DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

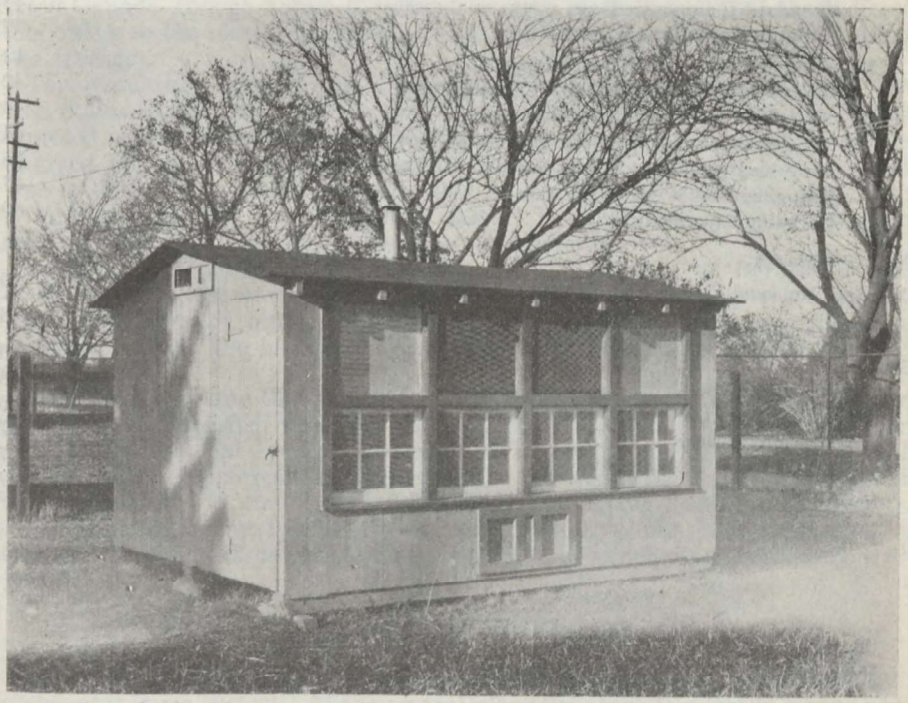
DOMINION EXPERIMENTAL FARMS

POULTRY DIVISION

REPORT OF THE DOMINION POULTRY HUSBANDMAN

F. C. ELFORD

FOR THE YEAR 1925



NEW-TYPE COLONY-HOUSE

Printed by Authority of the Hon. W. R. Motherwell, Minister of Agriculture, Ottawa, 1926

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POULTRY DIVISION

REPORT OF THE DOMINION POULTRY HUSBANDMAN, F. C. ELFORD

GENERAL CONDITIONS

A general cold spell in January, 1925, unusual in intensity and which followed a somewhat similar spell of weather in December, was very hard on the laying stock and materially reduced production.

During the spring an outbreak of European Fowl Pest reported by Washington as appearing in several States of the Union, was the occasion of an embargo being put on by Canada against the importation of fowl, including day-old chicks, from these States. This embargo no doubt affected to a certain extent the importation of chicks into Canada this year. There may be another effect upon Canadian Poultry conditions, the indirect result of the Fowl Pest, due more to the publicity given the disease than from the disease itself. There is reported to be a lack of consumption of dressed poultry in the United States because of the suspicion on the part of consumers occasioned by the knowledge of the presence of the disease. So far this curtailment of consumption has not affected Canada, though before the season is over, Canada may feel the indirect effects owing to the increased stocks of last year's dressed poultry in the United States storages.

The regulation that permitted day-old chicks to enter Canada from the United States free of duty when for the "Improvement of Stock" was this spring interpreted as meaning that chicks entitled to come in under the clause must be "pedigreed," hence only chicks that were accompanied by pedigrees were allowed in free of duty. It was the hope that this interpretation would keep out those that were not "for the improvement of stock," but just whether this hope was justified or not may as yet be hard to determine.

Following the publicity given Canadian birds last year at Barcelona, and later at Wembley, space was secured at Wembley this year in which to exhibit for sale a number of birds from Canada. As yet the sales have not been satisfactory, though the birds have occasioned very favourable comment on the other side.

It is worthy of note that the first Poultry Stock Book of Registered Poultry ever issued was published this year in Canada. The volume was published for the Canadian National Poultry Record Association by the Canadian National Live Stock Records and contains a complete list of the pedigrees of all registered birds that qualified in the Canadian National Egg-laying Contests, along with other information of an interesting character. The volume is indicative of a distinct advance step in national poultry breeding of which Canadians may well be proud.

WORK OF THE DIVISION

The work in general has progressed quite satisfactorily throughout the Experimental Farm system. At the central plant the practice adopted a year ago of giving clean ground for adult fowl and for rearing stock was adhered to. That part of the central plant that previously was not converted into a two-yard system for all permanent houses was completed this year. The year's crop of chickens was reared on rented land a few miles distant. The arrangement was

satisfactory and because of there being no land available for rearing on the home plant this plan will have to be continued, providing fresh land each year within convenient distance of the plant can be secured.

The new location that was provided last fall for the Canadian and Ontario Contests gives sufficient space for double yards. The 1925 yards to the south of each row of houses were used and a similar space to the north of the houses was cultivated and seeded to clover. This northern strip of clover will be utilized for yards during the summer of 1926. The plan adopted makes it easy to cultivate the alternate range each year, and the system of alternating the yards north and south provides fresh soil for each new contest.

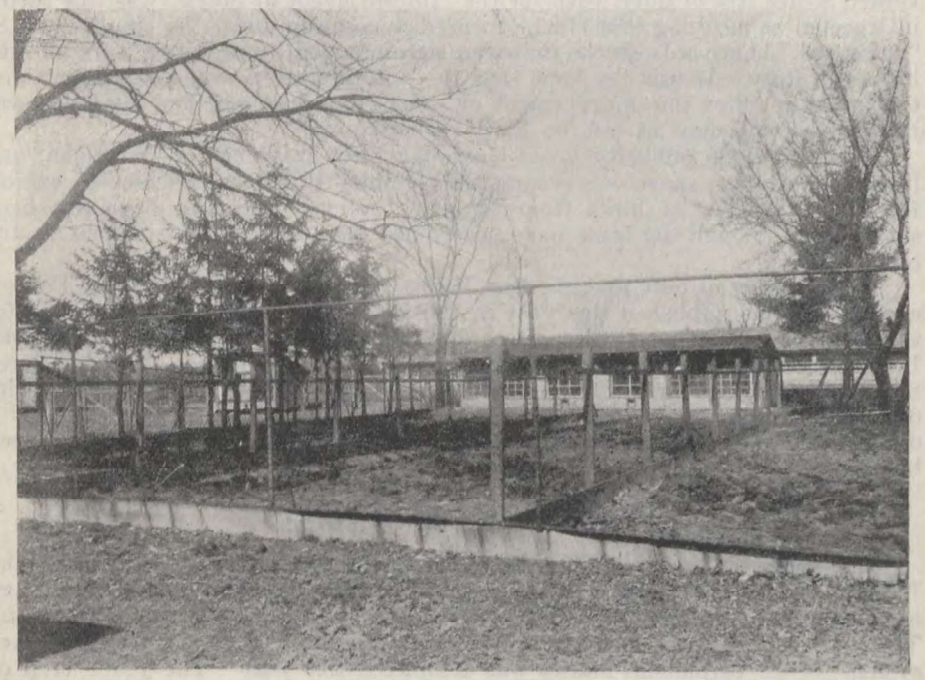
During the summer, Dr. C. H. Weaver, Animal Pathologist from the Health of Animals Branch, who is in charge of the work with poultry diseases, in company with the Dominion Poultry Husbandman, visited the western branch Farms and also looked into disease conditions in the four western provinces.

A uniform system of reporting experimental results from the branch Farms has been inaugurated which brings data to the Poultry Division in a form that allows summaries of all experiments to be prepared at Ottawa.

The organization of the work of the Division at Ottawa is as follows: Breeding and Divisional administration, George Robertson; egg-laying contests, registration and inspection, A. G. Taylor; work in connection with the French-speaking sections of Canada and oversight of all experimental work, W. W. Lee. The officers in charge have prepared the sections of this report dealing with their work.

BREEDING

A question frequently asked of this Division is: " Why are more breeds of poultry not being bred at the Experimental Farms?" It has been the aim of this Division, as far as possible, to confine the efforts of each branch Farm to



OLD YARDS AND BREEDING-HOUSES.
It was a difficult task to keep this type of yard free from contamination.

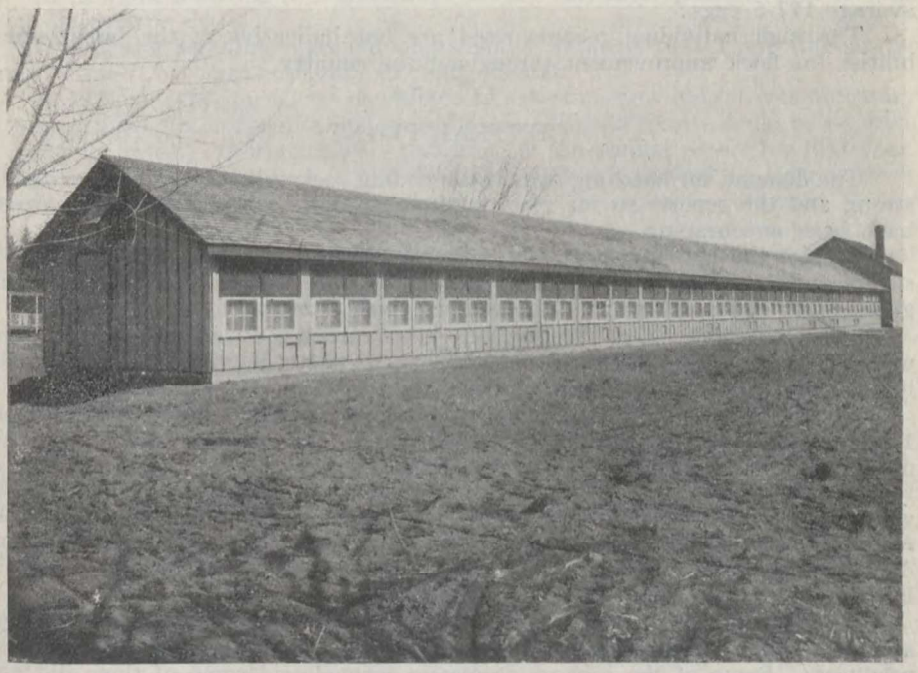
one breed for the reason that accommodation and space being limited it has been found that better results can be obtained where one breed is kept than where effort is spread over a number. Besides this, now that laying contests are being conducted on Dominion Experimental Farms in every province of the Dominion, where every standard breed may be tested if breeders so desire, the reason for more breeds being kept is no longer present.

A list of the breeds kept at the various Farms was published in the 1924 report.

EGG-LAYING RECORDS

During the past year some phenomenal official egg-laying records were made in Canada.

At the Agassiz contest, out of 450 birds competing, fifteen passed the 300-egg mark, and of these the Experimental Farm produced three, two White Leghorns with records of 332 and 311 eggs respectively, and a Barred Plymouth Rock with a record of 321 eggs.



THE TYPE OF YARD NOW USED AT THE CENTRAL FARM

Temporary fences are used to make runs for each pen. During the non-breeding season these fences are removed and the breeders allowed free range. No trees are planted in the runs and shade is supplied by a growing crop of Jerusalem artichokes, which interfere much less with the cultivation of the runs than do trees. The artichokes not only supply a good crop of green feed and tubers, but once they become established they have also the advantage of not requiring to be reseeded as there are always a sufficient number of tubers left to produce a new crop. Provision is made for yards both in the front and at the back of the house, so that while one part is being used as a run the other is being cleaned by a growing crop. It is thus possible to keep land sweet and avoid largely the dangers of land contamination.

At the Canadian Contest at Ottawa no 300-egg birds were recorded, the highest record being 284 eggs—three birds reaching this score, one a White Leghorn owned by Winchester Poultry Farm, Deepbrook, N.S., the others Barred Plymouth Rocks. One of these was owned by a breeder in Manitoba, but as the eggs averaged too small to be counted no further mention will be

made of it. The other was F 802, a hen bred by this Division. This bird was a daughter of D 687 which made a record of 210 eggs in the Canadian Egg-Laying Contest in 1921-22, and proved an exceptional producer of high-laying daughters. F 802 laid fourteen eggs before going into the contest, so that to the time of leaving the contest she actually had laid 298 eggs and these eggs averaged, from the time official weighing commenced, $2\frac{3}{16}$ ounces each, or $25\frac{1}{2}$ ounces to the dozen.

The foregoing shows what is being accomplished in individual cases. Similar advancement is being made in the general improvement of the Farm flocks, as a whole, by careful trap-nesting, selecting, and mating of the females to males equally carefully selected, the sons of high-producing dams, the offspring being carefully pedigree-recorded. This breeding work going on generation after generation is resulting in a continued improvement.

Take the flock of Barred Plymouth Rocks at the Lennoxville Farm as an example. In 1919 the average egg production for this flock was 121 eggs per bird. As a result of the system of breeding just mentioned, this average steadily increased until by 1924 it had been raised by 56·6 eggs, making the flock average 177·5 eggs.

The high individual records cited are but indicative of the latent possibilities for flock improvement throughout the country.

CENTRAL PLANT

The demand for hatching eggs and breeding cockerels has been exceptionally strong and the reports so far received from those to whom they were shipped have been encouraging.

Besides the hatching eggs and cockerels shipped out, there were about 500 surplus pullets distributed; many reports concerning them show that they are giving high egg-production at the present time, January 1.

The Pathologist, Dr. Weaver, has been carrying on investigational work with *Bacterium pullorum*, which is the cause of white diarrhoea in poultry, and it was deemed advisable to test our own flock to clean it up.

In all 298 hens were tested and of these 59 reacted, or 19.8 per cent, and 1,109 pullets, of which 255 or 23 per cent reacted. This was a severe blow, as the disease did not discriminate between the good and the bad. As a matter of fact, many of our very best breeding hens had to be sacrificed, and it appeared when we were through culling out the reacting pullets that we had taken the cream of our flock. However, the non-reacting pullets have come on and developed splendidly and it is hoped that the benefit of the sacrifices will be later reaped.

In checking back over the records after the test was completed it was apparent that the infection was not confined to any one group or groups of producers. Some of the highest producers reacted and some of them did not, similar results showing in the lower producers; also in the case of full sisters, some would react, while others would come through the test safely. In no case did it appear that the high or low fecundity of the bird made it either more or less susceptible to the disease.

WATERFOWL

In waterfowl more extensive breeding has been carried on than for some years.

No experimental work was attempted with geese as an endeavour is being made to establish satisfactory breeding flocks before undertaking any breed tests, or other experimental work.

With ducks besides a number of breed tests conducted and which are reported hereafter, a splendid lot of breeders were raised, that went into winter quarters in first-class condition.

The wild waterfowl with which, in co-operation with the Parks Branch, an attempt is being made to establish flocks, have done very well during the past season, several pairs of wild ducks having arrived at the plant, and stayed for the breeding season.

No wild geese, however, stayed at the plant other than those that have previously been located here. Two pair of these bred and produced ten goslings, but owing to the ravages of turtles or other depredators all but three disappeared within a few days of hatching. These latter grew well and are still at the plant, and as a number of turtles have been despatched during the season it is hoped that next season the loss from this source will not be so great.

DURATION AND CHANGE OF FERTILITY

In pedigree-breeding it is essential that the identical sire and dam of each chick be known.

During the breeding season it occasionally happens that a sire dies or for some reason it becomes necessary to change males.

In 1924 an experiment was conducted to ascertain how long it was necessary to wait after replacement of a male bird before accurate results could be secured. The results of that experiment were published in the annual report for that year. In the original experiment a White Leghorn male was mated to Barred Rock females. The resulting chicks from such a cross being white, whereas Barred Rock chicks are dark in colour, and as the hens had previously been mated to a Barred Rock male, the effect of the change of mating at once showed in the colour of the chicks.

During the past season further work was done along the same line and the same mating that was used in 1924 was used in this later experiment; that is, a White Leghorn male was mated to Barred rock females, that had previously been mated to a Barred Rock male.

The table (1) shows in detail the results:—

TABLE 1

Hen No.	Days after change of Males																												
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
000	..	R	..	..	W	..	W	W	..	W	W	..	..	I	W	..	W	..	..	..	..	..	..	..	..	..	..	..	..	..	..
F 3	..	R	..	..	..	R	..	..	..	..	..	I	..	..	..	I	I	..	I	..	..	I	..	..	..	..	..	..	..	..	..
F 39	..	..	..	..	..	..	..	..	W	..	..	W	..	D	I	D	W	D	..	..	..	W	..	W	W	I	W	W	..	I	W
F 87	..	..	..	..	I	..	..	..	..	..	..	..	..	..	..	I	..	I	I	I	..	I	I	I	..	I	..	..	..	..	..
G 205	..	..	R	..	R	R	..	W	W	..	W	W	..	W	W	..	D	W	W	I	W	W	..	..	I	W	W	W	W	W	..
G 878	R	..	R	..	R	I	..	R	W	..	I	W	..	W	W	W	..	..	W	W	W	W	W	..	W	..	I	..	I	I	I
G 889	R	..	I	R	I	..	W	W	W	..	W	W	W	..	W	D	W	..	D	D	D	D	..	W	W	W	..	W	W	W	I
H 70	I	R	..	R	R	..	R	..	R	..	R	I	R	I	..	..	I	I	I	I	I	..	I	I	I	..	I	..	I	I	..
H 74	..	R	R	..	R	..	R	..	I	..	R	I	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Key to Table—R. indicates a Rock chick, the result of the original mating.
W. indicates a cross-bred chick, resulting from the introduction of the Leghorn Male
I. indicates an infertile egg.
D. indicates a dead embryo, and a blank indicates that no egg was set that day.

In the 1924 experiment the effect of the Leghorn-Rock mating first became apparent on the third day after mating, and the effect of the previous Rock mating ceased after the seventh day.

In this experiment the effect of the Leghorn mating did not become apparent until the fourth day, and the effect of the previous Rock mating did not cease

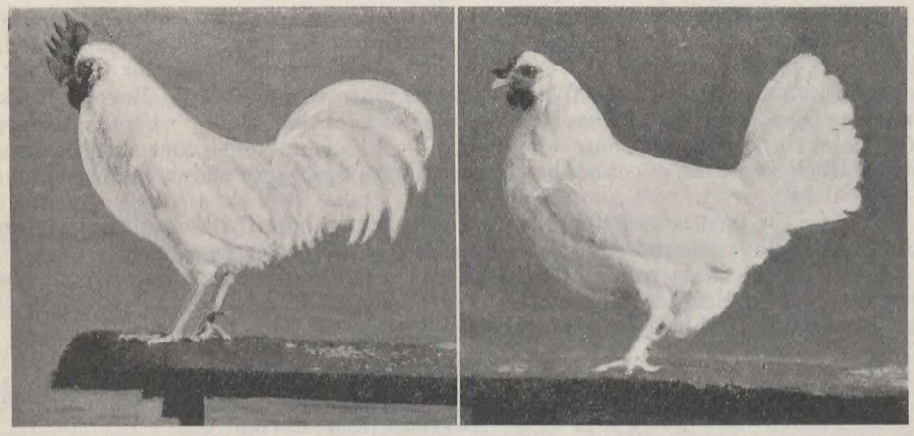
until after the twelfth day. The Leghorn male used both years was the same, and as might be expected, being a year older, was not so active this year as he was last. This would account for the effect not being apparent as soon as last year. Also if reference is made to the table it will be found that with only two hens did the result of the previous mating carry past the seventh day, and in both cases it is evident that the Leghorn never mated with these birds, as no white chicks were hatched from them.

An interesting fact noted in the experiment of 1924 is that in a number of cases a female produced a cross-bred chick and later reverted to the original mating and produced a pure Barred Rock chick. In referring to the table showing the year's matings no case of this will be noted.

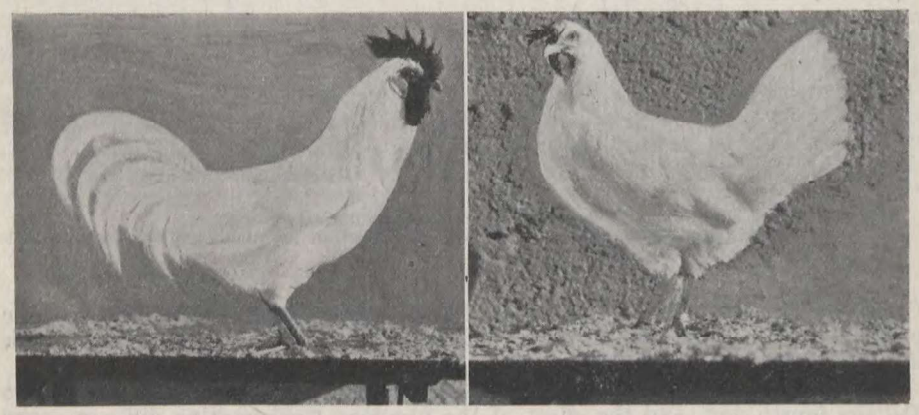
This experiment will be continued, when two pens will be mated one headed by a vigorous cockerel and the other headed by an old cock and the results published later.

VIGOUR AND BREEDING POWER OF REGISTERED HENS

There has been from time to time considerable criticism and discussion as to the vigour and power of reproduction of hens that have passed through laying contests. Undoubtedly a certain amount of this criticism is justified, as the

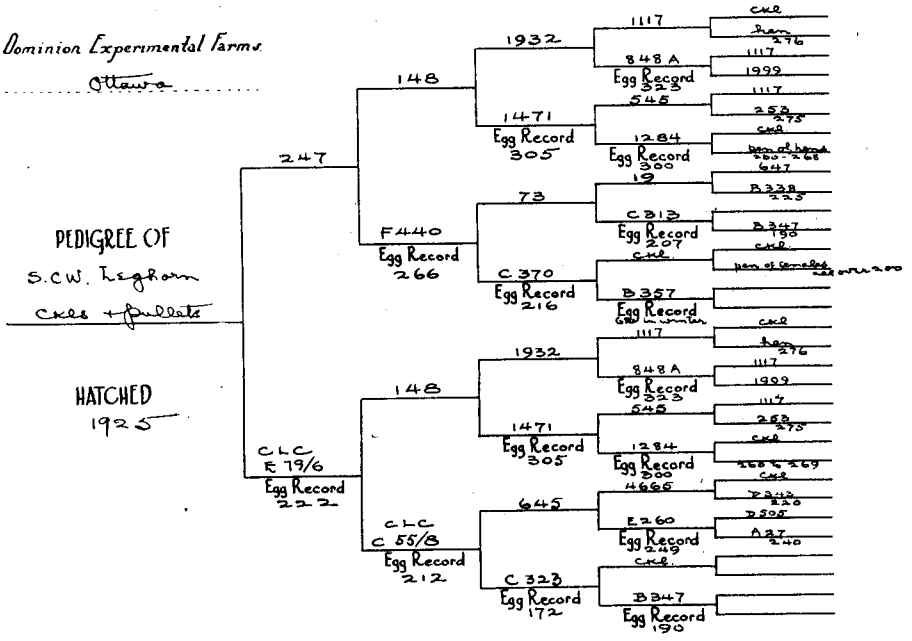


Male No. 247 which was mated to female C.L.C.E. 79/6 that laid 222 eggs in the Canadian Egg-laying Contest, eggs averaging 24 ounces to the dozen.



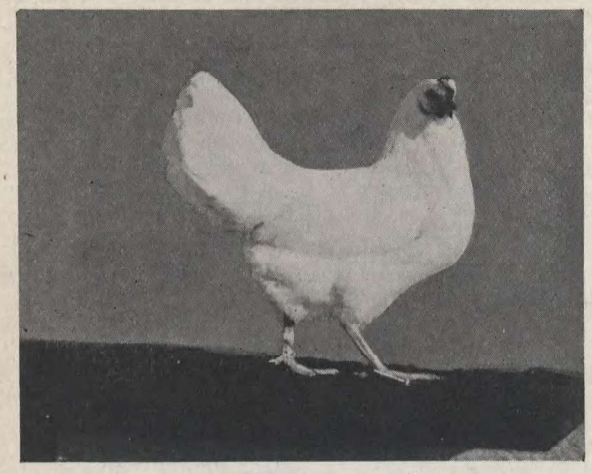
A son and daughter of the mating of male 247 with the female C.L.C.E. 79/6, representative of the vigorous type of birds produced.

vitality of any animal that has been kept closely confined and heavily fed for a long period must under ordinary circumstances be more or less reduced. That birds may be brought back to good vigorous breeding condition by resting and judicious feeding is, however, undoubtedly the case, the following being evidence of this.



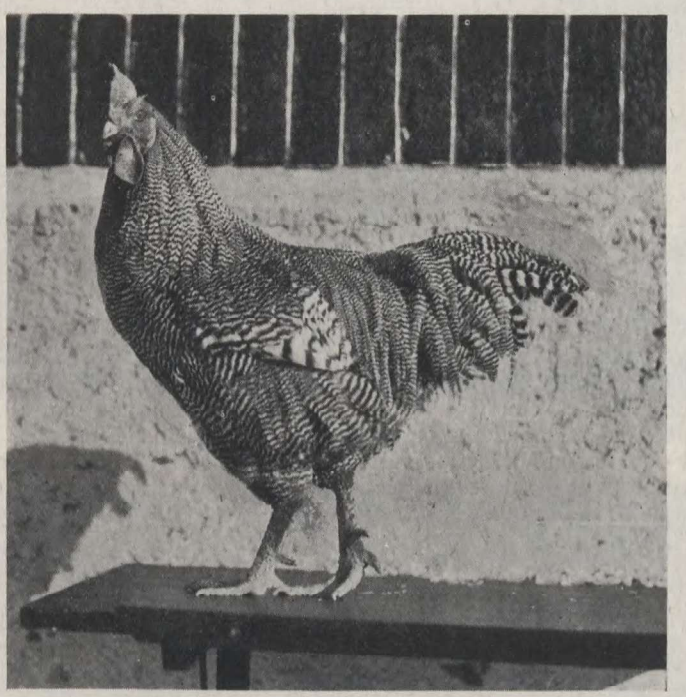
Pedigree-record.

Hen C.L.C.E. 79/6 laid 222 eggs that averaged 24 ounces to the dozen in the Canadian Contest. She was mated to No. 247 a highly-bred male the son of F. 440 a hen which laid 266 eggs in her pullet year. During the period between March 11 and April 29, thirty-five eggs were set from this mating, all of which proved fertile, one embryo, dying early in the hatch, the balance hatching, giving thirty-four strong vigorous chicks from the thirty-five eggs set. From these, eight pullets and eleven cockerels, all vigorous, strong birds have been selected for use in further breeding work.



A VALUABLE BREEDER

Hen C-370 has proved to be an exceptionally valuable breeder. This bird is in her eighth year and is still active and vigorous and in excellent breeding condition. She laid 216 eggs in her pullet year, not an unusually high production, but her blood is in strong evidence throughout the entire Leghorn flock on this Farm. It was a son of this hen, male No. 94, that mated to females with an average production of 166.5 eggs, produced pen No. 33 in the Ontario Contest of 1923, the birds in which laid an average of 210.5 eggs each. This hen's sons and grandsons have been used on the flock year after year until her blood permeates the whole flock.



A BARRED PLYMOUTH ROCK MALE.

In breeding Barred Plymouth Rocks for high egg production, unless great care is exercised in mating, there is a decided tendency towards a degeneration in size. To overcome this tendency and to improve the colour and barring, it is necessary occasionally to introduce new blood. The male shown in the illustration is one secured for this purpose, and will be used the coming season on females highly bred for egg production.

CROSS-BREEDING

Cross-breeding has been resorted to in an endeavour to study the mode of inheritance of egg colour and also the inheritance of form and plumage colour.

While there are not sufficient data collected on this work to warrant any definite conclusions, some of the results of the first crosses are of interest.

The following table shows the inheritance of egg-colour.

TABLE 2

Male	Female	Daughter	Colour of Egg
B.P. Rock	S.C.W. Leghorn	282	Light brown
"	"	283	" +
"	"	287	" +
"	"	288	"
"	"	292	"
"	"	293	"
"	"	294	"
"	"	295	" −
S.C.W. Leghorn	W. Wyandotte	284	" −
"	B. P. Rock	289	" +
R.I. Red	S.C.W. Leghorn	J804	"
"	"	805	"
"	"	806	"
"	"	807	"

The plus sign is used where the colour of the egg-shell was darker than the colour described as light brown. The minus sign is used where the colour of the egg-shell was a very light brown.

The egg-shell colour in B.P. Rocks, White Wyandottes and Rhode Island Reds is brown, whereas in White Leghorns it is white.

In table 2 it will be noted that in every case, no matter whether a white-egg male was mated to brown-egg female or vice versa, the eggs laid by the resulting progeny were brown which would indicate that brown in inheritance of egg-shell colour is dominant over white.

There has been considerable discussion from time to time, especially in the English poultry-press, as to the advantage of being able to distinguish sex at the time of hatching, and also as to matings to make possible distinction by plumage-colour.

English breeders have worked this out with a number of breeds but in making crosses we have noticed that even in cases where the chicks would be said to be white that there were differences, some coming with slight black fleck-ing.. It occurred to us that possibly these slight differences might be an indication of sex, so during the past season we made careful note of the chicks at hatching time and then checked up on them when they reached maturity.

Table 3 shows the results:—

TABLE 3

Sire	Dam	Chick No.	Sex	Down	Adult plumage and general description
R.I.R.....	S.C.W. Leghorn	2560	M	White-flecked with black	(1) White, trace of barring in hackle, type intermediate favouring the Red, lobe red + White.
"	"	3973	M	White	(2) White splashed slightly with red, type and lobes as in No. 1.
"	"	3974	M	White.....	Same as description (2)
"	"	3977	M	"	"
"	"	3805	M.	"	(3) Pyle, balance of description as (2).
"	"	3806	M	White-flecked with black	Same as description (3).
"	"	3808	F	"	(4) Pyle smudge ground colour, type intermediate favouring Leghorn, lobe as (1) and (2).
"	"	4373	F	"	Same as (2).
"	"	4372	M	White	Same as description (2).
"	"	4374	M	"	" (2).
"	"	4900	M	"	" (3).
"	"	4902	F	White-flecked with black	" (4).
"	"	4905	M	"	" (2).
"	"	4928	F	White-flecked with black	" (4).
B.P. Rock.....	R.I.R.....	3997	F	Barred Rock.....	Barred P. Rock type and colour.
"	"	3998	M	"	Barred P. Rock type and colour with few red feathers and slight lacing in hackle and saddle.
S.C.W. Leghorn	R.I.R.....	4877	F	White-flecked with black	(5) White-very light pyle, type intermediate, lobes red + white.
"	"	4878	M	"	(6) Rich pyle, lobes and type as in (5).
"	"	4879	F	"	Same as description (5).
"	"	4880	F	"	" (5).

It will be noted that in the mating of R.I.R. males to S.C. White Leghorn females that all the female chicks were flecked with black whereas 80 per cent of the males were white. If this ratio would hold good it would mean that 80 per cent of the males of this cross could be separated from the pullets at hatching time.

In the case of the B.P. Rock male mated to the R.I.R. female, or the S.C. White Leghorn male mated to the R.I.R. female, there is nothing to indicate that sex can be distinguished by colour of plumage at the time of hatching.

EXPERIMENTAL WORK

The experimental work of this Division is essentially practical in its nature and application, and is designed primarily to meet the need for information which will help solve the problems with which the farmer or poultryman is faced. With the growth of the poultry industry, these problems become more intense, and it is increasingly necessary to increase production, decrease costs and diminish losses due to disease or poor management.

Therefore the different phases of breeding, incubation, brooding, rearing, preserving and storing eggs and feeding for egg-production, all have their part in the programme of experimental work, together with the increasingly important subject of poultry diseases.

To a large extent, the experiments conducted at the Central Farm are duplicated at the branch Farms, thus making the data obtained far more reliable, owing to the larger number of birds under test. Where special local conditions warrant it, however, the branch farms conduct individual experiments covering these local problems.

Owing to the varied factors which may affect the results obtained, experiments of this nature must necessarily be repeated until sufficient reliable data

have been accumulated. Inasmuch as most of the experiments dealt with in this report are still being continued, no definite conclusions should be drawn until they are completed. When interim deductions may be made they are indicated in the remarks regarding the experiment.

THE EFFECTS OF FEEDING BONE MEAL, UPON FERTILITY, HATCHABILITY AND VIABILITY

In order to ascertain if the addition of bone meal to the ration fed to breeding stock during the mating season, has any effect upon the fertility and hatchability of eggs, and the viability of chicks therefrom, an experiment was conducted during the breeding season.

Twenty pens, containing two hundred and thirty-six hens in all, were used for the test, which started on March 25 and ended May 18.

All the birds were given the standard rations consisting of scratch-grain, mash (both dry and moistened), green feed, grit and shell, with both milk and water to drink. In eight pens, however, five of Barred Rocks containing fifty-three birds and three of white Leghorns containing forty birds, five per cent of bone meal was added to both the wet and dry mash. The other twelve pens, including five of Barred Rocks with a total of fifty birds, and seven of White Leghorns containing ninety-three birds, received no bone meal.

Complete hatching records were kept for all the eggs, and the mortality of the chicks to three weeks of age was also recorded. Details of these records are given in table 4.

TABLE 4.—DETAIL—EFFECTS OF FEEDING BONE MEAL UPON FERTILITY

Feed	Eggs set	Fertile	Hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched	Per cent mortality within three weeks
No bone meal.....	2,877	2,362	1,533	82·1	64·9	53·3	24·9
Bone meal.....	1,895	1,584	968	83·6	61·1	51·1	27·1

NOTES.—There was very little difference in the results obtained from the two respective groups. The birds receiving bone meal gave a slightly higher percentage of fertile eggs, but on the other hand the percentage of both total and fertile eggs hatched was a little lower and the mortality among the chicks somewhat higher.

STARVATION PERIOD FOR CHICKS

An experiment was conducted in the spring to ascertain the time that should elapse between taking chicks from the incubator and giving them their first feed, in order to obtain the best results from the viewpoint of viability. Eight pens of Leghorn chicks were used, four being fed the regular basal ration and four the special ration No. 1, details of which are given in the succeeding experiment.

One pen on each ration was fed immediately the chicks were taken out of the incubator being twenty-four hours after they were actually hatched, the three other groups receiving each ration, had their first feed twenty-four, thirty-six and forty-eight hours later, respectively.

The results obtained, however, were so indefinite, that no conclusions can be drawn, and consequently the experiment will be repeated next year. when fuller details will be given.

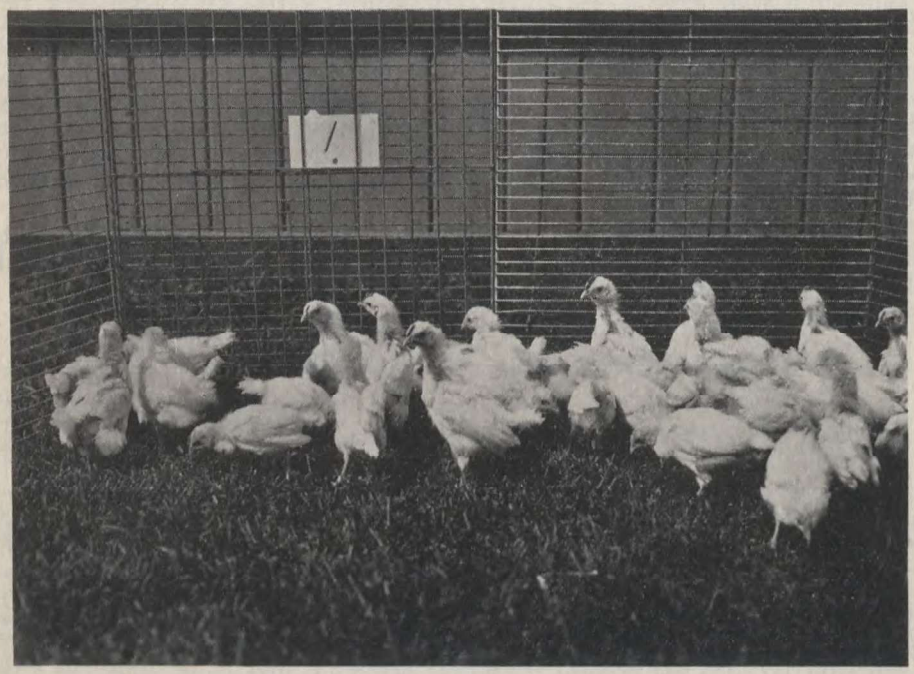
VITAMINE FEEDS AND RATIONS FOR BROODER-CHICKS

In the annual reports of the Dominion Poultry Husbandman for 1923 and 1924, details were given regarding experiments which had been undertaken to ascertain the best sources of vitamines in the rations for brooder-chicks.

These experiments were continued this year, with the addition of several pens on other special rations.

The chicks used were all White Leghorns, hatched in a mammoth incubator, the experiment being conducted in a pipe brooder-house.

When hatched on May 28, 840 chicks were divided into fourteen equal groups of sixty each, and as soon as feeding was commenced they were put on the special feeds or rations under experiment. In order to make due allowance for incubator-mortality, the experiment as such, was not begun until three days later, when the best fifty chicks were selected from each group.



Chicks in pen 1—Control flock fed the basal ration.

During the three weeks of the experiment, the chicks were kept confined in the brooder-house, being weighed daily and an accurate record kept of the daily mortality, feed consumed, their general condition and anything of note in the various pens. At the end of each week the condition of each pen as indicated by general appearances was recorded, the following letters being used:—E. (excellent); V.G. (very good); G. (good); V.F. (very fair), and F. (fair).

The basal ration included a commercial scratch-grain mixture for chicks; a home-mixed mash composed of equal parts by weight of shorts, middlings, corn meal and oat flour, with one-half part meat meal and one-half pound of table salt to one hundred pounds of mash; grit, green feed and both milk and water to drink. The scratch-grain was fed by hand, beginning when the chicks were ten days old; the dry mash was kept constantly before the chicks in hoppers and a small quantity mixed with hard-boiled eggs was given once a day, green feed consisting of chopped green alfalfa being also fed once a day.

Chicks in pen 5—Fed ration No. 1 with eleven parts meat meal, but no milk.

Chicks in pen 10—Fed basal ration and refined cod-liver oil.

Another ration which was tested and which may be called ration No. 1 consisted solely of a dry mash (hopper-fed) containing eighty parts yellow corn meal, twenty parts middlings, five parts raw bone meal, five parts pearl grit and one part common salt, with milk and water to drink, no scratch-grain, moist mash or green feed being given. Different variations of this ration were also used, details of these and also of the special feeds under experiment with the proportions given being indicated in the following arrangements of pens:—

Pen 1. (Control) Basal ration.
Pen 2. Basal ration minus oat flour in mash.
Pen 3. Ration No. 1.
Pen 4. Ration No. 1 with fifty parts each corn meal and middlings in mash.
Pen 5. Ration No. 1 with eleven parts meat meal in mash, but no milk.
Pen 6. Ration No. 1 with semi-solid buttermilk.
Pen 7. Basal ration and Larro yeast (one ounce to ten pounds of mash).
Pen 8. Basal ration and Fleischmann's yeast (one ounce to ten pounds of mash).
Pen 9. Basal ration and crude cod-liver oil (four teaspoonfuls one half ounce—for fifty chicks per day, mixed in the moist mash).
Pen 10. Basal ration and refined cod-liver oil (fed as per pen 9).
Pen 11. Basal ration, no meat meal in mash, with raw pork liver (passed through a meat chopper and enough fed to moisten the mash).
Pen 12. Basal ration with crude cod-liver oil and raw liver (fed as in pens 9 and 11).
Pen 13. Basal ration with crude cod-liver oil and Larro yeast (fed as in pens 7 and 9).
Pen 14. Basal ration with crude cod-liver oil and Fleischmann's yeast (fed as in pens 8 and 9).

Table 5 gives details of the experiment by weeks and for the entire period, including condition of birds, average actual and percentage weight-gains, mortality and cost of feed per chick alive at the end.

TABLE No. 5.—DETAIL.—VITAMINE FEEDS AND RATIONS FOR BROODER-CHICKS

Pen	Ration on special feed	Number of chicks at beginning	Average weight	Number of chicks end of first week	Average weight	Condition	Number of chicks end of second week	Average weight	Condition	Number of chicks at end	Average weight	Condition	Total mortality	Per cent mortality	Average gain per chick	Average per cent gain per chick	Average cost of feed per chick alive at end
			ozs.		ozs.			ozs.			ozs.			%	ozs.	%	c.
1	Basal ration (Control)	50	1·28	50	2·16	V.F.	50	3·67	V.G.	48	5·23	V.G.	2	4	3·95	3·09	1·6
2	Basal ration—no oat flour	50	1·24	48	2·02	V.F.	48	3·06	V.F.	46	4·22	V.F.	4	8	2·98	2·40	1·3
3	Ration No. 1	50	1·26	47	1·83	F.	46	2·83	F.	44	4·14	F.	6	12	2·88	2·29	1·4
4	Ration No. 1 (50 parts each corn meal and middlings	50	1·22	48	1·94	V.F.	48	2·96	V.F.	47	4·34	V.F.	3	6	3·1	2·54	1·4
5	Ration No. 1 (11 parts meat meal—no milk)	50	1·3	49	1·79	G.	47	2·38	V.F.	44	3·18	F.	6	12	1·88	1·45	1·5
6	Ration No. 1 (semi-solid buttermilk)	50	1·28	48	1·98	V.F.	48	3·0	G.	47	4·19	G.	3	6	2·91	2·27	1·6
7	Larro yeast	50	1·28	50	2·28	V.G.	49	3·88	E.	49	5·35	V.G.	1	2	4·07	3·18	2·2
8	Fleischmann's yeast	50	1·22	49	2·14	G.	49	3·71	V.G.	49	5·1	V.G.	1	2	3·88	3·18	2·0
9	Crude cod-liver oil	50	1·28	49	2·1	V.F.	49	3·45	V.G.	49	4·89	V.G.	1	2	3·61	2·82	1·7
10	Refined cod-liver oil	50	1·18	47	2·04	V.F.	46	3·61	G.	45	5·04	G.	5	10	3·86	3·27	1·9
11	Raw liver	50	1·18	46	1·96	F.	45	3·18	V.F.	41	4·54	F.	9	18	3·36	2·85	1·7
12	Crude cod-liver oil and raw liver	50	1·22	46	1·8	F.	46	2·98	F.	45	4·13	F.	5	10	2·91	2·39	1·7
13	Larro yeast and crude cod-liver oil	50	1·28	49	1·98	V.F.	48	3·21	V.F.	47	4·57	V.F.	3	6	3·29	2·57	1·9
14	Fleischman's yeast and crude cod-liver oil	50	1·2	47	2·09	V.F.	47	3·43	V.F.	46	4·89	V.F.	4	8	3·69	3·08	2·0

NOTES.—Of the various rations which were tested (pens 1 to 6 inclusive), by far the best results were obtained from the use of the basal ration, both as regards percentage weight-gains and low mortality, followed by ration No. 1 with 50 parts each of corn meal and middlings, and the basal ration without oat flour.

With reference to the feeds under experiment as sources of vitamines, the highest percentage gains were shown by the chicks receiving refined cod-liver oil, followed by those on Larro and Fleischmann's Yeasts respectively (which were equal), the basal ration alone, and crude cod-liver oil with Fleischmann's yeast.

The lowest mortality, one death, was recorded in the pens fed Larro yeast, Fleischmann's yeast and crude cod-liver oil respectively, the highest, nine deaths, being among the chicks receiving raw liver. In this connection the fact must be mentioned that difficulty was experienced in getting fresh liver of good quality and keeping it fresh during the extremely hot weather.

Some leg-weakness or stiffness was apparent before the end of the experiment among all the chicks that received no cod-liver oil. This was particularly noticeable in pen 5, receiving no milk, and pen 11 on raw liver.

In order to compare the results obtained from two years' work, a summary is included herewith covering the seven special feeds which were under experiment during those years. Table 6 gives the details for each year and the average for the two.

TABLE 6.—SUMMMARY OF TWO YEARS' EXPERIMENTS WITH VITAMINE FEEDS FOR BROODER-CHICKS

Special Feed	Year	Number of chicks at beginning	Average weight	Number of chicks end of first week	Average weight	Condition	Number of chicks end of second week	Average weight	Condition	Number of chicks at end	Average weight	Condition	Total mortality	Per cent mortality	Average gain per chick	Average per cent gain per chick	Average cost of feed per chick alive at end
			ozs.		ozs.			ozs.			ozs.			%	ozs.	%	c.
Basal ration	1924	40	1·3	35·0	1·94	E.	35·0	3·14	V.G.	34·0	4·94	G.	6·0	15·0	3·64	280·0	1·8
	1925	50	1·28	50·0	2·16	V.F.	50·0	3·67	V.G.	48·0	5·23	V.G.	2·0	4·0	3·95	309·0	1·6
Average	.....	45	1·29	42·5	2·05	.....	42·5	3·4	.....	41·0	5·08	.....	4·0	9·5	3·79	294·5	1·7
Larro yeast	1924	40	1·37	40·0	2·07	G.	40·0	3·2	V.G.	40·0	4·45	V.G.	.....	.....	3·08	225·0	1·9
	1925	50	1·28	50·0	2·28	V.G.	49·0	3·88	E.	49·0	5·35	V.G	1·0	2·0	4·07	318·0	2·2
Average	.....	45	1·32	45·0	2·17	.....	44·5	3·54	.....	44·5	4·9	.....	0·5	1·0	3·57	271·0	2·0
Fleischmann's Yeast	1924	40	1·32	39·0	2·05	V.F.	38·0	3·21	V.G.	37·0	4·68	G.	3·0	7·5	3·36	254·0	2·1
	1925	50	1·22	49·0	2·14	G.	49·0	3·71	V.G.	49·0	5·1	V.G.	1·0	2·0	3·88	318·0	2·0
Average	.....	45	1·27	44·0	2·09	.....	43·5	3·46	.....	43·0	4·89	.....	2·0	4·7	3·67	286·0	2·0
Refined cod liver oil	1924	40	1·37	39·0	2·13	V.F.	39·0	3·41	V.G.	39·0	5·13	V.G.	1·0	2·5	3·76	274·0	2·3
	1925	50	1·18	47·0	2·04	V.F.	46·0	3·61	G.	45·0	5·04	G.	5·0	10·0	3·86	327·0	1·9
Average	.....	45	1·27	43·0	2·08	.....	42·5	3·51	.....	42·0	5·08	.....	3·0	6·2	3·81	300·5	2·1
Raw liver	1924	40	1·3	38·0	2·03	V.G.	38·0	3·29	G.	38·0	4·76	V.F.	2·0	5·0	3·46	266·0	1·8
	1925	50	1·18	46·0	1·96	F.	45·0	3·18	V.F.	41·0	4·54	F.	9·0	18·0	3·36	285·0	1·7
Average	.....	45	1·24	42·0	1·99	.....	41·5	3·23	.....	39·5	4·65	.....	5·5	11·5	3·41	275·5	1·7
Cod-liver oil and raw liver	1924	40	1·22	36·0	1·72	F.	36·0	2·97	G.	36·0	5·06	V.F.	4·0	10·0	3·84	315·0	2·7
	1925	50	1·22	46·0	1·8	F.	46·0	3·98	F.	45·0	4·13	F.	5·0	10·0	2·91	239·0	1·7
Average	.....	45	1·22	41·0	1·76	.....	41·0	2·97	.....	40·5	4·59	.....	4·5	10·0	3·37	277·0	2·2
Cod-liver oil and Larro yeast	1924	40	1·3	39·0	1·87	F.	39·0	3·05	V.F.	39·0	4·62	F.	1·0	2·5	3·32	255·0	2·5
	1925	50	1·28	49·0	1·98	V.F.	48·0	3·21	V.F.	47·0	4·57	V.F.	3·0	6·0	3·29	257·0	1·9
Average	.....	45	1·29	44·0	1·92	.....	43·5	3·13	.....	43·0	4·59	.....	2·0	4·2	3·3	256·0	2·2

Cod-liver oil and Fleischmann's yeast	1924	40	1·27	38·0	1·82	F.	38·0	2·76	V.F.	38·0	4·26	G.	2·0	5·0	2·99	235·0	2·7
	1925	50	1·2	47·0	2·09	V.F.	47·0	3·43	V.F.	46·0	4·89	V.F.	4·0	8·0	3·69	308·0	2·0
Average		45	1·23	42·5	1·95	.....	42·5	3·09	.....	42·0	4·57	.....	3·0	6·5	3·34	271·5	2·3

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NOTES.—On the basis of percentage gains in two years' experiments, the basal ration plus refined cod-liver oil gave the best results followed by the basal ration alone and the basal ration with Fleischman's yeast respectively.

The basal ration with Larro yeast gave the lowest mortality however, the next lowest being the basal ration with cod-liver oil and Larro yeast.

Further experiments will have to be conducted before any definite conclusions can be drawn. It would appear, as was stated last year, that the addition of cod-liver oil to the basal ration, prevents leg-weakness and aids development.

METHODS OF FEEDING BROODER-CHICKS

An experiment was conducted in 1922 for the purpose of comparing various methods of feeding growing chicks, details being given in the annual report of the Dominion Poultry Husbandman for that year.

This year a further experiment, similar in its objective but varying in its nature, was undertaken. As a general rule, the hoppers of dry mash are kept constantly before the chicks during the brooding period, and in this experiment, this method of feeding was compared with that of allowing the chicks access to the hoppers only six times per day, for fifteen minutes each time. This was tried not only with the basal ration but without scratch-grain as described in the experiment covering vitamine feeds for chicks, but also with the ration No. 1 described in the same experiment. In addition one pen of chicks was fed the ration No. 1 plus crude cod-liver oil (one-half ounce per pen daily, given in the milk).

Five pens of fifty chicks each were used, the experiment being conducted concurrently with that dealt with under the heading "The effects of sunlight upon growing chicks," the chicks being of the same breed and age.

The arrangement of the pens and detailed figures covering the results will be found in table 7.

TABLE 7.—DETAIL-METHODS OF FEEDING BROODER - CHICKS

Pen	Ration and method of feeding	Number of chicks at beginning	Average weight	Number of chicks end of first week	Average weight	Condition	Number of chicks end of second week	Average weight	Condition	Number of chicks at end	Average weight	Condition	Total mortality	Average gain per chick	Average per cent gain per chick	Average cost of feed per chick alive at end
			oz.		oz.			oz.			oz.			oz.	%	c.
1	Basal ration—hoppers always available	50	1·22	40	1·82	V.F.	36	3·4	V.G.	36	5·06	G.	14	3·84	315	1·3
2	Basal ration—hoppers six times a day	50	1·3	46	1·93	V.G.	46	3·3	G.	45	4·58	G.	5	3·28	253	1·1
3	Ration No. 1—hoppers always available	50	1·22	45	1·76	G.	45	2·73	V.F.	44	3·5	F.	6	2·28	187	1·3
4	Ration No. 1—hoppers six times a day	50	1·28	45	1·76	V.F.	44	2·77	G.	43	3·58	V.F.	7	2·3	179	1·3
5	Ration No. 1—with crude cod-liver oil	50	1·16	42	1·62	V.F.	42	2·36	F.	41	3·17	F.	9	2·01	173	1·7

NOTES:—The chicks with the hoppers of basal mash constantly before them made the best percentage weight-gains, and those receiving the ration No. 1 with crude cod-liver oil, the lowest.

The highest mortality, however, was also among the chicks having constant access to the basal mash, while those getting the basal mash six times per day showed the lowest mortality and second highest percentage gains.

THE EFFECT OF SUNLIGHT UPON GROWING CHICKS

It has long been recognized that sunlight is a very important factor in the growth and vitality of animals and plants. In order to obtain information as to the extent to which the development and viability of chicks are affected by exposing them to direct sunlight, to indirect sunlight through window-glass, and by depriving them of sunlight entirely, a new project was undertaken in the early summer.

The chicks used for the purpose were White Leghorns, hatched on June 23, and housed in the pipe brooder-house. When taken from the incubator, the 585 chicks were divided into nine equal groups of sixty-five each, and were put under the experimental conditions immediately. Three days later, fifty of the most thrifty chicks in each group were chosen (to allow for incubator-mortality), and the experiment proper was started on June 27, to terminate on July 18, a period of three weeks.

All the chicks received the standard basal ration as described in the experiment "Vitamine Feeds for Brooder-chicks," but to determine the possible effects of feeding cod-liver oil to chicks handled under these conditions, in each of the three phases of the experiment, one lot of chicks received crude cod-liver oil and another refined cod-liver oil in addition. This was given in the same quantities as indicated in the experiment on vitamine feeds.

From the pens containing the chicks exposed to direct sunlight, the windows were removed entirely during the daytime. Because of the inclement weather, this could not be done, however, until July 1, and owing to the disposition of the front of the brooder-house and the angle of the sun's rays at this time of the year, the chicks received approximately only fifty hours of direct sunlight during the experiment.

The windows of the pens of chicks exposed to indirect sunlight, were left in, the amount of sunlight being exactly the same as for those getting direct sunlight.

For the third group of three pens, all possible sunlight was entirely shut out by heavy brown paper placed over the windows and around the pens. The interior was lighted by a strong electric lamp burning continually during the day time giving ample light for the chicks to feed.

All the chicks were weighed daily and the mortality noted. At the end of each week they were examined for general condition. In table 8 will be found details of weight, gains, mortality and condition for each week and for the entire period.

TABLE 8.—DETAIL-EFFECT OF SUNLIGHT UPON THE GROWTH OF CHICKS

Pen	Kind of sunlight and feed	Number of chicks at beginning	Average weight	Number of chicks end of first week	Average weight	Condition	Number of chicks end of second week	Average weight	Condition	Number of chicks at end	Average weight	Condition	Total mortality	Average gain per chick	Average per cent gain per chick	Average cost of feed per chick alive at end
			oz.		oz.			oz.			oz.			oz.	%	c.
1	Direct sunlight-basal ration	50	1·34	47	2·02	V.G.	46	3·5	G.	46	5·11	V.G.	4	3·77	281	1·6
2	Direct sunlight-basal ration crude cod oil	50	1·26	44	1·89	V.F.	42	3·19	G.	42	4·71	V.G.	8	3·45	274	1·8
3	Durect sunlight-basal ration and refined cod oil	50	1·34	49	1·98	G.	48	3·27	G.	46	4·57	G.	4	3·23	241	2·2
4	Indirect sunlight-basal ration	50	1·36	46	1·98	V.G.	45	3·4	G.	44	4·61	G.	6	3·25	239	1·7
5	Indirect sunlight-basal ration crude cod oil	50	1·2	37	1·78	V.F.	36	2·78	V.F.	36	4·31	V.F.	14	3·11	259	1·9
6	Indirect sunlight-basal ration refined cod oil	50	1·34	46	1·98	V.G.	45	3·16	G.	43	4·58	G.	7	3·24	242	1·9
7	No sunlight-basal ration	50	1·16	43	1·79	G.	40	3·0	V.F.	39	4·54	V.F.	11	3·38	291	1·8
8	No sunlight-basal ration crude cod oil	50	1·32	40	1·82	V.G.	37	2·95	F.	37	4·32	F.	13	3·0	227	2·0
9	No sunlight-basal ration refined cod oil	50	1·34	38	1·89	V.F.	35	2·83	F.	35	4·09	F.	15	2·75	205	2·3

NOTES.—The heaviest mortality was recorded in the three pens which received no sunlight, and the lowest in those under direct sunlight.

The greatest percentage weight gains, however, were made by the chicks receiving the basal ration, but getting no sunlight.

Taking the average of the three pens under direct sunlight we find that the chicks gained 265 per cent, compared with 246 for indirect sunlight, and 241 for those getting no sunlight.

These results should not be considered conclusive by any means, and the experiment will be continued for several years.

BUTTERMILK VERSUS NO BUTTERMILK FOR GROWING CHICKS

During 1921, experiments were conducted to ascertain the value of buttermilk in feeding chicks during the brooding period, details of which were given in the Annual Report of the Dominion Poultry Husbandman for that year.

This year an experiment somewhat similar in its nature was undertaken, but instead of being confined to the brooding period, was continued until the chicks were nine weeks of age.

The chicks used were Barred Rocks and White Leghorns, all hatched at the same date, but divided into two groups of 402 and 409 chicks respectively. During the first three weeks, they were housed in the pipe brooder-house, being afterwards transferred to colony-houses.

With the exception of the drink provided, all the chicks received the same standard rations. One lot however had both buttermilk and water to drink, while the other got water only.

The chicks were weighed and counted weekly, detailed records being given in table 9.

As the object of the experiment was simply to determine the effects upon growth and viability, no record was kept of the amount of feed consumed.

TABLE 9.—DETAIL—THE EFFECTS OF FEEDING BUTTERMILK UPON THE GROWTH AND MORTALITY OF CHICKS

Weeks	Buttermilk						No buttermilk						
	Number of chicks	Total Weight	Average weight	Per cent gain to date	Mortality	Per cent mortality to date	Weeks	Number of chicks	Total weight	Average weight	Per cent gain to date	Mortality	Per cent mortality to date
		lb. oz.	oz	%		%			lb. oz.	oz	%		%
Beginning	402	27·15	1·11	.....	.....	.....	Beginning	409	29 4	1·14	.....	.....	.....
1	372	32·6	1·39	25	30	7·4	1	386	32 14	1·36	16	23	5·6
2	368	55·0	2·39	115	4	8·4	2	335	52 0	2·48	117	51	18·1
3	364	83·0	3·65	229	4	9·4	3	333	73 0	3·51	208	2	18·6
4	364	125·0	5·49	395	.....	9·4	4	328	94 0	4·59	303	5	19·8
5	364	165·0	7·25	553	.....	9·4	5	328	136 0	6·63	482	.....	19·8
6	362	215·0	9·5	756	2	9·9	6	325	182 0	8·96	686	3	20·5
7	361	268·0	11·88	970	1	10·2	7	324	226 0	11·16	879	1	20·8
8	360	303·0	13·47	1,113	1	10·4	8	322	249 0	12·37	985	2	21·3
9	360	388·0	17·24	1,453	.....	10·4	9	322	324 0	16·09	1,311	.....	21·3

NOTES.—During the nine week period, the chicks receiving buttermilk made an average increased gain of one hundred and forty-two per cent over those receiving no milk.

The mortality among those which had no buttermilk was more than twice as heavy as among the others.

These results only tend to confirm those obtained in 1921, and indicate that buttermilk is extremely valuable in feeding growing chicks, both from the standpoint of development and viability.

VITAMINE FEEDS AND RATIONS FOR REARING

As was done in 1924 (for details see the Annual Report of the Dominion Poultry Husbandman for that year) this year a certain number of the pens of chicks used in the experiments described under the heading "Vitamine Feeds and Rations for Brooder Chicks", were used for a further experiment to determine the effects of these feeds upon the growth of chicks during the rearing period. For this purpose, twenty-seven chicks from each of seven pens, were transferred from the brooder-house to the experimental house at the conclusion of the above-mentioned experiment (when they were three weeks old) and kept there for ten weeks until they were thirteen weeks of age.

Each pen of birds was kept upon the same special feed as was given during the brooding stage, but owing to the chicks being older, the proportions were increased where necessary.

So far as was possible, only pullets were chosen for the experiments, but owing to the difficulty of definitely determining the sex at that age, a certain number of cockerels were inadvertently included. These cockerels were removed at the end of the seventh week, and consequently two tables are given for the experiment, one covering this first seven-week period when there were both cockerels and pullets, and the other the remainder of the time, when only pullets were left.

The birds were weighed weekly, and at the same time notes were made on their general appearance. Contrary to the method adopted last year, the birds were kept confined during the entire experiment in order more thoroughly to test the feeds under experiment by eliminating other factors which might be involved were the birds to have access to runs.

The standard basal ration as described in the details of the brooding period experiment, was used in all pens with the exception of number two, in which ration No. 1, also described in the same experiment, was fed.

The arrangement of the pens and the proportion of the special feeds were as follows:—

Pen No. 1. Control—Basal Ration.
Pen No. 2. Ration No. 1.
Pen No. 3. Crude cod-liver oil.—Two tablespoonfuls (1 oz.) per pen daily at the beginning, gradually increased to one-half tablespoonful per bird daily.
Pen No. 4. Refined cod-liver oil—The same quantity as in Pen 3.
Pen No. 5. Raw Liver—Enough to moisten the wet mash, about half an ounce per bird daily. The mash used contained no beef meal.
Pen No. 6. Larro yeast—One pound to every hundred pounds of mash.
Pen No. 7. Fleischmann's yeast—One-half pound to every hundred pounds of mash.

The prices for the various feeds were:—Scratch grain, $4.00 per hundred pounds.
Basal mash, $2.10 per hundred pounds.
Mash in ration No. 1, $2.42 per hundred pounds.
Basal mash minus meat meal, $1.98 per hundred pounds.
Larro yeast, $1.00 per pound.
Fleischmann's yeast, $1.00 per pound.
Crude cod-liver oil, $1.20 per gallon.
Refined cod-liver oil, $2.25 per gallon.
Raw liver, 3½ cents per pound.

The following tables Nos. 10 and 11, giving details of the results obtained, are worked out on the average basis of one bird, for after the removal of the cockerels, the number of chicks varied in the different pens. In computing costs, no allowance has been made for the milk, green feed, grit and shell consumed.

TABLE 10.—DETAIL—VITAMINE FEEDS AND RATIONS FOR REARING. (FIRST SEVEN-WEEK PERIOD. COCKERELS AND PULLETS)

(Average weight by weeks in ounces)

Pen	Special feed	Number of chicks	Beginning	1st week	2nd week	3rd week	4th week	5th week	6th week	7th week	Total gain	Per cent gain	Per cent mortality	Special feed consumed	Value	Value total feed consumed	Pounds of feed per pound gain	Condition at beginning	Condition at end
			oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	%	%	oz.	c.	c.	lb.		
1	Basal (Control)	27	5·15	6·96	9·85	12·44	14·74	19·08	22·78	24·85	19·70	3·83	.....	.....	.....	12·4	3·6	V.G.	E.
2	Ration No. 1	27	4·19	5·56	7·08	8·96	11·43	14·0	17·43	20·14	15·95	3·81	22·2	.....	.....	7·0	3·6	V.F.	V.F.
3	Crude cod-liver oil	27	4·78	6·42	8·77	11·54	14·00	18·31	21·77	23·81	19·03	3·98	3·7	2·4	1·8	15·2	3·9	G.	E.
4	Refined cod-liver oil	27	5·19	6·82	8·52	11·26	13·52	17·04	19·78	22·18	16·99	3·27	.....	2·4	3·4	15·6	3·9	E.	F.
5	Raw liver	27	4·29	5·33	7·30	9·96	13·22	17·18	20·74	23·65	19·36	4·51	14·8	24·5	5·4	17·4	3·3	F.	V.F.
6	Larro yeast	27	4·56	6·33	8·56	11·88	14·16	18·80	22·00	23·64	19·08	4·18	7·4	0·4	2·5	15·3	3·7	V.F.	V.G.
7	Fleischmann's yeast	27	5·19	6·59	8·85	11·56	13·78	17·52	20·89	22·81	17·62	3·39	.....	0·18	1·2	12·6	3·5	G.	G.

(Second three-week period, Pullets only)

1	Basal (Control)	24	24·46	27·54	30·33	32·5	.....	.....	.....	.....	8·04	33	.....	.....	.....	6·4	4·1	E.	E.
2	Ration No. 1	15	19·53	23·0	26·33	29·0	.....	.....	.....	.....	9·47	48	.....	.....	.....	2·8	2·0	V.F.	F.
3	Crude cod-liver oil	19	23·32	26·32	29·56	32·55	.....	.....	.....	.....	9·23	40	.....	1·3	1·0	8·4	3·9	E.	G.
4	Refined cod-liver oil	22	22·0	23·95	27·14	29·91	.....	.....	.....	.....	7·91	36	.....	1·3	1·8	8·5	4·2	V.F.	G.
5	Raw liver	13	22·08	24·77	27·85	30·62	.....	.....	.....	.....	8·54	39	.....	10·5	2·1	12·0	5·4	V.F.	V.G.
6	Larro yeast	15	22·47	25·6	27·73	30·53	.....	.....	.....	.....	8·06	36	.....	0·13	0·8	10·3	5·3	E.	E.
7	Fleischmann's yeast	23	22·12	25·32	28·09	30·95	.....	.....	.....	.....	8·83	40	4·3	0·06	0·4	7·4	3·9	G.	E.

NOTES.—During the first period, the highest percentage gain was made by the chicks receiving raw liver, followed by those on Larro Yeast and crude cod-liver oil respectively. Those on refined cod-liver oil made the least gain, followed by the pen on Fleischmann's yeast.

The highest mortality during this period was recorded in the pen receiving ration No. 1, and the next highest by the birds on raw liver.

Taking the entire duration of the experiment, the raw-liver pen stands ahead for percentage gains, followed by the birds on Larro yeast and crude cod liver oil respectively.

There were no deaths among the chicks fed the basal ration, nor among those receiving refined cod-liver oil.

For purposes of comparison, the following summary is given, covering the results of two years' experiments with the three special feeds and the basal ration. As with the foregoing table, this summary is based on the average for one chick.

TABLE 11.—SUMMARY OF TWO YEARS' EXPERIMENTS WITH VITAMINE FEEDS IN REARING. (FIRST SEVEN-WEEK PERIOD. COCKERELS AND PULLETS)

Average weight by weeks in ounces

Year	Special feed	Number of chicks	Beginning	1st week	2nd week	3rd week	4th week	5th week	6th week	7th week	Total gain	Per cent gain	Per cent mortality	Special feed consumed	Value	Value total feed consumed	Pounds of feed per pound gain	Condition at beginning	Condition at end
			oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	%	%	oz.	c.	c.	lb.		
1924	Basal	25	5·32	7·08	9·60	12·04	15·42	19·42	22·67	24·83	19·51	368	4	.....	.....	10·7	5·5	G.	E.
1925	Basal	27	5·15	6·96	9·85	12·44	14·74	19·08	22·78	24·85	19·70	383	.....	.....	.....	12·4	3·6	V.G.	E.
	Average	26	5·23	7·02	9·72	12·24	15·08	19·25	22·72	24·84	19·60	375	2	.....	.....	11·5	4·5	.....	.....
1924	Larro yeast	25	5·08	6·60	9·04	11·00	14·50	18·29	22·00	25·17	20·09	395	4	0·5	3·0	14·5	5·6	V.G.	V.G.
1925	Larro yeast	27	4·56	6·33	8·56	11·88	14·16	18·80	22·00	23·64	19·08	418	7·4	0·4	2·5	15·3	3·7	V.F.	V.G.
	Average	26	4·82	6·46	8·80	11·44	14·33	18·54	22·00	24·40	19·58	406	5·7	0·45	2·25	14·9	4·6	.....	.....
1924	Refined cod-liver oil	25	5·68	8·48	10·84	13·36	16·96	21·04	24·96	28·96	23·28	410	.....	6·0	8·0	20·3	5·3	E.	V.G.
1925	Refined cod-liver oil	27	5·19	6·82	8·52	11·26	13·52	17·04	19·78	22·18	16·99	327	.....	2·4	3·4	15·6	3·9	E.	F.
	Average	26	5·43	7·65	9·68	12·31	15·24	19·04	22·37	25·57	20·13	368	.....	4·2	5·7	17·9	4·6	.....	.....
1924	Raw liver	25	5·08	6·72	8·88	11·60	14·88	18·84	22·40	25·28	20·20	397	.....	21·0	4·5	14·3	4·1	V.G.	E.
1925	Raw liver	27	4·29	5·33	7·30	9·96	13·22	17·18	20·74	23·65	19·36	452	14·8	24·5	5·4	17·4	3·3	F.	V.F.
	Average	26	4·68	6·02	8·09	10·78	14·05	18·01	21·57	24·46	19·78	424	7·4	22·8	4·95	15·85	3·7	.....	.....

(Second three-week period. Pullets only)

1924	Basal	9	21·8	24·9	28·4	31·0	.....	.....	.....	.....	9·2	42	.....	.....	.....	7·6	8·2	V.G.	V.G.
1925	Basal	24	24·46	27·54	30·33	32·5	.....	.....	.....	.....	8·04	33	.....	.....	.....	6·4	4·1	E.	E.
	Average	16·5	23·13	26·22	29·36	31·7	.....	.....	.....	.....	8·62	37	.....	.....	.....	7·0	6·1	.....	.....
1924	Larro yeast	10	22·8	25·6	28·2	31·2	.....	.....	.....	.....	8·4	37	.....	0·17	1·05	9·05	7·6	E.	V.G.
1925	Larro yeast	15	22·47	25·6	27·73	30·53	.....	.....	.....	.....	8·06	36	.....	0·13	0·8	10·3	5·3	E.	E.
	Average	12·5	22·63	25·6	27·96	30·86	.....	.....	.....	.....	8·23	36	.....	0·15	0·92	9·67	6·4	.....	.....
1924	Refined cod-liver oil	8	26·5	29·5	32·5	34·5	.....	.....	.....	.....	8·0	30	.....	6·5	9·0	16·0	8·0	.....	V.G.
1925	Refined cod-liver oil	22	22	23·95	27·14	29·91	.....	.....	.....	.....	7·91	36	.....	1·3	1·8	8·5	4·2	V.F.	G.
	Average	15	24·25	26·72	29·82	32·20	.....	.....	.....	.....	7·95	33	.....	3·9	4·9	12·2	6·1	.....	.....
1924	Raw liver	17	22·8	26·3	28·7	32·0	.....	.....	.....	.....	9·2	40	5·9	10·5	2·3	7·5	4·7	V.G.	V.G.
1925	Raw liver	13	22·08	24·77	27·85	30·62	.....	.....	.....	.....	8·54	39	.....	10·5	2·1	12·0	5·4	V.F.	V.G.
	Average	15	22·4	25·53	28·27	31·31	.....	.....	.....	.....	8·87	39	2·9	10·5	2·2	9·7	5·0	.....	.....

NOTES.—From the viewpoint of percentage weight gains, the four feeds would be placed as follows:—raw liver, Larro yeast, the basal ration, and refined cod-liver oil.

In the two years' experiments, there was no mortality among the chicks receiving refined cod-liver oil, and only two per cent among those on the basal ration.

The outstanding feature of this experiment to date has been the exceptionally good results obtained from the use of the basal ration, not only with regard to feed costs but also for development, condition and viability of the birds.

This experiment will be continued for several years, in order to get more complete data, and until this has been done, no definite statement can be made as to whether the addition of other feeds (for their vitamine content) is economically advantageous or not.

FEED COSTS IN BROODING AND REARING CHICKS TO TEN WEEKS OF AGE

In order to obtain accurate figures on the feed costs in raising chicks to ten weeks of age, two groups of chicks (one each of Barred Rocks and White Leghorns) were handled separately for this period.

All the chicks were fed on the regular chick rations, consisting of a commercial scratch-grain mixture valued at $4 per hundred pounds; standard mash at $2.10 per hundred pounds; milk at 3 cents per gallon; green feed, grit and water.

Both the chicks and feed consumed were weighed weekly, details of the weights being given in table 12. In calculating the pounds of feed for one pound of grain, only the scratch-grain and mash are included, and in the cost of feed per chick no allowance is made for green feed or grit.

TABLE 12.—DETAIL FEED COSTS IN BROODING AND REARING CHICKS TO TEN WEEKS OF AGE

(Barred Rocks)

Weeks	No.	Weight	Average weight	Scratch grain	Value	Mash	Value	Milk	Value	Feed consumed per chick	Cost feed per chick	Pounds feed for one pound gain
		lb. oz.	lb. oz.	lb. oz.	$ c.	lb. oz.	$ c.	gal.	c.	oz.	c.	lb. oz.
Start	301	24–9	0– 1·3	.....	.....	.....	.....	.....	.....	.....	.....	.....
1	260	25–0	0– 1·5	.....	.....	7–5	0 154	.....	.....	0·45	0·06	2– 4
2	215	24–9	0– 1·8	.....	.....	17–0	0 357	.....	.....	1·27	0·17	4– 4
3	191	39–0	0– 3·3	2–0	0 08	40–0	0 84	1	3	3·52	0·49	2– 6
4	181	55–0	0– 4·9	3–0	0 12	60–0	1 26	2·5	7·5	5·57	0·8	3– 8
5	176	82–0	0– 7·5	5–0	0 20	92–0	1 932	3	9	8·82	1·26	3– 6
6	176	106–0	0– 9·6	21–0	0 84	95–0	1 995	3	9	10·55	1·66	5– 0
7*	175	139–0	0–12·7	25–0	1 00	75–0	1 575	3	9	9·14	1·52	2–15
8	174	173–0	0–15·9	30–0	1 20	90–0	1 89	2	6	11·01	1·81	3– 7
9	172	189–0	1– 1·6	30–0	1 20	90–0	1 89	2	6	11·16	1·83	6– 9
10	172	240–0	1– 6·3	40–0	1 60	90–0	1 89	3	9	12·09	2·08	2– 9
Total...	....	.....	.....	156–0	6 24	656–5	13 783	19·5	58·5	73·58	11·68	3– 8

(White Leghorns)

Start	487	39–5	0– 1·3	.....	.....	.....	.....	.....	.....	.....	.....	.....
1	435	37–4	0– 1·4	.....	.....	14–0	0 294	.....	.....	0·51	0·07	5–22
2	374	39–5	0– 1·7	.....	.....	32–0	0 672	.....	.....	1·37	0·18	4– 9
3	304	62–8	0– 3·3	3–0	0 12	60–0	1 26	2	6	3·32	0·47	2– 1
4	300	79–0	0– 4·2	5–0	0 20	98–0	2 058	2·5	7·5	5·49	0·78	6– 2
5	298	113–0	0– 6·1	7–0	0 28	137–0	2 877	3	9	7·73	1·09	4– 1
6	293	153–0	0– 8·4	35–0	1 40	140–0	2 94	4	12	9·56	1·52	4– 3
7*	292	182–0	0– 9·9	45–0	1 80	90–0	1 89	6	18	7·39	1·32	4–15
8	287	224–0	0–12·5	50–0	2 00	135–0	2 835	5	15	10·31	1·74	3–15
9	244	220–0	0–14·4	60–0	2 40	150–0	3 15	4	12	13·77	2·32	7– 4
10	244	268–0	1– 1·6	70–0	2 80	105–0	2 205	5	15	11·48	2·11	3– 9
Total...	....	.....	.....	275–0	11 00	961–0	20 181	31·5	94·5	70·93	11·6	4 6

NOTES.

*Owing to the extreme heat, the chicks ate much less feed this week.

The feed cost was approximately the same for each breed. The Barred Rocks made the best weight gains, however, and for each pound gained consumed fourteen ounces of feed less than the White Leghorns.

THE EFFECTS OF FEEDING COD-LIVER OIL UPON THE WEIGHT AND TEXTURE OF EGG-SHELL

The suggestion has sometimes been made that the feeding of cod-liver oil to laying hens would tend to a heavier deposition of lime compounds in the egg-shell or in other words that the weight of the egg-shell will be increased and the texture improved thereby.

In order to obtain some definite information on this subject an experiment was conducted with the co-operation of the Division of Chemistry, during the months of May and June.

Two groups of birds were used for the purpose, the first group consisting of pullets which had been fed on a normal ration all winter, and the second containing selected pullets which had been used in a feeding experiment and which had received no green feed for the previous six months. They had, however, been given Epsom salts daily, in the proportion of two ounces per day for fifteen birds.

The experiment was divided into two periods, the first or preliminary period lasting two weeks, and the second, or oil-feeding period, for one month.

During the preliminary period the birds were kept on the same rations which they had been receiving all winter. During the second period each bird received one teaspoonful (4 c.c.) of cod-liver oil daily, administered by means of a medicine-dropper.

All the eggs were marked and sent to the Division of Chemistry daily. Here they were weighed whole in the first place, the contents being afterwards taken out and the weights of the shells recorded, both when fresh and when dried.

During the preliminary period, fifty-two eggs were weighed from the group which had been fed a normal ration, and forty from the birds which had received Epsom salts instead of green feed. During the oil-feeding period, forty-six were weighed from the former group and ninety-seven from the latter.

Unfortunately the results obtained were not at all conclusive. Of the four birds from the pen fed a normal ration, and which laid eggs during both periods, the total egg-weight from three decreased slightly during the period in which oil was fed, and a slight increase noted in the case of the fourth. During this same period, however, there was an increase in the ratio of the total egg-weight to that of the dry shell. Expressed otherwise, the loss in weight of egg-shell was proportionately greater than the loss in total egg-weight.

Five birds from the Epsom salts group laid eggs during both periods. The eggs from three of these increased somewhat in total weight during the oil-feeding period, while those from the other two, showed a decrease. As was the case in the "normal ration" group, the proportionate decrease in weight of egg-shell was greater than the reduction in the weight of the whole eggs.

Consequently the results of this experiment would not indicate that the feeding of cod-liver oil has any appreciable effect in increasing either the gross weight of eggs or the weight of the shell.

A noteworthy feature was the daily variation in egg-weights for all the birds. In one instance with a bird which laid eleven eggs in fourteen days, the difference between the maximum and minimum egg-weights in that time was nearly one-third of an ounce. It was noted, however, that for all the birds the limit of variation during the oil-feeding period was only about half that shown during the preliminary period.

THE EFFECTS OF A COMMERCIAL STIMULANT AND OF BONE MEAL ON SPRING EGG-PRODUCTION

Information is often requested regarding the value of different commercial preparations which are supposed to stimulate egg-production. In order to test one of these preparations, and also to ascertain the effects upon egg production when bone meal is added to the ration, an experiment was undertaken during the spring.

The preparation under experiment is known as Davies Egg Maker, being sold in the form of tablets. These tablets are dissolved in hot water, in the proportion of one for each five birds daily, the solution being used for making a moist mash.

The bone meal was fed in both the dry and wet mash, five per cent by weight being added.

In order to make the experiment as complete as possible, the stimulant was tested both with and without the addition of bone meal to the standard ration, and the bone meal tested both with and without the stimulant.

The stock used consisted of breeding hens which were just coming in to lay, all housed in the breeding-house, and all fed the standard basal ration.

Previous experience with stimulants of this kind, had, indicated that the possible increased production when they were first given, was more than offset by the subsequent slump in production when their use was discontinued. Consequently the experiment was divided into two periods, one of fifty-five days during which the stimulant was given, and a second of fifty-three days when it was not fed.

Table 13 gives details of both the trial periods.

TABLE 13.—DETAIL—EFFECTS OF A STIMULANT AND BONE MEAL ON EGG-PRODUCTION

Feed	Feeding period				Non-feeding period			
	Number of birds	Days	Eggs laid	Average production	Days	Eggs laid	Average production	Per cent decrease
Egg maker with bone meal	23	55	733	31·87	53	443	19·26	39·6
Egg maker without bone meal	22	55	682	31·0	53	393	17·86	42·4
Egg maker total	45	55	1,415	31·44	53	836	18·58	40·9
Standard ration with bone meal	26	55	729	28·04	53	444	17·08	39·1
Standard ration without bone meal	22	55	614	27·91	53	337	15·32	45·1
Standard ration total	48	55	1,343	27·98	53	781	16·27	41·8
Bone meal with egg maker	23	55	733	31·87	53	443	19·26	39·6
Bone meal without egg maker	26	55	729	28·04	53	444	17·08	39·1
Bone meal total	49	55	1,462	29·84	53	887	18·1	39·3
Standard ration with egg maker	22	55	682	31·0	53	393	17·86	42·4
Standard ration without egg maker	22	55	614	27·91	53	337	15·32	45·1
Standard ration total	44	55	1,296	29·45	53	730	16·59	43·7

NOTES.—During the feeding period the birds receiving the "Egg Maker" tablets both with and without bone meal, gave a higher production of 3·46 eggs per bird than those fed the standard ration without the stimulant. During the period following, when the tablets were discontinued, there was a 0·9 per cent difference in the production decrease, in favour of the birds which had previously received the tablets.

The group fed on bone meal gave an average production during the feeding period of 0·39 eggs per bird more than those receiving no bone meal. The percentage produetion decrease of the first-mentioned group after the discontinuation of the bone meal was 4·4 per cent less than that for the birds which had had no bone meal.

As the difference in each case was so small, considering the length of the test, no definite conclusions can be drawn until the experiment has been repeated.

FEEDING EXPERIMENTS FOR WINTER EGG-PRODUCTION

Each year, experimental work is undertaken to ascertain the value of different feeds for laying pullets, both from the viewpoint of profitable winter egg-production, and their effects upon fertility and hatchability. During the winter of 1924-25, four such experiments were conducted to compare semi-solid with fresh buttermilk; home-mixed mash with two commercial mashes known respectively as "Staminex" and "Prolac"; various green feeds with Epsom salts as a substitute, and crude and refined cod-liver oil with Fleischmann's and Larro Yeasts.

The experiments were carried on in the Experimental House, beginning on October 15, and ending April 14, a period of six months. White Leghorn pullets were used throughout, fifteen in each pen, and so far as possible, pen sisters, *i.e.* birds sired by the same male, were used in each respective experiment. Unless otherwise indicated, the following standard feeds were used. The prices given per hundred pounds being based on an average for the six months: Commercial scratch-grain mixture at $2.75; home-mixed mash consisting of equal parts bran, cornmeal, middlings and ground oats, with half a part meat meal, at $2.25; sprouted oats at $2.15; mangels at 50 cents; grit at 87 cents; oyster shells at $1 and buttermilk at 3 cents per gallon.

During the first month the selling price of eggs was 65 cents per dozen, and 80 cents, 90 cents, 90 cents, 70 cents and 55 cents respectively for the succeeding months.

The regular feeding methods were followed, scratch-grain being fed in a deep litter twice a day; grit, shell and dry mash (when given) being kept constantly before the birds in hoppers; a little moistened mash (as much as the birds would clear up in fifteen minutes) given at noon; green feed, consisting of equal quantities of mangels and sprouted oats (except in the green-feed experiment) fed daily, and unless otherwise indicated, both milk and water kept constantly available.

Details of the special feeds and methods of feeding them are given under the headings of the respective experiments.

All pens were mated during the breeding season for the first period in the ordinary way, but during the second period the males were alternated daily to reduce the margin of possible error due to individual variation. The hatching results are included in the summaries. No birds were substituted during the duration of the experiments, and consequently, except for the hatching results, the detailed tables are all given on the basis of one bird, the amount of feed consumed during each month being calculated on the number of birds alive at the end of the month. As the value of the grit and shell consumed per bird was so small it has not been included in the tables.

Pen No. 7 in the experiment "Mashes for egg-production" and which received the regular standard ration, was used as a control or check pen for all the experiments in this series. In order to prevent unnecessary duplication, however, the figures for this pen have not been included in each experiment, but are given in the one to which reference has been made.

SEMI-SOLID VERSUS FRESH BUTTERMILK

The object of this experiment was to compare fresh buttermilk valued at 3 cents per gallon, or 30 cents per hundred pounds, with a commercial article known as semi-solid butermilk, which many poultrymen are using to-day, and which was valued at $4 per hundred pounds. The manufacturers of the semi-solid buttermilk recommend its use without any mash, and consequently the tests in each case were made both with and without mash.

The basal ration included scratch-grain, green feed, grit, shell and water, the pens being aranged and fed as follows:—

Pen No. 1. Basal ration plus semi-solid buttermilk in its original state (14 ozs. per pen each day, fed on a small tray covered with wire netting), without mash.
Pen No. 2. Basal ration plus semi-solid buttermilk as above, with dry mash ad lib., and moistened mash at noon.
Pen No. 3. Basal ration plus fresh buttermilk ad lib., without mash.
Pen No. 4. Basal ration plus fresh buttermilk ad lib., with dry mash constantly available and moistened mash at noon.

Table 14 gives details regarding quantities and value of feed consumed; eggs laid; their value and feed cost per dozen; profit over cost of feed; weight gains or losses and total mortality during the experiment.

TABLE 14—DETAIL—SEMI-SOLID VERSUS FRESH BUTTERMILK

Pen and Feed	Total mortality	Weight gain or loss	Scratch grain	Value	Mash	Value	Green feed	Value	Buttermilk	Value	Semi-solid	Value	Total value feed	Eggs laid	Value	Cost per dozen	Profit over cost of feed
		ozs.	lb. oz.	c.	lb. oz.	c.	lb. oz.	c.	gals.	c.	lb. oz.	c.	$ c.		$ c.	c.	$ c.
1. Semi-solid without mash		−4	20 0	55·5	.....	.....	19 2	21·6	.....	.....	10 11	43	1 20	58·5	3 55	24·6	2 35
2. Semi-solid with mash	3	−1	18 6	50·7	28 5	64·3	21 15	23·9	.....	.....	12 2	49	1 88	68·1	4 09	33·1	2 21
3. Buttermilk without mash	4	−8	23 2	63·5	.....	.....	22 2	24·2	1·76	5·2	.....	.....	0 93	70·8	4 19	15·7	3 26
4. Buttermilk with mash	1	−2	16 5	45·0	25 6	57·1	19 5	21·7	1·13	3·4	.....	.....	1 27	72·9	4 37	20·9	3 10

Hatching Results

	Mating Period	Eggs set	Fertile	Hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched
1	Ordinary	50	39	10	78·0	25·6	20·0
	Males alternated	40	37	29	92·5	78·4	72·5
	Total	90	76	39	84·4	51·3	43·3
2	Ordinary	93	72	27	77·4	37·5	29·0
	Males alternated	30	30	18	100·0	60·0	60·0
	Total	123	102	45	82·9	44·1	36·6
3	Ordinary	81	68	27	83·9	39·7	33·3
	Males alternated	22	20	6	90·9	30·0	27·3
	Total	103	88	33	85·4	37·5	32·0
4	Ordinary	105	76	55	72·4	72·3	52·4
	Males alternated	30	28	16	93·3	57·1	53·3
	Total	135	104	71	77·0	68·2	52·6

NOTES.—Two deaths in pen 2 due to cannibalism and the third to intestinal impaction; those in pen 3 to peritonitis, fatty liver, avitamosis and cannibalism respectively, and that in pen 4 to peritonitis.

The birds receiving fresh buttermilk without mash produced eggs at the lowest feed cost per dozen, and also gave the highest profit over cost of feed, being followed by those on fresh buttermilk with mash, semi-solid without mash and semi-solid with mash respectively.

It should be noted, however, that the heaviest mortality occurred in the pen in which fresh buttermilk was given without mash, and that there were no deaths among the birds fed semi-solid without mash.

The best hatching results for the period during which the males were alternated daily, were also obtained from the pen receiving semi-solid without mash.

The experiment will be repeated next year, and until that has been done, no definite conclusions should be drawn. The results would seem to indicate, however, that where fresh buttermilk can be obtained at a reasonable price, semi-solid buttermilk is not an economical substitute.

VARIOUS GREEN FEEDS AND A SUBSTITUTE

During the winters of 1922-23 and 1923-24 experiments were conducted to compare different green feeds and substitutes therefor, details of which were given in the Annual Reports of the Dominion Poultry Husbandman for 1923 and 1924.

As the results obtained for the two years were contradictory, an experiment was repeated this year to compare mangels, sprouted oats, clover leaves and Epsom salts.

Except for the green feed given, all pens were handled and fed alike, the arrangement being as follows:—

Pen No. 8. Mangels (50 cents per hundred pounds) ad lib.
Pen No. 9. Sprouted oats ($2.15 per hundred pounds) fed in a small trough once a day.
Pen No. 10. Dry clover leaves ($1 per hundred pounds) fed in the litter once a day.
Pen No. 11. Epsom salts ($3.25 per hundred pounds) dissolved and fed in the wet mash at the rate of 2 ounces per pen of fifteen birds daily.

The detailed figures for each pen are given in table 15 together with the hatching results.

TABLE 15.—DETAIL—GREEN FEEDS AND A SUBSTITUTE*

Pen and Green Feed or Substitute	Total mortality	Weight, gain or loss	Scratch grain	Value	Mash	Value	Green feed or substitute	Value	Milk	Value	Total alue feed	Eggs laid	Value	Cost per dozen	Profit over cost of feed
		ozs.	lbs. oz.	c.	lbs. oz.	c.	lbs. oz.	c.	gal.	c.	$ c.		$ c.	c.	$ c.
8. Mangels	3	−2	16 12	46·1	24 4	54·5	25 0	12·5	1·35	4·1	1 17	74·4	4 34	18·9	3 17
9. Sprouted oats	1	−3	16 11	45·9	30 8	68·6	14 10	31·2	1·38	4·1	1 50	80·4	4 73	22·3	3 23
10. Clover leaves	1	−2	16 5	44·9	24 15	56·1	24 5	24·3	1·28	3·9	1 29	81·7	4 83	18·9	3 54
11. Epsom salts	.....	+1	16 2	44·4	22 2	49·6	1 8	4·8	1·32	4·0	1 03	74·1	4 49	16·6	3 46

*For hatching results see p. 36.

TABLE 15—*Concluded*

Hatching Results

Pen and Green Feed or Substitute	Mating Period	Eggs set	Fertile	Hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched
8. Mangels	Ordinary	138	122	53	88·4	43·4	38·4
	Males alternated	27	21	15	77·8	71·4	55·5
	Total	165	143	68	86·7	47·5	41·2
9. Sprouted oats	Ordinary	151	133	86	88·1	64·7	56·9
	Males alternated	21	19	15	90·5	78·9	71·4
	Total	172	152	101	88·4	66·4	58·7
10. Clover leaves	Ordinary	148	107	53	72·3	49·5	35·8
	Males alternated	28	27	17	96·5	62·9	60·7
	Total	176	134	70	76·1	52·2	39·8
11. Epsom salts	Ordinary	106	99	73	93·4	73·7	68·9
	Males alternated	33	31	21	93·9	67·7	63·6
	Total	139	130	94	93·5	72·3	67·6

NOTES.—The deaths in pen 8 were due to roup, vent gleet and cannibalism, while no apparent causes were found for those in pens 9 and 10.

The best egg production and highest profit over cost of feed, were given by the birds receiving clover leaves. This pen also made slightly better weight gains. Eggs were produced most cheaply, however, in the Epsom salts pen, and it not only stood second for profits and weight gains, but had no mortality.

When the males were alternated daily, best hatching results were obtained from the birds on sprouted oats, being followed by those on clover leaves, Epsom salts and mangels respectively.

In order that a comparison may be made of the results obtained from similar experiments conducted during the past three years, a summary of the three is given in table 16 based, except for the hatching results, on the average for one bird. In this table the hatching results are given only for the periods when the males were alternated.

TABLE 16.—SUMMARY OF THREE YEARS EXPERIMENTS WITH GREEN FEEDS AND A SUBSTITUTE

Green feed or substitute	Year	Cost of green feed or substitute	Total cost of feed	Eggs laid	Value	Feed cost per dozen	Profit over cost of feed	Eggs set	Fertile	Hatched	Per cent fertile	Per cent fertile hatched	Per cent Total hatched
		$ c.	$ c.		$ c.	c.	$ c.						
Mangels	1922–23	12·0	1 10	85·7	4 87	15·4	3 77	29	27	8	93·1	29·6	27·5
	1923–24	12·3	1 30	108·9	6 20	14·3	4 90	60	53	13	88·3	24·5	21·6
	1924–25	12·5	1 17	74·4	4·34	18·9	3 17	27	21	15	77·8	71·4	55·5
Average	.....	12·3	1 19	89·7	5 14	16·2	3 95	39	34	12	87·2	35·3	30·8
Sprouted oats	1922–23	3·2	0 95	93·5	5 29	12·1	4 35	38	35	14	92·1	40·0	36·8
	1923–24	49·3	1 78	107·9	6 09	19·7	4 31	93	90	27	96·8	30·0	29·0
	1924–25	31·2	1 50	80·4	4 73	22·3	3 23	21	19	15	90·5	78·9	71·4
Average	.....	27·9	1 41	93·9	5 37	18·0	3 96	51	48	19	94·1	39·6	37·3
Clover leaves	1922–23	10·0	1 11	95·9	5·58	13·8	4 48	52	50	40	96·1	80·0	76·9
	1923–24	24·7	1 43	103·3	5 80	16·6	4 37	72	66	11	91·6	16·7	15·3
	1924–25	24·3	1 29	81·7	4 83	18·9	3 54	28	27	17	96·5	62·9	60·7
Average	.....	19·7	1 28	93·6	5 40	16·4	4 13	51	48	23	94·1	47·9	45·1
Epsom slats	1922–23	5·2	1 03	94·3	5 40	13·1	4 37	38	36	19	94·7	52·7	50·0
	1923–24	5·2	1 16	94·2	5 45	14·9	4 29	57	51	17	89·5	33·3	29·9
	1924–25	4·8	1 03	74·1	4 49	16·6	3 46	33	31	21	93·9	67·7	63·6
Average	.....	5·1	1 07	87·5	5 11	14·9	4 04	43	39	19	90·7	48·7	44·2

NOTES.—Taking the average of the three years' experiments, it will be noted that the birds fed dry clover leaves gave the greatest profit over cost of feed followed in order by those receiving Epsom salts, sprouted oats and mangels respectively.

The sprouted oats gave slightly the highest egg-production, being followed by clover leaves, mangels and Epsom salts, while eggs were produced most cheaply when Epsom salts were used.

With reference to hatching results, the four feeds would be placed in the following order:—Clover leaves, Epsom salts, sprouted oats and mangels.

From this it may safely be stated that dry clover leaves, gathered from the barn-floor and fed in the litter, provide one of the most satisfactory green feeds for winter egg production, and that where green feed is not available, Epsom salts are an efficient and economical substitute.

In view of the fact that this experiment is now being conducted at several branch Farms, it will not be repeated at the Central Farm.

STANDARD (HOME-MIXED) VERSUS COMMERCIAL MASHES

In past years a number of experiments have been conducted both at Ottawa and at several branch farms, to compare various commercial mashes with the standard (home-mixed) mash used upon the Experimental Farm system. A summary covering these experiments was given in the Annual Report of the Dominion Poultry Husbandman for 1923.

The following experiment was undertaken in order to test the relative value of this standard mash with two commercial mashes known respectively as "Prolac" and "Staminex."

With the exception of the mash used, the birds in the three pens were handled and fed alike, in the manner indicated in the introductory paragraphs to this series of experiments.

The standard mash contained bran, cornmeal, middlings and ground oats in equal parts with half a part of meat meal, being valued at $2.25 per hundred pounds. Both the Prolac and Staminex mashes were valued at $3.75 per hundred pounds.

Table No. 17 gives detailed figures for the experiment, including the hatching results.

TABLE 17.—DETAIL—STANDARD (HOME-MIXED) VERSUS COMMERCIAL MASHES

Pen and mash	Total mortality	Weight gain or loss	Scratch grain	Value	Mash	Value	Green feed	Value	Milk	Value	Total value feed	Eggs laid	Value	Cost per doz.	Profit over cost of feed
		oz.	lb. oz.	c.	lb. oz.	$ c.	lb. oz.	c.	gal.	c.	$ c.		$ c.	c.	$ c.
5. Prolac	2	.....	16 14	46·4	27 3	1 02	20 2	22·4	1·36	4·2	1 75	82·5	4 87	24·2	3 12
6. Staminex	1	−6	16 5	44·9	27 12	1 04	19 5	21·7	1·28	3·9	1 75	87·6	5 31	23·9	3 56
7. Standard (home-mixed)	1	−5	16 5	44·9	27 0	0·607	19 5	21·7	1·28	3·9	1 31	82·4	4 95	19·1	3 64

TABLE 17—*Concluded.*

Hatching Results

Pen and mash	Mating period	Eggs set	Fertile	Hatched fertile	Per cent fertile hatched	Per cent hatched	Per cent total hatched
5. Prolac	Ordinary	93	88	43	94·6	48·8	46·2
	Males alternated	37	32	20	86·5	62·5	54·1
Total		130	120	63	92·3	52·5	48·5
6. Staminex	Ordinary	156	143	87	91·6	60·8	55·8
	Males alternated	33	32	27	96·9	84·4	81·8
Total		189	175	114	92·6	65·1	60·3
7. Standard (home-mixed)	Ordinary	153	144	81	94·1	56·2	52·9
	Males alternated	38	35	25	92·1	71·4	65·8
Total		191	179	106	93·7	59·2	55·5

NOTES.—The two deaths in pen 5 were due to peritonitis, that in pen 6 to limber neck and in pen 7 to leg-weakness.

Highest production was given by the birds receiving Staminex mash, but the additional cost of the mash itself, put this pen in second place, both for profit over cost of feed and the feed cost of producing one dozen eggs, the standard (home-mixed) mash leading in these two respects.

For the period when the males were alternated daily, the best hatching results were obtained from the staminex pen, followed by the standard and Prolac mashes respectively.

These results, so far as feed cost of producing one dozen eggs and the profits over cost of feed are concerned, only serve to confirm those obtained in previous experiments to which reference has already been made. In fact the aggregate of all these similar experiments in which over four hundred birds were used shows an increased profit of thirteen cents per bird by the use of the standard (home-mixed) mash.

From this it may safely be said that home-mixed mash is the most economical and its use results in increased profit over cost of feed.

VITAMINE FEEDS FOR EGG PRODUCTION

Recent research work along nutritional lines has demonstrated the importance of the vitamines in feeding live stock, whether for production growth or reproduction. Experiments conducted to date would seem to indicate that in feeding poultry, the most essential are those known as the antineuritic and antirachitic vitamines respectively.

In order to obtain further information regarding the most satisfactory sources of these vitamines, an experiment was undertaken to compare certain feeds considered rich in vitamine-content, namely cod-liver oil both crude and refined, and two commercial yeasts manufactured especially for live stock, known as Larro and Fleishmann's Yeasts.

The birds in the four pens used, were all fed the standard ration previously outlined, the special feeds being added in the respective pens as follows:—

Pen 12. Crude cod-liver oil ($1.05 per gallon), two teaspoonfuls (¼ ounce) per pen of fifteen birds daily, mixed in the moist mash.

Pen 13. Refined cod-liver oil ($2.00 per gallon), given in the same proportion and the same manner as for pen 12.

Pen 14. Larro yeast ($1.00 per pound), one tablespoonful (½ ounce) per pen daily, mixed in the wet mash.

Pen 15. Fleischmann's yeast ($1.00 per pound), one and a half tablespoonfuls (1½ ounces) per pen daily, mixed in the wet mash. As recommended by the manufacturers, this mash was mixed three or four hours before feeding and allowed to stand in a warm room to ferment slightly.

In table 18 will be found detailed figures covering the experiment, and also the hatching results obtained.

TABLE 18.—DETAIL—VITAMINE FEEDS FOR EGG PRODUCTION

Pen and special Feed	Total Mortality	Weight gain or loss	Scratch grain	Value	Mash	Value	Green feed	Value	Milk	Value	Special feed	Value	Total value feed	Eggs laid	Value	Cost per dozen	Profit over cost feed
		oz.	lbs. oz.	c.	lbs. oz.	c.	lbs. oz.	c.	gal.	c.	oz.	c.	$ c.		$ c.	c.	$ c.
12. Crude cod-liver oil..	2	+3	16 11	45·8	23 4	52·3	19 13	22·1	1·34	4	3	2	1 26	75	4 27	20·2	3 01
13. Refined cod-liver oil	4	+2	17 1	46·9	26 7	59·5	20 5	22·7	1·4	4·2	3	3·6	1 37	71·5	4 26	22·9	2 89
14. Larro Yeast.....	1	−2	16 8	45·4	23 15	53·7	19 8	21·8	1·3	3·9	6	37·5	1 62	81·3	4 75	23·9	3 13
15. Fleischmann's Yeast	1	−11	16 8	45·4	24 2	54·3	19 8	21·8	1·37	4·1	13·8	86·2	2 12	78·4	4·70	32·4	2 58

Hatching Results

Pen and Special feed	Mating period	Eggs set	Fertile	Hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched
12. Crude cod-liver oil.....	Ordinary.....	90	63	45	70	71·4	50
	Males alternated.....	30	29	18	96·7	62·1	60
Total.....	.....	120	92	63	76·6	68·5	52·5
13. Refined cod-liver oil.....	Ordinary.....	53	44	32	83	72·7	60·4
	Males alternated.....	26	24	22	92·3	91·7	84·6
Total.....	.....	79	68	54	86·1	79·4	68·4
14. Larro Yeast.....	Ordinary.....	119	106	70	89·1	66·0	58·8
	Males alternated.....	25	24	15	96·0	62·5	60·0
Total.....	.....	144	130	85	80·3	65·4	59·0
15. Fleischmann's Yeast	Ordinary.....	95	82	30	86·3	36·6	31·6
	Males alternated.....	35	34	17	97·1	50·0	48·6
Total.....	.....	130	116	47	89·2	40·5	36·1

NOTES:—The deaths in pen 12 were due to enlarged liver and leukemia; those in pen 13 to roup, chicken pox and cannibalism; that in pen 14 to pneumonia, while the dead bird in pen 15 was killed by the others.

Highest production and greatest profit over cost of feed was given by the birds on Larro Yeast, the other feeds in order according to profit over cost of feed being crude cod-liver oil, refined cod-liver oil and Fleischmann's Yeast. It will be noted however, by referring to pen 7 in table 2, (which served as a control-pen) that none of these feeds gave such a high profit as did the regular standard ration, without the addition of any special feed.

With reference to hatching results when the males were alternated daily, the feeds would rank as follows;—refined cod-liver oil, crude cod-liver oil, Larro yeast and Fleischmann's yeast.

While the birds receiving cod-liver oil made slight weight gains in each case, those in the yeast-pens lost weight in both instances.

As this is the result of only one season's work, no definite conclusions should yet be drawn therefrom. The experiment will be continued for several years however, after which more reliable deductions can be made.

EGG-STORAGE EXPERIMENTS

In the annual report of the Dominion Poultry Husbandman for 1924, details were given concerning experiments which had been conducted to test the "Guaranise" process for eggs placed in storage. This year these experiments were continued, covering both new-laid and commercial eggs, kept both in cold storage and in an ordinary cellar.

PROCESSED VS. NON-PROCESSED NEW-LAID EGGS IN COLD STORAGE

One thirty-dozen case of new-laid eggs was used for this experiment, half the contents being processed and the other half left in their original state.

These eggs were stored with the Canadian Cold Storage Co., Ottawa, on May 7, and taken out six months later on November 6. They were all graded before being put into storage, and when taken out were graded again and tested for flavour.

Table 19 gives details of the two gradings of each half case, and table 20 covers a summary of three years' experiments.

TABLE 19.—PROCESSED VS. NON-PROCESSED. NEW-LAID EGGS

Case No	Kind of eggs	Dozens	Grade when stored				Grade when taken out					
									Seconds			
			Specials	Extras	Firsts	Seconds	Extras	Firsts	Heavy yolks	Weak and watery	Cracked	Bad
1A	Processed	15	180	.....	.....	.....	170	3	.....	.....	7	.....
1B	Non-processed	15	180	.....	.....	.....	81	68	31	.....	.....	.....

NOTES:—As indicated by the grading when taken out of storage, there was a difference of nearly fifty per cent, in favour of the "Guaranise" process. When tested for flavour the "Guaranised" eggs were also decidedly superior to the others and in many instances it was difficult to tell the difference between them and new-laid eggs.

TABLE 20.—SUMMARY OF THREE YEARS' EXPERIMENTS

Year	Kind of Eggs	Dozens	Grade when taken out					
					Seconds			
			Extras	Firsts	Heavy yolks	Weak and watery	Cracked	Bad
1923	Processed	30	101	240	.....	3	15	1
1924	"	30	318	25	.....	2	15	.....
1925	"	15	170	3	.....	.....	7	.....
	Total	75	589	268	.....	5	37	1
1923	Non-processed	30	153	181	.....	10	16	.....
1924	"	30	262	72	2	23	1	.....
1925	"	15	81	68	31	.....	.....	.....
	Total	75	496	321	33	33	17	.....

NOTES:—The summary of three years' experiments shows that when taken out of storage sixty-five per cent of the "Guaranised" eggs graded as "Extras" as against fifty-five per cent for those which had not been processed, a difference of ten per cent in favour of the "Guaranise" process.

THE VALUE OF THE "GUARANISE" PROCESS

In order to give an idea of the value of the "Guaranise" process for storage eggs as shown by three years' work, table 21 has been prepared, giving a summary of the results of all the experiments conducted during that time.

TABLE 21.—SUMMARY OF THREE YEARS' EXPERIMENTS WITH THE "GUARANISE" PROCESS

Year	Kind of eggs	Dozens	Grade when taken out					
			Extras	Firsts	Seconds		Cracked	Bad
					Heavy yolks	Weak and watery		
1923	Processed	186½	880	1,202	26	48	75	7
1924	Processed	195	1,878	293	11	20	136	2
1925	Processed	30	301	36	1	.....	22	.....
	Total	411½	3,059	1,531	38	68	233	9
1923	Non-processed	186½	859	1,237	30	32	78	2
1924	Non-processed	195	1,559	478	11	200	89	3
1925	Non-processed	30	137	135	79	4	5	.....
	Total	411½	2,555	1,850	120	236	172	5

NOTES.—The summary shows that on the basis of the grading, sixty-one per cent of the "Guaranised" eggs were classed as "Extras" when taken out of storage, whereas only fifty-one per cent of the non-processed ones were so classed, being a difference of ten per cent in favour of the "Guaranise" process.

As was stated in last year's report the results obtained in 1923 were not as satisfactory as those obtained later, due to the fact that the "Guaranise" solution was not applied exactly as recommended by the manufacturers owing to lack of definite information regarding it.

Judged on the basis of the succeeding two years' work, under all conditions, the "Guaranised" eggs showed a superior grading of over seventeen per cent when taken out of storage, and in each instance they were of a far better flavour than those which had not been processed.

Consequently it may safely be stated that this is an excellent and most satisfactory process for eggs to be placed in cold storage, as it improves their keeping qualities to a marked degree.

Inasmuch that the results have been so uniform no further experiments covering this process for cold storage purposes will be conducted at Ottawa in the near future. However, the experiments on the "Guaranise" process for eggs stored in an ordinary cellar and also those shipped to a distant market will be continued for several years until more definite and conclusive information has been obtained.

PROCESSED VS. NON-PROCESSED EGGS STORED IN AN ORDINARY CELLAR

The object of this experiment was to ascertain the value of the " Guaranise " process for eggs which are kept for two or three months in the cellar of a house or store. All the eggs used, consisting of fifteen dozen new-laid and fifteen dozen commercial processed, and an equal number of each non-processed, were put in ordinary thirty-dozen cases, and stored in the cellar under the Poultry Division offices on May 8.

Every week from then until August 21, or fifteen weeks later, a dozen eggs of each kind was taken out, candled, and tested for their flavour and palatability. During these fifteen weeks the temperature of this cellar varied from a minimum of 50° to a maximum of 77°.

From the first week until the end, there was a remarkable difference in the size of the air-cell of the " Guaranised " eggs as compared with the others. At the end of the fifteenth week the air-cell in the " Guaranised " eggs, both new-laid and commercial, measured only slightly over one eight of an inch, while in those which had not been processed it was well over half an inch. From the fourth week on, the non-processed commercial eggs began to show heavy yolks and by the tenth week this was very pronounced.

When tested for their flavour, there was a marked difference in favour of the "Guaranised" eggs, especially those which were new-laid when stored. This difference was particularly noticeable after the tenth week, when the non-processed eggs began to have a musty flavour. The "Guaranised" new-laid eggs, when taken out at the fifteenth week were quite palatable when boiled and poached.

This experiment will be continued for several years, in order to get more definite information, but this year's results would indicate that the "Guaranise" process has a decided effect upon the keeping qualities of eggs stored in an ordinary cellar.

PROCESSED VS. NON-PROCESSED COMMERCIAL EGGS IN COLD STORAGE

This experiment was identical with the foregoing, except for the quality of the eggs used which in this instance were straight commercial eggs. Table **22** gives details of the results obtained this year, and table **23**, a summary for three years.

TABLE 22.—PROCESSED VS. NON-PROCESSED COMMERCIAL EGGS

Case No	Kind of eggs	Dozens	Grade when stored				Grade when taken out					
									Seconds			
			Specials	Extras	Firsts	Seconds	Extras	Firsts	Heavy yolks	Weak and watery	Cracked	Bad
2A	Processed	15	16	125	28	11	131	33	1	.....	15	.....
2B	Non-Processed	15	16	126	28	10	56	67	48	4	5	.....

REMARKS:—The grading of the eggs when taken out of storage showed a difference of over fifty per cent in favour of the "Guaranise" process.

TABLE 23.—SUMMARY OF THE THREE YEARS' EXPERIMENTS

1923	Processed	27½	.....	165	165	.....	118	175	.....	19	15	3
1924	"	30	.....	180	180	.....	162	169	.....	10	19	.....
1925	"	15	16	125	28	11	131	33	1	.....	15	.....
	Total	72½	16	470	373	11	411	377	1	29	49	3
1923	Non-processed	27½	.....	165	165	.....	82	236	.....	.....	12	.....
1924	"	30	.....	180	180	.....	125	179	6	41	9	.....
1925	"	15	16	126	28	10	56	67	48	4	5	.....
	Total	72½	16	471	373	10	263	482	54	45	26	.....

NOTES:—The results of three years experiments show that eighty-six per cent of the "Guaranised" eggs which graded as "Specials" or "Extras" when stored graded as "Extras" when taken out of storage, as compared with only fifty-four per cent of the non-processed ones, or a difference of thirty-one per cent in favour of the former.

SHIPPING MARKET EGGS

In 1923 and 1924 experiments were conducted covering the Guaranise process for storage eggs and various methods of packing eggs for storage purposes. Details of these may be found in the annual reports of the Dominion Poultry Husbandman for those years. Particulars of similar experiments undertaken at Charlottetown and Brandon will be found in the annual reports of that Station and Farm for 1924.

This year, additional experiments were conducted to compare the relative advantages of shipping new-laid market eggs, packed with the large ends up and large ends down, respectively, and also to ascertain whether the " Guaranise " process has any effect upon the keeping quality of eggs when shipped to a distant market.

Four cases (of the regular commercial type) were used, each case being divided into two lots, three cases containing new-laid, and the other one commercial eggs. The contents of each are indicated in table 24.

In order to duplicate as nearly as possible the way in which eggs are handled when shipped from the producer to the wholesaler and thence to the retailer, all the eggs were graded and packed at Ottawa, and then shipped to Charlottetown, on May 19. On arrival there they were re-graded, repacked in the same manner and shipped back to Ottawa, to be graded again, reaching Ottawa on May 27.

The grading before shipment and again on return to the original shipping point, was done by the same egg-inspector of the Live Stock Branch.

Table 24 gives details regarding the contents of each case and lot, the kinds of eggs used and the quality as indicated by the grader's report both when shipped and on their return. The summary, table 25, shows the grading of the total number of eggs processed compared with those non-processed, together with those packed with large ends up and large ends down respectively.

TABLE 24.—DETAIL—EGG-SHIPPING EXPERIMENT

Case No	Kind of eggs	How packed	Dozens	Grade when shipped				Grade when returned						
				Specials	Extras	Firsts	Seconds	Extras	Firsts	Seconds		Cracked	Dirty	Bad
										Weak and watery	Heavy yolks			
5 (a)	Special (processed)	.....	15	180	.....	.....	.....	152	9	4	2	13	.....	.....
5 (b)	Special (non-processed)	.....	15	180	.....	.....	.....	96	37	20	8	19	.....	.....
6 (a)	Commercial (processed)	.....	15	32	108	30	10	19	73	21	48	13	2	4
6 (b)	Commercial (non-processed)	.....	15	16	120	36	8	16	70	51	24	16	.....	3
7 (a)	Special (processed)	Large ends up	15	180	.....	.....	.....	144	15	8	4	0	.....	.....
7 (b)	Special (processed)	Large ends down	15	180	.....	.....	.....	115	21	12	5	27	.....	.....
8 (a)	Special (non-processed)	Large ends up	15	180	.....	.....	.....	145	13	4	.....	18	.....	.....
8 (b)	Special (non-processed)	Large ends down	15	180	.....	.....	.....	69	51	37	.....	23	.....	.....

TABLE 25.—SUMMARY EGG-SHIPPING EXPERIMENT

Case No	Kind of eggs	How packed	Dozens	Grade when shipped				Grade when returned						
				Specials	Extras	Firsts	Seconds	Extras	Firsts	Seconds		Cracked	Dirty	Bad
										Weak and watery	Heavy yolks			
.....	Processed	.....	60	572	108	30	10	430	118	45	59	62	2	4
.....	Non-processed	.....	60	556	120	36	8	326	171	112	32	76	.....	3
.....	Large ends up	.....	30	360	.....	.....	.....	289	28	12	4	27	.....	.....
.....	Large ends down	.....	30	360	.....	.....	.....	184	72	49	5	50	.....	.....

NOTES.—Taking the eggs in cases numbers 5 and 6, which were packed indiscriminately, (that is to say without reference as to whether the large ends were up or down), those which were processed, both new-laid and commercial, stood up much better during shipment than the non-processed. Of the processed eggs in these cases which graded as specials or extras when shipped, fifty-three per cent graded as extras on their return, as compared with only thirty-five per cent for those which were not processed. On the basis of all the eggs shipped (including those packed in a special way, either with large ends up or down), there was also a difference of fifteen per cent in favour of the processed eggs.

When returned to the original shipping point there was a remarkable difference in the quality of the eggs shipped with large ends up as compared with large ends down. Of the former, which graded as specials or extras when shipped, sixty-three per cent came back as extras, while of the latter, the percentage was only thirty-five, a difference of twenty-eight per cent.

As this is the first experiment of its kind, no definite conclusions should be drawn until it has been repeated for several years, as it will be.

The results would indicate, however, that there is an advantage in "guaranising" new-laid eggs which are to be shipped to a distant market, and that it is preferable to pack eggs with large ends up to enhance their keeping qualities during shipment.

DUCK-FEEDING EXPERIMENTS

During the years 1921, 1922 and 1923, experiments were conducted to ascertain the rate of growth of ducklings of various breeds, the effects of different rations and the feed costs and profits, of which details were given in the annual reports for those years.

This year a further experiment was undertaken to ascertain the comparative rate of growth of ducklings of four different breeds, together with the amount and cost of feed consumed.

STOCK, RATIONS, AND METHODS OF HANDLING

The stock consisted of forty Pekin ducklings hatched on June 1; seventeen Rouens hatched on June 16; eleven White Muscovies, and fifteen coloured Muscovies all hatched on June 7. All the ducklings were incubator-hatched and were brooded at the duck-plant.

The experiment lasted for twelve weeks and during the entire period the birds were fed five times a day.

For the first five weeks the ration consisted of a mash composed of thirty parts by weight of bran, shorts and cornmeal, with ten parts of beef meal, costing $1.91 per hundredweight, while from the sixth to the twelfth week inclusive it was changed to fifteen parts bran, twenty parts shorts, fifty parts cornmeal and fifteen parts beef meal costing $2.20 per hundredweight. The mash was moistened with water and coarse sand was sprinkled over it.

Until the end of the sixth week a liberal supply of green feed was provided, but after that date the amount was gradually decreased and it was entirely eliminated about the end of the seventh week.

During the first six weeks the ducklings were kept off the water entirely, but from then until the end of the experiment they had access to water in small runs.

The ducklings were weighed weekly and the amounts of feed consumed per bird were calculated on the number alive at the end of each week.

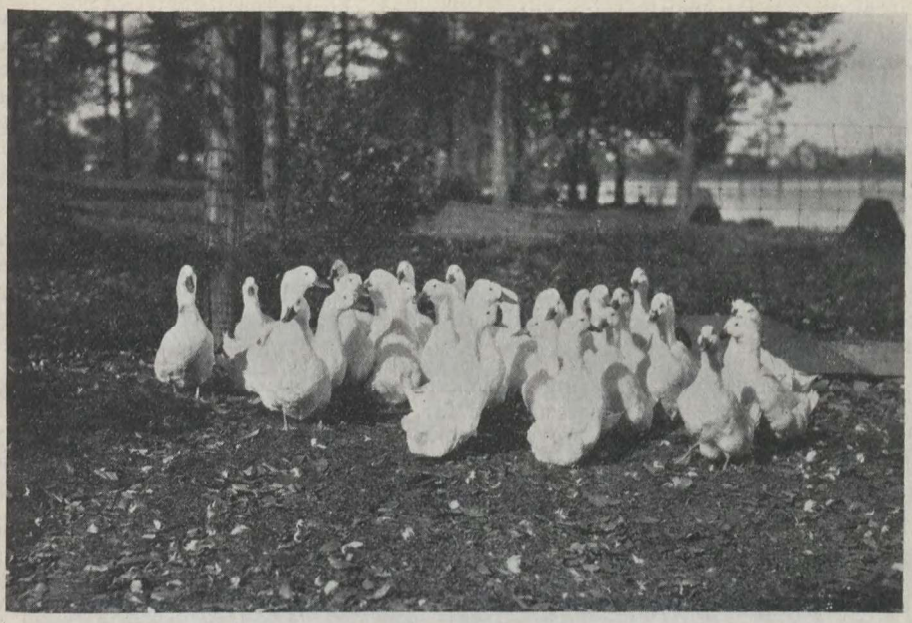
Table 26 gives weekly details of the experiment for the four breeds, while table 27 shows the summarized results including costs and profits; both tables being based on the average for one bird. In computing feed costs no allowance has been made for green feed.

TABLE 26.—DETAIL—DUCK-FEEDING EXPERIMENT

Weeks	Pekins					Rouens					White Muscovies					Coloured Muscovies				
	Number of birds	Average weight	Average gain	Average feed consumed	Pounds of feed per pound gain	Number of birds	Average weight	Average gain	Average feed consumed	Pounds of feed per pound gain	Number of birds	Average weight	Average gain	Average feed consumed	Pounds of feed per pound gain	Number of birds	Average weight	Average gain	Average feed consumed	Pounds of feed per pound gain
		lb. oz.	lb. oz.	lb. oz.	lb. oz.		lb. oz.	lb. oz.	lb. oz.	lb. oz.		lb. oz.	lb. oz.	lb. oz.	lb. oz.		lb. oz.	lb. oz.	lb. oz.	lb. oz.
Beginning	40	0 01·6	.....	.....	.....	17	0 01·4	.....	.....	.....	11	0 01·4	.....	.....	.....	15	0 01·4	.....	.....	.....
1	40	0 03·2	0 01·6	0 04·5	2 13	17	0 02·1	0 00·7	0 06·2	8 13·8	11	0 03·5	0 02·1	0 07·6	3 09·9	15	0 03·1	0 01·7	0 07·7	4 08·5
2	40	0 07·5	0 04·3	0 14·2	3 04·8	16	0 03·7	0 01·6	1 01·4	10 13·9	11	0 07·2	0 03·7	0 14·3	3 13·8	15	0 06·1	0 03	0 09·3	3 01·6
3	40	0 14·1	0 06·6	1 02·2	2 12·2	15	0 07	0 03·3	0 14·1	21 04·3	11	0 12·6	0 05·4	0 15·7	2 14·6	15	0 10·5	0 04·4	0 14·9	3 06·2
4	40	1 05·1	0 07	1 11·2	3 14·1	15	0 12·9	0 05·9	1 09·9	4 06·2	11	1 06·6	0 10	1 09·1	2 08·1	15	1 01·7	0 07·2	1 04·5	2 13·6
5	40	2 00·9	0 11·8	2 05·5	3 02·9	15	1 06·8	0 09·9	1 15·2	3 02·4	11	2 01·6	0 11	2 04·5	3 05·1	15	1 11·5	0 09·8	1 14·3	3 01·4
6	40	2 14·7	0 13·8	2 07	2 13·3	14	2 04·7	0 13·9	2 08·3	2 14·2	11	2 13·5	0 11·9	2 10·6	3 09·3	15	2 06·9	0 11·4	2 01·5	2 15·
7	40	3 15·3	1 00·6	2 07·5	2 06·1	14	2 14·4	0 09·7	3 05·1	5 07·5	11	3 07·8	0 10·3	2 11·6	4 03·7	15	3 02·8	0 11·9	2 05·1	3 01·9
8	40	4 08·5	0 09·2	3 08	6 01·4	14	3 10·9	0 12·5	2 14·3	3 11·2	11	4 02·3	0 10·5	2 10·5	4 00·8	15	3 07·5	0 04·7	2 05·5	7 15·7
9	40	5 04·4	0 11·9	3 06	4 08·6	14	4 03·4	0 08·5	2 12·6	5 04·0	11	3 13·1	0 05·2 (loss)	2 02·2	.....	15	3 14·1	0 06·6	2 01·1	5 00·3
10	37	5 14·1	0 09·7	3 00	4 15·2	14	4 13·1	0 09·7	3 06·9	5 10·6	11	4 01·5	0 04·4	2 05·1	8 06·9	15	4 00·5	0 02·4	1 14·9	12 13·9
11	37	6 14·7	1 00·6	3 06·5	3 04·5	14	5 12	0 14·9	3 08	3 12·2	11	4 08·7	0 07·2	2 14·5	6 07·4	15	5 03·2	1 02·7	2 12·8	2 06·2
12	36	7 00·9	0 02·2	3 09·8	26 04·3	14	6 02·9	0 06·9	3 08·6	8 03·2	11	5 01·5	0 09·8	3 05·8	6 01·8	15	5 11·7	0 08·5	3 03·2	6 00·3
Total	.....	.....	6 15·3	28 02·4	4 00·8	.....	.....	6 01·5	27 14·6	4 09·3	.....	.....	5 00·1	24 15·5	4 15·8	.....	.....	5 10·3	21 14·8	3 14·1

TABLE 27.—SUMMARY OF DUCK-FEEDING EXPERIMENT

Breed	Number at beginning	Number at end	Average weight at beginning	Average weight at end	Average gain	Average feed consumed	Pounds of feed per pound gain	Average cost of feed	Original value per duckling	Average final value at 35c. per lb.	Average profit over cost of feed and duckling
			lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	c.	c.	$ c.	$ c.
Pekins	40	36	0 01·6	7 00·9	6 15·3	28 02·4	4 00·8	60·1	25	2 46·9	1 61·8
Rouens	17	14	0 01·4	6 02·9	6 01·5	27 14·6	4 09·3	60·0	25	2 16·3	1 31·3
White Muscovies	11	11	0 01·4	5 01·5	5 00·1	24 15·5	4 15·8	53·1	25	1 78·3	1 00·2
Coloured Muscovies	15	15	0 01·4	5 11·7	5 10·3	21 14·8	3 14·1	46·8	25	2 00·6	1 28·8



Pekin ducks on experiment.

Rouen ducks on experiment.

REMARKS

PEKINS.—As will be noticed there were four deaths among the Pekins, due probably to sunstroke. The ducks of this breed made steady and rapid gains until the end of the eleventh week when they began to moult. Had these ducks been marketed at the end of the eleventh week the profits would have been much greater. As the experiment conducted in 1921 indicated that Pekin ducks are more profitable when marketed at the end of the eighth week while that of 1922 indicated the tenth week as the most profitable, further experiments will have to be conducted before definite conclusions can be drawn.

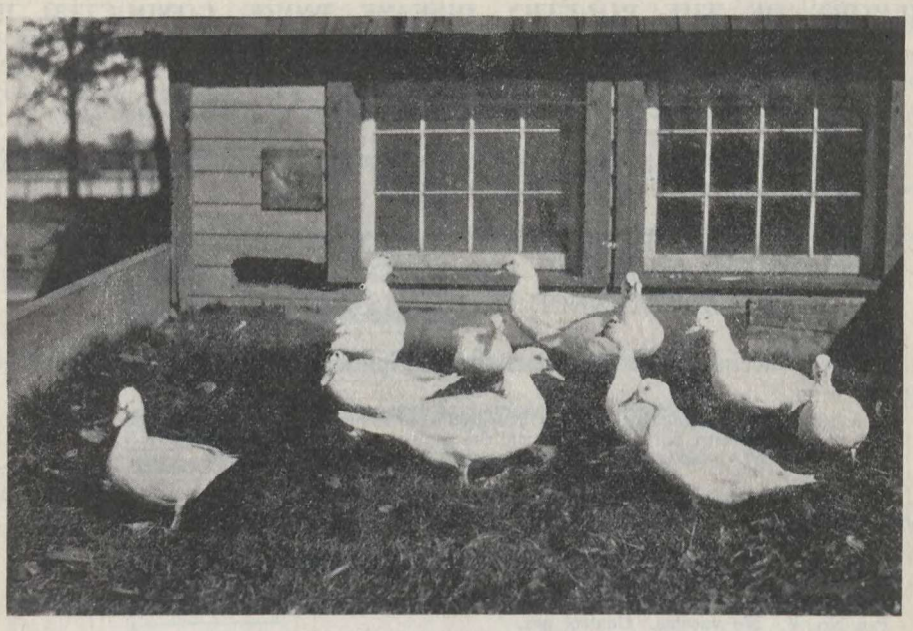
ROUENS.—The three deaths among the Rouens were apparently due to constitutional weakness. At the end of the twelfth week the Rouens were growing well and had not reached the complete development found in Pekins at this age. This would seem to indicate that Rouen ducks develop more slowly than Pekins.

WHITE MUSCOVIES.—During the eighth and ninth weeks the birds showed signs of leg weakness which accounted for the loss in weight during the ninth week. It should be noted however that at the end of the test there were only three males and eight females, the former being nearly twice as large as the latter. This explains the lower average weight per bird at the end of the period.

COLOURED MUSCOVIES.—These birds made steady gains throughout the experiment. The fact that the sexes were almost evenly divided, there being seven males and eight females, accounts for the difference between the average weight of these as compared with the White Muscovies. The ducks were growing well when the experiment ended. The experiment would indicate that Muscovies do not reach marketable age as early as Pekins but about the same time as Rouens.

GENERAL NOTES.—It will be remarked that the Pekins, Rouens and Coloured Muscovies show the largest weight gains during the eleventh week. The wing and tail feathers were developed and the birds were then putting on flesh.

The Pekins gave the highest profits over cost of feed, being followed by the Rouens and Coloured Muscovies respectively.



White Muscovy ducks on experiment.

Dark Muscovy ducks on experiment.

REPORT OF THE POULTRY DISEASE WORK CONDUCTED IN CO-OPERATION WITH THE EXPERIMENTAL FARMS BRANCH

(For the Poultry Year ending October 31, 1925)

The year's work has been conducted under the previously existing policy; its application having been similarly followed.

EXPERIMENT TO DETERMINE THE CONTROLLING EFFECT OF VACCINES ON ROUP AND POX WHEN APPLIED PREVIOUS TO THE APPEARANCE OF DISEASE IN THE FLOCK

Three vaccines were used the designation and nature of each being as follows:—

A. an aggresin (germ-free tissue-extract) prepared from an organism of the Pasteurella group.
B. a bacterial vaccine (polyvalent bacterin) the product of a commercial firm.
C. an attenuated virus (a true vaccine) prepared from Chicken-pox scabs.

Five pens of a continuous house structure were used with wire mesh netting partitions. Each pen contained ten birds.

Pen No. I received vaccine A at the rate of 1 c c per bird, subcutaneously.
Pen No. II, 0·5 c c of vaccine B was administered to each bird and was injected into the subcutis.
Pen No. III. Control pen, no vaccine was used.
Pen No. IV. Vaccine C was given subcutaneously at the rate of 1 c c per bird.
Pen No. V. No vaccine. Control pen.

The stock used consisted of well-matured Leghorn pullets of like breeding which had been grown free of intestinal parasites and were at the time of vaccination, (November 26, 1924), free of evident disease.

By January 1 all pens had remained free of contagion, and a Roup-infected cockerel was introduced into each pen. The position of each male was changed daily for a period of three weeks in order to equalize the chances of infection throughout the pens comprising the experiment.

The infection did not spread from the males to the females though the course of the disease was left unhindered. These cockerels were from a pen of males, and when introduced into the experimental pens, where they were no longer harassed by their pen-mates, made an early recovery.

No further information is given on experimental vaccination by this experiment since non-vaccinated and vaccinated birds remained equally free of disease. It does, however, indicate the important role played by contributing factors in the cause of Roup.

INTESTINAL PARASITISM

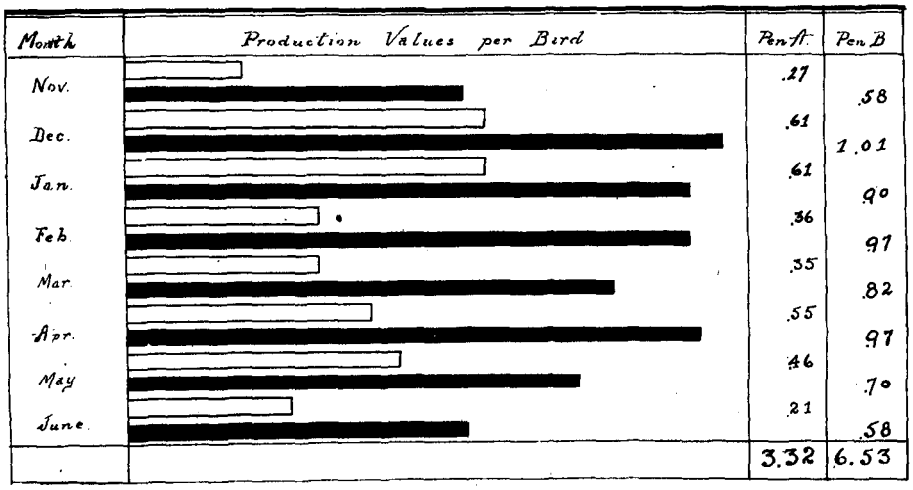
Round and tapeworm infestation (intestinal worms) as a disease of poultry has been given prominence in the work at this laboratory through its economic importance. Medicinal agents, as previously reported, having failed as effectual means of combat, other ways had to be resorted to for the suppression of the malady.

BREAKING THE LIFE CYCLE

Worms have definite life cycles, part being spent in the intestine of the fowl and the remainder in the polluted soil of yards or range, or in the bodies of intermediate hosts associated therewith. By controlling that part which is spent outside the body, poultry can be raised to maturity without worms.

ECONOMY IMPORTANCE OF WORMS

Two groups of birds were reared; one on land free of pollution the other under ordinary infected soil conditions. Thirty pullets of each are designated respectively pen B. and A. and their production values for eight months are given in the accompanying chart. The figures are reduced to one-bird values and were calculated on current prices at Ottawa. Conditions were as nearly identical as possible as to stock, housing, feeding, etc., the variable factor being the presence of worms in one lot and the absence of the parasites in the other.



INTESTINAL PARASITISM

Pen A—Worm-infested stock. Pen B—Worm-free stock.

Substitution as replacements for mortality followed, using like birds for each pen, except for a short period near the close of the experiment when pen A through the high mortality which it suffered was permitted to fall below the number designated.

The mortality variation between the two pens is even more marked than the production values. Pen A suffered a 53 per cent mortality, while in pen 8 the deaths amounted to 8.3 per cent.

PARA-TYPHOID INFECTIONS

SEROLOGICAL TESTS

The fact has been well established that certain members of this group of bacteria may be transmitted through the egg, the chick therefrom being infected at the time of hatching. Such infection of breeders tends to produce high mortality in the chicks, lower the hatchability of the eggs, and influence adversely the egg production of the stock.

Infected birds can be detected with a reasonable degree of accuracy, by serological diagnostic methods. Testing of the breeders with removal of the reactors seemingly influences favourably the viability of the chicks as indicated in the accompanying table 28.

It will be observed from table 28 that the viability over a period of six years previous to testing, gave a regular alternate high-and-low-year course. Following this, 1925, which should have been a low year gave a viability of

66.4 per cent as against an average of 39.5 per cent for the previous six years, or 27.7 per cent average for the three alternate low years. The variable factor was the testing of the breeders and removal of reactors.

A second test of this flock gave a marked contrast in the number of birds reacting, first test, 28.7 per cent, second test 3.9 per cent.

This experiment is being extended to include flocks, not under official control, to determine the practical usefulness of the test under varied conditions.

TABLE 28.—PARA-TYPHOID INFECTION

Viability of Chicks Hatched from an Infected Flock

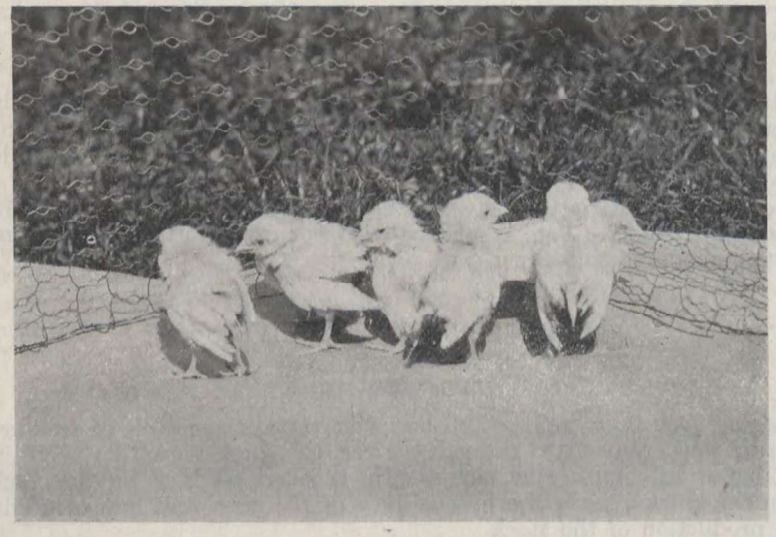
Year	Alternate high years	Average per cent	Alternate low years	Average per cent
	per cent		per cent	
1919			32	
1920	54			
1921		51·3	29	27·7
1922	58			
1923			22	
1924	42			

Average for 6 years	39·5%
1925	66·4%

NOTE.—The flock was serum-tested previous to 1925 hatching season, and the reactors were removed.

INCUBATOR INFECTION

In checking the various modes of transmission of infection, it has been found that chicks from a disease-free flock may become infected during incubation from eggs from a *Bacillus pullorum* infected flock even though pedigree



BACILLARY WHITE DIARRHOEA

Bacillus pullorum infection through the incubator.

baskets and separate trays were used. This is contrary to the generally accepted belief. The different results may be accounted for by the fact that in this exception the machine used was of the fan-system air-circulation type as against diffusion machines used heretofore.

Eggs from a flock known to be free of *B. pullorum* infection were divided into two lots, A and B.

Lot A were incubated in an incubator containing eggs from a flock suffering with the infection. Separate trays were used and during hatching, pedigree-baskets were used thus further limiting chick-movement.

Lot B was hatched under the same mechanical arrangement, the infected eggs being absent from the machine in this instance.

Both lots were removed directly from icubators to separate brooders, handling conditions of rearing being identical.

Three days following hatching, the chicks of lot A showed evidences of infection, developing all the clinical characteristics of Bacillary diarrhœa. Postmortem findings likewise were typical of the disease and the infecting organism was isolated from the dead birds. Out of a total of forty-eight chicks hatched in group A, thirty-four (70 per cent) died. The same bacterial organism was isolated from the "Dead in shell"—infected eggs incubated in the same machine with lot A.

Lot B remained free of the disease. Since the conclusion of the experiment which continued for six weeks, there has been one death in this lot of fifty-one chicks (2 per cent) which was due to causes other than infection.

The illustration on p. 56 shows chicks typical of lot A.

HOSPITAL REPORT

During the year, one hundred cases were admitted to hospital being a decrease of 132 over the preceding corresponding period. Medicinal prophylaxis was continued to birds in contact with those suffering acute attacks, as heretofore. In our experience we conclude that the common winter fowl contagions are fairly amendable to medicinal treatment, providing one is dealing with stock in otherwise normal condition; that treatment is extended to include all birds comprising the flock unit and that hygienic conditions are given due consideration.

HOSPITAL CASES

Roup only	71
Roup and pox	2
Pox only	1
Other causes	26
	100

AUTOPSY REPORT

These specimens consisting of ailing birds, fowl cadavers or portions thereof were received from three sources, the general public, to determine the nature and cause of disease and losses resulting therefrom and for advice in combating same; from the Experimental Farms' flocks, and the egg-laying contests.

This year shows a decrease of 106 in the number of specimens submitted over the previous corresponding period. (Table 29) Roup shows the marked reduction of 203 specimens, while Intestinal Parasitism is increased by twenty-six. This reverses the relative position of the two diseases, placing the latter first in point of numbers with a total of 155, whereas Roup has seventy-six.

Functional derangements of digestion, metabalism, nutrition and the productive organs remain essentially the same as the preceding year, and seem very much in excess of what might be considered as average deviation from a normal health ratio.

REPORT ON SEROLOGICAL EXAMINATIONS

During the year a total of 2,947 birds were blood tested for the detection of carriers of Para-typhoid infections, mainly *Bacillus pullorum*. Of this number 575 or 19.5 per cent gave positive reactions.

Aside from actual testing of the specimens, considerable work has been done upon the standardization of laboratory technique, and with the serum for the determination of the antigenic value of the various strains of the infecting bacterium, which are found to have a wide range of variation.

TABLE 29.—AUTOPSY REPORT FOR THE POULTRY YEAR 1925

Disease	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Total
Roup and chicken pox	....	....	1	....	2	....	....	....	....	....	....	....	3
Roup only	2	12	10	10	9	6	1	7	9	2	2	3	73
Pox only	....	....	....	....	....	....	....	....	....	....	....	....	....
Diseases incident to egg production	5	5	2	2	5	3	6	6	5	6	4	4	53
Hemorrhage	5	3	5	2	7	5	8	7	4	4	2	1	53
Peritonitis	3	6	2	4	7	15	10	10	9	9	5	9	89
Paralysis or blindness or both	....	5	3	1	2	2	2	....	2	....	....	1	18
Parasitism-intestinal	2	11	11	4	3	6	16	20	26	21	13	22	155
Distended burse of fabrious	....	1	....	1	....	....	....	....	....	....	....	....	2
Tuberculosis	3	1	2	3	4	2	2	2	....	3	2	2	26
Leukemia	2	1	1	2	3	4	1	1	4	3	....	1	23
Vent gleet	1	....	....	2	....	1	....	....	....	....	1	....	5
Tumor	....	....	1	4	2	1	2	....	4	2	1	....	17
Pneumonia	1	....	....	2	2	....	....	....	....	....	....	....	5
Heat prostration	....	....	....	....	....	....	....	19	....	5	....	....	24
Cannibalism	2	2	1	4	2	12	13	6	5	1	....	1	49
Visceral gout	....	4	....	1	1	1	....	....	1	1	....	....	9
Avitamosis	....	2	1	5	2	....	1	11	3	11	6	2	44
Digestive and liver trouble	1	4	3	6	4	4	5	14	....	1	5	1	48
No apparent cause and decomposed specimens	5	4	3	8	7	9	9	3	7	3	7	6	71
Prolapsus	1	1	....	1	....	....	....	....	....	....	....	....	3
Percarditis	1	1	1	....	1	....	....	2	1	1	....	2	10
Sepsis-non-specific	....	....	....	39	4	....	....	....	....	....	....	....	43
Para-typhoid infections	....	....	1	....	....	1	30	7	....	....	1	1	41
Miscellaneous	4	2	1	1	3	4	7	12	....	3	1	5	43
	38	65	49	102	70	76	113	127	80	76	50	61	907

CANADIAN NATIONAL EGG-LAYING CONTEST, REGISTRATION AND INSPECTION

During the year 1925, thirteen egg-laying contests have been conducted by this division. The Canadian Contest, international in its scope, was conducted at Ottawa while the remaining twelve contests were provincial in nature. The location of the contests and various detail are given in table 30.

TABLE 30.—NAME OF CONTEST AND NUMBER OF BIRDS IN EACH. NOVEMBER 1ST, 1924, TO OCTOBER 30TH, 1925

Contest	Number of birds	Average production	Production of leading pen	Production of highest registered bird
Canadian	800	167·6	2,271	284
Prince Edward Island	200	173·5	2,186	263
Nova Scotia	240	166·5	2,173	291
Nova Scotia Southern	200	149·9	2,143	243
New Brunswick	230	164·7	2,221	261
Quebec East	200	154·6	2,050	278
Quebec West	200	175·0	2,285	249
Ontario	390	166·6	2,168	257
Manitoba	270	154·7	2,177	264
Saskatchewan	280	139·0	2,181	287
Alberta	300	164·6	2,124	287
British Columbia	450	214·9	2,683	331
Vancouver Island	340	210·4	2,650	327
Totals and averages	4,100	172·2		

NOTE.—Ten birds constitute a pen and the average egg production per bird for the 4,100 birds was 172·2 eggs.

NUMBER OF BIRDS AND AVERAGE PRODUCTION BY VARIETIES OF ALL CONTESTS 1924-25

Variety	Number of birds	Average production
S.C. White Leghorn	1,730	184·9
Barred Plymouth Rock	1,540	172·9
White Wyandotte	370	169·6
S.C. Rhode Island Red	150	161·7
S. C. Ancona	90	149·2
White Plymouth Rock	60	142·0
R.C. Rhode Island Red	40	119·5
R.C. White Leghorn	20	157·5
S.C. Brown Leghorn	20	124·9
Buff Orpington	20	120·7
Chantecler	20	100·3
S.C. Buff Leghorn	10	152·1
Partridge Plymouth Rock	10	122·5
Silver Wyandotte	10	93·5
R.C. Ancona	10	81·4
Total	4,100	Ave. 172·2

The Canadian National Egg-Laying Contests have been in operation for six years and a survey of the work is interesting and encouraging. The following figures give the number of birds in each contest together with the average production.

Contest year	Total number of birds	Average production per bird
1919–20	1,610	122·5
1920–21	2,480	137·0
1921–22	2,590	146·3
1922–23	3,000	164·3
1923–24	3,710	169·6
1924–25	4,100	172·2

The number of birds in the laying contests has steadily increased each year since the work started. During the year 1919-20 there were 1,160 birds in seven contests, while in 1924-25 the number of contests had been increased to thirteen with 4,100 birds. The figures show that while the number of birds entered has more than doubled in the six-year period, the average production has also increased very materially. The production in the 1919-20 contest was 122·5 eggs per bird, while in 1924-25 the average production had reached 172.2 eggs.

A number of factors are responsible for this increased production which we believe are as follows:—

1. Better selection of the Contest-pen.
2. Pullets of the right age and development.
3. Advanced methods of breeding.
4. Improved contest management.

In the first instance, poultry-breeders soon learned that there was a very marked difference in the birds which they were breeding, and in order to make the best showing possible, careful selection was exercised in the picking out of the individual birds. The careful breeder made notes on various birds and then followed the weekly and yearly reports to verify his observations.

Pullets should be old enough to commence laying soon after the contest starts, and poultrymen soon started hatching their chicks so that they would come into laying about the beginning of November. This was especially true in Eastern Canada where many pens in the earlier contests were found undeveloped at the time the contest started.

Beyond question the factor which was responsible for the greatest increase in egg-yield was advanced methods of breeding. The using of male birds bred from high-producing dams on females with known records, the recording of the chicks hatched and the carrying out of a systematic form of pedigree-breeding have greatly assisted breeders in improving the quality of their stock along egg-producing lines.

The management of the various laying contests has also assisted in increasing the production of the birds. Better methods have been adopted for receiving the birds and caring for them during the contest-year. Generally speaking the class of poultryman responsible for the general care of the birds is better than when the contests started, and where no change has been made in the man, the experience gained has been of assistance to him in this work.

Production costs in the contests show that it takes the revenue of about seven dozen eggs per year to feed each bird and the eggs laid over this amount serve as the profit. With four dozen eggs added to each bird's total if calculated at 40 cents per dozen (which is a conservative estimate) would be $1.60 per bird. This added to profit from the three dozen eggs laid over cost of maintenance which would net $1.20, would give the bird a net income of $2.80, which is a fairly good profit.

1925-26 CONTESTS

Another series of egg-laying contests was started November 1, 1925. The contest accommodation is much the same as the previous year, with the exception of the Ontario Contest, which had twenty pens added to its number, making it a sixty-pen contest. Each pen throughout all contests is made up of ten birds and the total number of birds entered is 4,360.

A change has been made in the method of awarding placings in all contests. This has been brought about by the production of a very large number of eggs which are under 24 ounces to the dozen. The contests are primarily for registration purposes and it is desired to encourage breeders who are paying particular attention to egg-size in their poultry breeding operations. To accomplish this end, the following point-system has been adopted and all birds are now credited with points as well as with the number of eggs laid. Points are allotted as follows:

27	ounce eggs	1·3 points
26	"	1·2 "
25	"	1·1 "
24	"	1·0 "
23	"	0·9 "
22	"	0·8 "
21	"	0·7 "
20	"	0·6 "

Eggs weighing less than 20 ounces to the dozen are disregarded entirely, and eggs weighing over 27 ounces are scored as being 27-ounce eggs.

REGISTRATION

During the year 666 birds were registered in Canada. Registration was granted to all birds which laid 200 eggs or over, providing the birds were typical of the breed, free from standard disqualifications and that the eggs laid averaged 24 ounces or over to the dozen. Birds of the Mediterranean breeds which laid eggs with tinted shells were not granted registration. While 1,301 birds laid 200 eggs or over during the contest-year only 666 qualified for registration. Of the remainder, 571 were disqualified for laying undersized eggs, twenty-three for stubs on shanks or down between toes, and forty-one for other causes, such as white in ear lobes, foreign colour in plumage, laying tinted eggs, deaths, or because owners were not interested in registration. The distribution by contests is as follows (table 31):—

TABLE 31—REGISTRATION

Contest	No. birds in contest	Number laying 200 eggs or over	Qualified for Registration	Disqualified		
				Small eggs	Stubs or down	Other causes
Canadian	800	215	106	109	.....	.....
P. E. Island	200	65	26	39	.....	.....
Nova Scotia	240	56	27	29	.....	.....
Nova Scotia Southern	200	35	17	17	1	.....
New Brunswick	230	61	31	29	.....	1
Quebec East	200	46	26	18	.....	2
Quebec West	200	64	12	49	2	1
Ontario	390	102	56	45	.....	1
Manitoba	270	56	20	27	.....	9
Saskatchewan	280	40	17	18	1	4
Alberta	300	86	31	49	3	3
British Columbia	450	276	165	83	12	16
Vancouver Island	340	199	132	59	4	4
Totals	4,100	1,301	666	571	23	41

Of the 263 poultry-breeders referred to in the 1924 report as interested in poultry-breeding work with registered birds, fifty-four of them have sold or transferred their birds to other breeders or have gone out of the business during the year. This leaves 209 poultrymen who carried on breeding operations with registered birds during the year 1925. To this list has been added seventy-five new breeders this past season, making a total of 284 poultry-breeders now owners of registered birds in Canada. The distribution of breeders and registered birds is as follows:—

TABLE 32—DISTRIBUTION OF BREEDERS AND REGISTERED BIRDS

Province	Breeders			Registered Birds		
	Hatching season 1925	New breeders 1925	Total	Living from previous years	Registered 1925	Total
Pr. Ed. Island	18	4	22	o7	26	83
Nova Scotia	14	9	23	68	36	104
New Brunswick	14	5	19	53	45	98
Quebec	12	9	21	61	42	103
Ontario	52	9	61	385	134	519
Manitoba	7	3	10	65	18	83
Saskatchewan	9	7	16	25	13	38
Alberta	27	7	34	128	35	163
British Columbia	56	22	78	261	315	576
Totals	209	75	284	1,103	664	1,767

The table shows that there are in Canada at present 1,767 registered hens. The previous annual report of this division showed 1,420 registered hens at the beginning of the present year, but during the twelve months 317 birds died leaving 1,103 birds living from previous years. There were 666 birds registered during 1925, but as two of these were American birds and were returned to the United States the 664 birds remaining in Canada when added to 1,103 birds from previous years makes a total of 1,767 registered females distributed throughout the various provinces.

The growth of registration has been gradual and constant. In 1922, the first year registration was in operation, there were fifty-nine breeders doing work with 257 hens, mostly in the province of Ontario. The second year, 1923, the number of breeders had increased to 126 while the number of registered birds was 807. In 1924, the third year of registration, the number of breeders was again increased to 263 with 1,420 birds, while in 1925 a further increase takes place, and we find 284 breeders with a total of 1,767 registered birds. The distribution of breeders is now quite general throughout the various provinces, British Columbia leading in point of numbers with both breeders and registered hens, while Ontario comes a close second.

REPORTS

Weekly reports were sent out from each office where a contest was held giving the production of each bird and each pen for the week. These were sent to all contestants and interested parties, not only in Canada, but to the United States as well. Copies were also sent to various poultry-breeders and contest-managers in England, France, Australia, New Zealand and South Africa.

A report of eggs laid was also compiled each four-weekly period and sent to the Canadian and American poultry-press.

At the completion of the 1924-25 egg-laying contest a registration chart was sent out to each breeder giving him important information in connection with the performance of his birds while in the contest. This chart gave the

pen and bird number, the wing-label numbers if she was the daughter of a second generation registered hen, the breeder's mark and tattoo mark if the bird was duly registered, the body weight of the bird, the number and average weight of eggs laid, and disqualifications if such were present. Such information should be of value to breeders in determining the worth of a bird not only from her egg-producing ability, but from the standpoint of size of egg and size of bird as well.

INSPECTION

During the year 1925 five registration inspectors have been employed in the work of inspection of registered stock for the purpose of:—

1. Identifying (by means of breeders' registered tattoo marks) as qualified registered stock, the females mated for the season's hatchings.
2. Approving as to the standard quality and fitness the males mated to registered females.
3. Examining trap-nests and hatching records and instructing breeders as to the best methods of handling same.
4. Checking up and identifying the sealing of bands on all chicks within a given time after hatching.
5. Examining and labelling those pullets that are qualified to enter contest and to pass and tattoo qualified cockerels from registered matings.
6. Inspecting new breeders desirous of entering laying contests and tattooing all qualified females in the contests at the completion of the contest-year.
7. Giving advice and instructions, when desirable, to the breeders in the carrying on of their pedigree breeding work.

The successful breeders realize that intelligent breeding work is essential if good results are to be obtained, and it is very gratifying to know that the fullest co-operation exists between the breeders and the inspector in working towards this end. Even at this early date (the fourth year of registration), the calibre of the breeder and his work is making its appearance by the consistent performance of his stock in the laying contests.

The result of the registered matings is as follows:—

TABLE 33—NUMBER OF REGISTERED HENS MATED AND CHICKS HATCHED 1925

—	Hens mated 1925	Chicks wing-banded	Chicks wing-labelled	Entered in contests
Prince Edward Island	58	397	65	64
Nova Scotia	62	659	134	84
New Brunswick	58	639	117	67
Quebec	48	619	177	63
Ontario	241	4,210	767	420
Manitoba	54	288	34	30
Saskatchewan	11	24	8	16
Alberta	106	898	128	112
British Columbia	209	2,856	642	220
Totals	847	10,590	2,072	1,076

During the 1925 hatching season, 847 registered hens were mated, and produced 10,590 chicks, an average of 12·5 chicks per hen. Of this number 2,072 pullets were wing-labelled as suitable to enter laying contests, and of that number 1,076 are at present in contests as shown in table 33. Allowing for a mortality of 15 per cent, that half of the chicks hatched would be males, and realizing that many of the pullets would not pass inspection because of

disqualifications, physical disability, or underdevelopment, the number wing-labelled as suitable for contest-work is very favourable indeed. Unquestionably the reason why more did not enter contests was because of lack of accommodation.

Speaking generally, egg-laying contests and registration are making favourable progress.

STOCK-BOOK

During the year it was deemed advisable to publish a book giving various detail concerning birds which have been registered in the past. This book will cover the years 1922, 1923 and 1924 giving valuable information in connection with some 1,400 birds.

The information given will include breed, variety, name of bird, registration number, contest-band number, tattoo-marks, number of eggs laid, date of birth, and owner with address. Breeders' marks, and flock-names for all breeders of registered birds during the above years, will also be given.

This publication will be forwarded as soon as ready to all owners of registered birds and will be available by applying to the Accountant, Canadian National Live Stock Records, Queen St., Ottawa.

FIELD WORK IN QUEBEC

The activities of the Division included under this heading are: (*a*) French correspondence; (*b*) French Monthly Report-Form Service; (*c*) Survey Work in Quebec; (*d*) Co-operative work with other agencies and (*e*) visits to the branch Farms in Quebec and Northern Ontario.

FRENCH CORRESPONDENCE

The French correspondence continues to be very heavy, the requests for advice on the various phases of poultry-keeping coming not only from farmers in Quebec but also from French-Canadians in all the other provinces and the United States. During the year a number of letters asking for information regarding Canadian methods of poultry-farming and its possibilities have been received from France, Belgium, Holland and South America. The most noteworthy feature has been the increased correspondence with reference to poultry diseases.

FRENCH MONTHLY REPORT-FORM SERVICE

This service not only serves to keep the Division in touch with conditions of poultry-keeping in different parts of Quebec, but helps the farmers to keep accounts for their poultry. It also provides them with timely information as to the special things needing attention in their flocks each month.

The blank report-forms are supplied free of charge, provided that a completed copy is returned each month. These forms cover a record of all eggs laid, and the revenue obtained thereby; poultry sold and the price received, quantity and kind of feed purchased or used and its value; expenditures for stock and equipment; the numbers and breed of poultry kept; composition of the rations; total revenue, total expenses and profit or loss. They thus constitute an easily kept but complete record of the operations of the poultry plant for each month.

As soon as the copy of each month's report is received, a circular letter containing hints for the current month, is sent to the farmer. The report is then checked and studied, and if anything is found which warrants comment (such as faulty feeding methods, etc.) a further personal letter is written, pointing out how conditions may be improved. By this means the farmers are encouraged to send in their reports promptly, in order to get the monthly hints early in the

month. At the end of the year a balance-sheet is prepared for each one, and a summary of these is sent to all those who have forwarded reports, thus giving them complete figures covering their receipts, expenditures and profits, and also enabling them to compare their own results with those obtained by the others.

During the year, one hundred and forty-four farmers throughout Quebec took advantage of this service, as compared with ninety-nine for the previous year. Many of them have stated that any success which they have had with their poultry has been almost entirely due to the help and advice which they have received in this connection.

A study of the year's reports shows a decided improvement not only in the methods of managing and feeding, but particularly in the breeding. A large number of the farmers have purchased either hatching eggs or breeding stock from bred-to-lay strains to improve their flocks. These factors have resulted in increased production, lower costs and larger profits.

SURVEY WORK IN QUEBEC

This work, as outlined in last year's report has been continued in the districts served by the Experimental Stations at Cap Rouge, La Ferme and Ste. Anne, but with some modifications in each case. Over two hundred farmers in these districts were visited during the year, but only one visit was made to each instead of three or four as in previous years. As this work has now been carried on for several years, it is felt that the Division might now gradually withdraw from the field, leaving it to other agencies, particularly in the older-established parts of the province. Consequently, very little if any of this type of work will be undertaken in the future in the Cap Rouge and Ste. Anne districts.

In the newer districts, however, such as the Abitibi, the work will be continued as far as possible, for the needs in such districts are far greater than in the others. Even here, however, to the greatest possible extent, the responsibility for this work will be assumed by the local Experimental Station. Further reference to this point is made under the heading of " Co-operative work with other agencies."

A most striking example of the valuable results obtained through work of this kind is furnished by the progress made in poultry-keeping in the Abitibi since the work was inaugurated four years ago. In 1923, 2,767 cases of eggs valued at $37,354.50, representing $2.21 per head of population, were imported into this region. In 1924 however, only 976 cases, valued at $24,178.50 or $1.43 per head, were brought in.

The District Representative who conducted the investigation regarding this states that the diminution is due solely to the increased local production of eggs, and attributes the result (which is of great economic importance to the newly colonised district) almost entirely to the work done by the Experimental Farms.

CO-OPERATIVE WORK WITH OTHER AGENCIES

Since the inception of the co-operative programme for poultry work in Quebec four years ago, the policy of the Division has been to work with and through existing agencies, rather than to develop distinct lines of activity. This has been done, not only in order to help make the work of all these agencies more efficient, but also to prevent any possible and unnecessary duplication.

This co-operative programme, of which details were given in previous annual reports, has been continued, and the fourth year is now completed. The annual short course in connection therewith was held at the Oka Agricultural Institute this year, the subject treated being " Housing and feeding for egg production." Several members of the staff assisted with this course, and both the attendance and interest displayed were even greater than in the preceding years.

Following requests from the local poultry associations, the Division was represented at the following poultry shows: Montreal, Quebec, Sherbrooke, Three Rivers, St. Hyacinthe, Victoriaville, Knowlton, St. Guillaume, St. Pascal, St. Jacques, St. Alexis, and Macamic. In practically every case, an educational and attractive poultry exhibit, prepared by the Division of Extension and Publicity, was shown, and much information regarding poultry-keeping in general and the work of the Experimental Farms in particular, was given to those who attended the shows, through informal talks, lectures and lantern-slides.

A member of the staff helped at the agricultural short course held at St. Eugene, and lectured to the Brownsburg and District Poultry Association.

The Division also co-operated with the Poultry Association of Ste. Anne and district and the Abitibi Society of Agriculture, in the flock contests conducted by these two organizations, both in the inspection of the contestants' flocks and in the work concerning the monthly reports connected with the contests. These contests have done much to stimulate interest in poultry-keeping in these districts, and the competitive element has served as an added incentive. This year however, only one visit to each contestant was undertaken by this Division. In the Ste. Anne district, the three other visits were made by an instructor of the Provincial Poultry Service, and in the Abitibi, by the poultryman of the Experimental Station at La Ferme.

While in the future the Division will continue to co-operate in these two contests in so far as the monthly report-form service is concerned, as mentioned under "Survey Work", it will not undertake any inspection in the Ste. Anne district, and will do only part of that in the Abitibi.

With the completion next year of the five-year co-operative programme for poultry work in Quebec, it is hoped that the Division will be able to leave this type of work in the hands of the local and provincial organizations and agencies.

VISITS TO BRANCH FARMS IN QUEBEC AND NORTHERN ONTARIO

The branch farms in Quebec and the one in northern Ontario are visited periodically, chiefly in order to standardize the experimental work and to help and advise the poultryman at each farm.

GENERAL

POULTRY EXHIBITS.—As usual, it has been the practice this year to set up poultry exhibits at a number of the more prominent exhibitions and poultry fairs. The demand for this service is such that but a small proportion of the requests can be furnished. The aim is to lend assistance to places that are in most need, or where it is felt the effort will do the most good. Mr. J. McConnell who is in charge of this work reports a keen interest taken by the public in these exhibits.

THE WORK FROM THE BRANCH FARMS.—Men who are primarily engaged for registration inspection are used, where they can find the time, for various demands made upon the branch Farms. Included in these demands are, demonstrations at fairs and picnics, short-course lectures, institute speaking, personal visits to farms for special purposes, flock-culling, and many others of a like nature.

The men who are engaged in this work are J. G. Morgan in the Maritime Provinces, D. C. Foster in the Prairie Provinces, H. M. Greenwood in British Columbia. At times the demand for work of this nature is such that it is impossible for these men to attend to it, and the poultrymen in charge upon the branch plants may be called upon to help. From the Central office, Mr. W. T. Scott covers Ontario, and Mr. J. Roy the province of Quebec.

ILLUSTRATION STATIONS.—This year, in addition to the eggs and cockerels usually supplied the operators of Illustration Stations, the poultry inspectors throughout the Dominion have endeavoured to visit many of these farms along with the local supervisor. According to reports following such visits, these have been appreciated by the Station operators, and it is hoped that similar assistance may be given to all Illustration Stations in the future, where it is considered wise to give special encouragement to poultry-keeping.

THE WILD GEESE EXPERIMENT.—The endeavour to establish a flight-line for wild fowl carried on in co-operation with the Parks Branch of the Department of Interior has not been very encouraging. The four geese that were sent here from Kingsville, Ont., by Jack Miner, which left in May, 1924, have not returned. The five of our own breeding left last spring and have not returned. The White Fronted Goose left the park in the spring, but was reported dead in the city of Ottawa. Evidently it was shot before getting very far from home. This year there were three wild geese reared and they are still here. The effort to establish a flight line will be continued, and it is hoped the establishment of a sanctuary in the vicinity will further help the project.

PUBLICATIONS.—Several Circulars have been revised during the year; Bulletin (old Number 91) " Feeds and Feeding ", by George Robertson, has been rewritten and published as Bulletin No. 1, New Series; also Bulletin No. 46, " Turkeys, Their Care and Management ", by A. G. Taylor, has been written and published.

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