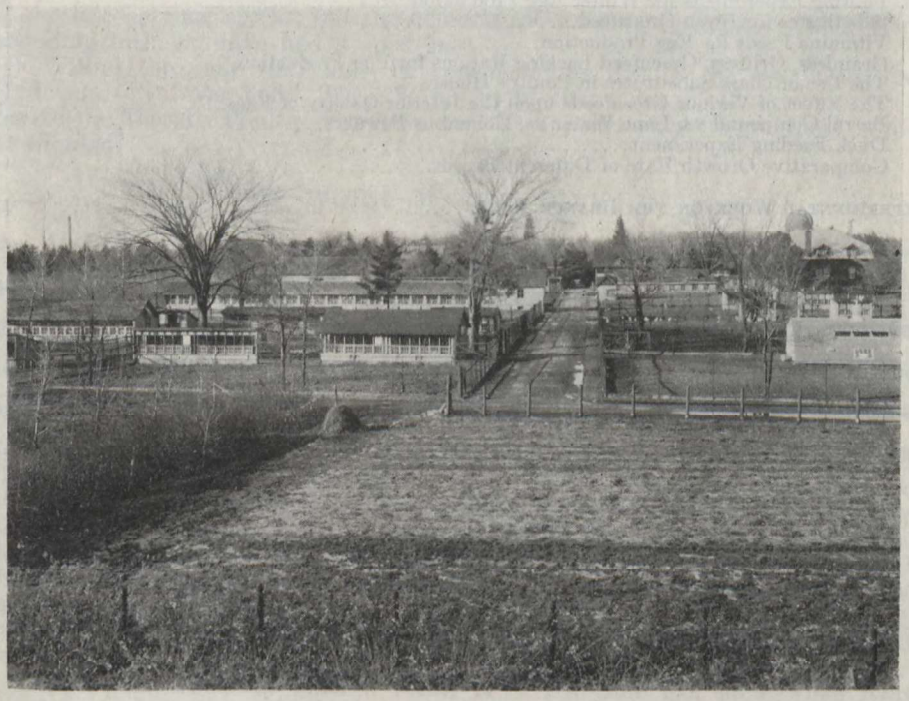
DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

POULTRY DIVISION

REPORT OF THE DOMINION POULTRY HUSBANDMAN

F. C. ELFORD

FOR THE YEAR 1927



The poultry plant, Central Experimental Farm, Ottawa.

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POULTRY DIVISION

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

GENERAL CONDITIONS

The year 1927 is claimed by producers to have been a record one and possibly the best year that Canada has had in the poultry business. During the winter new laid egg prices continued high for a longer period than usual, due largely to the more rigid enforcement of the import dumping clause in so far as it relates to eggs. The sale of breeding eggs was good and the demand for day-old chicks was greater than has been experienced in Canada heretofore. Considerably more hatching space has been installed and results in this line were so satisfactory, that by another spring many more hatcheries will be operating in Canada. It appears that Canadian breeders are preparing to supply all the baby chicks that Canada requires.

The broiler trade, this spring, was somewhat disappointing especially in the late hatched chicks, but the demand for roasters was good. Other fowl, including turkeys, have had a good sale.

Withal the year 1927 may be considered as one of the best Canadian producers have ever had. There is no doubt that some of this prosperity is due to the World's Poultry Congress and the opportunities for publicity which it afforded.

THE WORK OF THE DIVISION

The divisional activities have been progressing favourably. The Branch farms gradually are becoming better fitted with both men and equipment to conduct the work. The Central Farm, though still handicapped by lack of land, is able to do considerable to aid the industry. The best arrangement for the branch Farms, where the poultrymen may not have scientific training, is to have an assistant who can supply this technical oversight. In fact it seems that the time has come when some of the farms at least might have poultry assistants.

On the Central Farm the breeding work urgently requires more land. Each year arrangements have to be made to secure land as near home as possible where the rearing of the young stock can be conducted. The difficulty in obtaining permanent quarters, close enough to the home plant, necessitates the moving of rearing houses and equipment from year to year. This with the handling of the stock at a distance makes it more or less unsatisfactory and expensive. More land on the home plant that would allow for a better arrangement of buildings and yards as well as convenient rearing grounds is urgently needed.

In the experimental work it seems as if the time has come when more scientific investigation should be conducted. The class of experiments conducted in the past by this Division has been what might be termed practical, in that it has been designed for the benefit of the man who is carrying on his poultry operations more as a sideline. Now the industry is becoming specialized with more individual investment. There are problems now that require research of a more scientific nature than ever before. To meet such this

division is becoming better equipped. To attempt all that is being demanded by the industry requires more equipment and men both of which it is confidently expected may be forthcoming.

The contest and registration work is developing faster than was anticipated. The applications for space in the contests are generally more than can be accommodated. As a result many applicants are not able to have their pens admitted. The demands for inspection in registration have meant that all inspectors have had more than they could do. In order to meet this demand one inspector has been added to the staff in British Columbia, and it will be necessary to have another in Ontario.

The poultry disease work conducted in co-operation with the Health of Animals Division, by Dr. Weaver continues to give very satisfactory results. The disease question has become a very acute problem, a solution of which is being attempted. The testing of all the Experimental Farms' flocks for Pullorum is progressing very satisfactorily. Some of the noticeable results of a Pullorum-free flock, or even one comparatively so, are better hatches and lower mortality. Some of this work is touched upon in that part of this report dealt with by Dr. Weaver.

The farm, egg and poultry account, the survey work, the exhibition, the extension and other activities all have received attention and are being dealt with in other sections of this report.

This has been an unusually busy year for the members of the staff. Not only was the normal work multiplied, but the World's Poultry Congress added not a little to the work throughout the whole system, and for those at Ottawa especially the extra work was exceedingly heavy. Mr. Robertson had charge of all the live bird exhibits staged at the congress. Mr. Taylor conducted the registered bird exhibit and with W. Scott and J. McConnell the registration exhibit. In order to assist in this and to benefit the congress all the registration inspectors were brought to Ottawa at that time.

Dr. Weaver and his assistant Mr. Heslop had the direction of diseases and sanitation in the live bird exhibit. Dr. Weaver also had the direction of the disease section of the program sessions.

Mr. Gutteridge, Experimentalist, Mr. Desforges, Plant Foreman, and every member of the staff at times were called from their regular work to help in the congress work. Without these and others, there is no question the success of this world event would not have been so marked as it was.

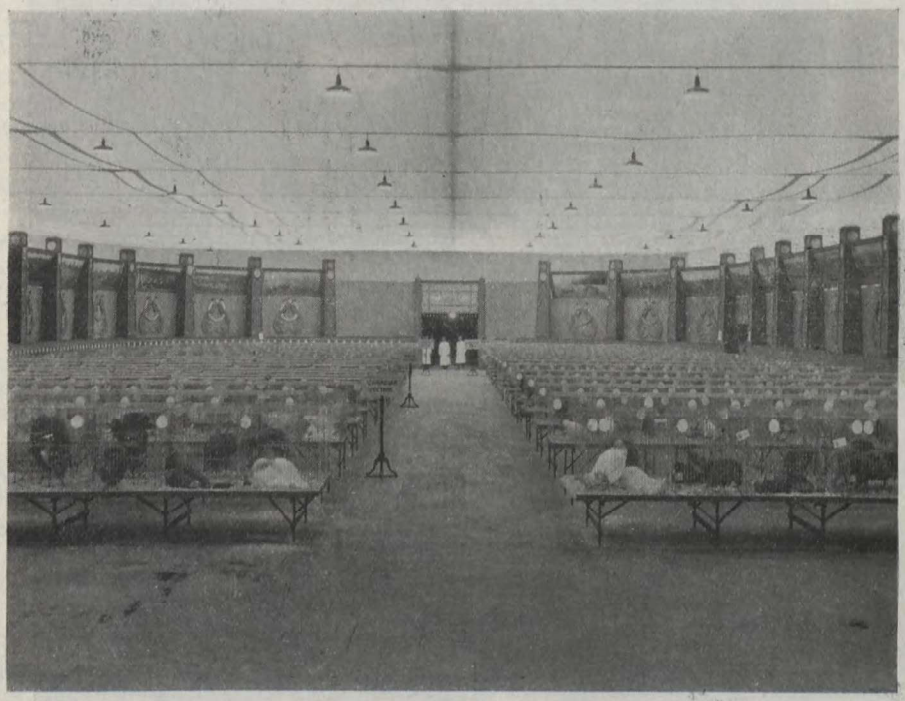
THE WORLD'S POULTRY CONGRESS

Since the Dominion Poultry Husbandman was the general director of the congress, and is now the President of the International Association of Poultry Instructors and Investigators under whose auspices the triennial congresses are held, it may not be out of place to include in this report something concerning the third World's Poultry Congress which met in Ottawa this year.

The preparatory work commenced early in 1925, when the National Congress Committee, the provincial committees, and the executive committees were appointed. The general director and the secretary also were named at that time. In January of 1926 the invitations were sent out by the Canadian Government, and in February the Preliminary Announcement was distributed. Early in 1927 the final announcement and program was issued. At intervals local committees were appointed until at the opening of congress twenty-four such committees were at work.

The replys to the invitations began coming in within a few months after the invitations were sent out. At the time the congress opened forty-three countries had signified their acceptance of the invitation, and had intimated what would be the nature of their contribution.

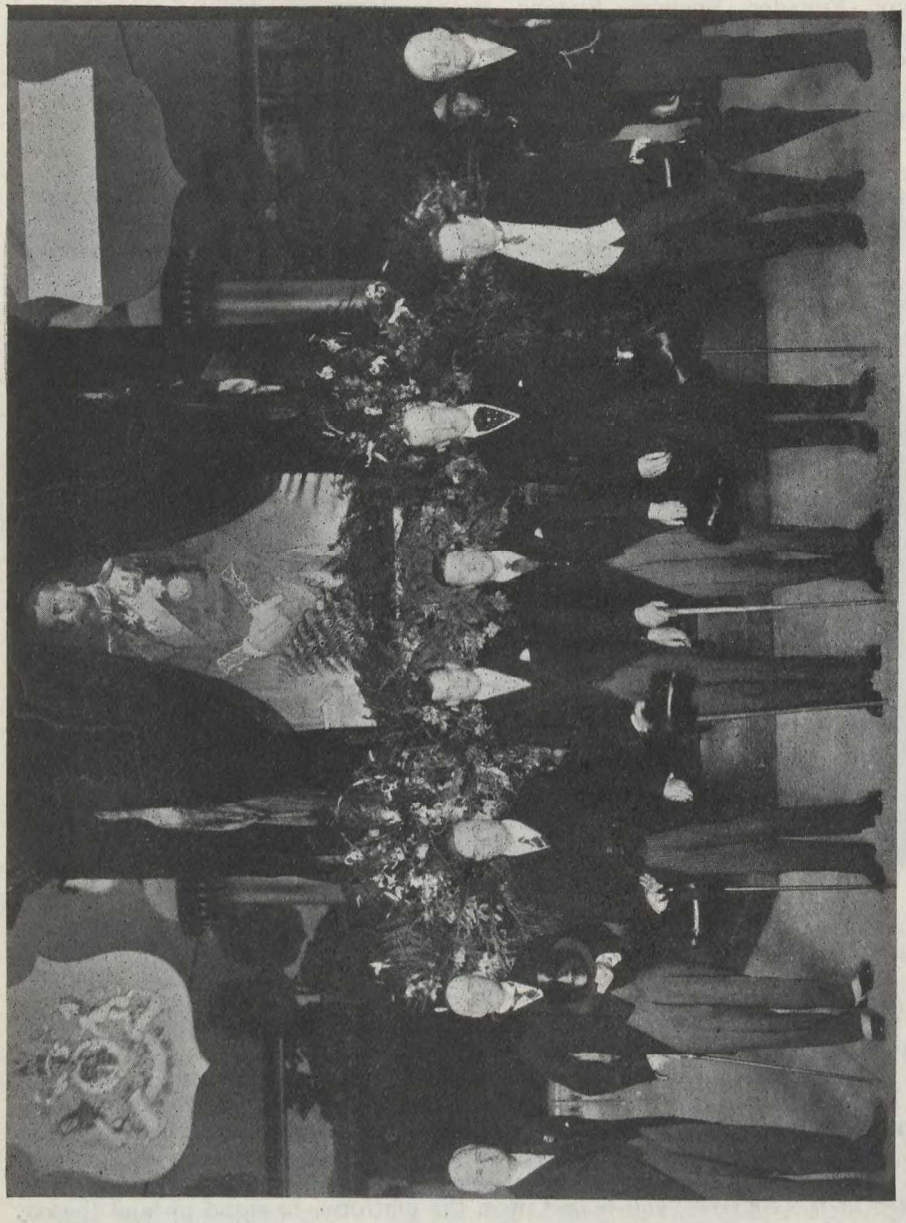
The countries accepting the invitation and which were represented at the congress were: Argentine, Australia, Barbados, Belgium, Bermuda, Brazil, Burma, Colombia, Cuba, Denmark, Dominican Republic, Dutch East Africa, Egypt, Equador, England, Finland, France, Germany, Guatemala, Holland, Hungary, India, Italy, Japan, Kingdom of Serbia, Croats and Slovenes, Mexico, New Zealand, Northern Ireland, Newfoundland, Palestine, Poland, Persia, Peru, Philippine Islands, Rumania, Russia, Scotland, South Africa, Spain, Switzerland, Turkey, United States and Venezuela.



The international live bird exhibit—World's Poultry Congress.

The opening ceremonies on July 27 consisted of the formal opening at ten-thirty in the Auditorium with the Hon. W. R. Motherwell, Minister of Agriculture, as chairman, when greetings to the congress delegates were extended by His Excellency Lord Willingdon, Governor General of Canada, Premier W. L. Mackenzie King, and J. P. Balharrie, Mayor of Ottawa. Acknowledgements were returned by Congress President Edward Brown, when the Hon. Mr. Motherwell handed the chairmanship of the meeting over to Mr. Brown. Mr. Brown then called upon the leading delegates from each country represented at the congress, and seated upon the platform, to stand up and thereby acknowledge on behalf of his country the greetings. At noon an official luncheon was given to 125 persons in the official dining room at Lansdowne Park. In the evening an International meeting was held in the auditorium.

Beginning Thursday morning five sections of the program were held, four in the Auditorium and one in the Museum. Each afternoon and evening during the congress the exhibits were open.



Group taken during official visit of the Prince of Wales and Prince George to the third World's Poultry Congress.

On Wednesday, August 4, the congress was visited by H.R.H. the Prince of Wales, H.R.H. Prince George and Premier and Mrs. Baldwin, in addition to their Excellencies Lord and Lady Willingdon, Premier King, provincial premiers and cabinet ministers.

During the day Premier Baldwin attended a session of the Directorate of the International Association when he officially invited the 1930 congress to meet in London, which invitation was verbally accepted by the president elect.

The attendance at both sessions and exhibits was good. In each section of the program the interest was keen and was maintained throughout. At the exhibition there were nearly 120,000 paid admissions in addition to the delegates, who had free admission, and the complimentary passes.

There were over 2,609 delegates—1,932 registering at the time of the congress and 677 who had previously registered. Of the registered delegates in attendance 1,171 were from Canada, 1,198 from United States, 78 from the British Isles and 162 from other countries, making a total of 2,609. The nine provinces were well represented and there were delegates from 44 states of the Union.

At the close of the congress a trans-Canada tour was conducted at which eighteen countries were represented. The first stop was Macdonald College where the President, Mr. Edward Brown, was honoured with the degree of Doctor of Laws by McGill University.

The train visited the Maritime Provinces, Quebec and Ontario before going west via Edmonton to Victoria and returned to Toronto via Calgary and Regina. A day was spent at the Canadian National Exhibition as guests of the exhibition directors.

The seventeen countries, not counting Canada, represented on the train were Argentine, Australia, Bermuda, Denmark, Egypt, England, Finland, Germany, Holland, India, Ireland (Northern), Italy, Persia, Scotland, Spain, United States and Wales.

EXPERIMENTAL WORK

The experimental work of the division made considerable progress during 1927. Owing to the fact that five paddocks which had been cropped with tobacco and alfalfa were again brought into use several new experiments were carried on from brooding age to maturity.

Unfortunately, experimental work with brooder chicks was somewhat handicapped by the incidence of disease, as was also one rearing experiment. Consequently, the experiments, "The effect of sunlight upon growth of chicks" and "Vitamine feeds for rearing", will not be reported upon until 1928. It has also been deemed advisable to hold the results obtained from the various experiments with ultra violet light until a later date.

In the discussion upon experiments which follows it is essential to bear in mind that in most cases experiments will be carried on over a period of from four to five years before definite conclusions will be drawn. The material here given constitutes only a progress report. When it is considered that conclusions are justified a final report will be made. A considerable amount of experimental work is being done by the branch Farms, results of which may be found in the annual report of the Farm or Station concerned. In some cases brief mention will be made of experiments upon the branch Farms which correspond with experiments carried on at this division.

HATCHING SUMMARY

In continuation of past work a hatching summary was compiled during the past season, covering the Experimental Farm system from Sidney, Vancouver island, to Charlottetown, Prince Edward Island. In such a summary are reflected conditions pertaining to hatchability, climate, breeding and feeding, in all their variations throughout Canada.

In comparing the present summary with that of 1926 considerable improvement is noted. Fertility is practically unchanged over the two years, the average per cent fertility over all the farms being 79·3 for 1927 as against 79.8 for 1926. Percentage of total eggs hatched was superior during 1927, the figures being 38·7 as against 36·9 for 1926. Hatchability as indicated by percentage of fertile eggs hatched was also superior during the latter year, viz: 48·8 as against 46·3.

Mortality, as shown by percentage of chicks hatched alive when wing banded, was slightly lower during 1926 as shown by 83·7 as against 83·1 (three weeks of age). Total eggs required for one chick hatched, fertile eggs required for one chick hatched, and total eggs required for one chick when wing banded were superior during 1927 as shown by 2·6, 2·0 and 3·1, as against 2·7, 2·7 and 3·3 respectively for 1926.

With regard to hatching results, according to the month set, the summary for 1927 shows the following: Fertility was highest for May with March and April a close second. February was poor in this respect. This is in accord with similar figures for 1926. Hatchability, as shown by percentage of fertile eggs hatched was best in May and April in the order named and poorest in February. Mortality to three weeks of age, was exactly the reverse, March and February being best in the order named followed by April and May. During 1926 the order of highest livability of chicks was March, February, April, and May.

Of the various breeds on the Experimental Farm system, fertility was best for White Leghorns, Barred Rocks, Rhode Island Reds and White Wyandottes in the order named. Percentage of fertile eggs hatched was best for Rhode Island Reds, White Wyandottes, White Leghorns and Barred Rocks in the order named. Livability of chicks to three weeks of age, was best for Rhode Island Reds, White Leghorns, White Wyandottes and Barred Rocks in the order named.

As in other years, fertility, hatchability and livability of chicks was superior from hens than from pullets.

The following figures (Table 1) indicate the comparative hatching results in the different agricultural sections of Canada:—

TABLE 1.—COMPARATIVE HATCHING RESULTS

—	Per cent fertile	Per cent total eggs hatched	Per cent fertile eggs hatched	Per cent chicks hatched alive when wing banded	Total eggs for one chick hatched	Total fertile eggs for one chick hatched	Total eggs for one chick when wing banded
Ontario and Quebec	86·3	46·5	53·9	90·2	2·2	1·9	2·5
Prairie Provinces	76·6	45·0	59·9	79·6	2·3	1·7	3·0
Maritime Provinces	76·5	28·2	36·2	84·1	4·0	2·9	4·7
British Columbia	81·7	44·9	55·9	92·9	2·2	1·9	2·9

Table 2 following shows a three-year average of hatching results over the Experimental Farms system.

TABLE 2.—HATCHING SUMMARY FOR EXPERIMENTAL FARMS—THREE-YEAR AVERAGE—1925, 1926 AND 1927

Farm	Total eggs set	Number fertile	Per cent fertile	Number of chicks	Per cent total eggs hatched	Per cent fertile eggs hatched	Number of chicks alive when wing banded	Per cent chicks hatched alive when wing banded	Total eggs required for 1 chick hatched	Total fertile eggs for 1 chick hatched	Total eggs required for 1 chick when banded
Agassiz	9,592	8,196	85·4	4,024	41·9	49·1	3,324	82·6	2·4	2·0	2·9
Brandon	24,691	18,905	76·6	8,266	33·5	43·8	†1,668	†59·1	2·9	2·3	†5·1
Cap Rouge	9,377	8,343	88·9	3,714	39·6	44·5	3,467	93·3	2·5	2·2	2·7
Charlottetown	7,995	5,817	72·8	2,906	36·3	49·9	2,160	74·3	2·7	2·0	3·7
Fredericton	14,874	12,404	83·3	4,403	29·6	35·5	2,957	67·1	3·4	2·8	5·0
Indian Head	5,903	4,097	69·4	1,127	19·9	27·4	789	70·0	5·2	3·6	7·5
Invermere	7,091	6,328	89·2	3,674	37·7	42·3	2,498	93·4	2·7	2·4	2·7
Kapuskasing	8,219	7,535	91·7	4,259	51·8	56·5	3,864	97·2	1·9	1·8	2·1
Kentville	13,393	11,276	84·2	3,833	28·6	34·0	2,923	76·2	3·5	2·9	4·6
Lacombe	8,985	6,249	69·5	2,952	30·6	44·0	1,835	66·7	3·3	2·3	4·9
La Ferme	6,750	5,853	86·7	3,437	50·49	58·7	3,248	94·5	1·9	1·7	2·1
Lennoxville	12,513	10,594	84·7	5,905	47·9	55·8	*2,202	*95·3	2·1	1·8	*2·0
Lethbridge	9,030	6,663	73·8	3,620	40·1	54·3	3,064	84·6	2·5	1·8	2·9
Morden	7,094	6,229	87·8	3,866	54·5	62·7	3,714	96·1	1·8	1·6	1·9
Nappan	10,412	6,746	64·4	1,847	17·8	27·4	1,520	82·3	5·6	3·7	6·8
†Ottawa	14,856	11,153	75·1	6,668	44·9	59·9	6,047	90·7	2·2	1·7	2·4
Rosthern	15,712	13,594	86·5	6,532	41·5	48·1	*1,085	*84·1	2·4	2·1	*4·6
Scott	4,919	4,401	89·5	2,833	57·6	64·4	1,891	66·8	1·7	1·6	2·6
Sidney	5,674	4,363	76·9	2,899	51·1	66·5	2,605	89·8	1·9	1·5	2·2
Ste. Anne	7,062	5,888	83·4	2,590	36·7	43·9	2,024	78·1	2·7	2·3	3·5
Summerland	4,691	3,818	81·4	2,524	53·8	66·1	2,002	80·0	1·8	1·5	2·3
*Swift Current	1,897	1,289	68·0	900	47·4	69·8	600	66·7	2·1	1·4	3·1
Total	210,730	168,452	79·9	82,779	39·3	49·2	55,487	81·4	2·6	2·3	3·1

†2 year average only. *1 year average only.

DURATION AND CHANGE OF FERTILITY

This experiment, started in 1924, has been carried on each succeeding year with results corresponding fairly closely.

As in former years the mating of a white Leghorn male to Barred Rock females that had previously been mated to a Barred Rock male, was used, because the chicks from the Leghorn-Rock cross are white, and consequently can readily be distinguished from the chicks of the previous Barred Rock mating, which are dark.

The following table (3) shows in detail the results obtained:—

TABLE 3.—DURATION AND CHANGE OF FERTILITY

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	31
K 55	R	.	.	R	I	.	R	W	W	.	I	W	.	W	.	W	.	.	W	.	.	D	I	I	.	I	I	W	.	W	I	I	I
58	I	R	.	.	I	.	D	.	I	I	I	D	.	W	W	.	W	W	.	.	D	I	I	.	I	I	W	.	W	I	I	I
104	R	R	R	R	.	R	D	.	W	D	W	.	.	W	W	.	I	W	.	W	W	W	.	.	W	.	.	W	.	W	.	.
105	.	R	R	.	W	.	W	W	W	W	.	.	W	W	W	.	I	W	W	.	.	W	W	W	W	W	.	W	.	W	W	.
110	R	R	I	I	W	W	D	I	W	D	W	W	.	D	W	D	.	W	W	W	W	.	W	.	W	.	W	W	W	W	W	.
114	.	R	R	.	W	R	W	.	W	W	W	W	.	D	W	W	.	I	W	.	W	W	.	I	W	.	W	.	.	.	.	.
115	.	.	D	D	W	D	.	W	W	D	.	W	.	W	.	W	I	.	W	.	.	W	W	.	.	.	1	.	W	.	.	.
118	R	R	R	W	W	.	W	W	W	W	W	W	D	.	W	W	W	W	W	.	W	W	W	.	.	W	.	W	W	.	W	.

Key to table:—R indicates a B. Rock chick, W indicates a crossbred chick, I indicates an infertile egg, D indicates a dead embryo and a blank indicates that no egg was laid on that day.

NOTES.—In 1924 results of the Leghorn and Rock cross became apparent on the third day, in 1925 on the fourth day, in 1926 on the second day and reference to the 1927 table shows that results became apparent on the third day and very strongly apparent on the fourth. In 1924 the effect of the previous mating showed up to the seventh day, in 1925 up to the 12th day, in 1926 up to the eighth day, and reference to the 1927 table shows the effect of the original mating up to only the sixth day.

In 1924 in three different matings, reversion to the original pure mating occurred after the cross mating was shown. In the 1925 and the 1926 matings no evidence of this appeared, but in the 1927 matings in the case of female K. 114 this again appeared, a cross bred chick having been produced from an egg laid the fourth day after the change of males, and a pure bred chick on the fifth day after the change.

This experiment will be continued next year, when a number of males will be used in different matings so that final conclusions may be drawn.

MOISTURE IN THE INCUBATOR

In continuation of work commenced during 1926, an experiment contrasting various methods of supplying moisture in the incubator was carried on during the incubation period of 1927.

The equipment used consisted of four Cyphers incubators, which had been giving good and even hatches. All external conditions, room temperature, moisture, etc., were identical for all machines. The relative humidity was determined twice daily by the use of wet-bulb hygrometers. The range of relative humidity in the incubator room was from 61 to 74 degrees during the experiment.

Moisture was supplied in one case in the regular manner, viz: by the use of moisture trays, in another case by the use of a pad made of a thin board wrapped to a depth of about three-quarters of an inch with cheese cloth. This pad was moistened once daily and suspended by hooks from the roof of the machine. The third machine had both moisture trays and pads, while no moisture was applied to the fourth machine.

The average relative humidity for the different incubators was as follows:—

No moisture	42	per cent
Moisture trays only	53	"
Moisture pads only	63	"
Moisture pans and pads	66	"

The object in placing the pads above the eggs is to have them in contact with the hottest air in the machine and where, consequently, the air being drier than below the eggs, the greatest amount of moisture is taken up. This moistened air, being heavier and cooler than the air below, sinks down through the eggs to the bottom of the machine, thus giving the maximum of moisture-laden air around the eggs. This treatment caused a greater relative humidity with pads only of 10 per cent over that with trays only. The relative humidity was taken at the level of the eggs.

Tables (4 and 5) following show hatching results in detail and a two-year summary of this experiment:—

TABLE 4.—MOISTURE IN THE INCUBATOR

Treatment	Total number eggs set	Fertile	Blood rings	Dead germs	Dead in shell	Total hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched	Per cent fertile dead in shell	Average weight per chick	Per cent mortality to three weeks of age
No moisture	309	235	5	23	44	163	76·0	69·4	52·8	18·8	1·19	17·6
Moisture pans and pads	156	122	5	30	26	61	78·2	50·0	39·1	21·3	1·37	25·0
Moisture pads only	178	117	5	18	32	62	65·7	52·9	34·8	27·4	1·??	18·2
Moisture pans only	167	107	2	7	20	78	64·1	72·9	46·7	18·7	1·26	24·0

NOTES.—Hatchability as shown by per cent fertile eggs hatched was best with moisture pans only and with no moisture. The splendid hatchability comparatively with no moisture may be explained by a fairly high content of moisture in the air of the incubator room. In a dry climate, as in an unsuitable incubator room, where humidity is low, a hatch of this quality could not be obtained. Hatchability was poorest with pans and pads and with pads only.

The percentage of fertile eggs producing dead in shell chicks is considered to be an excellent indication of moisture conditions. In this respect also moisture pans only and no moisture are superior. When the hatch was taken off it was noticeable that moisture was apparently too excessive and that their down was quite wet and slow in drying when moisture pans and pads were used.

After drying, the chicks from moisture pans and pads and from pads alone were heavier than those from the other treatments, this being the only factor of importance in their favour.

Mortality to three weeks of age in this experiment is not very indicative one way or the other.

TABLE 5.—SUMMARY TABLE (2 YEARS) MOISTURE IN THE INCUBATOR

Treatment	——	Total number eggs set	Fertile	Blood rings	Dead germs	Dead in shell	Total hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched	Per cent fertile dead in shell	Average weight per chick	Per cent mortality to three weeks of age
												oz.	
No moisture	1926	400·0	298·0	11·0	38·0	80·0	169	74·5	56·7	42·2	26·9	.....	.....
	1927	309·0	235·0	5·0	23·0	44·0	163	76·0	69·4	52·8	18·8	1·19	17·6
	Average	354·5	266·5	8·0	30·5	62·0	166	75·2	62·3	46·8	23·3	.....	.....
Moisture pans and pads	1926	220·0	178·0	4·0	24·0	31·0	109	76·4	64·8	49·1	18·4	.....	.....
	1927	156·0	122·0	5·0	30·0	26·0	61	78·2	50·0	39·1	21·3	1·37	25·0
	Average	188·0	150·0	4·5	27·0	28·5	85	79·8	56·6	45·2	19·0	.....	.....
Moisture pads only	1926	220·0	165·0	1·0	34·0	40·0	90	75·0	54·9	49·9	24·2	.....	.....
	1927	178·0	117·0	5·0	18·0	32·0	62	65·7	52·9	34·8	27·4	1·33	18·2
	Average	199·0	141·0	3·0	26·0	36·0	76	70·9	53·8	38·2	25·5	.....	.....
Moisture pans only	1926	220·0	172·0	3·0	19·0	30·0	120·	78·2	69·8	54·5	17·4	.....	.....
	1927	167·0	107·0	2·0	7·0	20·0	78	64·1	72·9	46·7	18·7	1·26	24·0
	Average	193·5	139·5	2·5	13·0	25·0	99	72·1	70·9	51·2	17·9	.....	.....

NOTES.—The summary of two years, owing to the great variation in results gives very little information. In the main moisture pans only and no moisture are favoured. This experiment will be continued.

METHODS OF FEEDING CHICKS

There has been during the past few years considerable discussion concerning the correct method of feeding baby chicks. A great many authorities on the subject insist that overfeeding is very injurious and that digestive and other troubles resulting from this evil are a factor of importance in cases of high mortality.

It has been the custom at the Poultry Division, at the Central Experimental Farm to leave dry mash before the chicks at all times so that if overfeeding was possible it would logically have taken place under these conditions. No increase over normal mortality was experienced, however, and consequently an experiment was carried on to determine the relative merits of the two systems of feeding. The procedure was as follows:—

Five hundred and forty chicks hatched April 7, 1927, were divided into twelve lots of forty-five chicks each. Alternate pens, odd numbers, received the ordinary chick mash, constantly before them while the even numbered pens were given mash six times per day only, starting at one-half hour per period and increasing by five minutes per period every second day until at the end of the experiment, or three weeks of age they were receiving it for seven and one half hours daily. In contrast to this, mash was available to the odd numbered pens for approximately fourteen hours daily, depending on the amount of daylight. All chicks received the ordinary basal ration as given in the experiment "Vitamin Feeds and Varied Rations." After the first week one handful of chick scratch night and morning was fed in the litter. No feed was given until the chicks were 60 hours of age. That sufficient hopper space was available is indicated by the fact that the chicks were apparently satisfied at each feeding.

The following table shows detailed results of experiment:—

TABLE 6.—METHODS OF FEEDING CHICKS

——	No. of chicks	Total weight	Average weight	Weight end of first week	Average weight end of first week	Per cent gain	Mortality to 3 weeks	Per cent mortality
		oz.	oz.	oz.	oz.			
Pen 1.....	45	52	1·16	81	1·84	58·6	3	6·6
2.....	45	52	1·16	71	1·65	42·2	2	4·4
3.....	45	51	1·13	84	1·91	69·0	1	2·2
4.....	45	53	1·18	70	1·63	38·0	4	8·9
5.....	45	55	1·22	89	2·00	64·0	0	0·0
6.....	45	54	1·20	75	1·67	39·1	1	2·2
7.....	45	52	1·16	77	1·83	57·8	4	8·9
8.....	45	55	1·22	74	1·72	49·9	2	4·4
9.....	45	53	1·18	78	1·86	57·6	3	6·6
10.....	45	54	1·20	71	1·61	34·2	1	2·2
11.....	45	52	1·16	85	1·90	63·8	0	0·0
12.....	45	52	1·16	71	1·61	38·8	2	4·4
Average—mash always available	270	315	1·17	494	1·98	69·2	11	4·1
Average—fed six times daily.....	270	320	1·19	432	1·60	34·5	12	4·4

NOTES.—A perusal of the above table shows that mortality in the two lots was almost equal being slightly greater only for those birds receiving the mash intermittently. The autopsy report shows that of the mortality in the intermittently fed pens fifty per cent showed death due to impaction caused by picking up of litter, the gizzard being empty of food. In only one case did this occur in the pens having constant access to mash.

The greatest percentage gains were made throughout by the pens with mash constantly before them, the proportion being as 2 to 1. The feeding of mash available only for a certain period rather than being an aid to health and growth was a decided disadvantage. A similar experiment was carried on during 1925 at which time the greatest percentage gains were made by the birds having mash always available. The experiment was carried on in duplicate and in one case mortality was higher for those with open hoppers and in the other slightly lower.

In view of the results of the above experiments and of the fact that continuous mash feeding has always given good results on this poultry plant, and further since the time and labour involved in the opening and closing of hoppers is entirely out of proportion to its value as a feeding practice, we conclude that the keeping of mash constantly before the chicks from the time of first feed on, is the most practical and successful of the two chick feeding methods.

VITAMINE FEEDS AND VARIED RATIONS

Experimental work with various feeds as sources of vitamines and with different growth producing rations was continued during the spring of 1927. The experiment was made up of twelve pens, eight pens on vitamine feeds and four different rations including one control pen.

The basal ration, as fed to the control pen consisted of a commercial chick scratch fed morning and evening and of a mash of the following formula: equal parts by weight of shorts, middlings, corn meal and oat flour with one half part of meat meal and one half pound of salt per one hundred pounds of mash. A small amount of wet mash was fed at noon in which were incorporated the various supplementary feeds. Grit, greenfeed and charcoal were available, water being the only beverage except in the case of the pen receiving the Wisconsin ration to which pen sour skim milk was also available. This ration was grainless and consisted of a mash of the following formula: eighty parts of yellow corn meal, twenty parts of middlings, five parts of ground bone meal, five parts of pearl grit and one part of common salt. No moist mash or greenfeed was given.

Two pens in this experiment were fed the basal mash without meat meal or with only one half the amount of meat meal in one case substituting a high quality vegetable protein (Soya bean meal) and a mineral mixture for the meat meal of the mash. Soya bean meal, is an excellent protein source and the mineral mixture substitutes for the minerals of the meat meal. The following are the formulae of mashes used.

Replacing all the meat meal.
- Shorts, 100 pounds.
- Middlings, 100 pounds.
- Yellow corn meal, 100 pounds.
- Oat Flour, 100 pounds.
- Soya Bean Meal, 60 pounds.
- Mineral Mixture, 9 pounds.

Replacing half of the meat meal.
- Shorts, 100 pounds.
- Middlings, 100 pounds.
- Yellow corn meal, 100 pounds.
- Oat Flour, 100 pounds.
- Meat Meal, 25 pounds.
- Soya Bean Meal, 30 pounds.
- Mineral Mixture, 5 pounds.

A mineral mixture of the following formula was used: Finely ground bone meal, 60 per cent; ground limestone, 20 per cent; common salt, 20 per cent.

Considering that soya bean meal is little more than half the price of a good grade of meat meal and that the cost of the mineral mixture is very slight; a considerable saving would be made if the substituted materials were efficient growth producers.

The chicks were weighed daily and consumption of feed was calculated. The following is the arrangement of pens:—

1. Basal ration.
2. Basal ration—mash radiated with ultra-violet rays for one hour daily at a distance of two feet.
3. Basal ration minus one half of the meat meal of the mash and substituting soya bean meal and a mineral mixture.
4. Basal ration minus the meat meal of the mash and substituting soya bean meal and a mineral mixture.
5. Wisconsin ration.
6. Basal ration minus meat plus half ounce of cod liver meal per day in wet mash.
7. Basal ration plus Larro yeast (1 ounce per 10 pounds of dry mash).
8. Basal ration plus Fleischman's yeast (half pound per 100 pounds of mash.)
9. Basal ration plus crude cod liver oil (4 teaspoonfuls—half ounce per day for 50 chicks in wet mash.)
10. Basal ration plus refined cod liver oil (4 teaspoonfuls per day for 50 chicks in wet mash.)
11. Basal ration plus raw liver (enough to moisten mash.)
12. Basal ration plus Larro yeast and crude cod liver oil (half quantities as for pens 7 and 9 respectively.)

Tables 7 and 8 following show results in detail for this experiment and also a summary covering four years of experimental work:—

TABLE 7.—VITAMIN FEEDS AND VARIED RATIONS

Ration	Number of chicks at beginning	Average weight	Number of chicks end of first week	Average weight	Number of chicks end of second week	Average weight	Number of chicks end of third week	Average weight	Number end of experiment	Average weight	Apparent condition	Total mortality	Percentage mortality	Average gain per chick	Average percentage gain per chick	Average cost of feed per chick alive at end	Feed cost per ounce of gain
		oz.		oz.		oz.		oz.		oz.			p.c.	oz.	p.c.	cts.	cts.
1 Basal ration	105	1·12	104	1·63	101	2·44	99	3·48	99	4·96	G	6	5·7	3·84	342·9	3·0	0·78
2*Basal ration—mash radiated for one hour daily at distance of 2 feet	35	1·17	34	1·62	34	2·59	33	3·70	32	5·22	G	3	8·57	4·05	346·1	2·53	0·63
3 Basal ration—minus one-half the meat meal plus soya bean meal and a mineral mixture	35	1·11	33	1·70	33	2·64	33	3·61	31	5·13	G	4	11·4	4·02	362·2	3·03	0·75
4 Basal ration—Minus meat meal plus soya bean meal and a mineral mixture	35	1·09	33	1·64	31	2·42	30	3·50	30	5·07	F*	5	14·3	3·98	365·1	2·29	0·58
5 Wisconsin ration	35	1·06	33	1·56	30	2·07	28	2·43	26	3·69	F	9	25·7	2·63	248·1	2·32	0·88
6 Basal ration—minus meat meal plus ½ oz. cod liver meal per day	35	1·09	35	1·71	35	2·57	34	3·76	34	4·86	G	1	2·86	3·77	345·9	2·71	0·74
7 Basal ration—plus Larro yeast (1 oz. per 10 lb. mash)	30	1·07	28	1·64	27	2·63	27	3·78	25	52·4	G	5	16·7	4·17	389·7	3·68	0·88
8 Basal ration plus Fleischmann's yeast (½ lb. per 100 lbs. mash)	30	1·00	28	1·47	25	2·16	24	3·17	22	4·46	G	8	26·7	3·46	346·0	4·09	1·18
9 Basal ration—plus crude cod liver oil (4 teaspoonfuls per day in wet mash)	140	1·16	139	1·60	138	2·37	137	3·10	136	4·61	G	4	2·86	3·45	297·4	2·78	0·81
10 Basal ration—plus Refined cod liver oil (4 teaspoonfuls per day)	35	1·09	35	1·50	35	2·26	34	3·38	34	4·80	G	1	2·86	3·71	340·4	3·20	0·86
11 Basal ration—plus raw liver (enough to moisten mash)	30	1·03	26	1·50	26	1·80	21	2·57	20	3·60	F	10	33·3	2·57	249·5	4·47	1·74
12 Basal ration—plus Larro yeast and crude cod liver oil (½ quantities as for pens 7 and 9 respectively)	30	1·07	29	1·59	25	2·52	24	3·75	24	5·04	G	6	20·0	3·97	371·0	4·35	1·09

*Cost of radiation not considered.

NOTES.—Considering those pens receiving vitamine feeds the greatest gains were made by the pen receiving Larro yeast followed by Larro yeast plus crude cod liver oil, Fleischman's yeast, cod liver meal and refined crude cod liver oil. The poorest gains were made on raw liver. Mortality was highest with raw liver and Fleischman's yeast pens and lowest with cod liver meal and crude and refined cod liver oils (equal).

The efficiency and economy of the various feeds as judged by feed cost per ounce of gain shows cod liver meal to be outstanding with crude cod liver oil a moderately close second. Larro yeast and refined cod liver oil also come within the limits of practicability with regard to efficiency and cost.

Larro yeast plus crude cod oil, Fleischman's yeast, and raw liver are in this experiment too expensive to be practicable.

With regard to the various rations considered the greatest percentage gains were made by the birds receiving no meat meal, but soya bean meal and a mineral mixture followed by these receiving the same treatment, but with one half part of meat meal. The irradiated and non-irradiated basal ration were next in order of gains. The birds on the Wisconsin ration did very poorly. Mortality was best on the basal ration and greatest on the Wisconsin ration. The feed cost per ounce of gain was greatest for the Wisconsin and basal rations. Most economical gains were made by the pens without meat meal followed by that receiving the irradiated ration.

TABLE 8.—VITAMIN FEEDS FOR BROODER CHICKS—4-YEAR SUMMARY

Ration	Year	Number of chicks at beginning	Average weight	Number end of 1st week	Average weight	Number end of 2nd week	Average weight	Number end of experiment	Average weight	Apparent 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	Feed cost per ounce of gain
			oz.		oz.		oz.		oz.			p.c.	oz.	p.c.	cts.	cts.
Basal ration	1924	40·0	1·3	35·0	1·94	35·0	3·14	34·0	4·94	G	6·0	15·0	3·64	280·0	·8	0·418
	1925	50·0	1·28	50·0	2·16	50·0	3·67	48·0	5·23	VG	2·0	4·0	3·95	309·0	1·6	0·41
	1926	40·0	1·45	40·0	1·9	38·0	2·53	35·0	3·6	VG	5·0	12·5	2·14	148·0	0·9	0·42
	1927	105·0	1·12	104·0	1·63	101·0	2·44	99·0	3·48	G	6·0	5·7	2·36	210·0	1·8	0·76
Average	.....	58·7	1·29	57·2	1·91	56·0	2·94	54·0	4·31	.....	4·75	8·09	3·02	234·7	1·5	0·50
Larro yeast	1924	40·0	1·37	40·0	2·07	40·0	3·2	40·0	4·45	VG	.....	.....	3·08	225·0	1·9	0·62
	1925	50·0	1·28	50·0	2·28	49·0	3·88	49·0	5·35	VG	1·0	2·0	4·07	318·0	2·2	0·54
	1926	40·0	1·12	37·0	1·78	35·0	2·66	35·0	3·77	E	5·0	12·5	2·57	229·0	1·08	0·42
	1927	30·0	1·07	28·0	1·64	27·0	2·63	27·0	3·78	G	3·0	10·0	2·71	253·0	2·21	0·82
Average	.....	40·0	1·21	38·7	1·94	37·7	3·09	37·7	4·34	.....	2·25	5·6	3·11	257·0	1·85	0·59
Fleichmann's yeast	1924	40·0	1·32	39·0	2·05	38·0	3·21	37·0	4·68	G	3·0	7·5	3·36	254·0	2·1	0·62
	1925	50·0	1·22	49·0	2·14	49·0	3·71	49·0	5·1	VG	1·0	2·1	3·88	318·0	2·0	0·52
	1926	40·0	1·17	38·0	1·79	36·0	2·72	36·0	3·9	E	4·0	10·0	3·0	256·0	1·25	0·42
	1927	30·0	1·00	28·0	1·47	25·0	2·16	24·0	3·17	G	6·0	20·0	2·17	217·0	2·45	1·13
Average	.....	40·0	1·18	38·5	1·86	37·0	2·95	36·5	4·21	.....	3·5	8·75	3·03	263·5	1·95	0·63
Refined cod liver oil	1924	40·0	1·37	39·0	2·13	39·0	3·41	39·0	5·13	VG	1·0	2·5	3·76	274·0	2·3	0·61
	1925	50·0	1·18	47·0	2·04	46·0	3·61	45·0	5·04	G	5·0	10·0	3·86	327·0	1·9	0·49
	1926	40·0	1·28	36·0	1·75	36·0	2·36	36·0	3·16	VG	4·0	10·0	2·0	156·0	1·22	0·61
	1927	35·0	1·09	35·0	1·50	35·0	2·26	34·0	3·38	G	1·0	2·86	2·29	210·0	1·9	0·83
Average	.....	42·5	1·23	39·2	1·73	39·0	2·91	38·5	4·18	.....	2·75	6·47	2·95	242·1	1·83	0·62
Crude cod liver oil	1924	40·0	1·37	39·0	2·13	39·0	3·41	39·0	6·13	VG	1·0	2·5	3·76	274·0	2·3	0·61
	1925	50·0	1·28	49·0	2·1	49·0	3·45	49·0	4·89	VG	1·0	2·0	3·61	282·0	1·7	0·47
	1926	40·0	1·12	38·0	1·83	38·0	2·66	38·0	3·63	VG	2·0	5·0	2·3	205·0	1·22	0·53
	1927	140·0	1·16	139·0	1·60	138·0	2·37	137·0	3·10	G	3·0	2·14	1·94	167·2	1·67	0·86
Average	.....	67·5	1·23	66·2	1·91	66·0	2·97	65·75	4·19	.....	1·75	2·6	2·90	235·5	1·72	0·59

TABLE 8.—VITAMIN FEEDS FOR BROODER CHICKS—4-YEAR SUMMARY—*Concluded*

Ration	Year	Number of chicks at beginning	Average weight	Number end of 1st week	Average weight	Number end of 2nd week	Average weight	Number end of experiment	Average weight	Apparent 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	Feed cost per ounce of gain
			oz.		oz.		oz.		oz.			p.c.	oz.	p.c.	cts.	cts.
Raw liver	1924	40·0	1·3	38·0	2·03	38·0	3·29	38·0	4·76	VF	2·0	5·0	3·46	266·0	1·8	0·52
	1925	50·0	1·18	46·0	1·96	45·0	3·18	41·0	4·54	F	9·0	18·0	3·36	285·0	1·7	0·51
	1926	40·0	1·33	39·0	1·8	39·0	2·69	36·0	3·45	F	4·0	10·0	2·16	162·0	1·41	0·65
	1927	30·0	1·03	26·0	1·50	26·0	1·80	21·0	2·57	F	9·0	30·0	1·54	149·0	2·68	0·72
Average	.....	40·0	1·21	39·6	1·82	37·0	2·74	34·0	3·83	.....	6·0	15·0	2·62	217·3	1·89	0·60
Larro yeast and crude cod liver oil	1924	40·0	1·3	39·0	1·87	39·0	3·05	39·0	4·62	F	1·0	2·5	3·32	255·0	2·5	0·77
	1925	50·0	1·28	49·0	1·98	48·0	3·21	47·0	4·57	VF	3·0	6·0	3·29	257·0	1·9	0·57
	1926	40·0	1·35	40·0	2·0	40·0	2·7	40·0	3·63	E	.....	.....	2·28	166·0	1·23	0·54
	1927	30·0	1·07	29·0	1·59	25·0	2·52	24·0	3·75	G	6·0	20·0	2·68	250·0	2·61	0·97
Average	.....	40·0	1·25	39·2	1·86	38·0	2·87	37·5	4·14	.....	2·5	6·25	2·89	232·0	2·06	0·71

NOTES.—A study of the above table shows the greatest percentage gains over a four year period to have been obtained by the birds on Larro and Fleischmann's yeasts respectively. These two feeds are outstanding in this respect. Mortality was least with crude cod liver oil followed by Larro yeast, Larro yeast plus crude cod liver oil, refined cod liver oil and the basal ration. Raw liver was consistently high in mortality during the four years, a fact which is upheld by the apparent poor condition of the birds, "very fair" being the best notation of condition. They were also lowest in percentage gains.

With regard to economy of gains it is noticeable that the pens on Larro yeast plus crude cod liver oil, raw liver, Fleischmann's Yeast and refined cod liver oil made slightly expensive gains. The birds on the basal ration made the most economical gains.

This experiment will be continued next year when a final report will be made.

THE CURATIVE EFFECT OF COD LIVER MEAL

In connection with this experiment a pen of birds fed a vitamin deficient ration produced eighteen birds most of which were completely off their legs with rickets. Feeding with cod liver meal in a wet mash twice daily brought all but three birds back to normal in fourteen days. A similar experiment with cod liver oil in 1924 produced the same effect in eleven days.

Upon laboratory examination the birds which failed to respond to treatment were found to be very soft in bone. Experimental work with cod liver meal will continue since this food promises to be of great value in poultry feeding.

FEED COSTS AND GAINS IN REARING PULLETS TO MATURITY

This experiment was undertaken in order to procure accurate figures on weight gains and costs in raising pullets to laying age. This work was in continuation of a previous experiment carried on only to ten weeks of age. Two pens of one hundred pullets each of Barred Rocks and White Leghorns were handled under exactly similar conditions, having good range over fresh alfalfa paddocks. The birds were weighed once weekly over the entire period of the experiment which covered fourteen weeks. Account was kept of all feed consumed. The birds received scratch grain morning and evening, milk and water to drink and had growing mash and crushed oats in hoppers always before them. The following table shows results in an experiment carried on under very similar conditions in 1925, up to ten weeks of age, combined with the results of the present experiment, making a total of twenty-four weeks or from hatching time to date of maturity for both breeds. The following prices were allowed for feeds: scratch grain, $2.40; mash, of which very little was consumed, $2.10 cwt.; crushed oats, $2.50 cwt.; and milk, $8 cwt (powdered buttermilk). Table 9 following shows details of this experiment.

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TABLE 9.—DETAIL—FEED COSTS IN REARING PULLETS TO MATURITY

Breed	Average weight per chick at 10 weeks	Feed consumed per chick at 10 weeks	Cost of feed per chick at 10 weeks	Pounds of feed per pound of gain	Number of pullets at beginning (11 weeks)	Average weight	Number end of 12th week	Average weight	Number end of 13th week	Average weight	Number end of 14th week	Average weight	Number end of 15th week	Average weight	Number end of 16th week	Average weight	Number end of 17th week	Average weight
	lbs.	ozs.	c.	lbs.		lbs.		lbs.		lbs.		lbs.		lbs.		lbs.		lbs.
White Leghorns...	1·15	11·48	2·11	2·85	100	1·58	100	1·75	100	2·03	100	2·15	100	2·20	100	2·36	100	2·52
Barred Rocks	1·45	12·09	2·08	3·85	100	1·87	100	2·04	100	2·54	100	2·66	100	2·83	99	3·17	99	3·43

Breed	Number end of 18th week	Average weight	Number end of 19th week	Average weight	Number end of 20th week	Average weight	Number end of 21st week	Average weight	Number end of 22nd week	Average weight	Number end of 23rd week	Average weight	Number pullets at end 24th week	Average weight	Feed consumed per bird from time of hatch	Cost of feed per bird to 24 weeks	Gain per bird (24 weeks)	Pounds of feed per pound of gain
		lbs.		lbs.		lbs.		lbs.		lbs.		lbs.		lbs.	lbs.	c.	lbs.	lbs.
White Leghorns...	100	2·59	99	2·72	99	2·75	97	2·80	96	2·83	96	2·84	95	2·84	13·15	35·0	2·74	4·8
Barred Rocks	99	3·55	99	3·70	99	3·73	96	3·79	96	3·82	98	3·93	96	3·96	15·58	39·5	3·86	4·03

*Separate experiment (see Annual Report 1925).

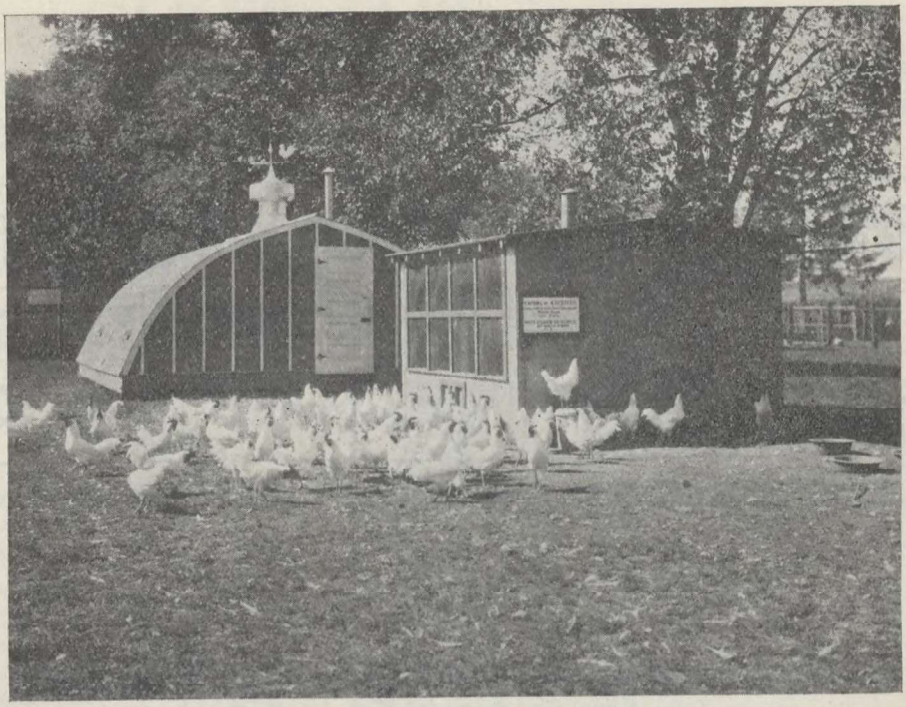
NOTES.—The above table is quite self explanatory. It shows among other things feed cost of 35c. per bird for White Leghorns and 39c. per bird for Barred Rocks to raise to maturity; and that the Barred Rocks made the most economical use of feed requiring but 4·03 pounds of feed for one pound of gain as compared with 4·8 pounds for the Leghorns. Very little mortality was experienced. At the twenty-first week two birds of each breed were removed and later replaced causing a variance of two numbers in the birds weighed at that time.

Allowing 15 cents per chick for Leghorns and 20 cents for Barred Rocks to cover cost of incubation, the total cost per bird, labour neglected, to twenty-four weeks of age would be 50 cents and 59·5 cents respectively.

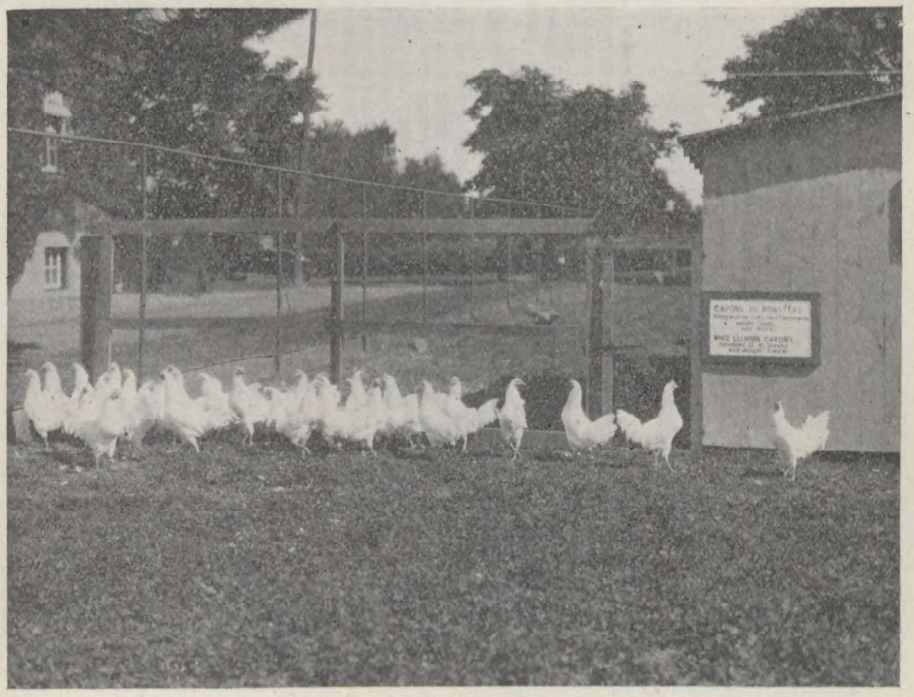
CAPONS VS. ROASTERS

In the spring of 1927 an experiment was started with the object of comparing capons and roasters as profit producers. This experiment covered birds of the two most common breeds, namely, White Leghorns and Barred Plymouth Rocks. In dealing with the advisability of caponizing Leghorn cockerels there is the added consideration that the market for Leghorn broilers is usually poor or even lacking entirely and consequently many breeders kill and destroy their Leghorn cockerels as soon as their sex is apparent. The result is that the cost of incubating and feeding these cockerels until about three weeks of age must be accepted as loss and charged against the pullets. In raising these Leghorn capons to maturity it was hoped to gain some idea as to the practicability of caponizing as opposed to destroying at three weeks or selling for a very poor price as broilers.

Two pens of cockerels of one hundred birds each, one of Leghorns and one of Barred Rocks and two pens of forty capons, Leghorns and Rocks, were started in the experiment at eleven weeks of age. The birds were treated the same in every respect. They were weighed once weekly and careful account was kept of all feed consumed. Table 10 following shows detailed results of this experiment. The capons were allowed one week for recovery from the operation before the experiment commenced.



Capons vs. roasters--Leghorn cockerels.



Capons vs. roasters—Leghorn capons.

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TABLE 10.—CAPONS VS. ROASTERS—WEIGHT GAINS

Average Weight per Bird in Pounds

Lot	Beginning (11 weeks of age)	1st week	2nd week	3rd week	4th week	5th week	6th week	7th week	8th week	9th week	10th week	11th week	12th week
Barred Rock capons	1·95	2·31	2·85	3·05	3·48	3·93	4·35	4·58	4·75	5·28	5·50	5·55	5·80
Barred Rock cockerels	2·24	2·41	2·95	3·36	3·52	4·04	4·43	4·79	4·96	5·07	5·15	5·48	5·64
White Leghorn capons	1·48	1·73	2·13	2·33	2·56	2·92	3·06	3·17	3·29	3·46	3·51	3·60	3·84
White Leghorn cockerels	1·71	1·98	2·31	2·52	2·67	2·80	2·96	3·12	3·32	3·37	3·47	3·51	3·71

Lot	13th week	14th week	15th week	16th week	17th week	18th week	19th week	20th week	21st week	22nd week	Per cent gain at 17 weeks	Per cent gain to 22 weeks
Barred Rock capons	6·10	6·11	6·45	6·59	6·83	7·00	7·14	7·33	7·33	7·19	250·3	268·7
Barred Rock cockerels	5·89	5·95	6·22	6·45	6·43	.....	.....	.....	.....	.....	187·1	
White Leghorn capons	3·99	4·07	4·20	4·20	4·23	4·43	4·51	4·47	4·46	4·43	185·8	200·0
White Leghorn cockerels	3·89	3·95	4·23	4·34	4·36	.....	.....	.....	.....	.....	154·9	

NOTES.—The declins evident during the last three wesks was caused partly by sevsre weather. It would appear from the above table that at 30 to 31 weeks of age would be the best time to dispose of capons.

TABLE 11.—CAPONS VS. ROASTERS—DETAIL

Lot	Number at beginning	Number at end	Feed Consumption per Bird				Total value	Weight at beginning	Weight at end	Gain per bird	Pounds of feed per pound of gain	Cost per pound of gain	Value as broilers 11 weeks	Final value per bird	Total profit per bird	Profit after deducting feed cost
			Scratch grain	Mash	Crushed oats	Milk										
			lb.	lb.	lb.	lb.	cts.	lb.	lb.	lb.			cts.	$ cts.	$ cts.	$ cts.
Barred Rock capons...	40	40	15·1	5·15	9·87	1·10	78·32	1·95	6·83	4·88	6·39	16·05	0·49	2 73	2 24	1 46
Barred Rock cockerels.	100	93	12·68	2·68	10·41	0·89	67·6	2·24	6·43	4·19	6·36	16·13	0·56	1 93	1 37	0 70
White Leghorn capons..	40	35	10·14	6·14	4·87	1·03	55·57	1·48	4·23	2·75	8·07	20·21	0·22	1 48	1 26	0 70
White Leghorn cockerels	100	94	9·48	2·58	6·80	0·64	49·0	1·71	4·36	2·65	7·36	18·5	0·26	1 09	0 83	0 34

NOTES.—The above table covers a period of 16 weeks or from eleven weeks of age, or time of caponising to twenty-seven weeks of age. Mortality was practically nil with the capons. Four slips were removed from the Leghorn capons during this period.

With the exception of crushed oats, feed consumption was greatest with the capons, a fact partly explained by the fact that the pugnacious tendencies of the cockerels kept many from consuming as much as they otherwise would. The cost of feed per bird was consequently greater for the capons in each case.

The total gain per bird was greatest for the capons in each case. This is particularly noticeahle in the case of the Barred Rock capons. The efficiency of use of feed as shown by pounds of feed per pound of gain was greatest for the cockerels. In this case the Leghorn cockerels are outstanding.

Owing to greater feed consumption the cost per pound of gain was greater for the Leghorn capons. It was slightly less however, for the Rock capons than for the cockerels of the same breed.

The total profit per bird was greatest for the capons in both cases due to the higher meat value of these birds.

The following prices were allowed for the various types of bird—

Barred Rock and Leghorn broilers 25 cts. and 15 cts. per pound respectively, Leghorn roasters 25 cts. pound. Barred Rock roasters, 30 cts. pound. Leghorn capons, 35 cts. pound. Barred Rock capons, 40 cts. pound. The average price paid to farmers on Ontario markets was allowed for broilers in each case.

Net profit, after deducting feed cost, is very much in favour of the capons.

It is apparent from the above that if cockerels are carried over into the "roaster" stage, greater profits would have been made if they had been caponized.

It is also doubtful whether, after labour, etc., is taken into consideration, anything is gained by caponizing and carrying Leghorn capons through. If, however, a very low price only can be obtained for Leghorn broilers or if broilers must be destroyed at three weeks, it might be profitable to caponize.

Discussion: It is of the utmost importance to bear in mind in this connection that the amount of profitable return in caponizing would depend to a very great extent on individual conditions. For example, on the ordinary commercial poultry farm space would in all probability be so limited and labour so expensive that caponizing of Leghorn cockerels would be out of the question. On the other hand, if the birds are on a general farm where plenty of range and perhaps running water is available and where large hoppers can be kept full of grain and mash the labour required would be extremely small, probably no more than an average of five or ten minutes per day. Practically the same amount of labour would suffice to take care of many times the number of birds carried in this experiment with a resultant decrease in labour cost per bird.

As given in the preceding table the value of the Leghorns as broilers was 22 cents per bird. Deducting the feed cost to 11 weeks or 13 cents we have a profit over cost of feed of 9 cents per bird as compared to a profit of 70 cents from the same bird caponized. A profit such as the above while perhaps insufficient for the commercial man would be very acceptable to the general farmer.

Allowing one-quarter hour per day for labour in the above experiment and considering the operator's time to be worth $2.20 per day, a labour cost of 21 cents per bird is given, leaving a profit of 49 cents per bird over labour and feed.

It is for the individual farmer, considering his own particular conditions, to determine from the above experiment whether it would pay him to caponize or not.

It is further of interest to note that when the Leghorn capons in this experiment were marketed at $4\frac{3}{4}$ to 5 pounds in weight, they made excellent dressed fowl being well fleshed on the breast and of good flavour.

POTATOES VS. CORN MEAL IN FATTENING

Since a great many poultrymen and farmers have difficulty in obtaining feeds of various kinds and are forced to pay very high prices for what they can get and since in most cases there is available a supply of small and cull potatoes which otherwise might be waste, an experiment was carried on to determine the relative merits of corn meal and potatoes in fattening poultry.

Two lots of capons, consisting in each case of fifteen White Leghorns and fifteen Barred Rocks, were fattened in small pens for a period of two weeks. The mash used was of the following formula: equal parts bran, middlings, oat flour, corn meal and $\frac{1}{2}$ part of meat meal.

In the case of the lot receiving potatoes, approximately $\frac{1}{3}$ of the weight of the mash consumed was made of cull potatoes and no corn meal was fed. In other words the corn meal of the mash was replaced by an equal weight of potatoes. The potatoes were small culls and were thoroughly cooked, mashed up and mixed with the mash. The mixture was fed moistened with milk in the usual way. The value of mashes used was 2·6 cents per pound with corn meal and 2·2 cents with potatoes, estimating cull potatoes at 50 cents per cwt.

Table 12 following shows detail of the experiment.

TABLE 12.—POTATOES VS. CORN MEAL IN FATTENING

Treatment	Number of birds	Average weight per bird at beginning	Average weight at end of first week	Average weight end of second week	Average gain per bird	Average per cent gain per bird	Food Consumption		Total value feed	Cost of feed per pound of gain
							Mash	Milk		
		lb.	lb.	lb.	lb.		lb.	lb.	c.	c.
Potatoes—Rock capons	15	6·87	7·13	7·7	0·83	12·08	.....	.....	.....	.....
Potatoes—Leghorn capons	15	4·27	4·57	4·93	0·66	15·46	.....	.....	.....	.....
Average	15	5·57	5·85	6·31	0·74	13·28	3·7	0·76	14·14	19·1
Corn meal—Rock capons	15	7·00	7·47	7·87	0·87	12·43	.....	.....	.....	.....
Corn meal—Leghorn capons	15	4·13	4·33	4·87	0·74	17·92	.....	.....	.....	.....
Average	15	5·56	5·90	6·37	0·81	14·58	3·7	0·76	15·62	19·3

It is noticeable from the above table that gains per bird were greater for the Barred Rocks and also for the birds on corn meal. The same may be said of percentage gains per bird except that the Leghorns showed a greater percentage gain than the Barred Rocks. The same amount of feed was consumed by each of the two lots. Owing to the use of potatoes, and in spite of the fact that they constituted but one-fifth of the ration, the cost of feed per pound of gain was less in the case of the potato fed birds than the corn meal fed. This also in spite of the fact that the corn meal fed birds made slightly the greater gains.

Although the results of this experiment do not indicate that potatoes are superior to corn meal except from the stand point of economy, it would tend to indicate that potatoes when available make an excellent fattening feed, and when cull potatoes are fed, are a source of profit that might otherwise be lost. It is reasonable to suppose that if potatoes had made up a higher percentage of the ration a greater saving might have been made. This experiment will be continued, feeding a much greater proportion of potatoes. The potato fed birds made the most attractive dressed fowl. Flavour, as judged by persons who tasted capons fattened upon both feeds was considered to be superior in the potato fed fowl in every case.

FEEDING EXPERIMENTS FOR WINTER EGG PRODUCTION

Experimental work with the object of testing the suitability of various feeds for winter egg production and to determine their effect upon fertility and hatchability was continued during the winter of 1926-27. Unfortunately, suitable pullets were not available to make up pens of fifteen birds each as has been the custom up to this time, and as a result fourteen pens of twelve birds each were used for these experiments. A continuous house was used and conditions were kept similar in every respect for all pens.

The following is the list of experiments and the number of pens devoted to each:—

Substitutes for Fresh Green Feed—4 pens.
Ultra Violet Rays for Egg Production (1 control pen)—2 pens.
Vitamin feeds for egg production—4 pens.
The comparative value of grainless, gritless, green feed lacking rations—3 pens.
The use of glass substitutes in poultry houses—1 pen.

The experiment covered a period of six months from November 1 to April 30 inclusive. Careful account was kept of kinds and weight of feed fed, of the condition of the birds each month, of mortality and cause where possible, and of weight gains or loss, during the experiment. Condition is noted in the tables throughout these experiments as follows:—

E.—excellent. V.G.—very good. G.—good. F.—fair. P.—poor.

The standard or basal ration used was as follows:—

Grain—a commercial scratch mixture.

Mash—equal parts by weight of bran, middlings, corn meal and ground oats with three-fifths part of meat meal (55 per cent protein) and one pound of salt per 100 pounds of mash.

The grain was fed in the straw night and morning, grit, shell, charcoal and dry mash (unless otherwise stated) being constantly before the birds. Green feed consisting of sprouted oats and mangels was fed daily to all birds except where otherwise indicated. No milk was fed in any form. Prices paid for the

different feeds of the basal ration, based upon the average price over the six months' period (November 1, 1926, to April 30, 1927) were as follows (per cwt.): Grain, $2.40; mash, $2.10; grit, 87 cents; oyster shell, 93 cents; and green feed, $1.

The average price received for eggs per dozen was: November, 75 cents; December, 85 cents; January, 80 cents; February, 70 cents; March, 60 cents; and April, 55 cents.

In order to determine the effect of the varied treatment accorded upon fertility and hatchability, all pens were mated during the breeding season, at first in the regular way and also after one week had elapsed for a second period during which the males were alternated daily in order to minimize in as far as was possible the error due to individual variation in the males. The fertility and hatching results are included in the summary tables.

No birds were substituted during the experiment and consequently all tables are worked out on an average basis per bird, the consumption of feed being calculated on the basis of the number of birds alive at the end of each month.

Pen No. 5 in the experiment "Ultra violet rays for egg production" was used as the control pen for the entire experiment.

Details of any special feeds given or treatment accorded the birds will be found under the separate heading of each experiment.

SUBSTITUTES FOR FRESH GREEN FEED

Experimental work with substitutes for fresh green feed was continued during the winter of 1926-27, raw potatoes, cooked potatoes, alfalfa meal and sweet clover meal being contrasted with the ordinary winter greenfeeds, viz: sprouted oats and mangels, as to their value for egg production and their effect upon fertility and hatchability.

Four pens of White Leghorn pullets were used and received the basal ration and one or other of the green feeds listed. The following is the arrangement of the pens:—

Pen 1.—Basal ration without greenfeed plus raw potatoes ($1 per cwt.) chopped and fed in wet mash—equal quantities mash and potatoes.

Pen 2.—Basal ration without greenfeed plus cooked potatoes mixed with wet mash as for pen 1.

Pen 3.—Basal ration without greenfeed plus alfalfa meal ($1.75 per cwt.) fed at the rate of 5 ounces per twelve birds daily in the wet mash.

Pen 4.—Basal ration without greenfeed plus sweet clover meal ($1 per cwt.) fed as for pen 3.

The potatoes used were small and culls, hence their low valuation. One-quarter pound of alfalfa and sweet clover meals was found to be the most suitable amount to ensure that all mash would be cleaned up.

Table 13 following shows detailed results of this year's experiment and also a summary covering the past two years' work.

TABLE 13.—SUBSTITUTES FOR FRESH GREENFEED

Pen and Special Feed — Pens 1 to 4	Total mortality	Weight gain	Scratch grain	Value	Mash	Value	Green feed	Value	Grit	Value	Shell	Value	Apparent condition	Total value feed	Eggs laid	Value	Feed cost per dozen	Profit over cost of feed
		lb.	lb.	lb.	lb.	cts.	lb.	cts.	lb.	cts.	lb.	cts.		cts.		cts.	cts.	cts.
Raw potatoes	4	.....	22·54	54·00	26·67	56·99	16·38	16·38	1·38	1·18	2·28	2·13	F	130·68	78·5	462·2	20·0	331·5
Cooked potatoes	1	0·2	21·85	52·43	31·18	65·47	15·36	15·36	0·76	0·67	1·99	2·34	G	136·27	78·8	478·4	20·7	342·1
Alfalfa meal	3	0·36	23·32	55·82	32·47	68·19	5·25	9·20	1·75	1·52	2·55	2·37	VG	137·10	83·1	505·3	19·8	368·2
Sweet clover meal	2	0·1	21·88	52·51	30·70	64·47	4·88	4·88	1·23	1·07	2·58	2·41	VG	125·26	79·2	460·0	18·9	334·7
Control	2	.....	24·90	59·76	33·30	69·92	35·12	35·12	0·86	0·75	2·74	2·55	VG	168·10	100·7	592·9	20·0	424·8

NOTES.—The above table shows a distinct advantage in favour of the basal ration, both in egg production and profit over cost of feed. Among the substitutes used the greatest profit was obtained from the use of alfalfa meal followed by cooked potatoes and sweet clover meals. In considering the cost per dozen using cooked potatoes the factor of additional cost and labour in cooking must be considered. The greatest average production per bird, the control pen excepted, was obtained by the use of alfalfa meal.

In this experiment alfalfa meal has proven the best substitute for fresh green feed. The meal fed was of good quality leaves and blossoms.

TABLE 14.—HATCHING RESULTS

	Treatment	Mating period	No. set	Fertile	Hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched
1	Raw potatoes.....	Regular.....	12	9	0	75·0	.....	.....
		Males alternated.....	17	10	4	58·8	40·0	23·6
		Total.....	29	19	4	65·5	21·1	13·8
2	Cooked potatoes....	Regular.....	10	8	5	80·0	62·5	50·0
		Males alternated.....	12	10	9	83·3	90·0	75·0
		Total.....	22	18	14	81·8	77·7	63·6
3	Alfalfa meal.....	Regular.....	14	1	0	7·0	.....	.....
		Males alternated.....	20	12	6	60·0	50·0	30·0
		Total.....	34	13	6	38·2	46·2	17·6
4	Sweet clover meal...	Regular.....	38	32	14	81·5	45·1	36·8
		Males alternated.....	29	18	7	62·0	38·8	24·1
		Total.....	67	50	21	74·6	42·0	31·3

NOTES.—Fertility was highest from the pen receiving cooked potatoes followed by that receiving sweet clover meal. The hatchability as shown by per cent fertile hatched was also best with cooked potatoes with alfalfa meal in second place.

The percentage mortality to three weeks of age was calculated but owing to the degree of variation obtained it will not be published until next year's report.

TABLE 15.—SUMMARY OF SUBSTITUTES FOR FRESH GREEN FEED—2 YEARS

Pen	Special Treatment	Year	Cost of special feed	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
			cts.	cts.		cts.	cts.	cts.						
1	Raw potatoes	1926	19·0	139·91	95·0	519·2	17·6	379·2	120	97	25	75·8	27·4	20·8
		1927	16·4	130·68	78·5	462·2	20·0	331·5	29	19	4	65·5	21·1	13·8
	Average	.....	17·7	135·29	86·7	490·7	18·8	355·3	74·5	58·0	14·5	77·8	20·5	19·5
2	Cooked potatoes	1926	18·0	128·6	84·2	493·7	18·3	365·0	112	83	20	74·1	24·7	17·8
		1927	15·4	136·27	78·8	478·4	20·7	342·1	22	18	14	81·8	77·7	63·6
	Average	.....	16·7	132·4	81·5	486·0	19·5	353·5	67	50·5	17	75·4	35·6	25·4
3	Alfalfa meal	1926	19·2	141·39	96·6	563·5	17·6	422·1	99	61	23	61·7	37·7	23·2
		1927	9·2	137·1	83·1	505·3	19·8	368·2	34	13	6	38·2	46·2	17·6
	Average	.....	14·2	139·2	89·9	534·4	18·7	395·1	66·5	37·0	14·5	55·6	39·2	21·8
4	Sweet clover meal	1926	20·6	133·71	90·5	537·2	17·7	403·3	120	97	25	75·8	27·4	20·8
		1927	4·9	125·26	79·2	460·0	18·9	334·7	67	50	21	74·6	42·0	31·3
	Average	.....	12·8	129·5	84·8	498·6	18·3	369·0	93·5	73·5	23	78·6	31·3	24·6
5	Control	1926	.....	136·8	77·0	441·2	21·3	304·4	79	59	9	74·7	15·3	11·4
		1927	.....	168·1	100·7	592·9	20·0	424·8	72	49	20	68·1	42·0	27·8
	Average	.....	.....	152·4	88·8	527·0	20·6	364·6	75·5	54·0	14·5	71·4	71·5	19·2

NOTES.—The above summary over a two-year period illustrates the following points in particular. Although difference in cost of feed consumed was slight in all cases production was superior in numbers with alfalfa meal and considerably superior in value owing to the fact that production was greater during the winter months of high egg values.

The lowest feed cost per dozen was obtained from alfalfa and sweet clover meals as was also the greatest profit over cost of feed.

The hatching summary indicates almost equal fertility from raw potatoes, cooked potatoes and sweet clover meal with alfalfa meal somewhat inferior.

Hatchability, indicated by per cent fertile hatched favours the control pen with alfalfa meal and cooked potatoes following in the order named.

Indications point to alfalfa meal as being the most suitable substitute with cooked potatoes and sweet clover meal next in order of merit. The experiment will be continued during 1927–28 when it is hoped that data obtained will justify a final report.

VITAMINE FEEDS FOR EGG PRODUCTION

In an endeavour to determine the best and most economical forms in which to supply vitamines to mature birds with the object of increasing egg production, fertility, hatchability and viability of chicks, an experiment was carried on during the winter of 1925-26 and 1926-27 in which four sources of the antirachitic and antineuritic vitamines were used. Of these four feeds refined and crude cod liver oil were considered to be rich in the antirachitic and growth producing and Larro and Fleischmann's yeast in the antineuritic. During the past winter 1926-27 this experiment was repeated, the same feeds being used and fed in the same manner. All pens received the basal ration as discussed in an earlier experiment with the addition of the vitamine feeds in the following manner.

Pen 7.—Basal ration plus crude cod liver oil (90 cents per gallon), 2 teaspoonfuls (¼ ounce) per 12 birds daily fed in the wet mash.

Pen 8.—Basal ration plus refined cod liver oil ($2 per gallon), same proportion as above.

Pen 9.—Basal ration plus Larro yeast (60 cents per pound), 1 tablespoonful (½ ounce) per 12 birds daily fed in wet mash.

Pen 10.—Basal ration plus Fleischmann's yeast (96 cents per pound), 1½ tablespoonfuls (¾ ounce) per 12 birds daily fed in wet mash.

Tables 16, 17 and 18 following give detailed results of the experiment, including hatching results, mortality to three weeks of age and a summary covering two years of the experiment.

TABLE 16.—DETAIL—VITAMIN FEEDS FOR EGG PRODUCTION

Pen and Special Feed — 7–10	Total mortality	Weight gain	Scratch grain	Value	Mash	Value	Green feed	Value	Grit	Value	Shell	Value	Special feed	Value	Apparent condition	Total value feed	Eggs laid	Value	Feed cost per dozen	Profit over cost of feed
		lb.	lb.	cts.	lb.	cts.	lb.	cts.	lb.	cts.	lb.	cts.	lb.	cts.		cts.		cts.	cts.	cts.
Crude cod liver oil	4	0·7	23·63	56·71	31·86	66·91	34·67	34·67	1·12	1·05	2·20	2·04	4·44	2·70	VG	164·08	89·6	536·2	21·9	372·1
Refined cod liver oil	2	0·35	22·36	53·66	29·43	61·79	31·52	31·52	1·44	1·26	2·00	1·84	4·15	5·63	F	150·07	85·7	513·5	21·0	363·4
Larro yeast	.....	0·13	20·08	48·12	28·95	60·78	29·17	29·17	1·58	1·34	2·02	1·88	7·57	28·54	G	169·83	79·5	472·3	25·6	302·5
Fleischmann's yeast	4	0·48	23·79	57·09	31·73	66·63	33·94	33·94	2·08	1·80	2·28	2·10	13·66	81·96	G	243·52	89·1	533·3	32·8	289·8
Control	2	.....	24·90	59·76	33·30	69·92	35·12	35·12	0·86	0·75	2·74	2·55	.....	.....	VG	168·10	100·7	592·9	20·0	424·8

NOTES.—The above table shows crude and refined cod liver oil as being outstanding with regard to profit over cost of feed. Crude cod liver oil and Fleischman's yeast divide honours with respect to number of eggs laid and their value. The high cost of Fleischman's yeast used, however, makes that product impractical from a profit standpoint. Feed cost per dozen is also very much lower for crude and refined cod liver oil. Mortality was best for the crude cod liver oil and Larro yeast pens. Deaths in pen 7 were due mainly to peritonitis and cecal worms. In pen 8, to the same reasons and in pen 10 to intra abdominal ovulation and cecal worms. It is worthy of note that during the past three years of experiment, mortality has been quite low in the pens fed Larro yeast.

TABLE 17.—HATCHING RESULTS

Pen	Treatment	Mating period	Number set	Fertile	Hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched	Per cent mortality to 3 weeks
7	Crude cod liver oil	Regular	29	21	8	72·4	38·0	27·5	12·5
		Males alternate	21	14	9	66·6	64·2	42·8	0·0
		Total	50	35	17	70·0	48·6	34·0	4·7
8	Refined cod liver oil	Regular	41	36	18	85·3	50·0	43·9	0·0
		Males alternate	18	15	8	83·3	53·3	44·4	12·5
		Total	59	51	26	86·4	51·0	44·1	3·8
9	Larro yeast	Regular	32	22	9	62·5	40·9	28·1	66·6
		Males alternate	25	23	21	92·0	91·2	84·0	28·6
		Total	57	45	30	78·9	66·6	52·6	40·0
10	Fleischmann's yeast	Regular	27	16	8	59·3	50·0	29·6	12·5
		Males alternate	11	3	0	27·3	.....	.....	.....
		Total	38	19	8	50·0	42·1	21·1	12·5

NOTES.—Fertility was best for the pens receiving refined cod liver oil and Larro yeast and poorest for Fleischmann's yeast. Hatchability was best for Larro yeast followed by refined cod liver oil and the crude oil in the order named.

Mortality of chicks to three weeks of age was lowest from refined and crude cod liver oil followed by Fleischmann's and Larro yeast's.

TABLE 18.—THREE YEARS SUMMARY VITAMINE FEEDS

Pen	Special treatment	Year	Cost of special feed	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
			cts.	cts.		cts.	cts.	cts.						
7	Crude cod liver oil...	1925	2·0	126·0	75·0	427·0	20·2	301·0	30·0	29·0	18·0	96·7	62·1	60·0
		1926	2·1	142·1	90·8	524·0	18·7	383·0	57·0	45·0	14·0	79·0	31·1	24·6
		1927	2·7	164·1	89·6	536·2	21·9	372·1	50·0	35·0	17·0	70·0	48·6	34·0
		Ave.	2·3	144·0	85·1	495·7	20·9	352·0	45·7	36·3	16·3	79·4	44·9	35·7
8	Refined cod liver oil.	1925	3·6	137·0	71·5	426·0	22·9	289·0	26·0	24·0	22·0	92·3	91·7	84·6
		1926	5·9	159·0	102·7	582·0	18·6	423·1	53·0	41·0	10·0	77·4	24·4	19·0
		1927	5·6	150·1	85·7	513·5	21·0	363·4	59·0	51·0	26·0	86·4	51·0	44·1
		Ave.	5·0	148·7	86·6	507·2	20·8	358·5	46·0	38·7	19·3	84·1	49·9	41·9
9	Larro yeast.....	1925	37·5	162·0	81·3	475·0	23·9	313·0	25·0	24·0	15·0	96·0	62·5	60·0
		1926	24·4	203·0	88·9	521·0	27·4	318·0	66·0	46·0	16·0	69·7	34·8	15·2
		1927	28·5	169·8	79·5	472·3	25·6	302·5	57·0	45·0	30·0	78·9	66·6	52·6
		Ave.	30·1	178·3	83·2	489·4	25·6	311·2	49·3	38·3	20·3	77·7	53·0	41·2
10	Fleischmann's yeast.	1925	86·2	212·0	78·4	470·0	32·4	258·0	35·0	34·0	17·0	97·1	50·0	48·6
		1926	86·6	227·0	72·4	416·0	21·3	190·0	54·0	42·0	6·0	77·7	14·3	11·1
		1927	81·96	243·52	89·1	533·3	32·8	289·8	38·0	19·0	8·0	50·0	42·1	21·1
		Ave.	84·9	227·5	80·0	473·1	28·8	245·9	42·3	31·7	10·3	74·9	32·5	24·3

NOTES.—The above table demonstrates particularly that although egg production was practically equal over the three year period, the cost of special feed, as shown in column one was considerably greater in the case of Larro yeast and Fleischmann's yeast than the amount of good obtained would justify. In other words the difference of 34·3 cents between the cost of crude cod liver oil and Larro yeast rations and of 83·5 cents between the former and Fleischmann's yeast is completely out of proportion to the egg production fertility, and hatchability obtained. Added to this is the fact that condition as noted from month to month was practically on a parallel for each pen. The feed cost per dozen also demonstrates this fact. Up to the present time neither refined nor crude cod liver oil have exceeded the control pen (2-year average—see table 15) in economy of production. However, fertility and hatchability have been better in both cases than in the control-pen and since profit over cost of feed has been quite comparable experimental work will continue during the coming season with cod liver oil.

Discussion: In the experiments as so far conducted the feeding of Fleischmann's yeast has proven quite impractical since the added cost is much greater than the benefit derived would justify. This also would apply to Larro yeast, but to a considerably lesser extent than to the other.

Until such time as some form of yeast is put on the market which will contain all the necessary properties of a good yeast and yet be reasonable in price, the advisability of feeding such a supplement is doubtful.

Over a three-year period refined cod liver oil failed to show any increase in production, profits, fertility or hatchability over the crude product. By crude cod liver oil is meant the oil pressed from the livers after steam cooking. By refined oil is meant the light oil which rises to the top in process of cooking, and which is dipped off. The refined oil is used for medicinal purposes.

Since refined oil is valued at $2 per gallon and crude oil at only 90 cents per gallon, it has not proven practical to feed the former oil if the crude product can be obtained. Consequently refined oil will be dropped from the experiment in future.

THE COMPARATIVE VALUE OF GRAINLESS, GRITLESS AND GREENFEED LACKING RATIONS FOR EGG PRODUCTION

Of recent years poultry investigators have claimed that laying birds will produce equally well on rations devoid entirely of scratch grain and with dry mash as the main source of nutriment. It has also been claimed that the addition of grit to the ration of confined laying birds is absolutely unnecessary, that the gizzard of the fowl is entirely capable of grinding all kinds of feed without further mechanical assistance, and that the fowl picks up grit only for the mineral (lime and phosphorous) which it may contain. In other experiments greenfeed has been dispensed with, and no resultant ill effect has been noted among the fowl thus treated.

In order to further test these theories, experiments were carried on during the past season feeding no grain in any case and removing grit and greenfed from the ration of two different pens. The birds in all three pens received oyster shell since this material is fairly readily soluble, and is necessary for the production of sound egg shells in any numbers.

The following tables (19 and 20) shows the results in detail of the first year's experiment:—

TABLE 19.—DETAIL GRAINLESS, GRITLESS, GREENFEED LACKING RATIONS

Pen and special feed	Total mortality	Weight gain	Scratch grain	Value	Mash	Value	Green feed	Value	Grit	Value	Shell	Value	Apparent condition	Total value feed	Eggs laid	Value	Feed cost per dozen	Profit over cost of feed
		lb.	lb.	cts.	lb.	cts.	lb.	cts.	lb.	cts.	lb.	cts.		cts.		cts.	cts.	cts.
11. No grain	5	0·04	.....	.....	56·82	119·32	33·74	33·74	1·55	1·34	2·64	2·45	G.	156·85	74·6	451·0	25·2	294·15
12. No grain—no greenfeed	2	0·30	.....	.....	53·26	111·85	.....	.....	2·58	2·23	2·17	2·02	G	116·10	73·7	447·2	18·9	331·0
13. No grain—no grit	3	0·18	.....	.....	51·38	107·89	31·08	31·08	.....	.....	3·13	2·93	F.*	141·91	66·6	395·3	25·6	253·4
5. Control	2	.....	24·90	59·76	33·30	69·92	35·12	35·12	0·86	0·75	2·74	2·55	V.G.	168·10	100·7	592·9	20·0	424·8

NOTES.—The most outstanding feature of the above table is the fact that all pens are inferior to the control pen with regard to eggs laid and profit over cost of feed. In comparing the three pens the showing of the pen receiving no greenfeed is outstanding, the profit over cost of feed being greatest and the production on a par with the pens receiving greenfeed. The condition of the birds also was apparently equal to that of the other pens.

The pen without grain and grit made a very poor showing as regards condition, production and profits.

TABLE 20.—HATCHING RESULTS

Pen	Treatment	Mating period	Number set	Fertile	Hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched	Per cent mortality to 3 weeks
11	Basal ration, no grain	Regular	24	18	1	75·0	5·5	4·2	0·0
		Males alternated	30	28	8	93·3	28·6	26·6	25·0
		Total	54	46	9	85·2	19·6	16·6	22·2
12	B.R.—No grain, no green feed	Regular	5	3	0	60·0	.....	.....	.....
		Males alternated	9	6	1	66·6	16·6	11·1	0·0
		Total	14	9	1	64·3	11·1	7·1	0·0
13	B.R.—No grain, no grit	Regular	22	14	6	63·6	42·9	27·3	16·6
		Males alternated	22	14	11	63·6	78·6	50·0	36·4
		Total	44	28	17	63·6	60·7	38·6	29·4

NOTES.—Fertility, hatchability and viability of chicks as shown by the above table is considerably at variance with results in egg production. Fertility is highest on the all mash ration and almost equal for the other two pens. Hatchability is best for the birds receiving neither grain nor grit and poorest for those receiving no grain and no green feed. Mortality to three weeks is lowest for those with neither grain nor green feed followed by no grain, and no grain and no grit respectively.

THE VALUE OF GLASS SUBSTITUTES FOR USE IN POULTRY HOUSES

Since a great many inquiries are received monthly concerning the value of glass substitutes in poultry houses, the scope of experimental work with this material was increased and a pen of fifteen White Leghorn pullets was run six months using a glass substitute in place of ordinary glass in all windows of the pen.

Tables 21 and 22 following gives full detail of the experiment.

TABLE 21.—DETAIL, GLASS SUBSTITUTES FOR POULTRY HOUSES

Pen and special feed	Total mortality	Weight gain	Scratch grain	Value	Mash	Value	Green feed	Value	Grit	Value	Shell	Value	Condition	Total value feed	Eggs laid.	Value	Feed cost per dozen	Profit over cost of feed
		lb.	lb.	cts.	lb.	cts.	lb.	cts.	lb.	cts.	lb.	cts.		cts.		cts.	cts.	cts.
14. Glass substitute	3	0·13	23·77	57·05	30·58	64·21	34·83	34·83	2·11	1·83	2·42	2·23	G	160·15	78·1	464·3	24·6	304·15
5. Control	2	.....	24·90	59·76	33·30	69·92	35·12	35·12	0·86	0·75	2·74	2·55	V.G.	168·10	100·7	592·9	20·0	424·8

NOTES.—In the above table it is again noticeable that the control pen is very superior in egg production, feed cost per dozen and profit over cost of feed. The control pen received sunlight through glass only.

TABLE 22.—HATCHING RESULTS

Pen	Treatment	Mating period	Number set	Fertile	Hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched	Per cent mortality to 3 weeks
14	Glass substitute	Regular	28	19	2	67·9	10·5	7·1	50·0
		Males alternated	35	26	20	74·3	76·9	57·1	45·0
		Total	63	45	22	71·4	48·9	34·9	45·5
5	Control	Regular	51	38	13	74·5	34·2	25·4	30·8
		Males alternated	21	11	7	52·3	63·6	33·3	71·4
		Total	72	49	20	68·1	42·0	27·8	45·0

NOTES.—The above table shows fertility and hatchability to be slightly superior for the birds in the glass substitute pen. Viability of chicks is almost equal. It is important to note that the effect, if any, of using a glass substitute would in all probability be equally as well marked in fertility, hatchability and viability of chicks, as in egg production. This experiment will be continued during the coming season.

THE EFFECT OF VARIOUS FEEDS UPON THE INTERIOR QUALITY OF EGGS

During the winter of 1926-27 an experiment was carried on with the purpose of throwing some light, if possible, upon the question of the interior quality of eggs and the part played by feeds and green feeds in particular in bringing about this condition.

The eggs from some 180 birds, upon various feeding experiments were candled at three-day intervals, close to 3,000 eggs being thus handled. The eggs were marked according to the individual bird and also to the pen from which they came so that the influence of the feed and of individuality might both be estimated.

In candling all inferior eggs classed as watery or weak in albumen and from slightly dense to heavy yolked were taken out and held for two successive periods of one month each being recandled at the end of each month. The eggs were left in cartons at an average room temperature of 60 degrees F. At the time of first candling, being strictly fresh no watery and very few heavy yolked eggs were found. All eggs showing inferiority in any way, however, were held over to determine the effect of storage upon their interior quality.

Even after two months of storage under the above noted conditions no decidedly watery eggs were found although a large proportion of slightly heavy to heavy yolked eggs were encountered.

So far as attaching the responsibility for inferior quality eggs upon feeds is concerned the results were somewhat of a negative character. The work will be continued however, when it is hoped that more definite results will be obtained.

The following are a few of the outstanding points of interest in the experiment:—

With the exception of the pen receiving treatment with ultra-violet rays, which received the basal ration, practically no inferior quality eggs were produced from the pens (five in number), upon the basal ration. This ration consisted of a scratch grain mixture, a mash of equal parts bran, middlings, ground oats, corn meal and three-fifths part of meat scrap, mangels and sprouted oats in small quantities as green feed and oyster shell, grit and charcoal.

One pen was fed alfalfa meal in a wet mash, to the maximum quantity which would be consumed. This pen later received mangels also to the maximum of consumption. Upon candling and holding for a period of two months the proportion of eggs of inferior quality (dense to heavy yolks) from the alfalfa fed and mangel fed periods was 8 to 3 respectively.

The highest percentage of inferior quality eggs was obtained from the pens receiving treatment with ultra violet rays and receiving alfalfa meal in only medium quantities. The percentage was next highest from those birds receiving sweet clover meal, cod liver oil and Larro yeast.

In connection with the comparative results obtained with alfalfa meal and mangels, it is interesting to note that the percentage of inferior eggs was quite low from the pens receiving cooked and raw potatoes, being only half that from alfalfa and sweet clover meals.

It is doubtful if any significance can be attached to the comparative results from various feeds and no conclusions are warranted until very much more work has been done.

That inferior quality may be equally or more dependent upon the individuality of the bird is a question suggested by the results of this experiment viz:—

Ultra violet rays.	(12 birds)	2	birds	produced	62.5	per cent	of the	inferior	eggs	produced
Alfalfa meal	"	2	"	"	71.4	"	"	"	"	"
Larro yeast	"	2	"	"	80.0	"	"	"	"	"
Sweet clover meal	"	1	bird	"	71.4	"	"	"	"	"
Refined cod liver oil.	"	1	"	"	43.0	"	"	"	"	"
Crude cod liver oil.	"	1	"	"	30.0	"	"	"	"	"
Fleischman's yeast	"	1	"	"	40.0	"	"	"	"	"
Cooked potatoes	"	1	"	"	75.0	"	"	"	"	"

BARRAL COMPOUND VS. LIME WATER VS. COLUMBUS POWDERS

On September 10, 1926, two lots of one hundred eggs each were put in preservatives, one lot in lime water and the other in barral compound. All eggs were candled and found to be sound in shell and in good fresh condition when preserved.

In preparing the barral compound one tablet of the compound after being broken up was dissolved in eight quarts of clean cold water. In making the preparation of lime water one pound of freshly burnt quicklime was used to five gallons of water, the lime being slaked in a small quantity of water first and the milk of lime formed stirred into the five gallons of water. After settling the saturated lime water formed was poured over the eggs. Eight gallon galvanized cans were used and were kept in a dry place at medium temperatures.

After the expiration of seven months' the eggs were removed and candled. A notable feature of all eggs was the small size of air cell. Ten per cent of those in Barral Compound and eight per cent of those in lime water showed slightly dense or heavy yolk on candling. On the average their appearance when candled was exceptionally good.

A number out of each lot of eggs were broken into open dishes. Those from barral compound were slightly fluid in albumen some being almost of a watery consistency. In almost every case the vitelline membrane of the yolk ruptured very easily. A somewhat stale odor was present in both lime water and barral compound preserved eggs. Upon breaking eggs from the lime water preservative it was noticed that the albumen was more viscous, and the vitelline membrane did not rupture.

Samples also were sent out for examination by persons with no more than a casual acquaintance with egg preserving methods in order to get an unbiased opinion upon the relative qualities of the two lots. In two cases in which the eggs were tested by different methods of cooking etc. those preserved in lime water were reported as being superior. Firmness of albumen, strength of yolk membrane and flavour were points in which the eggs preserved in lime water excelled those in barral compound. In one case very little difference in quality between the two lots was reported, all eggs having a slightly stale odour, the yolk membrane being weak, and the albumen inclined to be slightly watery. The opinion was expressed that eggs preserved by either method were superior to those preserved in water glass.

On May 8, 1927, experimental work with egg preservatives was continued, three lots of one hundred eggs each being put down in lime water, barral compound and Columbus powders. The first two lots were put down as above described, those in Columbus powders receiving the following treatment. One package of Columbus powders was dissolved in five quarts of water being stirred from time to time. This was poured over the eggs when dissolved and the water level kept several inches over the eggs at all times. After six months preservation they were taken out on November 6, 1927.

Upon candling, the small size of air cell was outstanding in all these preservatives as before. Very little difference in candling quality was noted over the three preservatives, each lot having in the neighbourhood of 10 per cent of inferior eggs. In this regard those preserved in lime water were superior to the extent of 1 per cent. A considerable number of apparently heavy yolked eggs were encountered in this 10 per cent some with a tendency to stick to the shell.

One and one half dozen eggs were broken on to a flat surface in lots of three, one of each preservative. The eggs from the lime water were found to stand up better on the flat surface and to be characterized by a less fluid albumen than the others. Columbus powders was slightly superior to barral compound in this respect, although very little difference was noted. The yolk membrane of all these broke very readily, but with a slight advantage in favour of lime water.

The remaining eggs were divided into seven lots, each one being given to a different person to be used in such a way as would best test their cooking qualities and flavour. Of the reports submitted all but two considered barral compound to be superior to the other two preservatives and in most cases, lime water was considered to be the poorest sample. The most common complaint was to the effect that both yolk and albumen were too weak and fluid in texture in the lime water preserved eggs.

Owing to a very great difference of opinion this experiment is being repeated.

EXPERIMENTAL WORK WITH WATERFOWL

Experimental work with ducks and geese during the season of 1927 consisted mainly of a continuation of growth and rearing costs experiments previously carried on. Owing to poor hatchability of the eggs from some geese the growth rate of the various breeds could not be charted during 1927.

By banding and keeping under observation until maturity it was determined that the black markings commonly found on the heads of some White Muscovy ducklings are not an accurate means of determining the sex of the bird as was thought to be the case.

DUCK-FEEDING—COSTS AND GAINS

The stock used in these experiments consisted of May-hatched birds of the following breeds: Pekin, Rouen, Indian Runner and Khaki Campbell. All birds were hatched on the Farm plant and were under similar management throughout the experiment.

The ration fed during the first five weeks consisted of a mash mixture of 30 pounds each of bran, shorts and cornmeal with 10 pounds of beef scrap, costing $1.73 per hundred. After the fifth week the mash was changed to a mixture of bran 15 pounds, shorts 20 pounds, corn meal 50 pounds, and beef meal 15 pounds, costing $1.91 per hundred.

The mash was fed five times daily, moistened with water and sprinkled with coarse sand.

During the period of feeding of the first mash, greenfeed was fed in large amounts, but was decreased gradually after that time until at the end of the eighth week the birds were receiving none. During the second period they had constant access to water in small runs.

For the feeding experiment the ducks were weighed weekly and the feed consumption calculated on the number of birds alive at the end of each week.

Tables 23 and 24 give details for the feeding experiment for those breeds which completed the test, while table 25 shows a summary of the results including costs and profits, both tables being calculated on the basis of one bird. In computing costs no allowance was made for greenfeed.

TABLE 23.—DETAIL—DUCK-FEEDING EXPERIMENT

Weeks	Pekin								Rouen							
	Number birds	Average weight		Average gain		Average feed consumption		Pounds of feed per pound of gain		Number birds	Average weight		Average gain		Average feed consumption		Pounds of feed per pound of gain	
		lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.		lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Beginning	24	0	1·7							8	0	1·6						
1	22	0	4·9	0	3·2	0	5·3	1	10·5	8	0	5·0	0	3·4	0	7·5	2	3·3
2	22	0	11·6	0	6·7	0	14·9	2	3·6	8	0	11·0	0	6·0	0	13·5	2	4·0
3	22	1	6·0	0	10·4	1	7·3	2	3·8	8	1	3·5	0	8·5	1	11·0	3	2·8
4	22	2	5·6	0	15·6	1	15·3	2	1·0	8	1	14·0	0	10·5	2	5·0	3	8·4
5	22	2	15·3	0	9·7	2	9·5	4	4·4	8	2	9·5	0	11·5	1	6·0	1	14·0
6	22	3	14·0	0	14·7	1	14·0	2	0·6	8	3	5·0	0	11·5	1	5·0	1	13·2
7	22	4	10·2	0	12·2	3	2·2	4	1·8	8	4	2·5	0	13·5	4	4·0	5	0·6
8	21	5	5·4	0	11·2	2	14·5	4	2·4	8	4	10·0	0	7·5	3	12·0	8	0·0
9	21	6	1·5	0	12·1	3	10·7	4	13·6	7	4	9·7	0	−0·3	3	8·0		
10	20	6	4·6	0	3·1	2	11·0	1	6·2	7	5	0·6	0	6·9	3	7·0	7	15·5
11	20	7	1·6	0	13·0	3	5·6	4	2·0	7	5	8·6	0	8·6	2	15·0	5	7·4
12	20	7	2·6	0	1·0	3	0·0	4	12·8	7	5	9·1	0	0·5	2	7·0	78·0	0·0
Total				7	0·9	27	14·3	3	15·2				5	8·4	30	10·0	5	8·7

TABLE 24.—DETAIL—DUCK-FEEDING EXPERIMENT

Weeks	Indian Runner										Khaki Campbell									
	Number birds	Average weight		Average gain		Average feed consumption		Pounds of feed per pound of gain			Number birds	Average weight		Average gain		Average feed consumption		Pounds of feed per pound of gain		
		lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.			lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	
Beginning	8	0	1·2								11	0	1·1							
1	8	0	4·5	0	3·3	0	6·0	1	13·1		11	0	4·4	0	3·3	0	4·4	1	5·3	
2	8	0	9·0	0	4·5	0	15·5	3	7·1		11	0	9·1	0	4·7	0	12·4	2	10·2	
3	8	1	1·0	0	8·0	1	8·0	3	0·0		11	1	8·7	0	15·6	1	5·1	1	5·6	
4	8	1	11·0	0	10·0	1	15·5	3	2·4		11	2	1·1	0	8·4	1	13·1	3	7·4	
5	8	2	0·0	0	5·0	2	8·0	8	0·0		11	2	9·5	0	8·4	2	0·7	3	14·3	
6	8	2	9·0	0	9·0	3	7·0	6	1·8		11	3	1·5	0	8·0	2	10·9	5	5·8	
7	8	3	3·0	0	10·0	2	14·0	4	9·6		11	3	2·2	0	0·7	2	8·0	57	5·0	
8	8	3	11·0	0	8·0	2	12·0	5	8·0		10	3	7·2	0	5·0	2	10·4	8	7·7	
9	8	3	8·0	0	−3·0	2	12·0				10	3	10·8	0	3·6	2	11·2	10	3·2	
10	7	3	12·6	0	4·6	2	6·3	8	5·0		10	3	14·4	0	3·6	2	4·0	10	0·0	
11	7	4	5·1	0	8·5	2	9·7	4	14·5		10	4	2·8	0	4·4	2	6·4	8	12·0	
12	7	4	1·1	0	−4·0	2	3·4				10	4	2·0	0	−0·8	2	0·8			
Total				4	0·0	29	6·0	6	9·4					4	0·9	23	7·4	5	12·5	

TABLE 25.—SUMMARY OF DUCK-FEEDING EXPERIMENT

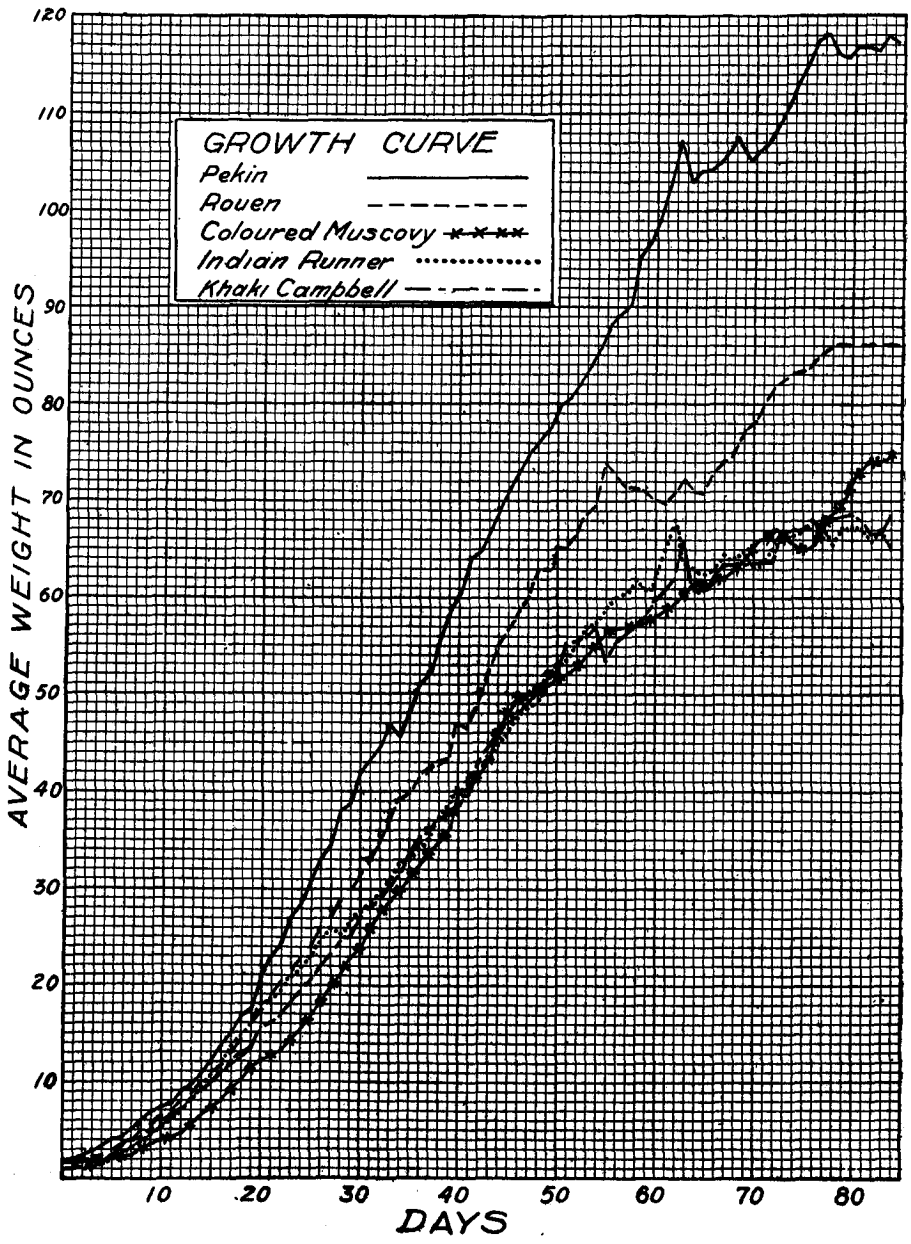
Breed	Number at beginning	Number at end	Average weight at beginning	Average weight at end	Average gain	Average feed consumption	Pounds feed per pound gain	Average cost of feed	Original value per duckling	Average final value at 35c. per pound	Average profit over cost of feed and duckling
			lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	cts.	cts.	$ cts.	$ cts.
Pekin	24	20	0 1·7	7 2·6	7 0·9	27 14·3	3 15·2	53	25	2 48	1 70
Rouen	8	7	0 1·6	5 9·1	5 8·4	30 10·0	5 8·7	58	25	1 94	1 11
Indian Runner	8	7	0 1·2	4 1·1	4 0·0	29 6·0	6 9·4	56	25	1 43	0 62
Khaki Campbell	11	10	0 1·1	4 2·0	4 0·9	23 7·4	5 12·5	45	25	1 45	0 75

NOTES.—A study of the above tables shows that more rapid and greater gains were obtained from the Pekin ducks than from the other breeds and at a lower cost. The Rouens are considerably poorer market ducks, giving a smaller profit by 59 cents per bird.

Of the egg production breeds the Khaki Campbells required fewer pounds of feed per pound of gain and showed a greater profit by 13 cents per bird.

COMPARATIVE RATE OF GROWTH OF DIFFERENT BREEDS

The birds used in this experiment were of both meat and production types and were reared under similar conditions. The graph below was calculated on the average weight per bird for each day.



NOTES:—As is to be expected the outstanding feature of the experiment is the way in which the Pekins demonstrated their superiority as market ducks. Although the flavour of the Muscovy is excellent, it cannot compare with the former breed in rapidity of weight gains. The Muscovies, however, would eventually attain the same weight. According to this graph the correct time to market Pekins would be in the neighbourhood of from seventy to seventy-five days. The Rouens come next in order of merit but require a longer period to attain an equal weight with the Pekins. An average gain of 1·4 oz. per day was attained by the Pekins.

Between the Khaki Campbell and Indian Runner, both production breeds, the graph shows little choice.

EXPERIMENTAL WORK AT THE BRANCH FARMS

Among the numerous experiments carried on at the branch Farms during 1927 the following are worthy of summarizing.

FEEDS FOR FERTILITY, HATCHABILITY AND VIABILITY OF CHICKS

This experiment was carried on at Fredericton, Kentville, Lethbridge, Nappan and Summerland with the following results. At Fredericton, fertility, hatchability and viability was apparently increased by the use of cod liver oil. Birds fed bone meal and cod liver oil plus raw liver as supplements gave increased hatchability and decreased mortality.

At Kentville birds fed combinations of cod liver oil and bone meal and of cod liver oil and raw liver gave increased fertility, hatchability and viability of chicks. Hatchability was also better with a raw liver and bone meal combination. Birds fed cod liver oil, bone meal and raw liver, all fed separately, gave increased hatchability. At Morden birds fed cod liver oil gave increased fertility, hatchability and viability.

At Lethbridge, the feeding of vitamin supplements gave no appreciable increase in fertility, hatchability and viability.

At Summerland birds given bone meal plus raw liver and bone meal plus cod liver oil gave increased fertility only. Increased hatchability and viability of chicks was given by birds fed a combination of raw liver and cod liver oil.

At Nappan, fertility, hatchability and viability of chicks was best from birds receiving vitamin supplements.

These experiments are being continued.

ROOTS VS. CLOVER VS. SPROUTED OATS VS. EPSOM SALTS

At Summerland, the birds fed mangels and alfalfa leaves gave better production and profits than those on either epsom salts or small apples.

At Nappan, birds receiving mangels and clover leaves gave much greater production and profits than those on salts or sprouted oats.

At Invermere birds on mangels, epsom salts and alfalfa were best in the order named.

HULLESS OATS VS. COMMON OATS

Greater and more profitable production was obtained at Brandon from the use of common oats than from hulless oats.

At Scott, equal production and very slightly greater profit was obtained from hulless oats.

CORN VS. BARLEY

Greater production and profit was obtained from the use of barley in the ration in place of corn at Brandon, Morden and Lethbridge.

MEAT SCRAP VS. FISH MEAL

Of four farms reporting upon this experiment two, Nappan and Invermere obtained slightly greater production and profits from meat scrap. Fredericton, on the other hand, obtained greater production and profits from fish meal, while Summerland reports slightly greater profits but lower production from meat meal.

POTATOES VS. CORNMEAL IN THE LAYING MASH

At Fredericton an experiment comparing the use of potatoes and corn meal for egg production gave greater production and increased profits from the use of potatoes, fed in the wet mash. In this connection it is interesting to refer to the experiment "Potatoes vs. Corn Meal in Fattening" in this report.

Details of the above experiments will be found in the annual reports from the farms concerned or from their records.

CANADIAN NATIONAL EGG LAYING CONTEST, REGISTRATION AND INSPECTION

During the year 1927, thirteen egg laying contests were conducted by this division. The Canadian Contest, international in its scope, is conducted at Ottawa while the remaining twelve contests are provincial in scope.

TABLE 26.—NAME OF CONTEST AND NUMBER OF BIRDS; AVERAGE POINTS PER BIRD; LEADING PEN, PRODUCTION AND POINTS OF HIGHEST REGISTERED BIRD IN EACH. NOVEMBER 1st, 1926 TO OCT. 30TH, 1927

Contest	Number birds	Average eggs per bird	Average points per bird	Leading Pen per No. of points	Highest registered bird	
					Eggs	Points
Canadian	800	171·1	168·2	2,415·0	282	315·9
Prince Edward Island	200	163·5	160·3	2,324·8	285	293·3
Nova Scotia	210	170·7	169·8	2,172·3	255	301·9
Nova Scotia Southern	200	164·3	146·7	1,813·9	221	266·2
New Brunswick	200	171·5	176·8	2,418·0	278	302·7
Quebec Eastern	190	142·7	139·0	1,894·5	212	254·8
Quebec Western	200	169·3	176·6	2,342·7	244	312·5
Ontario	600	157·1	151·1	2,125·8	262	293·6
Manitoba	210	181·3	191·2	2,371·1	256	328·2
Saskatchewan	360	141·9	144·3	2,282·0	265	283·6
Alberta	260	185·3	191·0	2,336·1	281	344·8
British Columbia	450	206·9	224·3	2,803·6	301	389·0
Vancouver Island	330	206·3	213·1	2,522·9	282	335·4
Total	4,210	Ave 172·5	174·0			

NOTE.—Ten birds constitute a pen.

TABLE 27.—NUMBER OF BIRDS AND AVERAGE PRODUCTION OF ALL CONTESTS 1926-27

Variety	All Contests	
	Number of birds	Average production
S.C. White Leghorns	1,910	180·2
Barred Plymouth Rocks	1,430	171·7
White Wyandottes	370	171·7
S.C. Rhode Island Reds	220	155·9
Single Comb Anconas	70	135·9
White Plymouth Rocks	70	126·0
Light Sussex	20	181·7
R.C. White Leghorns	20	164·5
R.C. Rhode Island Reds	20	141·9
Black Minorcas	20	126·2
R.C. Brown Leghorns	20	120·8
S.C. Black Leghorns	10	201·0
Partridge Rocks	10	167·4
Buff Orpingtons	10	127·1
Chantecler	10	98·4
Total	4,210	172·5

The Canadian National Egg Laying Contest has been in operation for eight years and a survey of the work is interesting and encouraging. Table 28 gives the number of birds entered in each year, together with the average production.

TABLE 28.—BIRDS ENTERED IN CONTESTS—BY YEARS

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
1925–26	4,220	179·5
1926–27	4,210	172·5

The egg laying contests in Canada started in 1919-20 with 1,610 birds in seven contests. The number of birds steadily increased each year and by the year 1925-26 there were 4,220 birds while the number of contests had been increased to thirteen. In 1926-27 there was one pen less than the previous year and these 4,210 birds gave an average production of 172·5 eggs. This was a decrease of 7 eggs per bird. There were quite a large number of eggs disqualified for being under the 20 ounce per dozen standard. This was the second year that the disqualifying weight regulation was applied.

The increased production year after year as shown in the above table can be attributed to a number of factors. We believe the outstanding ones are as follows:—

1. Better selection of the contest pen.
2. Pullets of the proper 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 that the careful selection of the contest pen was of considerable importance. Many breeders

kept careful notes on the birds sent to contests and then followed up these notes by weekly and yearly production to verify their observations. Consistent high production of the birds belonging to leading breeders throughout Canada substantiates this idea.

Probably the second factor, that of age and development in the pullet is of more importance than is generally supposed. Many cases could be cited where pens have been over ready before being shipped to the contest. Pullets which are in heavy lay when shipped usually give good production for two or three weeks and then go into a moult which is very discouraging to all concerned. On the other hand late hatched pullets, unduly forced to attain growth, very often come into lay about November 1, but such pullets are invariably a disappointment in contest work. They do not possess substance, and fall down in production with the least irregularity and since conditions must necessarily bring about changes, those pullets which are rushed to maturity almost invariably prove disappointing.

The pullet which is hatched in April or early May, depending on the breed and strain, and is developed at a normal rate is the bird which will enter the contests almost fully matured, strong in make up and ready for a hard year's work. It is only reasonable to expect that birds of such quality would be able to stand the strain of high production much better than birds which were unduly forced to maturity.

Probably the factor which was responsible for the greatest improvement in egg production was more advanced methods of breeding. The work of record keeping has been going on long enough to enable breeders to select males from high producing hens to head their breeding pens. The careful recording of chicks hatched and the carrying out of a systematic form of pedigree breeding has greatly assisted the breeder in improving his stock along egg producing lines.

The type of poultryman responsible for carrying out the detail in contest work has improved somewhat since Egg Laying Contests started in 1919. Better methods of management have also been employed in contest work. These and other factors of management have been of considerable assistance in bringing about increased production.

1927-28 CONTESTS

The 1926-27 laying contest ended October 30, and another series of Egg Laying Contests commenced November 1, 1927. No additional accommodation was provided for contest pens during the year so that the number of birds remains practically the same as in the previous year.

The rules and regulations which were altered last season to admit of two spares in each pen throughout the system were again put into force as the idea seems to have worked very satisfactory. At present there are 4,310 birds in 431 pens and 862 spare birds, making a total of 5,172, the same number as started the preceding contest.

Since egg laying contests in Canada are carried on primarily for registration purposes the regulations are drawn up in such a way as to encourage breeders who are paying particular attention to egg size in their breeding flocks. To accomplish this end birds are now scored on size of egg as well as on production. Points are allotted as follows:—

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

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

REGISTRATION

During the year 906 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 disqualified and refused registration. There were 1,490 birds which laid the required number of eggs, but of this number 544 failed to measure up to the required standard as to breed character, size of egg, stubs or down on feet or legs, foreign colour in lobes or plumage etc. The distribution by contests is as follows:—

TABLE 29.—REGISTRATION

Contest	Number birds in contest	Number laying 200 eggs or over	Qualified for registration	Disqualified		
				Small eggs	Stubs or down	Other Causes
Canadian	800	259	162	94	2	1
Prince Edward Island	200	49	16	33	0	0
Nova Scotia	210	67	36	29	0	2
Nova Scotia Southern	200	60	18	42	0	0
New Brunswick	200	71	48	23	0	0
Quebec Eastern	190	29	15	14	0	0
Quebec Western	200	72	49	22	1	0
Ontario	600	126	51	74	1	0
Manitoba	210	74	53	20	0	1
Saskatchewan	360	69	61	5	2	1
Alberta	260	106	66	36	3	1
British Columbia	450	290	195	61	3	31
Vancouver Island	330	218	136	81	1	0
Total	4,210	1,490	906	494	13	37

The 1926 Report of the Poultry Division shows 338 breeders owners of registered hens in Canada. Sixty breeders have sold or transferred their birds to other breeders or have gone out of business during the year. This number deducted from 338 leaves 278 breeders who have carried on work with registered hens under the Canadian National Poultry Registration Plan during the breeding and hatching season of 1927. To this list has been added 70 new breeders the past season making a total of 348 poultry breeders now owners of registered hens in Canada.

The distribution of breeders and registered birds is shown in table 30.

TABLE 30.—DISTRIBUTION OF BREEDERS AND REGISTERED HENS

—	Breeders			Registered Hens		
	Hatching season 1927	New breeders 1927	Total	Living from previous year	Registered 1927	Total
Prince Edward Island	8	9	17	34	16	50
Nova Scotia	20	5	25	67	37	104
New Brunswick	22	2	24	121	63	184
Quebec	27	4	31	96	65	161
Ontario	65	18	83	381	156	537
Manitoba	16	2	18	70	56	126
Saskatchewan	13	12	25	28	59	87
Alberta	27	9	36	99	67	166
British Columbia	80	9	89	660	376	1,036
Total	278	70	348	1,556	895	2,451

The table shows that there are in Canada at present 2,451 registered hens suitable for breeders in the breeding season of 1928. To this number might be added 100 birds which are still owned by breeders of registered stock, but for different reasons were not bred under the Registration policy in 1927. The 1926 report of this work showed 2,208 registered hens at the beginning of 1927, but during the year 652 birds have died or have not been used as breeders, sold or lost track of, leaving 1,556 birds living from previous years which were used as breeders in 1927. There were 905 birds registered from all contests in Canada during the year, but ten of these birds were the property of breeders outside of Canada (United States of America, 2 birds; England, 8 birds) and were returned to their owners at the close of the contest year. The remaining 895 registered females which were registered in 1927 when added to those living from previous years makes a total of 2,451 registered hens distributed throughout the various provinces of Canada.

CANADA'S NATIONAL POULTRY REGISTRATION EXHIBIT

During the World's Poultry Congress an exhibit was put up showing the different stages through which birds must pass before registration takes place. Some of the outstanding features in this display were, an egg laying contest pen from the farm flock which would symbolize stage No. 1. Next to the laying pen came stage No. 2, which was made up of a breeding pen of registered females from the contest pen mated to an approved male showing the kind and quality of stock used to advance this breeding work. Stage No. 3 was what is known as an egg laying contest pen of second generation pullets, daughters of the registered hens from the previous contest pen known as stage No. 1 and bred under the registration policy the following year shown in stage No. 2. The fourth part of the display showed the registered second generation hens in the mating pen the following year with a high class approved or registered male. Such females are qualified to be the dams of registered cockerels which were shown in the center of the exhibit as the apex of the Canada's National Poultry Registration Program.

This exhibit was planned and managed by the staff of this division who have charge of the laying contest and registration work and staged by the Department of Extension and Publicity of the Dominion Experimental Farms.

REPORTS

At the end of each week a report was sent out from each office where an egg laying contest was held giving the individual production of each bird for the week. These reports also gave the total eggs and points to date. Reports were sent to all contestants and interested parties, no only in Canada, but in the United States as well. In addition to those already mentioned the mailing list also included many poultry breeders and egg laying contest managers in England, Ireland, Scotland, France, Holland, Australia, New Zealand and South Africa.

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

At the completion of the 1926-27 contest year a production and identification chart was prepared and sent to each breeder giving him important detail in connection with the performance of his birds while in the contest. The information on the chart gave pen and bird number, the wing label numbers if she was the daughter of a second or third generation registered hen, the flock name and breeder's mark, also the tattoo mark if the bird was registered, the body weight of the bird, the number of eggs laid, points secured and average weight of eggs laid, and disqualifications if such were present.

With such complete information at hand the breeder should be prepared to act wisely in the mating up of his registered hens the following season. These charts are especially useful in determining the worth of a bird not only from her egg producing ability, but also from the standpoint of the size of egg and size of bird as well.

INSPECTION

During the year 1927 five registration inspectors have been employed in the work of inspection of registered stock. Assistance has also been given to these registration inspectors in British Columbia, Ontario and Quebec. In British Columbia a temporary appointment was made, while in Ontario assistance was given by the Poultry Exhibitor. In Quebec, J. D. Lang of the Lennoxville Station assisted in inspection work.

Inspections were made for the purpose of:—

1. Indentifying (by means of breeders registered tattoo marks) as qualified registered stock, the females mated for the season's hatchings.
2. Approving as to 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 labeling those pullets that are qualified to enter a 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.

As the work with registered poultry goes on from year to year it is interesting to know that intelligent effort on the part of the breeders to advance the quality of their stock is having its reward. The most successful breeders soon realized that their most hearty co-operation with the inspector in the carrying out the program as outlined was the surest and most rapid way to success. At the present time the fullest co-operation exists between the breeder and the inspector. The remark often heard is, "why does the inspector not make more visits to the flocks doing work under the Registration plan?"

To those most closely associated with the work it is clear that even at this early date (the fifth year of registration) the calibre of the breeder and the consistent performance of his birds is quite evident in the laying contests.

TABLE 31.—NUMBER OF REGISTERED HENS MATED AND CHICKS HATCHED 1927

—	Hens mated 1927	Chicks wing banded	Chicks wing labelled
Prince Edward Island	34	142	29
Nova Scotia	67	602	52
New Brunswick	121	1,353	179
Quebec	96	770	213
Ontario	381	4,612	759
Manitoba	70	371	37
Saskatchewan	28	347	60
Alberta	99	433	53
British Columbia	660	7,301	1,191
	1,556	15,931	2,573

During the 1927 hatching season 1,556 registered hens were mated to registered or approved males. From these matings 15,931 chicks were banded with official wing bands, an average of 10·2 chicks per hen. This was ·2 chicks less per bird than was produced the previous year from registered hens. The number of cockerels eligible for registration and pullets suitable to enter laying contests which were wing labeled totalled 2,573 birds.

There are now thirteen egg laying contests in Canada (at least one in each province), and with the assistance given to breeders through registration inspection, rapid progress is being made in poultry breeding work. Poultry breeders have been very optimistic as to the outcome of the registration policy and such sound judgment coupled with the fact that registered cockerels are now available for distribution to worth while breeders lends encouragement to the project and makes the work very captivating indeed.

FARM, EGG AND POULTRY ACCOUNTS

There is an ever increasing demand for the Farm, Egg and Poultry Account forms supplied by the Poultry Division, especially noticeable from amateurs starting into the poultry work and from boys' and girls' poultry clubs. It is also interesting to note that some of the first persons to submit these forms several years ago are still mailing the monthly reports regularly. This indicates that these poultrymen endeavour to keep closely in touch with their farm enterprise and consequently to carry on on a business basis.

In acknowledging the monthly reports received, the division forwards monthly circular letters of suggestions, stressing some important subjects for the month. This is followed by a personal letter provided that a study of the report reveals any conditions which call for comment. The correspondents are also invited to offer criticism and suggestions. This method improves the calibre of the work and as a correspondent writes: "By keeping my reports up to the minute, I imagine that I am a member of a coast to coast poultry club with a free correspondence course thrown in." This is one incident of many that go to show what the account forms are doing.

That the correspondence and the simple monthly forms supplied by the Poultry Division are often instrumental in stopping serious leakages and in greatly increasing the efficiency of poultry farm management is shown by the increased profits of the correspondents from year to year. The Farm, Egg and Poultry Account service serves as a systematic record of expenses, production and income showing up ways in which saving may be made. It is also advisable for the beginner, more especially the intending commercial poultry farmer, to take an inventory at the beginning of the poultry year, preferably November first. A balance sheet should also be made out at the close of the year.

This monthly report form service is available to poultrymen and farmers in all parts of Canada. The French monthly report form service is increasing steadily. Eighty-three French Canadian farmers are now making regular monthly reports. The following table gives a summary of the reports from twenty-two farms in different parts of Quebec.

TABLE 32.—SUMMARY OF MONTHLY REPORTS

—	1927	Four years 1923-24-25-26
Number of flocks	22	179 (total)
Average size of flocks	76	43
Breeds:—(flocks)—		
Barred Rocks	10	73 (total)
Rhode Island Reds	9	57
White Leghorns	2	9
White Wyandottes	.....	8
Chanteclers	.....	4
Hamburgs	.....	1
White Rocks	.....	4
Mixed	1	23
Average production per bird	125·6	115·4
Average profit per bird over cost of feed	3·79	3·39
Average yearly feed cost per bird	3·43	3·05
Average feed cost of eggs per dozen	0·29·4	0·32·1
Average selling price eggs per dozen	0·45·8	0·46·0

The highest average production recorded during the year was 199.1 per bird.

As will be noticed by the table, the average production, and average profit per bird, were higher in 1927, and the average feed cost of eggs per dozen was lower than the average for the past four years.

The increased production per bird is doubtless due to the culling that has been done, together with the introduction of male birds from high-producing strains.

A typical Poultry Division educational exhibit—Canadian National Exhibition.

FRENCH CORRESPONDENCE

The French correspondence continues to increase steadily and letters are received not only from the province of Quebec, but also from many French Canadians living in other provinces and in the United States. Several letters have come to hand from Italy, France, Belgium, Holland and Spain from men anxious to take up poultry farming in Canada. Correspondence with reference to poultry diseases has also been increased since last year.

DEMONSTRATIONS AND EXHIBITS

Attractive exhibits consisting of explanatory panels, models of poultry appliances, feeds, live birds, transparencies and appropriate legends, prepared by the Division of Extension and Publicity, were erected at various shows, notably the World's Poultry Congress, Ottawa, Central Canada Exhibition, Ottawa, Canadian National Exhibition, Toronto, Royal Winter Fair, Toronto, Amherst, N.S., Winter Fair, and fairs at Quebec, Montreal, Three Rivers, Maniwaki and many other places throughout Canada. These exhibits are proving as interesting and instructive as ever, judging by the number of visitors attending the shows and the numerous requests for literature. Demonstrations of killing and plucking were also put on at various winter poultry shows. As usual a small exhibit suitable for children was staged at the Annual Boys' Hobby Show at Ottawa.

WORK WITH POULTRY DISEASE

(In co-operation with Health of Animals Branch.) Report prepared by Dr. C. H. Weaver, Pathologist, Health of Animals Branch.

IMMUNIZATION AGAINST CHICKEN POX INFECTION BY MEANS OF INOCULATION

Observation of poultry flocks indicated that flocks which had been affected with chicken pox rarely if ever suffered a second attack, with perhaps but a rare individual exception. Clinical observation further indicated that pox (virus infection) disease among birds under summer range conditions where secondary (bacterial) infection was most unlikely, generally speaking, was not a very serious disease. Also among pens of layers where secondary infection was controlled by suitable means the virus disease though highly transmissible between birds was not a very serious cause of loss of production or mortality.

In order to obtain experimental evidence on the transmissability of the virus through cutaneous inoculation and the immunity if any that might be conferred by such inoculation the experiment herein described was undertaken.

In arranging the experiment an effort was made, so far as possible, to limit it to a virus inoculation by controlling the secondary bacterial infection. Particular attention was directed against the organism with which roup has been repeatedly reproduced in this laboratory, an organism frequently associated with pox lesions, and one of variable virulence more or less constantly associated with the normal mucosa of the upper respiratory tract. The medicinal prophylaxis previously reported which was found effectual in controlling these bacteria was administered to all birds, inoculated and controls, previous to the virus inoculation. Argyrol, 10 per cent aqueous solution, was instilled into the eyes, nostrils and throats in the usual way.

Thirty White Leghorn pullets that were normal except for a heavy intestinal parasitism, which if anything would predispose them to infection, were divided into two lots of fifteen birds each on November 1st. These are designated lot No. 1, subsequently inoculated, and lot No. 2 not inoculated.

PROPAGATION OF VIRUS

The virus used for inoculation was prepared by taking natural infection scab material that had been dried and ground in normal saline solution and applying the same to the scarified combs of cockerels. The resulting scab material from this inoculation was placed in thin layers in open glass containers, gauze covered and left exposed to permit complete drying of the product.

Pathogenic bacterial organisms, the secondary infectors commonly associated with pox lesions, are readily killed by desiccation and the scabs were thoroughly dried merely for the purpose of killing these organisms. By this means a fairly pure virus was obtained—so far as freedom from pathogenic bacteria is concerned—of a greater concentration and virulence than is usually possible to obtain by the filtration method.

PREPARATION OF THE INOCULUM

The inoculating material was prepared by grinding the dried scabs in normal saline solution until a fine division of the scabs was obtained. Sufficient fluid was added to permit settling of the heavier particles, but was used while much of the smaller particles were still in suspension, and of course the extractable portion of the scabs was in solution.

METHOD OF INOCULATION

Lot No. 1 was inoculated by removing six to ten feathers from the outer aspect of the feathered portion of the leg of each individual and applying the inoculation fluid to the areas with a cotton swab, infection being obtained through the open feather follicles. The skin was otherwise uninjured. The subjects were quite susceptible and the virus of good virulence as an examination seven days following inoculation showed all fifteen birds with the definite and characteristic swelling of the follicles seen in this form of inoculation with Pox virus. Later an inter-follicular cutaneous swelling developed and was accompanied by sero-sangumous fluid exuding from the follicles which dried, sometimes becoming confluent between follicles. Where scabs formed healing took place beneath them in the usual way, the dried scabs falling off leaving little or no evidence of the previous reaction and injury.

In addition to the already described reactions with uneventful termination one subject developed pox lesions about the head, became emaciated and was destroyed. The virus infection may have been entirely responsible for this condition, or the emaciation may have been partially the result of intestinal parasitism. Two other birds succumbed to causes entirely separate from the disease under consideration.

A time sufficient to permit complete recovery from the infection was permitted to elapse after which lot No. 1 birds were placed with lot No. 2.

INTRODUCTION OF INFECTION

Four cockerels were inoculated on the blade of the comb with a pox virus inoculum prepared in the same manner as that used on lot No 1 pullets and after lesions had sufficiently developed they were introduced into the pen con-

taining pullets, lots No. 1 and No. 2. Three days later one of the cockerels developed lesions due to bacterial infection and had to be removed. The three remaining cockerels were left with the pullets to the conclusion of the experiment.

RESULT UPON THE PULLETS

Pullets comprising lot No. 1, previously cutaneously inoculated, from the time of the introduction of the infected cockerels to the close of the experiment remained free of the disease, at no time showing any indication, or evidence of pox infection.

Pullets comprising lot No. 2 gave the following results:—

These pullets commenced showing unmistakable evidence of pox disease fifteen days after the introduction of the infected cockerels, and in twenty-three days nine birds had definitely sickened with the malady. An additional bird developed lesions twenty days later, making a total of 10 affected with pox. One death occurred from virus infection and the lesions resulting therefrom. One bird succumbed after apparently recovering from the virus infection with caseous mass formation in the trachea, mediastium and pericardium. Pox virus could not be demonstrated in this material by cockerel inoculation, though the birds were susceptible as shown by successful inoculation several weeks later with virulent scab material. The caseous material gave a pure culture of bi-polar bacillus, that possibly was permitted to develop through weakening of the bird due to the virus disease, with which it had but a short time previously suffered. Two additional pullets succumbed to disease conditions unassociated with this experiment. The disease followed its usual course in the remaining infected subjects, terminating in recovery.

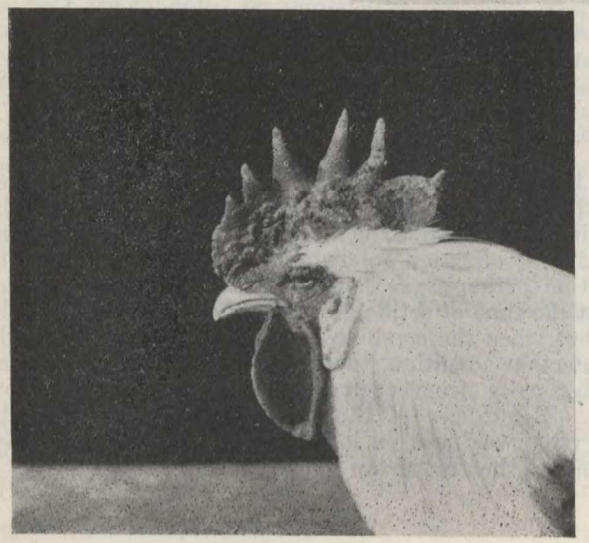
Summary—

Lot No. 1	15 birds	
Lot No. 2	15 "	
Date of inoculation Lot No. 1 birds, November 10. (Immunization.)		
Lots Nos. 1 and 2 combined January 7.		
Males inoculated January 24.		
Males placed with pullets, February 15.		
Pullets photographed March 25.		
Lot No. 1 (Immunized)—		
Pullets showing local reaction	15	
Pullets developing general infection	1	
Number dying of Pox	1	(?)
Number developing Pox after immunization	0	
Lot No. 2 (Natural infection)—		
Number developing Pox	10	
Number dying of Pox	1	
Experiment concluded May 6.		

This experiment would indicate that fowl may be inoculated with chicken pox virus through the feather follicles, that the cutaneous infection results in a high degree of immunity against subsequent natural source of infection, but there is a possibility of generalization following with undesirable results. This tendency to generalization perhaps was somewhat influenced by the very poor condition of the stock at the time of artificial infection. By the time of the second stage of the experiment when the combined lots of pullets were brought into contact with natural infection condition, the birds through proper feeding and care had improved physically from their earlier state resulting from unhygenic range conditions. Regardless of the stock, however, it must be remembered that a straight virus was used on lot No. 1 and was not as sometimes referred to as a vaccination, but rather an inoculation.

Lot No. 1 pullets were immunized against pox and remained free of the disease when introduced by means of infected cockerels.

Lot No. 2 pullets were not immunized against pox and developed the disease when introduced by means of infected cockerels.



Cockerels artificially infected with chicken pox by means of which the disease was introduced into the pen comprising pullets of lots Nos. 1 and 2.

TABLE 33.—AUTOPSY REPORT FOR THE POULTRY YEAR 1927

Disease	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Total
Roup and chicken pox						1							1
Roup only	10	2	3	12	8	1	3	3	5	3	3	11	64
Pox only				1	1						1		3
Diseases incident to egg production	1	6	6	5	12	9	15	20	20	20	13	12	139
Hemorrhage	4		1	5	2	2	6	8	7	5	3	12	55
Peritonitis	9	5	4	8	14	10	11	10	4	4	5	6	90
Paralysis or blindness or both	1	2	9	4	5	3	4	4	3	2	1	1	39
Parasitism-intestinal	15	23	20	10	10	10	22	51	33	64	38	44	340
Distended burse of fabrious				1				2	2				5
Tuberculosis	5	5	1	4	1	2	1	8	2	2	3	6	40
Leukemia	1	4	5		2	2	2	3	2	4	2	5	32
Vent gleet		1	1	1	1				2		1	1	8
Tumor	3	5	7	8	4	5	5	5	4	2	2	2	52
Cannibalism	1	4	2	1	8	10	4	2	1	1	1		35
Visceral gout	2	0	1		1	2	5	1	2	1			15
Avitaminosis	5	2	4	1	2	3	3	7	1	1	3	1	33
Digestive and liver trouble	2	2	2	6	7	184	179	35	47	16	3	2	485
Undetermined and decomposed specimens	4	2		3	11	12	20	28	20	20	6	11	137
Pericarditis		2	1		2		1	1	2	2	1		12
Para-typhoid infections		4	2	1	12	28	34	19	3	1		1	105
Miscellaneous	3	11	3	4	4	6	6	6	7	5	1	6	62
	66	89	72	75	107	290	321	21	316	715	387	121	1,752

The above table lists the specimens examined during the year under several disease headings, giving the number of cases of each disease by the month and the total for the year.

The total number of specimens received, examined and reported upon amounts to 1,752, which is 467 greater than the number for the preceding year.

Certain diseases according to this table show a relatively high percentage. It is particularly so with regard to Intestinal Parasitism wherein 340 individuals or 18 per cent of the total specimens, the cause of inquiry was directly traceable to this disease. Added to this number must be taken into consideration many specimens suffering from various disorders the development of which might be indirectly traceable to the subnormal physical condition resulting from parasitism. The high incident recorded this year is not an exception, for during the past four years covering 5,528 specimens there has been an average of 20·2 per cent due to this cause.

New plants as a rule do not suffer from this disease, but with the introduction of parasites in the original stock, with additional varieties of worms in subsequent purchases, and parasitic propogation resulting from methods of rearing the disease subsequently makes its presence felt. Propogation of the parasites is brought about by spreading the worm eggs from the faeces of infected fowl to the young stock either directly, as in the case of round worms, or indirectly through the intermediate hosts of the tape worms. The problems therefore becomes one of sanitation and hygiene.

If the specimens received at this laboratory are representative of the industry in general, it appears self evident that present methods are inadequate to cope with the control of this malady and that little actual progress is being made in that direction. Furthermore it becomes equally obvious that the methods of handling which have resulted in the propogation of this parasitic malady will need to be changed in order to effectually deal with the situation. Radical changes are undesirable and the plan adopted must be practical and applicable to the needs of the industry.

This laboratory working with the Branch Farms and through them to the industry by example, has been working on a broader scheme of sanitation with the object of breaking the life cycle of the parasites and thus produce disease free stock. To accomplish this demands strict care to prevent infesting the chicks during the indoor brooding period and the transfer of the growing stock at as early period as possible to clean land a sufficient distance from the main plant to prevent the spreading of the parasites by nature's methods, then the maintenance of these conditions by appropriate means.

It is gratifying to report that under this plan during the year one of the most badly infested Branch Farm flocks has been added to the list in which the young stock is being produced worm free.

In addition to the above, this laboratory is co-operating with a number of the Branch Farms in control work with *Bacillus pullorum* infection (Bacillary White Diarrhoea). The laboratory undertakes the diagnosis of the disease among the breeders by means of the agglutination test and the Farms aim to prevent the spread of infection to the young stock by removing the reactors from the flocks and by suitable sanitary precautions worked out or decided upon by the two agencies. A few commercial flocks are also included in the testing in a purely experimental way as a means of comparison between institutional and commercially controlled plants.

Considerable variations in the extent of the infection has been met with between different flocks, as might be expected. The work will be continued until such time as definite conclusions are arrived at. At this time, progressive report only can be made, one or two tests seemingly being followed by considerable reduction of mortality due to that cause. On two plants the reduction in the number of reactors with subsequent tests has not been in keeping with the average. One of these is a commercial flock where evidence indicates incomplete segregation from stock of other sources. The other is a departmental flock where the infection is fowl typhoid of a strain transmissible through the egg. This flock was badly infected and previous to control work suffered an extremely high chick mortality. Since testing, a marked improvement is recorded in the viability of the chicks, but a large percentage of birds continue to react.

During the year, 5,964 blood samples were submitted to agglutination tests. Several Farms were visited during the year in the interests of the work.

CO-OPERATION WITH OTHER AGENCIES

HEALTH OF ANIMALS BRANCH

The poultry disease work that is being conducted in co-operation with the Health of Animals Branch is producing good results. Dr. C. H. Weaver who is in charge of the work in this Division is producing valuable material of great assistance to the poultrymen of Canada. As soon as the new laboratory of the Health of Animals Branch is completed, additional patholigists are promised for the poultry work. This will no doubt make it possible to conduct needed investigations that up to the present have not been possible owing to the lack of pathologists and laboratory room.

CHEMICAL DIVISION

Considerable co-operative work has been conducted with the Chemistry Division in the analysis of feeds, tests of digestibility of feeds etc. The Chemistry Division always is willing to co-operate in experiments that are of interest to the poultry work.

ILLUSTRATION STATIONS

As has been the case for several years, the poultry work at the Illustration Stations is assisted by this Division. Hatching eggs and breeding stock are supplied under certain conditions. The Poultry Inpectors from time to time visit the operators of the Illustration Stations in company with the Supervisors and meetings are arranged at many of the Stations.

TOBACCO DIVISION

We are indebted to the Tobacco Division for our nursery rearing grounds for the past two years. The clover year in a three years' rotation in growing tobacco has been used by this Division with the best of results.

PROVINCIAL DEPARTMENTS

The fullest co-operation with the poultry departments of the provincial governments and the colleges is maintained. Assistance is secured from these, and this Division is always willing to assist them. The friendly attitude of all provincial authorities toward this Division is much appreciated and fully reciprocated.

NEW PROJECTS UNDERTAKEN DURING 1927

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P. 31. Rearing costs according to breed.
P. 40. Capons vs. roasters.
P. 35. Costs of producing capons.
P. 36. Comparison of breeds for capons.
P. 188. Potatoes vs. corn meal in fattening.
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