UNIVERSITY COLLEGE OF WALES
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DEPARTMENT OF AGRICULTURAL ECONOMICS

AN ECONOMIC STUDY OF SOME ACCREDITED POULTRY-BREEDING-ENTERPRISES IN WALES 1952-53.

by

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E. F. Nash.

June, 1954. Professor of Agricultural Economics.

C O N T E N T S.

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Summary.

There are indications that the death-rate in laying flocks has been increasing slowly during the past four or five years. The results of post-mortem examinations, carried out by the Ministry's Veterinary Investigation Officer at Aberystwyth, show that, during the past four years, the leucosis complex (including tumours) was the most important cause of death amongst fowls over 2 months old in Wales. High death- and culling-rates add substantially to the costs of egg-production; and it is the poultry breeders' responsibility to produce healthy high-quality birds, and thereby contribute to the establishment of a prosperous poultry industry from which they themselves must benefit.

The average profit per layer, for the 20 accredited breeding flocks in our sample for 1952-53, was 15s.1d. Fifteen farms showed profits ranging from 1s.9d. to 43s.6d. per layer and 5 showed losses ranging from 1s.9d. to 31s.6d.

Eight of the farms sold less than 33 per cent of their eggs for hatching but used a comparatively large number for home-hatching; 9 sold more than 33 per cent for hatching but used few for home-hatching; whilst 3 farms sold less than 33 per cent for hatching and used very few for home-hatching. In order to make as fair a comparison as possible of the profitableness of these three groups of farms, those showing very high and very low egg-yields were discarded so that the first group (group A) consisted of 5 farms, the second (group B) of 5 farms and the third (group C) of 3 farms.

Group A farms showed the highest average profit and current earnings per layer. Group C farms showed, on average, a heavy loss, or comparatively low current earnings, and taken as a whole were inefficient. In the first place they did not make full use of their labour. With the labour available they could double the size of their flock and thereby increase their returns to such an extent that their total costs would be covered or their current earnings would be more than doubled. Secondly, they did not make full use of their buildings and equipment which may well be capable of accommodating many more birds. Thirdly, they should, as a whole, be able to sell a larger proportion of their eggs for hatching and thereby increase their earnings.

Compared with group A, group B farms were also a little extravagant in the use of labour.

The largest portion of the income of all three groups of farms was derived from the sale of market eggs. The demand for hatching eggs is highly seasonal and 10 to 30 per cent of all eggs produced are unsuitable for hatching. Nevertheless, it appears that during the peak hatching season, when there is unlimited demand for hatching eggs, group A and, in particular group C farms, could increase their sales of them with advantage.

The production of day-old chicks and growing pullets is a highly remunerative pursuit, and on farms with an abundant supply of labour it can be undertaken with beneficial results. High rates of fertility and hatchability help to reduce costs in chick production and enhance the reputation of the breeder. There is little demand for day-old cockerels and demand for table-poultry is limited but, where a market can be found, table-poultry production can be a profitable supplementary enterprise. For those farmers who are interested only in fattening the surplus cockerels hatched in the spring, the most profitable age to slaughter is 17 to 18 weeks. But for those who wish to produce table-birds all the year round, 10-11 weeks is the age at which the highest profit is most likely to be attained.

The Poultry Industry in Pre-war Years.

Poultry farming in the twenties was profitable, a fact which encouraged large numbers of ex-servicemen, with little or no experience of this type of work, to try their hand in what appeared to be a comparatively

easy and worthwhile occupation. Poultry farms sprang-up rapidly all over the country and the demand for replacement stock increased correspondingly. The comparatively few established breeders had difficulty in meeting this accelerated demand for hatching eggs, chicks, pullets, and stock cockerels with the result that commercial egg-producers, inexperienced in the field of poultry-breeding and with little stock sense, were tempted to become breeders and, in addition, many large commercial hatcheries were set up. The policy of these inexperienced breeders was very simply the selection of birds with the highest egg-yields to their credit, irrespective of such factors as health and stamina. They disregarded the fact that the high egg-yield factor becomes fully evident only when it is present in healthy birds possessing a high degree of stamina.

The result of these unsound breeding practices was an ever-increasing death-rate amongst flocks throughout the country. This is made clear by the following table, which was presented in the Report of the Poultry Technical Committee of Great Britain in 1938.

Table 1.

Percentage Mortality in Four Large Egg-Laying Trials.

Year.	Trial. 1.	2.	3.	4.
	Per cent	Per cent	Per cent	Per cent
1926-27	4.1	6.6	9.6	7.0
1927-28	5.3	7.3	7.1	6.5
1928-29	6.8	7.1	7.8	5.5
1929-30	7.8	8.8	13.8	8.3
1930-31	7.9	10.7	12.3	9.0
1931-32	10.8	15.5	15.4	10.0
1932-33	11.2	14.8	15.4	9.6
1933-34	13.5	16.4	17.8	15.2
1934-35	14.8	20.0	23.1	17.3
1935-36	16.8	20.2	17.9	19.6
1936-37	17.5	21.3	21.2	19.6

A report* published in 1938 by this Department shows that the average death-rate was 22.3 per cent (of the average number in the laying flock) for 44 flocks in 1936-37 as compared with 19 per cent in 1935-36 and 17.7 per cent in 1934-35. During 1936-37 the flocks under study showed, as a whole, a depletion, through deaths and culling, of about 55 per cent of the original number of laying birds, and the financial loss thereby incurred amounted to no less than 3d. per dozen eggs produced or 16 per cent of total costs.

These figures indicate that the high rate of mortality amongst laying flocks was very serious and, by the early thirties, had become a heavy financial burden threatening to undermine the future prosperity and even the very existence of the poultry industry. The industry could not long survive if the production of diseased and inferior stock was allowed to continue.

The Poultry Technical Committee was appointed in 1935, on the recommendation of the Poultry Re-organisation Commission, with the following terms of reference:-

> "To consider the present methods of supply and distribution of hatching eggs, day-old chicks and breeding stock in Great Britain, both generally and with particular reference to the reduction of poultry mortality, and to make recommendations for the improvement of those methods."

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* Financial Results of 53 Poultry Farms in Wales, 1937-38, by J. H. Smith, M.Sc.

The recommendations made by this Committee were incorporated in the Poultry Industry Bill 1938. The various clauses of this Bill provided for the setting up of a Poultry Commission for the purpose of reviewing "matters relating to the maintenance and improvement of the health and quality of poultry stock and eggs for hatching and the production, marketing, and consumption of poultry and poultry products." Persons supplying fowls not intended for immediate slaughter, and/or fowls' eggs for hatching, would have to register with the Commission. The Commission would have the power to (a) make regulations for preventing the use of unsuitable fowls for breeding purposes and for requiring the notification of diseases, and (b) prohibit the distribution of fowls' eggs for hatching from diseased premises or from premises where the breeding stock was unsuitable. It would be required to prepare voluntary accreditation schemes for breeders of fowls and for hatcheries, in which the standards would be higher in certain respects than those required of other breeders and hatcheries. A Stock Improvement Advisory Committee would be set up to advise and assist the Commission on the discharge of its functions in relation to stock improvement.

These were the steps proposed to ensure the supply of sound healthy replacement stock for laying flocks in the immediate pre-war years. Unfortunately the Poultry Industry Bill, owing to the threat of war, was put aside and did not become law. But the Bill is of interest in that it indicates the trend of thought and of legislation and the kind of action which would have been taken to improve breeding had not the war intervened.

The Accredited Breeders' Scheme.

The seriousness of the mortality position became very apparent in the early thirties; and it was with a view to stemming its upward advance and encouraging the production of healthy stock of recognised or proven quality for replacement purposes, that the Ministry of Agriculture introduced the Accredited Breeders' Scheme in 1932. This scheme was purely voluntary and comparatively few breeders enlisted in it. It was not until the later war-years that this scheme became popular, largely as a result of the impetus given to it by the rationing system, which then allowed supplementary rations for approved stock.

Table 2.

Numbers of Accredited Breeders' Flocks in Wales.

County.	1939	1942	1944	1946	1948	1950	1951	1952	1953
Anglesey	-	-	3	3	4	4	4	3	4
Brecon	-	-	3	1	3	4	5	5	7
Caernarvon	4	6	10	10	34	42	39	37	38
Cardigan	-	3	6	12	16	18	18	16	15
Carmarthen	-	-	13	18	31	44	44	40	37
Denbigh	3	4	12	14	17	30	28	27	31
Flint	3	4	18	13	15	19	17	17	15
Glamorgan	-	3	17	23	32	42	40	41	37
Merioneth	-	-	-	3	2	7	7	6	7
Monmouth	6	7	8	11	15	21	19	17	18
Montgomery	-	-	5	11	19	28	27	27	26
Pembroke	-	-	8	9	18	26	26	23	22
Radnor	-	-	6	12	14	19	18	16	14
Wales	16	27	109	140	220	304	292	275	271

Table 2 shows that accredited breeders in the Principality numbered only 16 in 1939; but there were 109 by 1944 and their number continued to increase up to and including 1950, when the total was 304. Since then their numbers have shown a slight reduction each year to 271 in 1953.

The Accredited Breeders' Scheme became incorporated in the Poultry Stock Improvement Plan which was formulated in 1948. The main objects of this

Plan are to assist poultry keepers to obtain healthy, disease-free stock of good quality. There are two main schemes in the Plan, namely:-

(1) The Accredited Section. This includes poultry-breeding stations and hatcheries which can be classified as follows:

(a) Breeders' Grade, in which pedigree breeding is necessary and some trapping essential.

(b) Commercial Stock Suppliers' Grade in which good healthy stock, a reasonable level of egg production, or of carcase quality in the case of table-poultry, and low mortality, together with a good standard of management, are required, but no trapnesting is necessary.

(c) Accredited Hatcheries, which receive eggs only from accredited breeding stations and which satisfy the Ministry with regard to the standard of hygiene and condition of the building(s) and equipment.

(2) The Approved Section. This includes:

(a) Approved hatcheries which receive eggs only from accredited breeders and approved suppliers, provided their standard of hygiene and the condition of their building(s) and equipment are satisfactory.

(b) Approved suppliers who must satisfy the Ministry of their ability as rearers of poultry stock.

The Present Rate of Mortality Amongst Laying Flocks.

The results for our own survey of commercial egg-producing flocks in Wales show a considerable increase in deaths amongst laying birds in each of the years since 1949-50. For that year the average death-rate was nearly 10 per cent (of the average number of layers kept throughout the year) but by 1952-53 the mortality had more than doubled, having reached nearly 23 per cent.

Table 3.

Average Death-Rate Amongst Commercial Egg-Producing Flocks 1949-50 to 1952-53.

Year.	Number of Flocks.	Average Number of Layers per Flock.	Average Death-Rate.
			%
1948-49	10	175	13.7
1949-50	13	173	9.8
1950-51	19	184	12.0
1951-52	15	164	16.0
1952-53	14	250	22.8

It will be realised that our samples of farms during these years were very small and certainly not representative of Welsh farms generally. Nevertheless the following figures obtained from two leading Egg Laying Trials also show a tendency for the death-rate to increase during recent years, although not to the extent suggested by the figures in Table 3.

Table 4.

Year.	National Laying Test. 1st Year Section.	National Laying Test. 2nd Year Section.	Yorkshire Federation Laying Test.
	Per cent	Per cent	Per cent
1948-49	8.24	4.17	-
1949-50	9.38	5.00	-
1950-51	9.11	8.50	8.77
1951-52	9.85	12.86	9.36
1952-53	9.84	13.95	10.40

The importance of the death-rate from the financial standpoint is illustrated by the following table:

Table 5.

Losses from Deaths and Depreciation.

Initial No. of Layers.	No. at End of Year.	Average No. of Layers.	Average Death-Rate.	Average Egg* Yield per Layer.	"Cost" of Deaths and Depreciation. Per Layer.	"Cost" of Deaths and Depreciation. Per Dozen Eggs.	Per Cent of All Costs.
			%		s. d	s. d	Per cent
250	125	171	23	168	15. 3	1. 1	24.0
250	160	203	10	168	11. 9	0.10	18.5

* Average egg-yield of 14 dozen taken in both cases although it would probably be higher in flock showing only 10 per cent mortality.

With 250 pullets, each costing 18s. to rear to point of laying, an average death-rate of 23 per cent, and a total removal rate of 50 per cent of the initial number in the laying flock, the 'cost' of (or losses due to) deaths and depreciation amounts to about 15s. per layer (based on the average number of layers in the flock) or 1s.1d. per dozen eggs produced, and represents nearly one-quarter of the total costs of egg-production. The loss due to deaths alone amounts to about 3½d. per dozen eggs. With the average death-rate at 10 per cent and about 35 per cent of the hens removed during the 12 months, the average 'cost' of deaths and depreciation amounts to 11s.9d. per layer, 10d. per dozen eggs produced and 18.5 per cent of all costs. Losses through deaths at this rate would amount to 1½d. per dozen eggs.

Causes of Deaths.

The results of post-mortem examinations carried out by the Veterinary Investigation Officer at Aberystwyth show that, for the years 1950 to 1953 inclusive, about one-third of the deaths of fowls over 2 months old resulted from the leucosis complex, including tumours. Bacterial and virus diseases (including the salmonella group and T.B.) were responsible for between 10 and 20 per cent of deaths and egg-peritonitis for between 6 and 14 per cent. It is apparent that egg-peritonitis became less important in each successive year.

Table 6.

Causes of Deaths Amongst Fowls.*

A. Growing Fowls over 2 months, and Adult Stock.

	1950.	1951.	1952.	1953.
Number of Birds Examined	730	919	699	570
Nature of Disease:	%	%	%	%
Bacterial and Virus	10.4	18.7	13.4	14.0
Parasitic	3.1	1.8	10.6	9.5
Respiratory, Digestive, Nutritional and Excretory Systems	12.9	13.5	12.0	7.2
Reproductive Systems -				
(a) Egg Peritonitis	14.1	11.4	8.1	5.6
(b) Other Reproductive Diseases	0.7	0.7	1.2	0.2
Leucosis Complex Including Tumours	33.6	32.5	29.8	31.6
Miscellaneous	11.1	5.6	7.0	11.9
Undiagnosed	14.1	15.8	17.9	20.0
Total	100.0	100.0	100.0	100.0

B. Chicks up to 2 Months Old.

	1950.	1951.	1952.	1953.
Number of Chicks Examined	89	90	90	72
Nature of Disease:	%	%	%	%
Bacterial and Virus:-				
(a) Salmonella including B.W.D.	12.4	8.9	17.8	18.0
(b) Other Bacterial and Virus	-	4.5	6.7	1.4
Parasitic:-				
(a) Coccidiosis	43.8	22.2	12.2	25.0
(b) Other Parasitic	1.1	2.2	1.1	1.4
Nutritional	10.1	5.6	6.6	1.4
Chilling	11.2	2.2	-	7.0
Miscellaneous and Undiagnosed	21.4	54.4	55.6	45.8
Total	100.0	100.0	100.0	100.0

* Results of post-mortem examinations carried out by the Veterinary Investigation Officer, Ministry of Agriculture & Fisheries, Aberystwyth.

The leucosis complex takes several forms and very little is known about this disease. So far no particular treatment has been discovered; but certain control measures should be adopted where an outbreak occurs. Firstly, chicks should be kept separate from adult birds since, although the disease occurs most frequently as the bird approaches maturity and afterwards, infection can occur at the chick stage. Secondly birds should be reared on 'clean' ground. Thirdly only healthy resistant stock should be used for breeding; birds that have survived an outbreak of the disease are probably highly resistant.

The two most important causes of deaths amongst chicks under 2 months old were, firstly the salmonella group of bacteria, including B.W.D., which accounted for 9 to 18 per cent and, secondly, coccidiosis, deaths due to which represented from 12 to 44 per cent of all deaths amongst chicks.

The Importance of High-Egg-yields.

The importance of producing healthy stock has been emphasized; but capacity for high production, whether of eggs or of meat, is also a vital factor and must be coupled with good health and stamina. The economic

importance of attaining high egg-yields in commercial egg-production is illustrated by the following table, which refers to heavy breeds.

Table 7.

Food-costs and Profits at Various Levels of Egg Production (Heavy Breeds).

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Egg Yield per Layer per Annum.	Food Required per Layer for Maintenance and Production.	Food-Cost per Layer.	Food-Cost per Dozen Eggs.	Total Cost per Dozen Eggs.	Profit per Dozen Eggs.	Total Profit per Layer.
	lb.	s. d	s. d	s. d	s. d	s. d
120	92	23. 0	2. 3½	3. 9½	0. 2½	2. 1
140	94	23. 6	2. 0	3. 6	0. 6	5.10
160	96	24. 0	1. 9½	3. 3½	0. 8½	9. 5½
180	98	24. 6	1. 7½	3. 1½	0.10½	13. 1½
200	100	25. 0	1. 6	3. 0	1. 0	16. 8
220	102	25. 6	1. 4½	2.10½	1. 1½	20. 7½

Column 4 shows that the cost of food per dozen eggs varies inversely with the egg-yield, provided that the birds are fed according to their scientific requirements. The reason for this is that the food required for maintenance is constant whatever the egg-yield may be and consequently the higher the yield the larger the number of eggs over which this fixed food-cost is spread. With a ration containing 40 per cent home-grown grain the food-cost per dozen eggs is 2s.3½d. when the yield is 120, whereas it is only 1s.4½d. when the yield is 220. On the assumption that other costs are constant at 1s.6d. per dozen at all levels of production, and that the average price per dozen for market eggs is 4s.0d., the profit per dozen eggs is 2½d. at the 120-egg level but 1s.1½d. at the 220-egg level. Furthermore, in the latter case there are 8⅓ dozen more eggs available for sale than in the former and, consequently, the profit per layer is 20s.7½d. compared with only 2s.1d.

It is extremely difficult to ration each hen according to its performance; and it is usually the practice to ration on a collective basis, or even to feed ad lib. A poor layer may well consume as much, and sometimes even more food than a good layer, so that the food-cost per dozen eggs will be very much higher for the former than for the latter. It is essential, therefore, if the greatest economy in the use of foods is to be achieved that breeders should produce birds that have capacities for high egg-yields.

It is interesting to note that the results for our small samples of commercial egg-producing flocks show that the average egg-yield per layer has increased from about 120-125 during the war years to 175 in 1952-53. This does not mean that the average egg-yield for all flocks in Wales is now at such a high level, but there can be no doubt that a marked rise has occurred in the country generally and that accredited breeders have contributed to this improvement. The average egg-yield for our samples of accredited breeding flocks has increased from about 125 to 154 during the past 8 years.

The Role of Accredited Breeders Today.

The importance of the role of accredited breeders as suppliers of high-quality stock and hatching eggs cannot be over-emphasized. Especially is this the case today when the controls on the prices of eggs and poultry-meat and the subsidies on feeding-stuffs have been removed. These circumstances have served to make the economic environment less favourable to poultry farmers. Reasonable profits can be achieved only by efficient production, which means the attainment of the highest possible egg-yields or the production of the greatest possible quantity of meat at the lowest

possible cost per dozen or per lb. This can only be achieved by the use of sound, healthy stock with an inherent capacity for high egg-production or high food-conversion-rates and these can only be supplied by experienced breeders. In fulfilling their task conscientiously, accredited breeders are assisting to secure a reasonably prosperous future for our poultry industry, from which they stand to benefit as much as commercial egg-producers or specialist table-poultry producers.

FINANCIAL RESULTS FOR 20 ACCREDITED FLOCKS 1952-53.

Average results for all farms.

Attention must be drawn to the fact that, although the financial results are expressed per layer, the costs and returns actually include, in addition to those relating to the layers, those attributable to growing and mature stock intended for replacing the existing flock and/or for sale as replacement-stock or as table-poultry. The "per layer" basis has been adopted as a convenient one for the presentation of facts and for a comparison of the over-all results for individual flocks and for different types of business. In order to arrive at the profitableness of egg-production as distinct from that of "stock"-production, however, a costing method involving the separate recording of the costs and returns relating to each will have to be adopted.

Financial and other relevant information was obtained for 20 accredited breeding flocks in 1952-53. These flocks varied very considerably in size and also in their organization. The range in size of the laying flocks was from 91 to 576 layers.

The average results for all flocks are presented in Tables 8 to 10 in the text and Table II in the Appendix.

Table 8.

Average Costs per Laying Bird and per Dozen Eggs 1952-53.

Cost Items.	Per Laying Bird.	Per Dozen Eggs Produced.	Per cent.
	s. d	s. d	%
Food - Purchased	59. 3	4. 7½	64.5
Home-grown	2. 6	0. 2½	2.8
Total Cost of Food	61. 9	4.10	67.3
Labour - Hired	5. 4½	0. 5	5.9
- Family	10.11½	0.10	11.9
Other Costs	13. 9	1. 1	14.9
Total Costs	91.10	7. 2	100.0

Table 9.

Average Returns and Profit per Laying Bird and per Dozen Eggs 1952-53.

Sources of Returns.	Per Laying Bird.	Per Dozen Eggs Produced.	Per Cent.
	s. d	s. d	%
Total Returns from Eggs	70. 4½	5. 6	65.8
Total Returns from Poultry	33.10	2. 7½	31.6
Other Returns	2. 8½	0. 2½	2.6
Total Returns	106.11	8. 4	100.0
Total Costs	91.10	7. 2	-
Profit	15. 1	1. 2	-

The average profit per layer was 15s.1d., which was an improvement of 1s.9d. or 16 per cent on that for the previous year. Fifteen of the twenty farms showed profits whilst 5 showed losses for the year.

Table 10.

Distribution of Flocks According to Profit or Loss per Laying Bird, 1952-53.

Range in Shillings.	Number of Flocks.
Profit: Over 30	4
20 - 30	2
10 - 20	4
Up to 10	5
Total With Profits	15
Losses: 0 - 10	3
10 - 20	-
20 - 30	2
Total With Losses	5

Table 10 shows the distribution of the flocks according to profit or loss. Profits of up to 20s.0d. per layer were obtained from 9 flocks and of over 20s.0d. from 6 flocks. Of the five flocks on which losses were sustained, three showed losses of less than 10s.0d. per layer whilst for the other two the losses were between 20 and 30 shillings per layer. Table II in the Appendix presents some supplementary information essential for appreciating more fully the results given in the previous tables. The various factors affecting the financial position of these accredited breeding flocks are calculated as an average for all flocks; but the range for them all is also shown, so that the extent to which each of these factors varies on different farms may be fully realized.

Other points of interest illustrated by these average results for all flocks are:-

(1) The cost of food constituted just over two-thirds of the total cost and that of labour nearly 18 per cent. Comparatively little home-grown food was fed: with breeding flocks the feeding of purchased foods is more convenient, since these already contain, in the correct proportions, certain vitamins and minerals for promoting good hatchability.

(2) The sale and home- and farm-use of eggs accounted for two-thirds of the total returns. The sale of market-eggs alone contributed one-third and of hatching eggs one-quarter of the total returns.

(3) The value of poultry sold and consumed in the house represented just under one-third of the total returns. The sale of live poultry, i.e. day old chicks, growing and mature pullets and cockerels contributed nearly 18 per cent.

(4) The average egg-yield per layer was 154. The corresponding figure for our 1951-52 sample of flocks was 143.

The rate of winter-production was rather low (at 34 per cent) despite the high proportion of first-year layers. One reason for this is that the majority of flocks, in the interest of maintaining the health of breeding stock, are given free range of land, a practice which does not encourage high winter-production.

Different types of business organization.

An examination of the results for the individual farms revealed that they varied in their business organization and could be classified, broadly, into three groups or types of enterprises which we shall designate as groups A, B and C. The eight farms in group A, although they sold some hatching eggs, concentrated mainly on home-hatching and sold large numbers of day-old chicks, some growing and mature stock, and table-poultry. Group B farms, of which there were 9, were concerned mainly with the sale of hatching eggs during the hatching season, using comparatively few eggs for home-hatching. The three farms in group C sold fewer hatching eggs and used fewer for home-hatching than those in group B. The basis of the classification was the proportion of the total egg-production sold for hatching. Thus, group A consisted of those farms selling less than 33 per cent of their eggs for hatching. Group B farms sold more than 33 per cent of their eggs for hatching; whilst group C farms were exceptional in that, although they sold fewer hatching eggs than those in group B, they used very few for home-hatching either. Another point which should be explained is that farms showing very high or very low egg-yields had to be omitted from the comparison so that the average yields should be similar for the three groups - 162, 157, and 157 for groups A, B and C respectively. The three groups were now represented by 5, 5 and 3 farms respectively. Differences in costs, returns, and profits cannot be attibuted to differences in yield, and must be due to differences in the types of business pursued by these three groups of farms, or to differences in the quality of management of the farmers representing each group. The figures for food consumption rates, the utilization of labour and the rate of winter production, given in Table 11 below suggest that group A farmers were, on the whole, more efficient than group B and C farmers.

Table 11.

General Information.

	A.	B.	C.
Number of Farms	5	5	3
Number of Birds per Farm:	No.	No.	No.
Layers	328	370	151
1st Year Layers as % of Laying Flock	79	80	53
Growing Pullets	179	146	53
Growing Cockerels	93	54	7
Stock Cockerels	19	35	9
Chicks under 1 month	94	45	16
Feeding and Food Prices:			
Cwt. Fed per Layer	1.84	2.02	1.52
Cwt. Fed per Layer-Equivalent*	1.37	1.51	1.29
Home-grown Food as % of Total Food Fed:	14.9	9.1	Nil
Average Price per cwt. of Purchased Food	£1.13. 0	£1. 8. 6	£1.18. 9
Egg-Production and Prices:			
Egg Yields per Layer	162	157	157
% Eggs Laid in September-February	43.5	40.6	37.5
Winter-Production-Rate (per cent)	36	33	32
Summer-Production-Rate (per cent)	55	54	57
Average Price per Dozen Received for Market Eggs	4s.10d.	4s.10d.	4s.8½d.
Average Price per Dozen Received for Hatching Eggs	6s. 8d.	7s. 6d.	7s.4½d.
Labour - Hours per Flock per Day	4.9	5.4	5.0
Mortality - per cent	9.1	10.0	12.8

* 1 layer = 10 chicks under 1 month = 4 pullets 1-6 months = 3 cockerels 1-6 months = ¾ stock cockerel.

A comparison of the financial results for groups A, B and C.

The most striking feature illustrated by the tables giving the financial results for the three groups is the very wide difference in profit, whether measured per layer or per dozen eggs, as between the three. Group A shows an average profit of 29s.5d. per layer, group B an average profit of 15s.8d., and group C a very heavy loss of 17s.8d. But the total costs include such items as family labour and the depreciation on equipment which are not costs actually incurred during the year. It is true that the profit figure, which is arrived at by deducting total costs from total returns, is a useful guide to the financial position of farmers whose poultry are cared for wholly or to a large extent by hired labour, as was the case on three or four farms. On the majority of farms, however, the poultry were attended to almost wholly by unpaid family labour. Furthermore, to a farmer who has established himself in the business the depreciation of equipment is not an item which has to be paid for in actual cash each year, although its inclusion as an item of cost is justified in cases where the farmers are newcomers to the industry and have to meet heavy capital expenditure on new equipment. It will, therefore, be appreciated that the profit or loss figure does not represent the true financial position of all farmers; a loss does not necessarily mean that they have actually incurred a loss in cash. For these reasons it was decided to present, in addition to the average profit, the average current earnings: i.e. the excess of returns over current costs, current costs being the total costs excluding the value of family labour and the charge for depreciation of buildings and equipment.

The average current earnings per layer were highest for group A and lowest for group C. Owing to the fact that the poultry on group C farms were attended to more or less entirely by family labour, there was little or no charge for labour in the total current costs; and this fact, together with the omission of the depreciation charge on buildings and equipment, resulted in an excess of returns over current costs, or in other words in current earnings of 17s.6d. per layer, rather than the loss which was arrived at on the basis of total costs. The current earnings per layer were considerably higher than the profits per layer for groups A and B also; but the increase was not so great as for group C because, firstly, the poultry on group A and B farms were attended to by hired labour as well as by family labour, so that the current costs included an appreciable charge for hired labour; secondly, these farms were more efficient in the use of labour; and, thirdly, the depreciation charge on buildings and equipment was higher for group C than for the other two groups.

Costs.

Total costs were highest for group C the main reason being that this group, as a whole, was far too extravagant in the use of labour. All three farms in this group specialized in poultry keeping and only on one was any hired labour employed. Even in this case most of the work was done by family labour. It will be seen from Table 11 that group C, in which the average number of layers and other fowls was less than one-half of that in group A, used even more labour than did the latter.

These figures suggest that group C farmers, taken as a whole, could well double the size of their flocks. Their total returns would then be doubled also, and their total costs would just be covered (on the assumption that all costs, except labour costs, would be twice as high.) Their current earnings would be increased to 35 shillings per layer, and this could be achieved through merely making fuller use of what labour appears to be available on these farms. Since group A farms are concerned to a greater extent with home-hatching and rearing, one would expect them to have a higher labour requirement than those in group B. But the results for our sample show that, relatively to the average number of birds carried, group A farms used slightly less labour than group B farms, a point which suggests that labour costs could be reduced or the size of flock could be increased in the latter case.

Table 12.

Costs per Layer and per Dozen Eggs.

Group	Cost per Layer.			Cost per Dozen Eggs.			Percentage.		
	A.	B.	C.	A.	B.	C.	A.	B.	C.
	s. d	s. d	s. d	s. d	s. d	s. d	%	%	%
Food - Purchased	60. 7½	58. 2	58.11	4. 6	4. 5½	4. 6	64.5	71.0	59.4
Home-grown	3. 7	2. 4½	-	0. 3½	0. 2½	-	3.8	2.9	-
Total Cost of Food	64. 2½	60. 6½	58.11	4. 9½	4. 8	4. 6	68.3	73.9	59.4
Labour - Hired	5. 6½	4. 9	0. 1	0. 5	0. 4½	-	5.9	5.9	0.1
Family	7. 2	9. 6½	32.11½	0. 6	0. 9	2. 6	7.6	11.8	33.3
Hatching Eggs:									
Bought	-	-	-	-	-	-	-	-	-
Home-Produced	8. 8½	1. 7	0. 6	0. 8	0. 1	0. 0½	9.3	1.9	0.5
Livestock Purchased	2. 7½	1. 0½	2.10	0. 2	0. 1	0. 2½	2.8	1.3	2.9
Depreciation on Buildings and Equipment	1.11½	1.10½	2. 2½	0. 1½	0. 2	0. 2	2.1	2.3	2.2
Other Costs	3. 9½	2. 4	1. 7½	0. 3½	0. 2	0. 1½	4.0	2.9	1.6
Total Costs	94. 0	81. 8	99. 1½	6.11½	6. 3½	7. 6½	100.0	100.0	100.0
Total Current Costs*	84.10½	70. 3	63.11½	6. 4	5. 4½	4.10½	-	-	-

* Current Costs are Total Costs excluding Family Labour and Depreciation on Buildings and Equipment.

The cost of food per layer was highest for group A and lowest for group B. Food consumption per layer (see Table 11) was highest for group B because one farm in this group purchased large quantities of bakery-waste at a very low price. A comparison of cost or consumption on a "per layer" basis is not strictly fair because the three groups of farms have varying numbers of growing stock and stock cockerels and the food consumed by these are included in the "per layer" figures. But even when these other stock are taken into consideration and the food consumption is calculated per "layer-equivalent" the consumption-rate for group C is less than that for groups A and B.

About 15 per cent of the food fed by group A and 9 per cent of that fed by group B was home-grown whereas group C used no home-grown foods. Ninety per cent by weight of the foods purchased by group A farms consisted of expensive mashes and pellets compared with 73 per cent and 84 per cent for groups B and C respectively.

The value of home-produced hatching eggs was, of course, very much higher for group A farms.

It would be expected that the charge for depreciation of buildings and equipment would have been higher for group A, since it did far more home-hatching and rearing than the other two groups. In fact, this charge was only very slightly higher for group A than for group B, and for group C it was even higher than for group A. The following table shows the capital value of buildings and equipment for these groups of farms.

Table 13.

Capital Investment in Buildings & Equipment per Layer.

Buildings and Equipment:	A. s. d	B. s. d	C. s. d
General Equipment	0. 8½	1. 6	0. 6
Main Buildings	7. 3	9. 8	13. 9½
Hatching Equipment	5.10½	1. 2½	2. 6½
Rearing "	2.10½	3. 8	0. 9
Feed "	0. 8	0. 4	0. 8
Transport	0. 0½	0. 4	0. 1
Tools	0. 1	0. 1	-
Total Equipment	17. 6	16. 9½	18. 4

It must be pointed out that the figures for group A do not altogether represent current values. Three of the five farms have been co-operating since the war years or even longer, and the values of the older equipment, in order to make a fair comparison of the financial results from year to year, have not been brought up to date. Consequently the capital value figures for the different groups in the table are not strictly comparable. But when allowance is made for this discrepancy in values the general impression gained is that group A makes fuller use of its buildings and equipment than group C. In particular is this the case with regard to main buildings and hatching equipment. Group C farms could well increase the size of their flocks although it is difficult to say to what extent. Some additional rearing equipment would be required but certainly no additional labour.

"Other Costs", which were very much higher for group A than for groups B and C, consisted of items such as paraffin, veterinary and medicine costs, transport, carriage on hatching eggs and chicks, sexing and insurances.

Table 14.

Returns, Profit and Current Earnings per Layer and per Dozen Eggs.

Group	Returns per Layer. A.	Returns per Layer. B.	Returns per Layer. C.	Returns per Dozen. A.	Returns per Dozen. B.	Returns per Dozen. C.	Per Centage. A.	Per Centage. B.	Per Centage. C.
	s. d	s. d	s. d	s. d	s. d	s. d	%	%	%
Market Eggs	43. 9	35. 5½	43. 9½	3. 2½	2. 9	3. 4	35.4	36.4	53.8
Hatching Eggs Sold	14. 7½	37.11	24. 5½	1. 1	2.11	1.10½	11.8	39.0	30.0
Hatching Eggs Used on Farm	8. 8½	1. 7	0. 6	0. 8	0. 1½	0. 0½	7.1	1.6	0.6
Eggs Consumed in House	1. 2½	1. 6	1. 8½	0. 1	0. 1	0. 1½	1.0	1.6	2.1
Total Returns from Eggs	68. 3½	76. 5½	70. 5½	5. 0½	5.10½	5. 4½	55.3	78.6	86.5
Table-Poultry	17. 8½	4. 6	0. 5	1. 3½	0. 4½	0. 0½	14.3	4.7	0.5
Old Hens and Culls	4. 6½	5. 3½	6. 0	0. 4	0. 5	0. 5½	3.7	5.4	7.4
Poultry Consumed in House	0. 5½	0. 8½	0. 5½	0. 0½	0. 0½	0. 0½	0.4	0.7	0.6
Cocks, Pullets and Chicks	27. 0	6. 8½	0. 6½	2. 0	0. 6	0. 0½	21.9	6.9	0.6
Total Returns from Poultry	49. 8½	17. 2½	7. 5	3. 8	1. 4	0. 7	40.3	17.7	9.1
Other Returns	5. 5	3. 8	3. 7	0. 5	0. 3	0. 3	4.4	3.7	4.4
Total Returns	123. 5	97. 4	81. 5½	9. 1½	7. 5½	6. 2½	100.0	100.0	100.0
Total Costs	94. 0	81. 8	99. 1½	6.11½	6. 3½	7. 6½	-	-	-
Total Current Costs*	84.10½	70. 3	63.11½	6. 4	5. 4½	4.10½	-	-	-
Profit or Loss	29. 5	15. 8	-17. 8	2. 2	1. 2	- 1. 4	-	-	-
Current Earnings	38. 6½	27. 1	17. 6	2. 9½	2. 1	1. 4	-	-	-

* Current Costs are Total Costs excluding Family Labour and Depreciation on Buildings and Equipment.

Returns.

The average total returns per layer for groups A, B and C respectively were 123s.5d., 97s.4d., and 81s.5½d., as is shown in Table 14. For each group the sale and farm- and home-use of eggs contributed the largest portion of these returns - 55 per cent of the total returns for group A, 79 per cent for group B and 87 per cent for group C.

The returns from eggs varied according to the use made of them. Owing to the very much higher price of hatching eggs, compared with that for market eggs and the charge made for eggs used on the farm, the larger the number sold for hatching, the higher the returns. Furthermore, the higher the rate of winter production the more eggs would be sold during the high-priced winter period and again, therefore, the higher the returns. Since the average egg-yield per layer was roughly similar for all these groups, group B showed the highest returns from eggs per layer because, on average, farms in this group sold 39 per cent of their total egg-production as hatching eggs compared with 26 per cent by those in group C and only 16 per cent by group A farms. Groups B and C farms were probably more skilful than group A farms in the marketing of their hatching eggs; and they received a higher price for them, as is shown in Table 11.

The important point illustrated by the tables is that even farms in groups A and B have to rely on the sale of market-eggs for the larger portion of their returns. The hatching season is limited to the first five months of the year and, even during the peak hatching months of February, March and April, all eggs cannot be used or sold for hatching purposes owing to the unsuitable size and quality of some of them. The percentage of unsuitable eggs varies from about 10 to 30. During the remainder of the year all, or almost all, eggs must be sold for human consumption. Group C sold just over 70 per cent of their eggs for human consumption; whereas group A sold 67 per cent and group B 56 per cent for this purpose.

Table 15.

Proportional Uses and Returns from Eggs.

	% of Total Production.			% of Returns from Eggs.			% of Total Returns.		
	A.	B.	C.	A.	B.	C.	A.	B.	C.
Hatching Eggs Sold	16.4	38.7	25.6	21.4	49.6	34.7	11.8	39.0	30.0
Hatching Eggs Home-Hatched	14.5	2.4	0.9	12.8	2.0	0.7	7.1	1.6	0.6
Market Eggs Sold	67.2	56.4	70.9	64.1	46.4	62.2	35.4	36.4	53.8
Eggs Used in House	1.9	2.5	2.6	1.7	2.0	2.4	1.0	1.6	2.1

Table 16.

Seasonal Disposal of Eggs.

	Group A.			Group B.			Group C.		
Month.	Sold & Used as Market Eggs.	Sold as Hatching Eggs.	Used for Home-Hatching	Sold & Used as Market Eggs.	Sold as Hatching Eggs.	Used for Home-Hatching	Sold & Used as Market Eggs.	Sold as Hatching Eggs.	Used for Home-Hatching
Jan.	50.6	20.0	29.4	40.0	55.7	4.3	80.5	19.5	-
Feb.	25.0	37.8	37.2	19.2	76.4	4.4	46.9	53.1	-
Mar.	25.8	35.3	38.9	19.0	71.8	9.2	41.1	58.9	-
April	40.5	31.8	27.7	33.7	64.9	1.4	41.1	53.7	5.2
May	80.4	14.9	4.7	68.9	30.0	1.1	70.1	29.1	0.8
June	91.6	6.9	1.5	71.7	28.3	-	99.6	-	0.4
July	93.3	6.7	-	66.6	33.4	-	71.8	28.2	-
Aug.	92.6	7.4	-	88.1	11.9	-	100.0	-	-
Sept.	100.0	-	-	100.0	-	-	100.0	-	-
Oct.	100.0	-	-	100.0	-	-	100.0	-	-
Nov.	95.1	4.9	-	96.3	3.7	-	100.0	-	-
Dec.	83.0	6.9	10.1	87.0	10.3	2.7	100.0	-	-
Average	69.1	16.4	14.5	58.9	38.7	2.4	73.5	25.6	0.9

It will be seen from Table 16 that during the first eight months of the year, group B farmers sold as hatching eggs and used for home-hatching a larger percentage of their total egg-production than did groups A and C. During February and March, the peak hatching months, group B farmers sold or used for this purpose just over 80 per cent of their total egg-production, whereas the corresponding figures for groups A and C were 75 per cent and under 60 per cent. There is a great demand for hatching eggs during these two months and there seems to be no reason why groups A and C should not be able to increase their sales of hatching eggs during this period so as to bring their total eggs sold and used for hatching to figures comparable with those of group B farms. In the case of group C farms generally, they could well increase the volume of home-hatching and thereby make fuller use of the available equipment.

The greater emphasis placed on home-hatching and stock-production by group A farmers is reflected in the greater volume of returns from poultry for this group. Their average returns from poultry were nearly 50s.0d. per layer or 40 per cent of the total returns; whereas for group B the average returns from poultry per layer were 17s.3d. or 17.7 per cent of total returns, and for group C only 7s.5d. or 9.1 per cent. These returns from poultry comprised, in addition to the receipts from the sale of live-stock, receipts from the sale of table-poultry and old hens and culls and the value of poultry consumed in the house.

Table 17 shows very wide differences in returns from the sale of day-old chicks, growing pullets and also table-poultry for the three groups. In the first place neither group B nor group C sold any day-old chicks; whereas group A sold 1,908, nearly 75 per cent of them being pullets. There is very little demand for cockerels, and a large number have to be destroyed at day-old. The receipts from these day-olds alone averaged 16s.2d. per layer, or 13 per cent of total returns. Group A farmers, with a laying flock of 328 birds, sold 321 growing pullets which realized nearly 9 shillings per layer; group B farmers, with a slightly larger laying flock, sold only 181 growing pullets, the returns from which averaged 5s.2d. per layer. Group C farmers sold only 4 growing pullets. The differences in the prices received by the three groups for these pullets appeared to be due to differences in the ages of the birds.

Table-poultry figured fairly prominently in the business of group A farms, but was less important in that of group B farms and negligible on group C farms. The sales of table-birds contributed to total returns to the extent of 14 per cent, 5 per cent and less than 1 per cent for these three groups respectively. "Table-poultry" included young cockerels kept specifically for table purposes and also a comparatively few culled pullets. There is a general complaint amongst poultry farmers that there is very little demand for table-poultry and very little encouragement to pursue this business on a large scale. Profits 'per bird' are small and, to be worthwhile, they must be produced in large numbers. Consequently group A, selling 369 table birds, probably made a much higher profit than group B, which sold only 122.

"Other Returns" consisted almost entirely of appreciation on poultry.

Table 18 shows the average current earnings and the average profit per £100 expenditure, per man-hour (hired and family labour), per £100 food, and per £100 capital. It further illustrates the more favourable financial results obtained by group A farms. The most interesting figures are those showing the profit per man-hour and per £100 food. The profit per man-hour for group A was almost double that for group B, and the profit per £100 food was nearly 75 per cent greater.

Table 17.

Sales and Returns from Poultry.

	Number Sold per Flock.			Price per Head.			Returns per Layer.			Per Cent of Total Returns.		
	A.	B.	C.	A.	B.	C.	A.	B.	C.	A.	B.	C.
	No.	No.	No.	s. d	s. d	s. d	s. d	s. d	s. d	%	%	%
Growing Cockerels	98	45	-	5. 3	6. 2½	-	1. 6½	0. 9	-	1.3	0.8	-
Stock Cockerels	1	4	1	35. 0	16. 0½	25. 0	0. 1½	0. 2	0. 2	0.1	0.2	0.2
Mature Pullets	2	9	-	25. 0	23.10	-	0. 2	0. 7½	-	0.2	0.6	-
Pullets 1-6 months	321	181	4	9. 2	10. 8	12.10	8.11½	5. 2	0. 4½	7.3	5.3	0.4
Day-old Chicks:												
Pullets	1434	-	-	3. 3	-	-	14. 3	-	-	11.5	-	-
Cockerels	170	-	-	0. 6	-	-	0. 3½	-	-	0.2	-	-
Mixed Sexes	304	-	-	1. 9½	-	-	1. 8	-	-	1.3	-	-
Table-Poultry	369	122	3	15. 8½	13. 8	19. 6	17. 8½	4. 6	0. 5	14.3	4.7	0.5
Old Hens and Culls	149	228	96	10. 0	8. 6	9. 5½	4. 6½	5. 3½	6. 0	3.7	5.4	7.4
Poultry Consumed in House	13	24	8	11.11	10. 8	8.10	0. 5½	0. 8½	0. 5½	0.4	0.7	0.6
Total	2861	613	112	-	-	-	49. 8½	17. 2½	7. 5	40.3	17.7	9.1

Table 18.

	Per £100 Current Costs.	Per Man Hour.	Per £100 Food.	Per £100 Capital.
Current Earnings:	£. s. d	£. s. d	£. s. d	£. s. d
Group A	45. 7. 3	0. 7. 1	59.19. 8	114. 0.10
" B	38.17. 0	0. 5. 1	45. 6. 4	67.10. 8
" C	27. 8.10	0. 1. 5	29.15. 8	41.13. 3
	Per £100			
Profit:	Costs.			
Group A	31. 4. 5	0. 5. 5	45.14. 8	86.19. 1
" B	19. 7. 7	0. 2.11	26. 5. 9	39. 3. 8
" C	-17.16. 2*	-0. 1. 5*	-29.19. 3*	-41.18. 4*

* Loss.

Chick-Production and Pullet-Rearing Versus the Sale of Hatching Eggs.

Tables 14 and 18 have clearly indicated that group A farms, i.e. those that produce a large number of day-old-chicks and growing pullets, were more profitable than those that produced fewer stock and sold a comparatively large number of hatching eggs. The more profitable results for group A farms were, as has already been indicated, partly the result of more efficient management; but they were probably also very much due to differences in the type of business pursued. It seems that livestock production is a more profitable pursuit than the production of hatching eggs for sale.

The relative profitableness of chick-production and hatching egg-production is illustrated by the following estimates of the profits, per dozen hatching eggs produced, derived from (a) the sale of day-old pullets and (b) the sale of hatching eggs. It is estimated that, after allowing for costs relating to growing stock, the cost of producing hatching eggs is 5s.9d. per dozen. The cost of producing day-old pullets is derived from the results obtained on four farms in 1951-2.

Table 19.

Sale of Hatching Eggs.	s. d	Sale of Day-old Pullets.	s. d
Cost of Hatching Eggs per Dozen	5. 9	Cost per Pullet at Day-old*	2. 0
		Assuming that 30 Vigorous Pullets are Hatched from 100 Eggs, Cost of 30 Day-old Pullets	60. 0
Sale Price	7. 3	Returns from 30 day-old Pullets at 3s.3d. each	97. 6
Profit per Dozen Hatching Eggs Sold	1. 6		
		Profit per 100 Hatching Eggs Set	37. 6
		Profit per Dozen Hatching Eggs Set	4. 6

* It is assumed that all the cockerels are killed and therefore the cost per pullet at day-old is twice the cost per vigorous chick hatched.

The figures in Table 19 indicate that, when hatching eggs are sold at 7s.3d. per dozen, the profit per dozen is 1s.6d.; but when these eggs are home-hatched, and day-old pullets are sold, the profit is 4s.6d. per dozen hatching eggs produced or set. This must be the main reason why group A farms proved more profitable than those in groups B and C. The extra capital and labour involved in chick-production is amply remunerated, a fact which is borne out by the figures in Table 18.

As is illustrated in the following table, if the labour is available, and if customers can be found, pullet-rearing can, with reasonable luck, be a highly profitable pursuit. It does, however, involve more risk and a heavy outbreak of disease may result in a financial loss.

Table 20.

Estimated Costs of Rearing Pullets to Various Ages, and Profits per Head and per Dozen Hatching Eggs Set.

Age of Pullets.	Estimated Cost of Rearing* per Head.	Sale Price per Head.	Profit:- Per Pullet Sold.	Profit:- Per Dozen Hatching Eggs Set.
	s. d	s. d	s. d	s. d
Day-old	2. 0	3. 3	1. 3	4. 6
4-weeks	3. 6	6. 0	2. 6	8. 5
8 "	6. 0	11. 6	5. 6	17. 9
12 "	8. 6	15. 6	7. 0	21.10
16 "	11. 6	19. 0	7. 6	23. 2
20 "	14. 6	22. 0	7. 6	23. 8
24 "	18. 6	26. 0	7. 6	22. 6

* These figures are based on the assumption that 30 vigorous pullets are hatched from 100 hatching eggs set and that 5 of these die up to the 24-week stage.

The above figures indicate that the highest profits from pullet-production are attained when the birds are sold at 12 to 24 weeks old. The 12-week stage appears to be the most advantageous because the profit per bird at that stage is almost as much as at 16-24 weeks; a smaller floor-space per bird and less capital equipment is required and a larger turnover is possible.

Fertility and Hatchability.

The fertility and hatchability of the hatching eggs produced are important to poultry-breeders for several reasons. Firstly, high levels of fertility and hatchability reduce the cost of chick-production, since the overhead costs per chick and, consequently, the total costs per chick vary inversely with the number of chicks produced. Again, the more chicks are available for sale, the greater are the total returns derived from them. Finally, a farm with high fertility and hatching rates will enhance its reputation as a source of high-quality hatching eggs and stock with the result that the demand for its products will increase and they will command the highest prices. Fertility should be in the region of 75 to 80 per cent and hatchability should not be less than 85 per cent of the fertile eggs or 65 per cent of all eggs set.

The following table gives the costs of hatching 5,000 eggs. These are derived from the results obtained on four farms in 1951-52, adjusted to allow for the higher cost of hatching-eggs. It shows the number of chicks hatched from 5,000 eggs set at various levels of hatchability. It also shows the cost per 100 chicks hatched, the profit per 100 chicks and the total profit from all chicks hatched at the various levels of hatchability.

The total cost of hatching 5,000 eggs is the same whatever the hatchability; but the higher the hatchability the more chicks are hatched and, therefore, the higher the returns and the higher the profit. When costs and profits are measured on the "per chick" or "per 100 chicks basis", then

Table 21.

Cost per 100 Chicks, Profit per 100 Chicks, and Total Profit from 5,000 Hatching Eggs Set at Various Levels of Hatchability.

Number of Eggs Set	Total Cost of Hatching.	Hatchability Per cent.	Number of Chicks Hatched.	Cost per 100 Chicks.	Profit per 100 Chicks at Value of £8 per 100.	Value of all chicks at £8 per 100.	Total Profit
	£.			£. s. d	£. s. d	£. s. d	£. s. d
5,000	143	50	2,500	5.14. 6	2. 5. 6	200. 0. 0	57. 0. 0
5,000	143	55	2,750	5. 4. 0	2.16. 0	220. 0. 0	77. 0. 0
5,000	143	60	3,000	4.15. 4	3. 4. 8	240. 0. 0	97. 0. 0
5,000	143	65	3,250	4. 8. 0	3.12. 0	260. 0. 0	117. 0. 0
5,000	143	70	3,500	4. 1. 8	3.18. 4	280. 0. 0	137. 0. 0
5,000	143	75	3,750	3.16. 4	4. 3. 8	300. 0. 0	157. 0. 0
5,000	143	80	4,000	3.11. 6	4. 8. 6	320. 0. 0	177. 0. 0

it is apparent that there is a double advantage to be gained from a high hatchability. Not only is the cost per 100 chicks lower and the profit per 100 chicks higher, but also the larger number of chicks hatched adds still further to this profit. Thus, with the total cost of hatching 5,000 eggs at £143, and the value of day-old chicks as hatched at £8 per 100, the total profit, with hatchability at 50 per cent, is £57. When hatchability is at the average level of 65 per cent the total profit is £117, and when it is at 80 per cent the total profit is £177. When the level of hatchability is at 36 per cent the value of the chicks hatched is only just enough to cover the cost of hatching.

It is believed that fertility is not an inherent characteristic but that the factors affecting it, e.g. constitutional vigour, are inherited. Although it is known that the factor for hatchability is inherent, this too is dependent on constitutional vigour. It is important, therefore, that breeding birds should be fed properly, in order that they may build up a healthy vigorous constitution and so attain the highest possible fertility and hatching rates. Secondly, it is important to keep records of the fertility and hatching rates of breeding males and females, so that only those which show satisfactory results are kept for further breeding. Another point of economic importance is that fertility is fairly constant throughout the season and from year to year. Breeders, therefore, can and should dispose of birds giving low fertility early in the season, since they are unlikely to improve later. Again, cold and windy weather has an adverse effect on fertility, because under these conditions birds are less active; and for this reason breeding stock fed on open range should be given adequate protection.

Profitable Table-Poultry Production.

Food is the most important item of cost in table-poultry production. It represents from 70 to 80 per cent of the total costs and, consequently, the efficient conversion of food into poultry-meat is the primary factor to be considered if success is to be achieved. The bigger the bird the more food it requires for maintenance. The food-conversion rate therefore declines as the age of the chicken increases i.e. the older the bird the more food it requires to produce 1 lb. of meat. The younger the bird the more efficient it is as a converter of food into meat.

An experiment carried out under the supervision of Dr. Coles, Chief Poultry Officer of the Ministry of Agriculture and Fisheries, showed that, with heavy breeds, the growth rate of cockerels began to decrease after about the 10th week. At the same time the food-conversion rate began to show a more marked decline and the carcase quality of the birds began to deteriorate. Broadly the decline continued until after the 16th week, when these three

factors showed improvement.* Table 22 gives the average weight per bird, the weekly food-conversion rate and the cumulative food-conversion rate per lb. gain, the weekly food cost and the cumulative food cost per lb. gain.

Table 22.

Cumulative Food Costs, in Pence, of Producing 1 lb. Liveweight at Successive Weekly Stages, and Food Costs of Producing 1 lb. Liveweight Each Week for 20 Weeks. (a)

Week.	Number of Birds Alive at end of Week.	Average Weight of Birds, lb.	Weekly food-conversion rate per lb. gain. (b)	Cumulative food-conversion rate. (c)	Weekly Food Cost. Pence per lb. (d)	Cumulative Food Cost. Pence per lb. (e)
6	671	1.389	3.069	2.481	13.15	10.63
7	671	1.821	3.073	2.621	13.16	11.23
8	671	2.320	3.145	2.734	13.48	11.71
9	670	2.783	3.692	2.888	15.81	12.37
10	666	3.281	4.125	3.065	17.67	13.13
11	661	3.728	4.982	3.258	21.33	13.96
12	659	4.191	5.238	3.461	22.45	14.49
13	658	4.590	6.603	3.725	28.29	15.96
14	656	4.782	13.704	4.086	58.72	17.51
15	58	4.850	10.600	4.604	45.42	19.72
16	58	5.125	10.402	4.924	44.57	21.09
17	58	5.573	5.635	5.000	24.14	21.42
18	58	5.869	9.514	5.213	40.76	22.33
19	58	6.050	14.619	5.493	62.64	23.53
20	56	6.275	11.000	5.788	47.13	24.80

(a) "Production of Table Poultry" by R. Coles. Journal of the Science of Food and Agriculture, Vol. 4, No. 11, pp. 532-539.

(b) The weekly food-conversion rate is determined by dividing the amount of food consumed in one week by the weight increase recorded during that week.

(c) The cumulative food-conversion rate is determined by dividing the total amount of food consumed from the beginning of the experiment up to the end of any one week by the total weight of the birds at the end of the same week.

(d) The weekly food cost is determined by multiplying the cost of 1 lb. of food by the quantity of food in lb. required to produce 1 lb. liveweight during any one week.

(e) The cumulative food cost is determined by multiplying the cost of 1 lb. of food (valued at 40/- per cwt.) by the quantity of food in lb. required to produce 1 lb. liveweight by the close of any one week.

It is apparent that the decline in the food-conversion rate became more marked after the 10th week and in particular during the 14th week when, at 13.704 lb. it was less than half that for the 13th. This decline is obviously reflected in corresponding increases in costs. For example during the 11th week the increase in food cost per lb. liveweight gain was (21.33 - 17.67) 3.66 pence compared with 1.86 pence during the 10th week or 2.33 during the 9th. The increase in the 12th week was comparatively small; it

* It must be pointed out that the total number of birds was about 680 at the commencement of the experiment, but after the 14th week the number was drastically reduced to only 58. The results for the 15-20 week period, therefore, are not so reliable as those obtained prior to this period, but it is claimed that they do reflect what happens, generally, during these stages in table-poultry production.

was more marked in the 13th, and during the 14th the food-cost per lb. liveweight gain was actually more than double the corresponding cost for the 13th week. There was a heavy reduction during the 17th week. These changes were reflected, although not to such a marked degree, in the cumulative food-conversion rates and the cumulative food costs per lb. liveweight gain up to the end of the particular weeks mentioned.

The figures suggest that it becomes increasingly disadvantageous to slaughter after the 10th week and in particular during the 14th, 15th and 16th weeks and again after the 17th. The most desirable stages for slaughter are at 10-12 weeks or 17-18 weeks. Now at 10 weeks the cost of food amounts to 3s.7d. and the total costs to 4s.9d. per bird weighing $3\frac{1}{3}$ lb. liveweight. At an average price of 2s.6d. per lb. liveweight this bird will fetch 8s.2d., leaving a profit of 3s.5d. At 17 weeks the cost of food is 10 shillings and total costs about 13s.3d. At this age the bird weighs just over $5\frac{1}{2}$ lb. and at an average price of 3s.6d. will fetch 19s.6d., leaving a profit of 6s.3d. per bird as compared with only 3s.5d. for the 10-week bird.

For a farmer who is concerned merely with fattening his surplus cockerels it appears, therefore, that the 17- or 18-week bird is the more profitable; but for a farmer who intends producing table-poultry throughout the year there are two other points to be considered. The first is that, owing to their smaller size, the number of 10- or 11-week birds that can be produced in a given space will be at least twice the number of 17- or 18-week birds that can be produced there. The second is that at least three batches (probably four) of the younger birds can be produced in the year as compared with only two batches of the older birds. In a 750 cubic-foot house, therefore each batch of 17- or 18-week birds will consist of about 300, so that about 600 will be turned out during the twelve months. In the same space 600 ten- or eleven-week birds per batch can be kept: i.e., at least 1,800 birds can be produced during the twelvemonth. The following table illustrates the difference in profit that will probably be obtained by slaughtering at these two stages respectively.

Table 23.

Age.	Average Live-weight per Bird.	Number per Batch.	Number of Batches per Year.	Total Number of Birds Sold.	Profit per Bird.	Total Profit.
Weeks	lb.				s. d	£. s. d
10	3.281	600	3	1,800	3. 5	307.10. 0
17	5.573	300	2	600	6. 3	187. 4. 0

Moreover, the above figures do not take into consideration the fact that the overhead costs will be slightly reduced from the larger number of small birds, so that the total profit on them will be slightly higher than the table indicates.

Table-poultry, produced on deep litter, require comparatively little labour; a batch of 300 or 400 birds would not take up more than 30 to 40 minutes per day.

APPENDIX A.

ACCREDITED POULTRY-BREEDING ENTERPRISES.

Table No.

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Table I.

CAUSES OF DEATHS AMONGST FOWLS*.

A. Growing fowls over 2 months, and adult stock.

	1950.	1951.	1952.	1953.
Number of Birds Examined	730	919	699	570
Nature of Disease:-	Per Cent.	Per Cent.	Per Cent.	Per Cent.
1. Bacterial & Virus:-				
(a) Salmonella	4.0)	14.4)	9.3)	9.1)
(b) Other Bact. or Virus	2.4)10.4	1.4)18.7	1.7)13.4	2.1)14.0
(c) T.B.	4.0)	2.9)	2.4)	2.8)
2. Parasitic:-				
(a) Coccidiosis	2.3	1.6	7.9	8.4
(b) Other Parasitic	0.8	0.2	2.7	1.1
3. Respiratory System	1.5	0.8	1.6	0.5
4. Digestive System	5.3	8.8	6.0	2.5
5. Nutritional	1.4	-	-	-
6. Excretory	4.7	3.9	4.4	4.2
7. Reproductive System:-				
(a) Egg Peritonitis	14.1	11.4	8.1	5.6
(b) Other Repr. Disease	0.7	0.7	1.2	0.2
8. Tumours	11.8)	30.7)	26.0)	14.7)
9. Leucosis Complex	21.8)33.6	1.8)32.5	3.8)29.8	16.9)31.6
10. Undiagnosed	14.1	15.8	17.9	20.0
11. Miscellaneous	11.1	5.6	7.0	11.9
Total	100.0	100.0	100.0	100.0

B. Chicks up to 2 Months Old.

	1950.	1951.	1952.	1953.
Number of Chicks Examined	89	90	90	72
Nature of Disease:-	Per Cent.	Per Cent.	Per Cent.	Per Cent.
1. Bacterial & Virus:-				
(a) Salmonella incl. Pullorum Disease (B.W.D.)	(3.4 (9.0	- 8.9	- 17.8	6.9) 11.1)
(b) Other Bact. & Virus	-	4.5	6.7	1.4
2. Parasitic:-				
(a) Coccidiosis	43.8	22.2	12.2	25.0
(b) Other Parasitic	1.1	2.2	1.1	1.4
3. Nutritional:-				
(a) Rickets	7.9	1.1	1.1	-
(b) Crazy Chick Disease	-	4.5	5.5	1.4
(c) Other Nutritional Diseases	2.2	-	-	-
4. Chilling	11.2	2.2	-	7.0
5. Miscellaneous	4.5	2.2	16.7	34.7
6. Undiagnosed	16.9	52.2	38.9	11.1
Total	100.0	100.0	100.0	100.0

* Results of Post-Mortem Examinations carried out by the Veterinary Investigation Officer, Ministry of Agriculture and Fisheries, Aberystwyth.

Table II.

General Information 1952-53.

	Range.		Average for All Flocks.
	Highest.	Lowest.	
Number of Birds per Farm:-			
Layers	779	91	284
1st Year Layers as % of Laying Flock	87.1	30.0	71.8
Growing Stock & Stock Cockerels	430	134	202
Chicks Under 1 Month	125	75	45
Feeding and Food Prices:-			
Cwt. Fed per Layer	2.84	0.87	1.84
Home-grown as % of Total Food Fed	37%	-	10%
Average Price per cwt. of Purchased Food	40s. 2½d.	25s. 5½d.	35s. 6½d.
Egg Production, Usage and Prices:-			
Egg Yield per Layer	184	69	154
Winter-Production-Rate (per cent.)	48	13	34
Summer-Production-Rate (per cent.)	69	27	53
Percentage Sold as Market Eggs	74.6	30.7	59.3
Percentage Sold as Hatching Eggs	65.8	-	27.9
Percentage Used for Home-Hatching	39.2	-	10.5
Percentage Used in House-Hold	7.2	0.7	2.3
Average Price per Dozen Received for Market Eggs	5s. 2½d.	4s. 4½d.	4s. 10d.
Average Price per Dozen Received for Hatching Eggs	11s. 6d.	6d. 1d.	7s. 3½d.
Labour:- Hours per 100 Layers per day	4.82*	0.50*	1.68
Mortality:- per cent	32.5	0.2	9.4

* These two flocks have approximately the same number of "other stock" relative to the number of layers -about 60 growing stock and 20 chicks per 100 layers.

Table III.

Average Returns, Costs, Farm Income and Profit per Flock for Groups A, B and C.

Group.	Number of Layers.	Returns.	Cost excl. Family Labour.	Income from Poultry.	Unpaid Family Labour.	Balance Profit or Loss.
		£. s. d	£. s. d	£. s. d	£. s. d	£. s. d
A	328	2022. 14. 7	1424. 3. 9½	598. 10. 9½	117. 5. 1½	481. 5. 8
B	370	1798. 13. 10½	1329. 17. 6	468. 16. 4½	176. 16. 10½	291. 19. 6
C	151	616. 8. 7½	500. 9. 2½	115. 19. 5	249. 10. 3	-133. 10. 10