UNIVERSITY OF MANCHESTER

FACULTY OF ECONOMIC AND SOCIAL STUDIES

DEPARTMENT OF AGRICULTURAL ECONOMICS

ECONOMICS OF SCALE IN EGG PRODUCTION

A Survey of 60 Large Scale Egg Production Units 1969/70

by

D. I. SUE RICHARDSON

BULLETIN No. 137/EC 65

Price: 50p

UNIVERSITY OF MANCHESTER

DEPARTMENT OF AGRICULTURAL ECONOMICS

ECONOMICS OF SCALE IN EGG PRODUCTION

A Survey of 60 Large Scale Egg Production Units 1969/70

by

D. I. SUE RICHARDSON

BULLETIN No. 137/EC 65

Price: 50p

ACKNOWLEDGMENT

The Department wishes to express its sincere thanks to the egg producers and companies who kindly co-operated in the survey and without whose ready help this report would not have been possible.

CONTENTS

SUMMARY

1. The poultry industry is the most dynamic sector of the agricultural industry. Probably the most marked change, which has taken place in recent years, has been the development of large scale egg production units, which has been caused largely by the cost/price squeeze situation in the industry.

2. The purpose of the Survey has been to provide information covering the more important relationships in the economics of egg production of large scale units, and to determine likely economies due to scale of production.

3. The Survey covers results obtained from 60 units in the North and West Midlands. The sample has been mainly divided into three groups of units of 5—10,000, 10—20,000 and over 20,000 layers.

4. There was a fairly wide range in the individual results, but trends are evident.

5. Costs of production decreased, and margins increased on average, as scale of production increased.

6. Feed was the most important item of cost. Larger units achieved greater economy in the use of feed due to better feed conversion rates and the discount system on volume purchases. Home mixing contributed to a reduction in unit costs. Smaller units are not necessarily at a disadvantage on mixed farms.

7. Mortality rates tended to be rather high. Decline in home rearing was due to Marek's disease and development of specialist pullet rearing industry. Larger units benefited from lower price of replacement pullets due to discount system.

8. There was greater economy in the use of labour by larger units.

9. Return on capital invested increased as size of unit increased.

10. Average yield was 233 eggs per layer. Larger units averaged higher yield than smaller units.

11. Price of eggs was determined by B.E.M.B. Marketing Scheme and the Contract Scheme, percentage of eggs sold to the packing stations, retail and wholesale, percentage seconds, and breed of stock. Larger units benefited from higher packing station bonus payments.

12. Most important factors affecting profitability of the units were yield and feed conversion rates. Economies associated with scale of production were evident for the larger units. However scale alone does not necessarily guarantee a higher rate of return from egg production unless this is associated with a high level of performance of stock and management.

INTRODUCTION

The egg production sector of the agricultural industry has undergone many changes in recent years. Perhaps the most notable change has taken place within the structure of the industry.

Although the number of layers on agricultural holdings in England and Wales increased by 22 per cent between 1960 and 1969, the number of flocks declined by 31 per cent. Table I indicates that the outstanding feature in the change in structure has been the rapid growth in the number of large scale units and the decline of small scale flocks. Flocks of more than 5,000 layers increased from 182 in 1960 to 1,410 in 1969, whereas the number of flocks of less than 500 layers declined by 32 per cent.

TABLE I
DISTRIBUTION OF FLOCKS ON AGRICULTURAL HOLDINGS
BY SIZE OF FLOCK (ENGLAND AND WALES)

Size of Flock	*1960*	*1965*	*1969*
1—99	128,439	103,296	103,112
100—499	73,873	40,598	33,735
500—999	9,615	6,581	5,613
1,000—4,999	4,392	6,392	5,892
5,000—9,999	} 182	829	919
10,000—19,999		304	370
20,000+over		103	121
Total	216,501	158,103	149,762

The importance of the growth in the number of large scale units is illustrated by Table II. This indicates that flocks of more than 5,000 layers accounted for only 4 per cent of the national flock in England and Wales in 1960. By 1969, the percentage had risen to 56 per cent, whereas small flocks (less than 500 birds) which accounted for over half the national flock in 1960, only covered 14 per cent in 1969.

TABLE II
NUMBER OF LAYERS ON AGRICULTURAL HOLDINGS
BY SIZE OF FLOCK (ENGLAND AND WALES)

Size of Flock	*1960 Number '000's*		*1965 Number '000's*		*1969 Number '000's*	
		%		%		%
1—99	4,747	14	3,252	8	2,144	5
100—499	14,607	43	8,054	20	3,814	9
500—999	6,178	18	4,258	10	2,230	5
1,000—4,999	7,150	21	12,461	31	10,454	25
5,000—9,999	} 1,458	} 4	5,319	13	7,246	18
10,000—19,999			3,757	9	5,549	13
20,000+over			3,547	9	10,167	25
Total	34,140	100	40,648	100	41,604	100

The growth of large scale units has been caused largely by the cost/price squeeze situation in the egg industry. The price of eggs has declined and unit costs of production, particularly feed and labour, have increased. Producers have sought to maintain or increase their incomes by increasing the size of their flocks. At the same time they have been able to take advantage of the economies associated with scale of production.

Other factors have also influenced the rapid growth in the number of large scale units. Technological change in the form of controlled environment houses has made a marked contribution. This system of housing is only economically worthwhile on a large scale.

The " 60's " also saw the development of integration in the industry. This has taken several forms. Perhaps the most notable has been the development of " ownership vertical integration ", partly by companies already associated with the poultry industry, and also by companies previously outside the industry. Various other forms of integration have taken place, in particular contract farming and co-operative integration, which have also favoured the setting up of large scale units.

The existence of a guaranteed market for eggs favoured the establishment of many of these units during this period, but no doubt the economies associated with scale of production were also an influential factor.

The knowledge that the B.E.M.B. would cease to function after March 1971 when there would be a " free market " in eggs has discouraged many small scale producers. Packing stations will no longer be required to collect eggs from all producers regardless of scale of production. In preparation for the new marketing situation, packers have been reluctant to make contracts with small scale units because of the extra costs of collection. In any case the number of packing stations has also declined. The system of higher bonus payments for large consignments also favoured the development of large scale units and discouraged small scale producers.

In view of the changing structure of the industry and the lack of knowledge of the results achieved by large scale units, it was therefore decided that a survey of these units would serve two useful purposes. Firstly to provide information about the more important relationships in the economics of egg production, and secondly to determine the economies of scale achieved by large scale units.

The Sample

The information for this study was collected from 60 farms in the North and West Midlands. Each farm account relates to the year ending March 28th, 1970.

The distribution of the units according to size of unit is shown in Table III. The units varied in size from 5,025 to 66,307 layers per unit. Taking into account the effect of the mortality rate, the

TABLE III
DISTRIBUTION OF SURVEY UNITS BY SIZE OF UNIT

Average Number of Birds Per Unit	*Number of Units*
5,001—7,500	15
7,501—10,000	5
10,001—15,000	10
15,001—20,000	11
20,001—30,000	12
30,000+	7
Total	60

livestock replacement policy and the length of the " clear-out " period, the actual housing capacity of each unit is of course larger than the average size of each unit in the survey. (The average size of unit for the year was determined by the total of the average number of layers in the flocks each 4 week period and divided by 13).

The total number of layers in all the flocks involved in the survey amounted to over one million birds. The sample is considered to be reasonably representative of large scale units in the North, particularly in the largest size group (over 20,000 layers). According to the B.E.M.B. Producer Survey (1969), there were seventy-nine units of over 18,000 birds in the North and Midlands (including the East Midlands which is outside the survey area). There were twenty-six units of comparable size in this survey, i.e. 33 per cent of the number in the B.E.M.B. survey.

The sample has been divided into three size groups for comparative purposes. The groups contain units of 5—10,000 layers, 10—20,000 layers and over 20,000 layers. Further sub-divisions have been made where this is considered to be of particular interest.

COSTS, RETURNS and MARGINS

The average costs, returns and margins per bird and per dozen eggs are set out in Table IV for the three size groups and for the survey as a whole.

It should be noted that only the costs of the laying flocks have been included. Pullets reared as replacements to the laying flocks have been valued at 15s. per pullet reared. Purchased replacements have been entered at the purchase price.

TABLE IV

AVERAGE COSTS, RETURNS AND MARGINS

PER DOZEN EGGS

Size Groups	*5—10,000*	*10—20,000*	*20,000+*	*All Flocks*
Costs	s. d.	s. d.	s. d.	s. d.
Feedingstuffs	1 $7\frac{3}{4}$	1 $6\frac{1}{4}$	1 $6\frac{1}{4}$	1 $6\frac{3}{4}$
Labour	$2\frac{1}{2}$	2	2	$2\frac{1}{4}$
Livestock Depreciation	$7\frac{1}{2}$	8	$7\frac{1}{2}$	$7\frac{1}{2}$
Deadstock Depreciation + Miscellaneous	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{1}{4}$
Total Costs	2 $7\frac{3}{4}$	2 $6\frac{1}{2}$	2 $6\frac{1}{4}$	2 $6\frac{3}{4}$
Returns	2 $11\frac{1}{2}$	2 $10\frac{3}{4}$	2 11	2 11
Margin	+ $3\frac{3}{4}$	+ $4\frac{1}{4}$	+ $4\frac{3}{4}$	+ $4\frac{1}{4}$

PER BIRD

Size Group	*5—10,000*	*10—20,000*	*20,000+*	*All Flocks*
Costs	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Feedingstuffs	1 11 5	1 9 2	1 9 11	1 10 2
Labour	4 1	3 3	3 3	3 6
Livestock Depreciation	12 1	12 2	12 4	12 2
Deadstock Depreciation	1 8	2 1	2 4	2 1
Miscellaneous	1 6	1 8	1 9	1 7
Total Costs	2 10 9	2 8 4	2 9 7	2 9 6
Returns	2 17 1	2 15 3	2 17 6	2 16 7
Margin	+ 6 4	+ 6 11	+ 7 11	+ 7 1
Number of Units	20	21	19	60
Average Yield	232	230	237	233
Average size of Unit	6,524	14,317	30,712	16,911

The results indicate that margins increase as size of unit increases, both on a per bird and per dozen eggs basis. Costs per dozen decrease as size of unit increases. This is due to the lower feed and labour costs of the larger units.

During recent years, there has been a great deal of speculation as to the likely performance of large scale units. Expert opinion has suggested that possibly the " economies of scale argument " in favour of large scale units has been over-exaggerated, and that possibly diseconomies of scale would manifest themselves at some point. It has been suggested that this might occur somewhere in the region of 20,000 layers per unit. At the same time it has been speculated that yield might diminish as scale of production increased. But, so far, lack of information has prevented any confirmation of these views. The findings of this survey show that the larger flocks averaged a higher yield than the smaller flocks, which is contrary to the speculative view that stockmanship is necessarily of a higher quality on small scale units.

These aspects will of course be examined in closer detail later in the report. But at this stage it should be borne in mind that the results indicate a range in levels of performance of the units within each size group. This is due to variation in the quality of management, livestock and in the age and type of houses and equipment used. In particular, it should be noted that, throughout the survey, none of the units were exactly comparable for all of these aspects. However, likely trends are indicated.

Perhaps one of the most important points to be noted from the survey is the tremendous improvement which has taken place in recent years both in the management of poultry flocks and in the productive capacity of laying stock. The average cost of production for the period 1953–56 amounted to 3s. 5½d. per dozen, and 3s. 2½d. per dozen in 1960, in the Manchester Poultry Survey. Despite

TABLE V

DISTRIBUTION BY PROFIT MARGIN PER BIRD AND SIZE OF UNIT

Margin per Bird	*Size of Units*			*% Total Number of Units*
	5—10,000	*10—20,000*	*20,000+*	
	Number of Units			
Losses				%
6s. — 4s.	—	—	1	2
4s. — 2s.	—	—	—	—
2s. — 0s.	1	1	—	3
Profits				
0s. — 2s.	3	1	1	8
2s. — 4s.	3	3	1	12
4s. — 6s.	2	6	2	16
6s. — 8s.	3	2	2	12
8s. — 10s.	2	1	6	15
10s. — 12s.	6	3	2	18
12s. — 14s.	—	3	3	10
14s. — 16s.	—	—	1	2
16s. — 18s.	—	1	—	2
Total	20	21	19	100%

higher unit costs of production the average cost for the flocks in this survey was 2s. 6¾d. per dozen. Admittedly, the flocks in earlier years were much smaller but monetary unit costs of resources were also lower. The average yield in 1953–56 was 185 eggs per bird, and 196 in 1960. The average yield in the current survey was 233 eggs per bird (i.e. on an average flock basis, not on a "hen-housed" basis.)

The distribution of the margins between the costs and the returns, which is set out in Table V, indicates a fairly wide range of results but not as wide as in the early 1960's. It seems likely that this is a reflection of the improved overall standard of management of flocks. It is also a reflection of the weeding out of poorly managed units which have not managed to survive the cost/price squeeze. In any case, it would be unlikely that owners of these flocks would risk expanding the size of their units.

FACTORS INFLUENCING THE COST OF PRODUCTION

(*a*) Feedingstuffs

Feed is the most important item of cost, for it accounts for 61 per cent of the net cost of production. Clearly the relationship between the cost of food and the price of eggs is of paramount importance. This relationship is not, of course, the same for all farms since the average price of eggs will vary as well as the cost of feedingstuffs.

Some comparative indications of feed levels of performance and size of unit are indicated in Table VI. (Since the material in this report may be used by advisers and producers for planning purposes, it should perhaps be remembered that the survey refers to the year ending March 28th, 1970. *The cost of feedingstuffs has increased substantially since this date.* The Monthly Index of Poultry Feed Prices increased from 115·9 in March to 131·5 in November 1970.)

TABLE VI

LEVELS OF FEEDING AND PERFORMANCE

Size of Units	*5—10,000*	*10—20,000*	*20,000+*	*All Flocks*
Feed Intake per bird (lbs.)	97·4	91·9	95·5	94·8
Egg Yield per bird	232	230	237	233
Feed Conversion Rate (lbs./doz.)	5·0	4·8	4·8	4·9
Av. Cost F/S per cwt.	£1 16s. 1d.	£1 15s. 6d.	£1 15s. 1d.	£1 15s. 7d.
Av. Cost Purchased Compounds per cwt.	£1 17s. 5d.	£1 16s. 6d.	£1 16s. 6d.	£1 16s. 10d.
Av. Cost Home Mixed Feed per cwt.	£1 14s. 1d.	£1 14s. 4d.	£1 13s. 6d.	£1 13s. 11d.
No. Flocks (Compounds)	12	12	10	34
No. Flocks (Home Mixed F/S)	8	10	9	27
No. Eggs (@ 2s. 11d. dozen) required to cover F/S Cost per cwt.	149	146	144	146
Margin. Egg Return/F/S per bird	£1 5s. 8d.	£1 6s. 1d.	£1 7s. 7d.	£1 6s. 5d.
Margin. Egg Return/F/S per dozen	1s. 3¾d.	1s. 4½d.	1s. 4¾d.	1s. 4¼d.
Egg Returns per £100 F/S/	£183	£189	£192	£188
F/S % Net Cost Production	62%	60%	60%	61%

Scale of operation is naturally related to economies in the unit cost of feed due to the discount system for bulk purchases of feed. The cost of feedingstuffs for the larger flocks in the survey was lower than for the smaller flocks. The difference is not as marked as might be expected at first glance. This is due to the fact that the flocks in the survey were all large flocks by industry standards. The difference would have been more marked if comparisons had been made between the unit costs of small flocks of 500 birds and flocks of over 20,000 birds. Economies due to bulk buying and the discount system begin to level out after a certain stage of operation. In any case nearly half the flocks in the sample were kept on mixed farms, so that many of the smaller flocks in the survey would obtain substantial discounts from their merchants, since they would already be purchasing large quantities of feed for other livestock on their farms.

Nevertheless, the results indicate that the larger units, on average, achieved greater economy in the use of feed than the smaller units. This is indicated by the feed conversion rates, the margin between the egg returns and the cost of feed as well as output per £100 feed. But it should be noted that within each size group there was a substantial range in levels of performance. This indicates that economy in the use of feed is not necessarily entirely related to scale of production. But, given that the feed conversion rate is the same for units of varying sizes, the larger units are likely to find themselves in a more favourable position owing to the discount system. Fewer eggs are needed therefore to cover the unit cost of feed by large scale units.

Rate of Feed Conversion

The level of egg yields and efficiency in the use of feed are clearly the main determinants of profit per bird or per dozen eggs. Table VII illustrates the wide range in feed conversion rates and indicates the importance of economy in the use of feed. It clearly illustrates that the margin between egg returns and feed costs increases as the feed conversion rate improves, leading to an increase in profit margins.

TABLE VII

FEED CONVERSION RATE

Feed Conversion*	4·26 — 4·50	4·51 — 4·75	4·76 — 5·00	5·01 — 5·25	5·26 — 5·50	5·51 +
Yield per bird	243	244	238	223	219	210
Feed per bird (lbs.)	88·4	93·8	96·4	94·5	97·9	103·2
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Egg Returns per bird	2 19 1	2 18 3	2 17 11	2 14 0	2 12 1	2 14 4
Feed Cost per bird	1 9 2	1 9 8	1 10 8	1 9 7	1 9 9	1 13 5
Margin. Egg Return less F/S per bird	1 9 11	1 8 7	1 7 3	1 4 5	1 2 4	1 0 11
Egg Returns per dozen	2 11	2 10½	2 11¼	2 11	2 10½	3 1¾
Feed Cost per dozen	1 5¼	1 5½	1 6½	1 7	1 7¾	1 11½
Margin. Egg Returns less Feed per dozen	1 5¾	1 5	1 4¾	1 4	1 2¾	1 2¼
Total Cost per dozen	2 4½	2 5½	2 7	2 6¾	2 8	3 1
Profit Margin per bird	10 1	8 6	6 11	6 5	3 7	1 0
Profit Margin per dozen eggs	6½	5	4¼	4¼	2½	¾
Number of Units						
5 — 10,000	2	4	3	4	4	3
10 — 20,000	4	6	4	5	1	1
20,000+	4	3	8	2	1	1
Total Number	10	13	15	11	6	5
" Company " Flocks	2	2	6	1	—	2
Owner Flocks	8	11	9	10	6	3

* Number of pounds of feed to produce one dozen eggs.

The relationship between yield and feed intake is complicated by the use of different breeds of birds and variation in the level of management between the units. The composition and the quality of the food is a further complicating factor. It is not possible to ascertain whether high yields are due more to the strain of bird or to close attention to feeding. However, the results indicate that the higher feed conversion rates were associated with a higher proportion of units producing brown or tinted shell eggs. A further complicating factor is that some of the units were using a number of different breeds, even though this is contrary to recommended husbandry practice. Nowadays the quality of stock and feed may be regarded as being more uniform than hitherto, so possibly management in the form of close attention to feeding and stockmanship, as well as housing, may be playing a proportionately more important role in affecting the results which are obtained.

So far as scale of production is concerned, it is perhaps significant that there is a relationship between the number of smaller flocks and a high feed conversion rate, for 35 per cent of the smaller flocks had F/C rates of over 5·25 lbs/dozen eggs; whereas only 10 per cent of the larger flocks had rates of over 5·25 lbs. The average mortality rate, at 27·8 per cent, was particularly high for the highest F/C rate group. This compares with 16·5 per cent for the lowest F/C rate group. Indeed, high feed conversion rates may be the consequence of poor health and high mortality.

Proprietary Compounded Rations and Home Mixed Feedingstuffs

Apart from economies achieved by purchasing in bulk and quantity discounts, producers can achieve a considerable economy in the unit cost of feedingstuffs by milling and mixing feed on the farm.

The cost/price squeeze has been an inducement for producers to turn to home mixing as a means of reducing the cost of egg production. It has been evident for some time in the U.K. that the production of compounded rations has been declining. Nevertheless it is surprising to find that such a high proportion of units in the sample were home mixing. Amongst the forty-six independent " ownership " units, twenty-five were home mixing (54 per cent). No doubt there has been a considerable improvement in techniques and equipment used for milling and mixing on farms in recent years. Clearly the savings due to home mixing are worthwhile, provided that this is well done.

The results in Table VIII indicate that, although the yield was lower for the flocks fed on home mixed rations and the feed conversion rate was slightly poorer, the saving in the unit cost of feedingstuffs (3s. per cwt.) more than compensated for these factors. The margin between the egg returns and the cost of feed per bird and per dozen eggs was therefore higher although not much higher for the flocks fed on home mixed rations. Output per £100 feed was also higher. The range in the feed conversion rates and yields was broadly similar for both feeding systems. The size of the flocks was spread evenly throughout both groups. The general farm and specialist units were also divided fairly evenly in both groups.

The decision to home mix will depend partly upon the confidence and the ability of owners to carry out this function as well as on the availability of reliable labour. It may also depend upon whether mixing is already carried out for other livestock on general farms, and upon the bargaining power of producers vis-à-vis feed merchants to obtain substantial discounts or other advantages. Some large scale units have not considered it worthwhile to home mix in view of the discounts to be obtained on volume purchases. The question of home mixing as such does not arise for many integrated units since these systems often include a centralised mill to service the requirements of breeding, pullet rearing and egg laying units. When feed firms set up integrated units, then, as might be expected,

TABLE VIII

PROPRIETARY COMPOUNDED FEEDINGSTUFFS AND HOME MIXED FEEDINGSTUFFS

Feeding System	*Proprietary Rations*	*Home Mixed Feed*
Feed Intake per bird (lbs.)	96·3	93·5
Egg Yield per bird	238	227
Feed Conversion (lbs./doz.)	4·86	4·94
Feed Cost per cwt.	£1 16s. 11d.	£1 13s. 11d.
Egg Returns per bird	£2 17s. 10d.	£2 15s. 2d.
F/S Cost per bird	£1 11s. 8d.	£1 8s. 4d.
Margin (Egg Returns F/S Cost per bird)	£1 6s. 2d.	£1 6s. 10d.
Egg Returns per dozen	2s. 11¼d.	2s. 11d.
F/S Cost per dozen	1s. 7¼d.	1s. 6d.
Margin (Egg Returns F/S Cost) per dozen	1s. 4d.	1s. 5d.
Profit Margin per bird	6s. 1d.	8s. 2d.
Profit Margin per dozen	3½d.	5d.
Egg Returns per £100 F/S	£183	£195
Number of Units		
5 — 10,000	12	8
10 — 20,000	11	9
20,000+	10	9
	33	26
Average size of Flocks	16,308	17,711

the feed produced by the firm will normally be used. Difficulties sometimes arise in pricing the feedingstuffs within vertically integrated systems due to intra-firm competition between the various production sectors.

So far as size of unit is concerned, the cost of home mixing on large scale specialist farms is rather less than for the smaller units. However, smaller units on general farms need not be necessarily at a disadvantage in terms of size so far as home mixing is concerned. Frequently they will already be milling and mixing feed for other livestock on the farm, and thus should obtain similar savings in the unit cost of feedingstuffs by home mixing.

(*b*) Livestock Depreciation

Livestock depreciation is the second most important item of cost. On average, it accounted for 25 per cent of the cost of production. It has increased in importance in recent years, because of the deterioration in the price of hens caused by the growth of the chicken meat industry. The average price of culls in this survey was only 2s. 8d. per hen. Ten years ago the price would have been about 9s. per bird. Although real efficiency in rearing has increased, the difference between the cost of the pullet and the price of the culled layer is much wider today.

The livestock depreciation cost is affected by the relationship between a number of factors.

Cost of Pullet Replacements

Home rearing can effect a major saving in the cost of replacing a laying flock. Nevertheless many egg producers have given up rearing in favour of purchasing replacement pullets. It is noticeable, for example, that only 35 per cent of the smaller size group in the Survey (5—10,000 layers) were home rearing all or part of their replacements.

There are several reasons for the decline in home rearing amongst smaller units. The major reason has been the disastrous effect of Marek's disease, and other diseases have further discouraged home rearing. At the same time good husbandry practice does not favour the retention of more than one age group on one site. The all in/all out system of production may involve heavy investment in rearing equipment which may only be used once a year. A further factor has been the re-structuring of the industry towards specialisation and the development of a specialist pullet rearing sector. The contract system of operation may stipulate the purchase of replacements as part of the terms of the contract. Extra labour may not be available to deal with rearing on small units. It is possible however that, in the future, there may be a swing back to home rearing now that vaccines are available to protect stock against Marek's disease and infectious bronchitis.

The majority of the larger units, on the other hand, tended to home rear, particularly units in the 20—30,000 group, where 75 per cent of the units were home rearing. Clearly there are advantages to scale of operation in rearing, which encourage large units to pursue a home rearing replacement policy. Apart from the savings in unit costs, there is a further economy in the use of rearing equipment throughout the year, as well as the possibility of employing full time specialist skilled labour for rearing purposes.

Savings due to home rearing and scale of operation are not as evident in the survey as might be expected. Home reared replacements have been entered at 15s. per pullet for all the units. The survey did not include an investigation into the cost of rearing as well as egg production. If the pullets had been transferred into the laying flocks at the actual cost of rearing, it may be assumed that economies due to scale of operation would have been much more marked for the larger flocks.

Purchased Pullets

The price of purchased pullets depends upon breed, whether they are fully vaccinated, the contract system, discounts and the bargaining power of egg producers.

Clearly there are advantages to scale where a purchased replacement policy is followed, particularly in discounts on volume purchased. The average price paid for pullets by the larger units at 14s. 4d. per pullet was 1s. less than the price paid by the smaller units. However, since the units in the survey may be termed large scale for the poultry industry as a whole, the relative economies achieved would have been much greater if comparisons had been made with small units of, for example, 500 birds.

Some of the very large units preferred to purchase rather than to rear their own replacements because of their very strong bargaining position with specialist pullet rearers. It sometimes happens however, that small scale units are in an advantageous position in that they can purchase surplus lots at very reasonable prices from specialist rearers.

Price of Culls

The price received for layers culled at the end of the laying season is mostly related to the breed of the flock, scale of operation, and the contract system. Again the larger units tend to receive preferential treatment in the price of culls, since processing stations are reluctant to take small lots.

Even within this survey of large scale units as a whole, the larger units tended to receive a higher price than the smaller units. The price ranged from 2s. 5d. to 4s. per hen and averaged 2s. 11d. for the larger units, whilst the price for the smaller units ranged from 2s. 1d. to 3s. 7d. and averaged 2s. 9d. per hen.

Mortality Rate

Perhaps the most important factor which influences the cost of livestock depreciation is the mortality rate. Various factors associated with the mortality rate are set out in Table IX.

TABLE IX

MORTALITY RATE

Mortality Rate	*Below 15%*	*15% — 20%*	*Over 20%*
Av. Mortality Rate	11·1%	18·0%	26·1%
Livestock Depreciation Cost per dozen	6¾d.	7¾d.	8¼d.
Margin (Returns less Costs) per dozen	5d.	4½d.	3d.
Livestock Depreciation Cost per bird	11s. 4d.	13s. 1d.	12s. 6d.
Margin (Returns less Cost) per bird	8s. 3d.	7s. 9d.	4s. 8d.
Average Length Laying Season (weeks)	57	58	60
Range Laying Season (weeks)	44 — 72	52 — 96	48 — 80
Yield per bird	235	244	219
F/S Conversion Rate (lbs./doz. eggs)	4·8	4·8	5·3
No. Units with *1* Strain of layer per unit	12	5	2
No. Units with more than 1 Strain of layer per unit	12	13	16
Size of Flock (No. of units)			
5 — 10,000	7	5	8
10 — 20,000	8	5	8
20,000+	9	8	2
Independent Owner Units (No.)	20	13	14
Company Units (No.)	4	5	4
Replacement Policy (No. of Units)			
Purchased Pullets	13	7	4
Home Reared Pullets	8	9	10
Combination (Purchased+H.R.P.)	3	2	4

The mortality rates were surprisingly high. The average was 18 per cent for all the units, and ranged from 6 per cent to 31 per cent. Clearly some improvement is required in this sector of management if egg production is to remain profitable in the future. Marek's disease has, of course, a very disastrous effect upon the mortality rates of laying stock as well as upon young stock.

The effect of high mortality rates in causing a reduction in profit margins and an increase in the livestock depreciation cost is clearly indicated in Table IX. There is also an indication that high mortality rates are associated more with the smallest units (5—10,000 layers) which averaged 18·6 per cent mortality rate than the very large units of over 30,000 layers which averaged a mortality rate of 11·5 per cent. Units managed by independent owners tended to average a lower mortality rate than company operated units. Units pursuing a purchased replacement policy also averaged a lower mortality rate. Stretching the length of the laying season is associated with a higher mortality rate. However, although these trends are indicated, there were wide ranges within each group.

This table emphasises the importance of good husbandry practice in keeping only one strain of layer on each unit, for this tends to reduce the risk of disease. There is a marked indication for the mortality rate to be much lower for these units. Many producers retain more than one strain of layer on their units. This may be due to the requirements of packing stations (e.g. a percentage of brown eggs may be required to satisfy consumer preferences), or the demand of retail customers or the wholesale trade for brown shelled eggs as well as white shelled eggs. However, many producers gave as their reason for keeping several different strains as being the need to compare performance levels of stock on their particular units. Some owners kept as many as eight different strains of birds on their units. It might be preferable to leave the testing of stock to specially operated laying trials to obviate the risk of disease on laying units.

Length of the Laying Season

Extending the length of the laying season generally results in a reduction in the livestock depreciation cost. Units pursuing a policy of keeping flocks for over eighteen months in lay, averaged a livestock depreciation cost of 8s. 7d. per bird, whereas units retaining flocks for less than thirteen months averaged a cost of 13s. 3d. per bird.

The lower the price received for hens at the end of the laying period and the lower the price of eggs (provided that the margin between large and small grades is sufficiently wide) the greater are the advantages of retaining a flock for a longer laying season. However, consideration should be given to the higher egg yields and the better quality of eggs laid by pullet flocks as well as a generally lower mortality rate. A further argument against extending the laying season is that because of the risk of a high mortality rate, this could lead to under-utilisation of housing and equipment. In any case the length of the laying season may well rest upon the terms of contracts made with packing stations, co-operative groups or integrated firms. The egg market requires an even supply of eggs throughout the year. Consumer requirements do not vary very much from week to week. Packing stations therefore tend to contract with producers to meet these requirements. The timing of replacements and the length of the season will be determined to a large extent by the packing stations.

Many owners of units in this survey have realised the advantage of retaining flocks for longer than one year (because the price of culls and eggs has declined). They have also been aware of the disadvantages of retaining a flock for too long.

The average length of the laying period extended to fifty-eight weeks (fourteen and a half months). However, there was quite a wide range from forty-four to ninety-six weeks for different flocks. The smaller units tended to keep their flocks in lay for a longer period (sixty weeks) than the larger flocks, which on average were kept in lay for fifty-six weeks.

(*c*) Labour

Labour is the third most important item of cost. On average, labour accounted for 7 per cent of the net cost of production. Economy in the use of labour which is associated with scale of production is another reason for the increase in the size of flocks in recent years.

Some measures of labour productivity are shown in Table X. The results indicate that scale economies tend to flatten out as size of unit increases towards the level of the very large units. However all the flocks in the survey were large flocks by present day standards. If the results had been compared with those for smaller flocks then economies of scale would have been more pronounced. For example, the battery flocks in the 1960 survey (average size of flock—871) averaged 2·0 labour hours per bird,

whereas the average for this survey is 0·56 hours, and only 0·45 hours for the largest flocks. The productivity of labour depends not only upon the scale of production, but also upon the degree of automation and mechanisation, which in turn is related to the size of the unit.

TABLE X

PRODUCTIVITY OF LABOUR AND STRUCTURE OF LABOUR FORCE

Size of Unit	*5,000— 10,000*	*10,000— 20,000*	*20,000— 30,000*	*30,000— +*
Average size of units (layers)	6,524	14,317	23,318	43,386
Hours per unit	4,172	7,539	12,450	20,099
Hours per layer (all units)	0·64	0·53	0·53	0·45
Hours per layer Independent units	0·64	0·48	0·51	0·40
Hours per layer Company units	—	0·74	0·56	0·53
Labour Cost as % Net Cost	8·9%	6·7%	6·8%	5·8%
Labour cost per dozen	2½d.	2d.	2d.	1¾d.
Labour cost per layer	4d. 1d.	3s. 3d.	3s. 6d.	2s. 8d.
Margin (excluding labour cost) per dozen	6¼d.	6¼d.	6¼d.	7¾d.
per layer	10s. 5d.	10s. 2d.	10s. 6d.	12s. 3d.
Output per £100 labour	£1,398	£1,700	£1,681	£2,076
		percentages		
Family labour	47	26	11	10
Hired labour	53	74	89	90
Labour force Male	71	60	63	57
Labour force Female	29	40	37	43
Labour force full-time workers	55	58	67	44
Labour force part-time (O.F.W.)*	32	20	4	10
	87	78	71	54
Labour force part-time (P.U.O.)†	13	22	29	46
	100	100	100	100

* Part-time on egg units, but employed full-time on each farm, i.e. employed on egg production unit and other farm work as well.

† Part-time, but employed solely on egg production unit and *not* on other farm work.

The range in the number of hours per bird was much wider for the smaller flocks. This may indicate that the labour involved in some of these units was higher than the actual labour requirements. It is also perhaps of interest to observe that the flocks owned by independent producers tended to be more economical in the use of labour than "company" owned flocks.

The cost of labour as a percentage of the net cost of production decreases as size of unit increases. Output per £100 labour, therefore increases as the size of the unit increases. Since the yield of the larger flocks was greater than the yields for the smaller flocks, then this relationship is even more pronounced.

Availability of labour, in particular trained labour, is one of the factors which may limit expansion of the size of units. This point was frequently mentioned by independent producers as well as managers of company operated units. It is perhaps of interest that a number of managers and owners of flocks did not have a farming background. The composition of the labour force involved in these units is therefore of special interest. In the past, family labour provided the backbone of the labour force of the egg industry. But the importance of family labour today diminishes rapidly as scale of production increases. Family labour only accounted for 10 per cent of total labour employed by the largest units.

At the same time the results indicate the growing importance of women within the work force of large scale production units. The situation in the egg industry may be rather different from other sectors of agriculture, nevertheless it may indicate possible changes for the other sectors in the future. Technological change in the form of greater mechanisation and automation has lightened the load of many operations on these large scale units. Women tend to be more careful, and because they are nimble fingered, tend to break fewer eggs (greater emphasis is placed on the quality of eggs in the marketing process as the " free " egg market approaches). Frequently part-time labour is required for egg collection purposes. This suits the needs of married women. Since many of these units are isolated, part-time work offers a welcome job opportunity to the wives of men already working on these units. For these reasons, and also for the reason that wage rates are lower for women than for men employed in agriculture, the percentage of women employed will tend to increase in egg production. The importance of the employment of women, and the possibility of substituting their labour for more expensive male labour, is particularly marked for the largest units in the survey, where 43 per cent of the work force (on an hourly basis) consisted of women.

For smaller units, male labour was of greater importance—71 per cent (women—29 per cent). The labour involved in these units consisted basically of one full-time man with the assistance of some part-time labour.

Also of interest is a breakdown of the labour force into full-time and part-time workers, particularly when the part-time workers are divided into two groups. Firstly, part-time work on the egg unit, which is done by workers already engaged in other farm work on the same unit or farm, so that in fact they are full-time workers for the farm as a whole. Secondly, part-time work done by workers solely employed on the egg production unit and not employed on any other work on the farm.

The results indicate the importance to owners of the smaller flocks in the survey of the utilisation of labour surplus to the overall requirements of their farms as a whole. The availability of this labour has no doubt determined the decision by many farmers to expand production to this size of unit. It is an argument which favours this size of unit in any case. The number of hours worked by full-time workers (55 per cent) plus 32 per cent by workers already engaged on other farm work or wives accounted for 87 per cent of the total number of hours worked on the smaller units. In marked contrast the total for the largest units amounted to 54 per cent.

Again, the employment of part-time labour engaged solely on work on the egg unit is in marked contrast for the different size groups. This only consisted of 13 per cent of the total number of hours worked on the smaller units, but amounted to 54 per cent for the largest units. This again emphasises the importance of the employment of women on the very large production units. This tendency is perhaps natural, in that while all units require male labour for some heavy tasks, this requirement does not increase proportionally with size of unit.

If the number of poultry farmers and the agricultural labour force is diminishing so far as men are concerned, women seem to be returning to find part-time employment, in particular in the egg sector of the industry.

Employment opportunities for the management of large scale units is also evident, particularly on integrated units. Many owners mentioned that it was difficult to obtain managers capable of organising and running large scale production units.

TABLE XI

AVERAGE NUMBER HOURS WORKED PER WORKER

	Full-time		*Part-time*	
	Per annum	*Per week*	*Per annum*	*Per week*
Men	2,681	51·6	1,309	25·2
Women	2,416	46·5	1,184	22·8

The average number of hours worked is set out in Table XI. Men tended to work longer hours than women. Full-time family workers and owners tended to work longer hours (2,716) on the smallest flocks than hired workers (2,667), but the reverse was true for the largest units. Part-time workers tended to work longer hours on the largest flocks than on the smallest flocks.

In the past, farmers' wives were an important element in the labour force, but only eleven wives in this survey worked on the units. They worked part-time, and none worked on the larger units.

CAPITAL AND THE RATE OF RETURN ON CAPITAL

Any investigation into the economics of scale in egg production will be concerned with the likely return on capital according to scale of operation. Calculating the value of an enterprise solely on grounds of profitability is meaningless unless this is related to the level of investment.

On the whole, the main limit to expansion will be the availability of capital, though labour could also be a limiting factor. Obviously the ability to market eggs is also of critical importance when there is a free market in eggs. The decision to invest capital to establish a large scale unit or to expand an existing unit mainly rests upon the likely return on capital invested.

One of the many theories advanced in support of large scale egg production units is that by increasing the scale of operation a higher return on capital invested will be obtained. This is partly related to savings in the costs of production to which reference has already been made in this report, and partly to economies achieved in the cost of housing and equipment. The performance levels of the units in this survey will therefore be of particular interest to investment decision-making in the egg industry, for no other information has yet been published covering the actual results achieved by large scale units in the United Kingdom.

A comparison of the investment requirements and rate of return on capital according to scale of operation is outlined in Table XII. There are two methods which are generally used to compare rates of return on capital. One system values housing and equipment on the basis of the current

TABLE XII*

CAPITAL AND RATE OF RETURN ON CAPITAL

Size of Units (Capacity)	*5—10,000*	*10—20,000*	*20—30,000*	*30,000+*
Current Value				
Fixed Capital per bird	9s 3d.	10s. 6d.	12s. 7d.	11s. 6d.
Fixed + Working Capital per bird	17s. 3d.	18s. 6d.	£1 0s. 7d.	19s. 6d.
Return on Fixed+Working Capital	30%	29%	27%	40%
Replacement Value (New)				
Replacement Value. Fixed Capital per bird	£1 9s. 11d.	£1 8s. 4d.	£1 4s. 2d.	£1 2s. 7d.
Replacement Value. Fixed+Working Capital per bird	£1 17s. 11d.	£1 16s. 4d.	£1 12s. 2d.	£1 10s. 7d.
Return on Replacement Value of Fixed Capital per bird	7%	10%	16%	28%
Return on Replacement Value of Fixed+Working Capital per bird	5%	8%	12%	21%
Range of Rate of Return on Fixed+Working Capital per bird	−13% to +21%	−6% to +40%	−14% to +27%	−3% to +42%
Number of Units	17	16	16	11
Average Size of Flocks (Capacity)	7,461	14,058	24,391	43,261

* This table is based upon the housing capacity of the units.

written down value. This method, which is used in the first part of the Table, presents what might appear to be a rather surprising impression that capital requirements (on a per bird/total capacity

basis) increase as size of unit increases. This is due to the fact that the values indicated are based upon the written down value, so that the age of the investment clearly has an important influence upon the current value and hence upon the rate of return.

As the national statistics indicate, and as in fact occurred with the units in this survey, the medium and particularly the large and extra large units have only been established relatively recently. Therefore the current value of these units is higher than for the smaller units. A comparison of the likely returns on this basis is therefore unrealistic. A better indication of the likely comparative returns according to scale of operation is provided when capital values are indicated according to their new or replacement value. Even with this system there are difficulties, since some of the flocks were kept in houses that were quite old, and clearly if replaced the flocks would achieve a rather better level of performance.

The results, based upon replacement values, indicate the lower unit capital requirements as scale of operation increases, which together with the higher profit levels of the largest units, results in a much higher rate of return on capital invested. It should be noted that return on capital is related not only to the level of investment, but also to the level of profitability. As has already been indicated the larger units were also more profitable on average than the smaller units. These factors have of course been put forward as an argument in theory in favour of scale of operation. Judging from the results of this survey theory is borne out in practical terms.

Although it is clear that the cost of establishing large scale units diminishes on a unit basis as scale increases, it is evident from the price lists of housing and equipment manufacturers that this cost tends to flatten out towards the 50,000 to 100,000 size of unit. Evidence of a flattening out is also indicated for the costs of egg production for the larger units. It should also be stated that some of the units in the 20—30,000 size groups were evidently undergoing management difficulties. Nevertheless, for the units in this survey, in general, evidence of possible diseconomies of scale was not apparent even to the level of the largest units where housing capacity amounted to 75,000 birds.

The return on capital invested, particularly for the smaller units, reveals a very low rate of return, especially if consideration is given to existing high interest rates when capital has to be borrowed.

At first glance, it might be assumed that it is not worthwhile producing eggs on the smaller units. However the wide range in the return on capital invested (including substantial losses), indicates that it is possible to obtain a reasonable return provided that the level of management and the performance of flocks is efficient on these units. A further reason for the establishment or expansion to this size of unit is of course the use of family labour. If labour is not charged as a cost for these units then the average rate of return on capital invested for these units would increase from 5 per cent to 14 per cent.

The situation will differ from unit to unit, depending upon the system of housing, level of management and availability of family labour or labour that would not have an alternative use on mixed farms, and of course upon prices which will vary from year to year. However the likely returns are indicated for the particular year in question. The Table also illustrates the wide range in returns on capital invested within each size group. It is an indication of the narrow margin between success and failure and the risks involved in egg production on a large scale, particularly if margins of profit and the price of eggs are lower than in earlier years. Other risks, in the form of disease particularly fowl pest during the past year, need also to be given careful consideration before investing capital in egg production.

The range in the returns obtained on capital invested is also a reflection of the under-utilisation of housing capacity on several of the units. For some units, this was as low as 62 per cent of the total housing capacity of the unit. In many cases this was, of course, due to a high mortality rate, but in others it was caused by over-lengthy periods when the houses were left empty between clearing-out and re-stocking the houses. Under-utilisation of housing capacity places a heavy burden on the fixed costs of production and reduces the return on capital invested in a unit.

FACTORS INFLUENCING EGG RETURNS

(*a*) Yield

Yield is one of the most important factors which determines the extent of the margin of profit to be made from egg production. This relationship, and the relationship between yield and the cost of production is clearly illustrated in Table XIII.

The average yield was 233 eggs per bird for all the units in the survey. But as the table indicates, there was a fairly wide range in yields from unit to unit. The difference between the lowest and the highest yields per bird per year was sixty-eight eggs per layer, which valued at 2s. 11d. per dozen amounts to 16s. 7d. per layer. This is an indication of the importance of the effect of yield upon egg returns.

So far as size of unit is concerned the table indicates that a higher proportion of the smallest and medium sized units were associated with low yields than the largest size group of units.

TABLE XIII

YIELDS, COSTS OF PRODUCTION AND PROFIT MARGINS

Range in Yields per Layer	*Less than 210*	*210—220*	*220—230*	*230—240*	*240—250*	*250+*
Cost per dozen	2s. 8½d.	2s. 8½d.	2s. 7d.	2s. 6½d.	2s. 6d.	2s. 5¼d.
Margin per dozen	2d.	3½d.	4d.	4¼d.	4¾d.	6¼d.
Margin per bird	3s. 0d.	5s. 4d.	6s. 2d.	7s. 0d.	8s 1d.	11s. 0d.
Size of Unit	Number of Units					
5—10,000	1	6	3	3	3	4
10—20,000	4	3	2	6	4	2
20,000+	1	1	4	4	6	3
	6	10	9	13	13	9

(*b*) Price of Eggs

During the time that the B.E.M.B. has been in operation, the basic producer packing station price of eggs has been fixed at the same rate for all producers regardless of size of unit. However, the average price obtained for eggs sold by individual producers varies from unit to unit for a number of reasons.

In recent years the operation of the B.E.M.B. Annual Contract Scheme favoured producers who contracted to supply a level quantity of eggs on a quarterly basis to the packing stations. Producers who were able to achieve their contracts, or who co-operated in Consortia, were paid an extra 4d. per dozen above the level of the basic producer price of eggs each quarter. Producers who were unable to fulfil their commitments under the Contract Scheme were accordingly penalised. Also new entrants to the industry were penalised, since they were not paid the extra 4d. differential during the first year of production. The producer price of eggs could therefore vary by as much as 4d. per dozen from unit to unit because of the operation of the Contract Scheme.

Within the B.E.M.B. marketing system, the producer price of eggs was fixed according to the various weight grades of eggs supplied to the packing stations. The production of extra small and second quality eggs was penalised. These eggs were priced at only 8d. per dozen during the particular

year in question. The average price obtained from the packing stations therefore depended upon the distribution of the supply of eggs within the various weight grades during the year as well as upon the 4d. differential payment scheme.

A higher average price could be obtained by an individual producer by taking advantage of the seasonal pattern of production of a laying flock, and fitting this in with the seasonal price of eggs related to the various weight grades. However the Contract Scheme, which sought to encourage an even supply of eggs throughout the year discouraged this system of operation. In any case, the units in the survey were large scale units operating several laying houses on each site, so that their systems of production largely followed a continuous process of production throughout the year, which was further encouraged by packing station bonus payment schemes.

The average price received for eggs within the various weight grades is largely related to the breed of stock kept on the units. On the whole the lighter breeds lay more eggs, but they generally produce a lower percentage of large eggs than heavier breeds. In general therefore light breeds tend to average a lower price for eggs than the heavier breeds. Although contrary to recommended good husbandry practice, forty-one of the units in the survey kept more than one breed of stock on their farms.

The length of the laying season will also affect the average price of eggs obtained by producers. The longer the laying season the higher the percentage of large and standard eggs which will be produced, though at the same time the percentage of second quality eggs will tend to increase. The accounting period for the survey covered one year. However the flocks in the survey were being kept for laying seasons which ranged from forty-four to ninety-six weeks in lay, and averaged fifty-eight weeks.

The packing station bonus system tends to favour the large scale units since the bonus system is based upon a sliding scale which is related to the number of eggs collected by packing stations either on a weekly or annual basis. Extra bonuses may be paid for quantity contracts with large scale units as well as bonus payments for brown shelled eggs. Bonus payments varied a good deal between packing stations both in the value of the bonuses and the system of payment in 1969–70. Some packing stations ran into difficulties during the year, and were unable to pay a bonus to producers. Others ceased to operate altogether or were taken over by other packing stations. It seems probable that packing stations will be unlikely to operate bonus schemes in the future when a free market is in operation. It is more likely that producers will be paid the packing station realisation price for eggs less the costs of operating the packing station.

A higher average price may be obtained by selling a proportion of eggs which are produced either retail or wholesale. Opportunities to do this will depend upon the location and the organisation of units. Many large scale units were situated in remote places to reduce disease risks. There was therefore little opportunity to sell retail or even that they would wish to do so in view of the risk of disease. Although three quarters of the smaller and medium sized units sold a proportion of the eggs produced either retail or wholesale, this only accounted for 6 per cent and 10 per cent respectively of the total number of eggs sold by these units. So far as the larger units were concerned, only two of the units of over 30,000 layers sold eggs retail or wholesale, and these eggs only accounted for 2 per cent of the total number of eggs produced.

The price obtained for eggs sold retail and wholesale varied according to the shell colour and the weight grades of the eggs sold. Several producers sold second quality eggs retail or wholesale in order to obtain a better price than they would otherwise have obtained if the eggs had been sent to the

packing stations. The number of second quality eggs sold to the packing stations as a percentage of the total number of eggs sold averaged 6·4 per cent for the smaller units, 7·4 per cent for the medium sized units and 7·8 per cent for the larger units.

For the reasons outlined therefore the average price obtained for eggs varied from unit to unit, the range being from 2s. 6½d. to 3s. 4d. per dozen and the average being 2s. 11d. for all the units in the survey.

CHARACTERISTICS OF UNITS IN ORDER OF PROFITABILITY

Table XIV is included to indicate the performance of units according to level of profitability. The reasons for the differences in the margins between the more profitable groups and the less profitable groups are well illustrated.

TABLE XIV
COMPARISON OF PERFORMANCE OF UNITS IN ORDER OF PROFITABILITY

Order of Profitability	*Low Margins* *1st Quarter*	*2nd Quarter*	*High Margins* *3rd Quarter*	*4th Quarter*
Cost per layer	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Feedingstuffs	1 10 8	1 10 2	1 11 2	1 8 5
Labour	3 11	3 6	3 6	3 2
Livestock Depreciation	13 2	12 10	12 1	10 8
Misc.+Deadstock Deprec.	3 9	4 0	3 8	3 5
Total Costs	2 11 6	2 10 6	2 10 5	2 5 8
Returns per layer	2 12 9	2 16 0	2 19 6	2 18 0
Margin per layer	+ 1 3	+ 5 6	+ 9 1	+ 12 4
Costs per Dozen				
Feedingstuffs	1 $8\frac{1}{4}$	1 $7\frac{1}{4}$	1 $6\frac{1}{2}$	1 $5\frac{1}{4}$
Labour	$2\frac{3}{4}$	$2\frac{1}{4}$	2	2
Misc.+Deadstock Deprec.	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	2
Livestock Depreciation	$8\frac{1}{2}$	$8\frac{1}{4}$	7	$6\frac{1}{2}$
Total Costs	2 $9\frac{3}{4}$	2 8	2 $5\frac{3}{4}$	2 $3\frac{3}{4}$
Returns	2 $10\frac{1}{2}$	2 $11\frac{1}{2}$	2 $11\frac{1}{4}$	2 $11\frac{1}{4}$
Margin per dozen	+ $\frac{3}{4}$	+ $3\frac{1}{2}$	+ $5\frac{1}{2}$	+ $7\frac{1}{2}$
Average Yield	221	228	243	239
Feed Conversion (lbs./doz.)	5·3	5·0	4·9	4·6
Hours per bird	0·63	0·54	0·54	0·51
Mortality Rate	19·7%	21·0%	14·0%	15·9%
Number of Units				
5 — 10,000 layers	7	5	4	4
10 — 20,000 layers	5	7	3	6
20,000 layers	3	3	8	5
	15	15	15	15
Average size of Unit (layers)	12,192	13,202	21,214	21,035

DEFINITION OF TERMS EMPLOYED AND ACCOUNTING CONVENTIONS

(*a*) *Average Size of Unit.* Average of the monthly average number of birds on the unit each month (four week month) during the year.

(*b*) *Average Yield per layer.* Total eggs laid divided by the average size of the unit.

(*c*) *Feedingstuffs.* Purchased feed charged at the net cost delivered to the units. If feed was home mixed then additional costs of mixing and milling added to feed costs. Home grown feed charged at estimated market value.

(*d*) *Labour.* Paid labour charged at actual cost, including employer's share of national insurance contributions, paid holidays etc. Standard rates were charged for unpaid family labour.

(*e*) *Home Reared Pullets.* Charged at 15s. per pullet transferred to the laying unit. Purchased pullets entered at purchase price.

(*f*) *Deadstock Depreciation.* Houses 10 per cent. Equipment 20 per cent.

(*g*) *Miscellaneous Costs.* Include direct miscellaneous costs of egg production, e.g. repairs, vet. and medicines, electricity, water etc., but there is no charge for general farm overheads.

PRINTED FOR THE UNIVERSITY
BY MORRIS AND YEAMAN (PRINTERS) LIMITED
MANCHESTER M15 5EJ
32907.6.71