained	Eggs laid during experiment	Value at 60 cents per dozen of eggs laid	Total value of products	Total value of feed	Gain per pen
	lb.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
Mangels or swede turnips.....	35	10 50	166	8 30	18 80	18 68	0 12
Dry clover leaves.....	39	11 70	252	12 60	24 30	18 82	5 48

The above figures leave no doubt that dry clover leaves can profitably replace roots in the ration of laying birds during winter. Sometimes a "big

year" makes a lot of difference in averaging results, but in this case the birds fed dry clover leaves had the advantage both in gain of weight and in number of eggs laid, four years out of five.

As roots no doubt have a beneficial effect on the digestive tract, they may be given when available at a reasonable price, but they can also well be replaced by dry clover leaves.

SKIM-MILK VERSUS BEEF SCRAP FOR WINTER EGG PRODUCTION

In general practice, animal feeds are the limiting factor for winter egg production, and more attention should be given to them. Of these, skim-milk is the most easily available and it was compared during five seasons with beef scrap, from November to February inclusive. The following table gives results of this comparison of the two most common sources of animal protein:—

SKIM-MILK VERSUS BEEF SCRAP FOR WINTER EGG PRODUCTION

Kind of feed	Weight gained during experiment	Value at 30 cents per pound of weight gained	Eggs laid during experiment	Value at 60 cents per dozen of eggs laid	Total value of products	Total value of feed	Gain per pen
	lb.	$ cts		$ cts.	$ cts.	$ cts.	$ cts.
Skim-milk	36	10 80	315	15 75	26 55	19 08	7 47
Beef scrap	27	8 10	212	10 60	18 70	20 07	−1 37

The birds receiving skim-milk not only laid more eggs but gained more weight than those getting beef scrap. There was an average of 728 pounds of skim-milk given each year to 25 birds during 120 days, or about 6 pounds per day per 25 birds.

The rule should be to feed it always either sweet or sour, as most convenient, also to see that the supply is not cut off by freezing in winter, as the essential point is that good layers should get all the animal protein which they require.

WATER VERSUS SNOW FOR WINTER EGG PRODUCTION

The object is to determine whether snow is a satisfactory substitute for water for layers. One of the reasons of the project is that water often freezes in the modern cold poultry house, especially when it is not easy to attend to the birds many times a day, so that hens are often deprived during most of the time of what was considered an essential part of their daily ration.

The experiment was conducted during five winters with a total of 230 birds. Both groups received practically the same quantities of feed, one lot having water available all the time, and the other snow. Results are shown in the following table:—

WATER VERSUS SNOW FOR WINTER EGG PRODUCTION

Kind of feed	Weight gained during experiment	Value at 30 cents per pound of weight gained	Eggs laid during experiment	Value at 60 cents per dozen of eggs laid	Total value of products	Total value of feed	Gain per pen
	lb.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
Water	39	11 70	138	6 90	18 60	17 62	0 98
Snow	35	10 50	177	8 85	19 35	18 30	1 50

Individuals were chosen each year as similar as possible and were housed in adjoining pens. The lots receiving water gained more weight, the lots getting snow laid more eggs, and both took about the same quantity of feed.

Though it is admitted that water should be given when it is practicable to renew it often in very cold weather, the conclusion may be drawn that nobody need be afraid to give snow when it is impossible to do otherwise.

TEMPERATURE OF HOUSES OF DIFFERENT WIDTHS

The object is to determine temperature variations in houses of different widths, compared with outside temperature. Thermometers, registering the highest and the lowest temperatures were placed during eleven winters in a colony 8 feet wide, in a laying house 12 feet wide, in another 16 feet wide, and

Part of the exhibit of the Cap Rouge Experimental Station at one of the Quebec Provincial Exhibitions.

outside. All these buildings were of the shed roof pattern, were similarly constructed, and were placed so as to be equally sheltered from the wind and so as to get practically the same amount of sun. The thermometers were put at the middle of each house, taking length, width, and height into consideration. The following table gives details:—

TEMPERATURE IN POULTRY HOUSES OF DIFFERENT WIDTHS

Length of experiment	Duration		Outside			Colony—8 feet wide			House—12 feet wide			House—16 feet wide		
	From	To	Highest	Lowest	Range	Highest	Lowest	Range	Highest	Lowest	Range	Highest	Lowest	Range
11 winters.....	Nov. 19	Feb. 20	32·5	-5·2	38·2	39·7	8·1	31·6	37·1	9·1	28·0	34·8	8·5	26·3

The results show that the range of temperature, even in cold poultry houses, is much less than outside, also that the wider house shows less fluctuation.

PULLETS VERSUS HENS FOR WINTER EGG PRODUCTION

The object is to determine the comparative values of pullets and hens, for egg production. In this project a comparison was made between early pullets hatched in April, late pullets hatched in May, yearling hens, and two-year-old hens. The experiment began on the first day of November and finished on the last day of February during five consecutive years. Details will be found in the following table:—

PULLETS VERSUS HENS FOR WINTER EGG PRODUCTION

Age of layers	Weight gained during experiment	Value at 30 cents per pound of weight gained	Eggs laid during experiment	Value at 60 cents per dozen of eggs laid	Total value of products	Total value of feed	Gain per pen
	lb.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
Pullets hatched in April.....	35	10 50	474	23 70	34 20	18 46	15 74
Pullets hatched in May.....	45	13 50	173	8 65	22 15	18 87	3 28
Yearling hens.....	33	9 90	193	9 85	19 75	18 74	1 01
Two-year-old hens.....	19	5 70	54	2 70	8 40	17 82	—9 42

From the above figures it is seen that when early pullets produced a certain number of eggs at a cost of $1, yearling hens produced the same number at a cost of $2.49, late pullets at a cost of $2.80, and two-year-old hens at a cost of $8.48. When it cost early pullets $1 to produce a certain weight of eggs, it cost $2.35 for yearlings to produce the same weight, $2.92 for late pullets, and $8.10 for old hens.

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