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PRODUCTION *and* MARKETING of CAGE-LAID EGGS *in Alabama*



AGRICULTURAL EXPERIMENT STATION
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PRODUCTION *and* MARKETING of CAGE-LAID EGGS *in Alabama**

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INTRODUCTION

CONSIDERABLE INTEREST in the production of cage-laid eggs has developed within the past few years. As recently as 1950, there were practically no caged-layer operations in Alabama. In 1954, the number of cage farms in the State exceeded 200, most of which had 500 or more cages.

There are several reasons for the rapid increase in number of caged-layer operations, both in the State and in the South. First, commercial egg production has been expanding in the South. Second, certain advantages of the caged-layer system over the floor system make this operation attractive, especially to those just beginning in the poultry business. Third, commercial concerns have been quick to use this new development as a means for expanding the sales of their products, and have utilized their facilities to promote it.

As with most new ventures, mistakes are more frequent in the beginning. Methods that appear sound do not always prove practical. Problems peculiar to the new venture arise and have to be solved. Cost-price relationships may shift and cause the new venture to lose some of its initial advantage. Because a thorough knowledge of current production and marketing practices is essential to the development of a program to assist in making needed adjustments, a study of caged-layer operations was conducted in Alabama.

* This study was supported by Federal and State research funds.

** Resigned. The author acknowledges the assistance and cooperation of the 73 caged-layer operators and personnel of the Extension Service of the Alabama Polytechnic Institute. Acknowledgment also is due members of the Poultry Husbandry and Agricultural Economics departments for helpful suggestions throughout the study.

OBJECTIVES

The objectives of this study were (1) to determine the marketing and production practices used on commercial caged-layer farms, and (2) to determine the marketing and production costs and returns for eggs produced on commercial caged-layer farms.

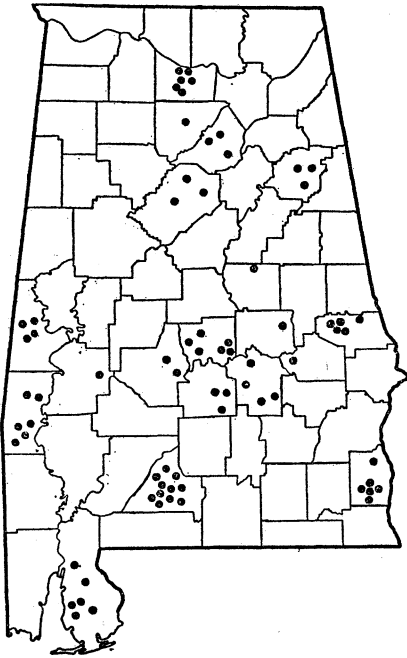


Fig. 1. Locations of the 73 farms in the caged-layer study, Alabama, September 1953-August 1954.

are shown in Figure 1. Enumeration was completed in December 1954.

Complete records were not obtained on all of the 73 farms in the sample. Therefore, the analysis of some of the factors studied is based on data from fewer than 73 farms.

ECONOMIC SITUATION

The economic situation for commercial poultrymen during the period covered by this study was highly variable, Figure 2. From September 1953 through February 1954, egg prices were very favorable. However, from March through August 1954 (end of

METHOD OF STUDY

A list of caged-layer flocks by location in the State was obtained by the Extension poultryman through the cooperation of County Agents. From this list, a random sample of 78 caged-layer farms reported as having 500 or more cages was selected. However, several of the farms had less than 500 cages when they were visited by trained enumerators, who obtained the desired information for the study. A total of 73 records was obtained, 5 of the farms in the original sample having gone out of the caged-layer business. The period of time covered was from September 1, 1953 to August 31, 1954. The locations of the 73 farms

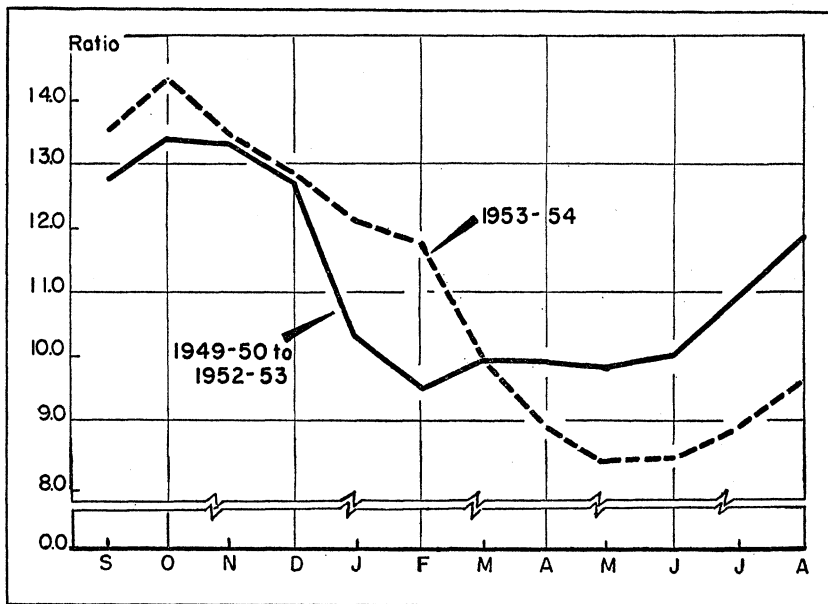


Fig 2. United States egg-feed ratios, by months, 1949-50 to 1952-53 and 1953-54.

period studied), egg prices were low and failed to show normal seasonal improvement. The average farm price received by Alabama farmers from September 1953 through August 1954 was 48.2 cents per dozen eggs, compared with 50.9 cents for the same period a year previously.

Although economic conditions were relatively unfavorable at the time of the survey, 38 per cent of the caged-layer operators were planning to expand their operations, and 6 per cent were undecided about their plans. The remaining 56 per cent were not planning to expand. Of those with plans for expansion, 60 per cent planned to expand immediately, and 25 per cent planned to do so when they had accumulated additional capital. The remaining 15 per cent had plans to increase their flocks as soon as the price situation improved.

STATUS OF CAGED-LAYER FLOCKS IN ALABAMA

Prior to 1947, there were no single-deck caged-layer farms in Alabama. In 1947, the Agricultural Experiment Station of the Alabama Polytechnic Institute constructed the first single-deck

caged-layer plant in the Southeast, and since that time has conducted research with cages.¹ There were an estimated 1 million hens in cages in Alabama, Florida, and Georgia in 1954.

YEAR ESTABLISHED

The data in Table 1 give some indication of the rapidity with which caged-layer operations have expanded in Alabama. Only three of the farms visited were in operation prior to 1951. Over half of the operations were established in 1954.

TABLE 1. YEAR IN WHICH CAGED-LAYER OPERATIONS WERE ESTABLISHED, 73 ALABAMA CAGED-LAYER FARMS, 1954

Year cage operation was established	Number of farms	Percentage of farms
	<i>Number</i>	<i>Per cent</i>
1947.....	1	1.4
1948.....	1	1.4
1949.....	1	1.4
1950.....	0	.0
1951.....	3	4.1
1952.....	5	6.8
1953.....	20	27.4
1954.....	42	57.5
TOTAL	73	100.0

REASONS FOR ENTERING CAGED-LAYER BUSINESS

A number of reasons were given for entering the caged-layer business, all of which involved the anticipation of greater income from this type of operation. Eighty-five per cent of the operators visited had no poultry prior to starting with caged layers. Fifteen per cent had floor flocks prior to putting in cage flocks. Each of these operators felt he could improve efficiency through better culling and/or lower mortality, thereby improving his income.

OTHER POULTRY ON CAGE FARMS

Caged-layer operators generally limited their operations to caged layers. Only 8 per cent also had floor flocks, 2 per cent had broilers, and 2 per cent had turkeys. Some of those with both cage and floor flocks were in the process of changing over to all-cage flocks.

¹ "Single-Deck Cages for Laying Hens." A.P.I. Agr. Expt. Sta. Cir. No. 116. May 1954.

TENURE STATUS OF OPERATORS

Eighty-one per cent of the operators owned their farms, and 6 per cent were part-owners. Five per cent of the operators were in partnership, and the remaining 8 per cent operated under other types of arrangements.

LAND USED FOR POULTRY ENTERPRISE

The poultry enterprise has long been recognized as one in which the amount of land required is a relatively unimportant factor. Although 63 per cent of the farms visited averaged over 50 acres in size, only 18 per cent of all operators used more than 1 acre for the poultry enterprise, 49 per cent used 1/2 to 1 acre, and 33 per cent used less than 1/2 acre.

IMPORTANCE OF THE CAGED-LAYER ENTERPRISE

The importance of the caged-layer enterprise as a source of income to the operator is shown below:

<i>Percentage of operator's income from caged-layer enterprise</i>	<i>Percentage of farms</i>
Less than 10	20
10-24	20
25-49	33
50-74	18
75 and over	9
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On one-fifth of the farms, the caged-layer enterprise could be considered relatively unimportant, contributing less than 10 per cent to the operator's income. However, on three-fifths of the farms, the amount contributed to the operator's income exceeded 25 per cent, making the caged-layer operation a very important part of the farm business.

Off-farm work contributed substantially to the income of caged-layer operators, especially of those whose income from caged layers was but a small proportion of their total. Of the operators whose receipts from caged layers was less than 25 per cent of their total, off-farm work generally contributed more to their incomes than did all farm enterprises.

CAPITAL INVESTMENT

Investment in land, dwellings, other buildings, poultry, livestock, and other items was obtained on 54 caged-layer farms.² The investment averaged \$15,769 on 33 farms, \$36,058 on 14 farms, and \$88,934 on 7 farms, Table 2.

TABLE 2. AVERAGE CAPITAL INVESTMENT, BY PRINCIPAL ITEMS, AND BY SIZE OF INVESTMENT, 54 CAGED-LAYER FARMS, ALABAMA, 1954¹

Item	Size of total investment			Average investment
	Less than \$25,000	\$25,000-\$50,000	More than \$50,000	
Number of farms	33	14	7	54
Land.....	\$ 2,771	\$ 9,361	\$39,594	\$ 9,253
Dwellings.....	6,039	13,214	15,714	9,154
Poultry buildings and equipment	2,642	3,494	4,522	3,107
Poultry.....	1,500	2,162	3,397	1,917
Other buildings and equipment	616	1,101	6,643	1,523
Livestock.....	474	1,704	9,574	1,996
Cars, trucks, and tractors.....	1,564	3,693	6,971	2,817
Feed supplies.....	163	1,329	2,338	747
TOTAL.....	\$15,769	\$36,058	\$88,934	\$30,514
Average investment in poultry enterprise, percentage of total	26%	16%	9%	16%

¹ Based on inventory valuation.

The average investment in the poultry enterprise was 26 per cent of the total for the group with an investment of less than \$25,000, 16 per cent of the total for the \$25,000 to \$50,000 group, and 9 per cent for the group with a total investment exceeding \$50,000. The average investment in the poultry enterprise for all farms was 16 per cent of the total.

FINANCING THE CAGED-LAYER ENTERPRISE

Approximately 60 per cent of the caged-layer operators used their own funds to build poultry houses and to buy cages and other equipment. About 35 per cent borrowed money and paid cash for building materials, cages, and equipment. The remaining operators were financed by feed dealers.

Of those borrowing, the two main sources of funds were local banks and the Farmers Home Administration. A few received loans from the Farm Credit Administration. In general, interest

² Based on inventory valuation.

on bank loans ranged from 4 to 8 per cent, with an average of 6 per cent. The loan period ranged from less than a year to 20 years. Most were for 2 years or less. Loans obtained from the Farmers Home Administration ranged from 3 to 20 years, with an average interest charge of 5 per cent. Most Farmers Home Administration loans were for periods of 3 years.

There is an initial period of approximately 6 months during which new commercial egg producers receive little or no income. Chicks must be purchased, brooded, fed, and otherwise cared for. As will be brought out more fully later, about \$1.75 is required to raise a pullet to laying age. Two-thirds of the caged-layer operators financed this initial cost with their own funds, and about one-fourth borrowed money and paid cash for the items needed. Very few reported they were financed by feed dealers.

INVESTMENT IN CAGED-LAYER HOUSES AND EQUIPMENT

One of the major investment costs in most poultry enterprises is housing and equipment. Cage houses are similar to conventional poultry laying houses, with the exception that they have individual cages for the layers. In Table 3 is given the average investment in houses and equipment of 73 cage farms in Alabama.

The average investment per farm was \$1,743 for cage houses, \$911 for cages, and \$110 for other buildings and equipment. The

TABLE 3. AVERAGE INVESTMENT IN CAGED-LAYER HOUSES AND EQUIPMENT, BY NUMBER OF CAGES, 73 CAGED-LAYER FARMS, ALABAMA, 1954

Number of cages	Average number of cages	Number of farms	Average investment				Average investment per cage
			Cage houses ¹	Cages ²	Other buildings and equipment ³	Total	
	<i>Number</i>	<i>Number</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Less than 500	384	9	1,000	368	18	1,386	3.61
500- 999	619	32	1,234	640	99	1,973	3.19
1,000-1,499	1,027	22	1,890	1,063	111	3,064	2.98
1,500 and over	2,355	10	3,719	1,932	223	5,874	2.49
TOTAL OR AVERAGE PER CAGE	951	73	1,743	911	110	2,764	2.91
			1.83	0.96	0.12	2.91	

¹ Includes lighting systems. Also includes feed rooms when separate from cage house.

² Includes feeders and waterers.

³ Includes egg rooms, egg graders, candlers, washers, refrigerators, egg baskets, and poultry coops.

total investment was \$2,764, or \$2.91 per cage. The average investment per cage declined as the number of cages increased. Farms with less than 500 cages had an average investment per cage of \$3.61, whereas those with 1,500 cages or more had an average investment of \$2.49 per cage.

The investment in cage houses and equipment was considerably higher in northern Alabama than in central or southern Alabama. The investment per cage in the three areas is given below:

<i>Area</i>	<i>Investment per cage</i>
Southern Alabama	\$2.55
Central Alabama	2.96
Northern Alabama	<u>3.56</u>
AVERAGE	\$2.91

Part of the difference in investment per cage between southern Alabama and northern Alabama can be explained by the size of the enterprise. The average number of cages per farm in northern Alabama was 704, whereas in southern Alabama the average number was 968. However, this does not account for the difference between southern Alabama and central Alabama. In the latter area, the average number of cages was 1,063 as compared with 968 in southern Alabama. Cage houses in central and northern Alabama were constructed in such a way as to give protection to layers during severely cold weather. This had the effect of increasing housing costs in these colder areas. It appears from the data that cage houses were constructed for one-fifth to one-third less cost per cage in southern Alabama than in the colder areas of the State.

OTHER BUILDINGS AND EQUIPMENT

FEED HOUSES. In addition to the cage house, cages, and cage equipment, other buildings and equipment are often necessary to a caged-layer operation. On about one-fourth of the farms, the feed house was not a part of the cage house. Existing buildings were used for feed houses or a separate house was built for this purpose. The average investment in separate facilities for feed storage was \$230. If the separate feed house was used only for the purpose of storing poultry feed, the investment exceeded the cost of the feed room included in the laying house.³ In addition,

³ Assuming a feed room in the caged-layer house with a floor area 10 × 24 feet and an average cost of 75 cents per square foot (including a cement floor).

having the feed room away from the laying house usually resulted in greater labor requirements.

EGG ROOMS. About one-fifth of the caged-layer operators had rooms used specifically as egg rooms. The average investment in egg rooms was \$280 on these farms. The remainder of the operators kept eggs in their dwelling houses or used a portion of the feed room for this purpose. Fourteen per cent of the farms visited had refrigeration equipment for holding eggs. The investment ranged from \$50 to \$800, with an average of \$350.

OTHER EQUIPMENT. Most of the operators sorted eggs for size and had grading equipment for this purpose. This equipment was, for the most part, very inexpensive, averaging less than \$3 on 45 per cent of the farms, and less than \$25 on 85 per cent. On 10 per cent of the farms (each with more than 1,000 cages), large automatic egg graders were used; the average investment in this type of equipment was \$135 on these farms.

Candlers were used by 40 per cent of the operators, but these were generally homemade and very inexpensive, the cost averaging about \$2 each.

Egg baskets are a necessary part of any laying enterprise but were a small part of the total investment, averaging about \$8 per farm.

Commercial egg washers were used on only two farms; the remainder of the operators used pans, buckets, sandpaper, and damp cloths for cleaning dirty and stained eggs.

TYPES AND SIZES OF BUILDINGS

The basic structure of the caged-layer house is very similar to that of laying houses used for floor flocks. Floor-flock laying houses have roosts, dropping pits, nests (either individual or community), feeders, and waterers. Feeders and waterers are usually on the floor. Caged-layer houses have individual cages for the layers. The cages are raised off the floor and are provided with feeders and waterers. The eggs roll down the slanting wire cage floor and are gathered in front of the cage.

All except two of the cage farms visited had single-story laying houses; the exceptions had two-story buildings. Ninety per cent of the houses had all-dirt floors, and the remainder had dirt floors with concrete walks. Practically all had wooden and wire

sides. Three-fourths of the houses had aluminum roofs; one-sixth had galvanized iron roofs; and the remainder had composition roofs.

The widths of the houses ranged from 8 to 40 feet, but were generally from 20 to 26 feet. Below are given the percentages of houses with various widths:

<i>Width of caged-layer house (feet)</i>	<i>Percentage of houses</i>
Less than 20	8
20-21	16
22-23	9
24-25	50
26-27	7
28 and over	10
	100

Cage houses 8 feet in width have two rows of single cages, placed back to back. Cage houses 20 to 26 feet wide usually have six rows of single cages placed so that two rows are back to back.

On three-fourths of the farms, feed rooms were in the cage house, the location depending on the length of the building. Houses less than 100 feet in length usually had feed rooms on the end, whereas those longer than this had feed rooms in the center of the house. The most general lengths of feed rooms ranged from 8 to 12 feet. Total floor space, of course, would depend on the width of the building, but generally ranged from 160 to 288 square feet.

FLOOR SPACE PER CAGE

The amount of floor space per cage, excluding feed room space, ranged from 2 to over 6 square feet, with an average of 3.6. The percentages of farms allowing various amounts of floor space per cage were as follows:

<i>Square feet of floor space per cage</i>	<i>Percentage of farms</i>
Less than 3.0	15
3.0-3.4	33
3.5-3.9	34
4.0-4.4	10
4.5 and over	8
	100

There did not appear to be any relationship between the size of the operation, as determined by the total number of cages, and the average amount of floor space used.

From these data, it appeared that the caged-layer operators were using as much or perhaps slightly more floor space per bird than were operators with floor flocks. By keeping the cages full at all times, the cage house might be better utilized throughout the year than would a floor-flock house. Also, better arrangement of cages within the house might result in more efficient utilization of space.

UTILIZATION OF CAPACITY

The ideal situation on any poultry farm would be the complete utilization of all laying houses and equipment throughout the year. The caged-layer enterprise probably comes nearer to this ideal than does the floor enterprise. By comparing the average number of layers on hand during a month with the actual number of cages available, it was determined that the average utilization of capacity on 28 cage farms was 90 per cent. The percentage of utilization by months is shown below:

<i>Month</i>	<i>Percentage of cages utilized</i>
September 1953	88
October 1953	93
November 1953	89
December 1953	88
January 1954	89
February 1954	90
March 1954	87
April 1954	88
May 1954	85
June 1954	96
July 1954	96
August 1954	94
AVERAGE	90

Utilization varied somewhat during the period studied. There was some indication that cage houses were filled nearer to capacity during June, July, and August than during other months. Part of this may have been due to the late pullet hatch in 1954 and to the fact that rigorous culling had not yet become necessary.

WATERING SYSTEM

The watering system is an indispensable part of the poultry equipment. Of the farms visited, 99 per cent used the "V" trough, continuous-flow waterer. In practically all houses, the "V" trough

was placed between cages so that the layers in two rows of cages had access to the same trough.

Drilled wells were used as sources of water on two-thirds of the farms, city water was used on one-sixth, dug wells were used on one-eighth, and the remainder used other sources for their water supply. Much of Alabama suffered from drought conditions during the summer of 1954, and 16 per cent of the operators reported they had difficulty getting enough water for their poultry enterprises during this period. Several of these operators were planning to drill wells to insure a water supply.

LIGHTING SYSTEM

The poultrymen visited installed lights either over the cages or over the aisles. On 51 per cent of the farms, lights were placed over the cages, on 45 per cent of the farms they were placed over the aisles, and on 4 per cent they were placed elsewhere.

The wattage of lights used on the various farms was as follows:

<i>Wattage</i>	<i>Percentage of farms</i>
15	3
25	55
40	21
60	15
75	3
100	3
	100

The number and wattage of lights used may be an important factor in a laying program. The number of lights per 100 cages and wattage is given below:

<i>Wattage of lights</i>	<i>Average number of lights per 100 cages</i>
15	4.8
25	4.3
40	4.0
60	2.6
75	3.3
100	1.2

When weighted, the number of watts per 100 cages was 120, or 1.2 watts per cage. This is approximately the 1.0 watt per cage that is recommended by this Experiment Station. Operators using 15-watt lights appeared to have less watts than recommended, whereas those using 75-watt lights had considerably more watts than recommended.

PRODUCTION PRACTICES

FEEDING

TYPE OF FEED. The all-mash feeding program was used by 80 per cent of the caged-layer operators, with only 10 per cent using a mash-grain program, and 10 per cent some other program of feeding. Supplemental feeding of pellets was practiced by about 15 per cent of the operators. Shell or limestone was used on about 75 per cent of the farms, and grit was used by the other 15 per cent.

FREQUENCY OF FEEDING. Fifty-one per cent of the operators reported feeding only once a day, 45 per cent fed twice, and 4 per cent three times daily.

FEED CONSUMPTION. On the basis of 21 farms where data were available, it was determined that feed consumption was 98 pounds per layer per year.⁴ This amounted to 5.7 pounds of feed per dozen eggs produced.

DELIVERY. Feed was delivered at varying intervals, usually in 50-pound bags. Sixty-six per cent of the feed was delivered weekly or more often, 20 per cent twice monthly, and 14 per cent less often than twice monthly. On 90 per cent of the farms, delivery was made by the feed dealer; on the remaining 10 per cent, the grower hauled his own feed.

TERMS OF PURCHASE. The terms for over 90 per cent of the purchases were cash, payable the 10th of the following month. It was evident from talking to cage operators that a great deal of flexibility existed in the terms of payment for feed. An operator may not pay the full balance owed for several months and still obtain feed and supplies on a regular basis. Disease problems, lowered production from heat or cold, low egg prices, and many other factors may temporarily result in an operator being unable to make full payment for feed purchases. Feed suppliers take these factors into consideration.

SERVICES. Most feed companies today employ the services of persons trained in helping poultrymen with their production problems. Forty-five per cent of the operators reported that advisory

⁴ This figure includes an unknown, although probably small, amount of feed fed to pullets placed in cages prior to beginning to lay.

services were provided them, and 49 per cent stated that help was available if needed. Only 6 per cent stated that no services were provided by the feed dealer.

CULLING

One of the main advantages credited to the caged-layer operation is the ease of determining which birds are nonproductive. Since each layer's eggs are gathered separately, it is simple to determine whether a hen is laying.

CULLING RATE. The culling rate refers to the number of layers culled during the year, expressed as a percentage of the average number of layers on hand during the year. On 22 farms where complete data were available, the culling rate was 66 per cent. In addition, 10 per cent of the average number of layers on hand died, which means that three-fourths of the layers had to be replaced during the year. This Experiment Station recommends that a caged-layer operator plan to replace about 100 per cent of his layers each year.

FREQUENCY. Caged-layer operators were asked how often they culled and how they determined when to cull. The pattern for culling varied considerably. Nineteen per cent culled weekly, 36 per cent every 2 weeks, 27 per cent monthly, and the remaining 18 per cent either culled continuously or followed no regular pattern.

About 80 per cent of the operators culled whenever a hen fell below 50 per cent production during a 2-week or longer period, the length depending on price of eggs, price of fowl, and availability of replacements. A few operators kept a bird in the cage as long as she appeared to be in good condition, even though her rate of production might be below 50 per cent.

Cull hens were normally sold to wholesale buyers, although a number of operators sold to local retail stores. Culls sold to the latter were generally dressed on the farm.

DOUBLING UP. Since the ease of determining nonlayers is a major advantage of the cage system, operators were asked whether they ever "doubled up" their cages, or put two birds in one cage. Two-thirds of them reported that they did double up, although

the practice was limited primarily to young replacements. Replacement pullets not in production often were doubled up until they began laying. Then, as older layers went out of production, the pullets were moved into the empty cages. It should be noted, however, that doubling up was not confined to this use, but was sometimes used by operators as a means of expanding the size of their flock without increasing the capital investment in houses and equipment. In doing so, they were running the risk of being unable to determine whether each bird was laying at a profitable rate, thereby losing one of the advantages of the cage operation. When birds are doubled up, it is usually desirable to debeak them to prevent cannibalism.

RATE OF LAY. Caged-layer operators were able to maintain a relatively high rate of lay throughout the year, averaging 56 per cent. The monthly rate of lay is shown below:

<i>Month</i>	<i>Percentage rate of lay</i>
September 1953	56
October 1953	60
November 1953	62
December 1953	61
January 1954	59
February 1954	61
March 1954	59
April 1954	55
May 1954	55
June 1954	55
July 1954	51
August 1954	58
WEIGHTED AVERAGE	56

The rate of lay was highest during the fall and winter months, and lowest during the late spring and summer months. There are two possible reasons for this variation. First, caged-layer farms may have been operated at a more intensive rate during the fall and winter when egg prices are generally highest. Second, the period March through August 1954 was one of rapidly declining egg and poultry prices. Because of the difference between the value of cull hens and the cost of replacements, caged-layer operators may have found it more profitable to operate at a lower rate of production, keeping the low-producing layers for a longer period than usual.

NUMBER OF EGGS PER LAYER. The number of eggs per layer averaged 203 on the 21 farms that had complete egg records, Table 4.

TABLE 4. AVERAGE NUMBER OF EGGS PER LAYER, 21 CAGED-LAYER FARMS, SEPTEMBER 1, 1953-AUGUST 31, 1954

Number of eggs per layer	Number of farms	Average number of eggs	Average yearly rate of lay
	<i>Number</i>	<i>Number</i>	<i>Per cent</i>
Less than 200.....	8	185	51
200-209.....	4	204	56
210-219.....	4	216	59
220 or more.....	5	244	67
TOTAL OR AVERAGE.....	21	203	56

Eight of the 21 farms produced less than 200 eggs per hen per year, averaging 51 per cent production for the year. Five farms produced more than 220 eggs per hen per year, averaging 67 per cent production.

DISEASE CONTROL AND SANITATION

About one-half of the operators reported having disease problems with both replacements and layers during the previous year. Of those having disease problems, 30 per cent cited leucosis as the major disease, 27 per cent reported either colds or bronchitis, 16 per cent reported coccidiosis, and the remainder reported combinations of diseases.

MORTALITY. Inasmuch as each bird is separated from the others, the caged-layer operator is more likely to discern any symptoms of disease, heat exhaustion, or other factors contributing to mortality. One of the first symptoms that may presage mortality is a drop in egg production. Feathers under a cage may also indicate that something is wrong. By culling such birds, mortality can probably be reduced. Mortality was held to 10 per cent on 22 caged-layer farms with complete records. This is very favorable when compared with floor flocks, which average around 20 per cent mortality.

VACCINATION PROGRAM. Eighty-eight per cent of the operators reported vaccinating for Newcastle disease. Practically all of these vaccinated at 1 day of age and again at an age of from 8 to 14 weeks. Most operators vaccinated the second time at 12 weeks, although some vaccinated as early as 6 weeks and some as late as 20 weeks.

All except two operators reported vaccinating for fowl pox. Vaccination was usually done at 9 to 12 weeks, although some operators vaccinated at younger and older ages.

Thirty-four per cent of the caged-layer operators reported vaccinating for bronchitis, and 10 per cent reported natural exposure to the disease. The remaining 56 per cent reported that they did not vaccinate. Of those vaccinating, a few treated at 1 day of age and again in 8 to 10 weeks. The majority vaccinated at between 12 and 20 weeks, or prior to housing the pullets.

DISPOSAL OF DEAD BIRDS. Various methods were used to dispose of dead birds. Almost half of the operators reported burying the dead birds; one-third burned them; and the remainder disposed of them in other ways, mainly by carrying them off the farm and throwing them away.

FLY AND ODOR CONTROL. One of the major problems encountered in a caged-layer operation is that of flies. Under certain conditions the accumulated droppings provide a favorable media in which fly larvae can develop. If enough larvae develop into flies, they can become a nuisance to the caged-layer operator and perhaps to the neighborhood as well. Several caged-layer farms located within cities have been forced to discontinue operation because of flies.

The caged-layer operators visited were evenly divided as to whether they thought flies were a problem on their farms. Actually, all farms were bothered to some extent, but satisfactory control measures prevented flies from becoming a serious problem on many of them. Given below are the months during which flies were considered to be a major problem.

<i>Months bothered by flies</i>	<i>Percentage of operators reporting problem</i>
January	0
February	0
March	0
April	0
May	40
June	39
July	99
August	90
September	85
October	56
November	14
December	0

It is quite obvious that the fly problem in Alabama is generally limited to the 6 months May through October.

Malathion, or its derivatives, was the major agent used to control flies. It was applied both as a spray and as a dust. The amounts of the material used varied considerably, depending on condition

of the droppings and degree of infestation. Other materials used included aldrin, borax, lime phosphate, TEPP, and toxaphene. The average cost for fly control materials for the caged-layer enterprise was \$51 per farm. This amounted to about 6 cents per bird.

Odors are often a problem in a caged-layer enterprise, especially during damp weather. Lime and/or superphosphate were used by 75 per cent of the operators to control odors and to dry out the droppings, thereby aiding in odor and fly control. Another means of controlling odors and flies is that of cleaning out droppings if they become excessively wet. Half of the operators cleaned under their cages twice a year, one-third once a year, and the remainder more often than twice a year. The manure was used principally on pastures and crops. Very little was sold.

USE OF LIGHTS

Lights are used in poultry houses primarily as a means of maintaining or increasing egg production. However, there is still a lack of knowledge of the physiological basis of lights, and there are many ways in which lights are used.

Twenty-five per cent of the operators reported that they used lights only in the mornings, 19 per cent used them only in the evenings, and 56 per cent used both morning and evening lights. The number of hours of light maintained on the cage farms studied were as follows:

<i>Number of hours of light (daylight and artificial)</i>	<i>Percentage of farms</i>
Under 14	3
14	38
15	18
16	18
17	8
18-23	5
24	10
	100

LABOR REQUIREMENTS

PRODUCING AND MARKETING EGGS

Labor is an important item in the caged-layer operation. In Table 5 are given the estimated number of hours used to perform the various jobs in producing and marketing cage-laid eggs.

TABLE 5. ESTIMATED LABOR REQUIREMENTS FOR PRODUCING AND MARKETING EGGS, 71 CAGED-LAYER FARMS, ALABAMA, 1954

Number of cages on farm	Average	Labor required per week					Total
		Daily chores ¹	Handling eggs ²	Marketing eggs ³	Culling ⁴	Cleaning house ⁴	
	Number	Hours	Hours	Hours	Hours	Hours	Hours
Less than 500	384	6.2	4.7	0.7	0.3	0.4	12.3
500- 749	549	9.9	5.7	2.2	.5	.3	18.6
750- 999	898	11.9	8.0	2.3	.4	1.1	23.7
1,000-1,499	1,027	12.0	10.5	5.5	.7	.7	29.2
1,500-1,999	1,602	17.5	17.5	6.2	.7	.7	42.6
2,000 and over	2,137	25.1	12.5	3.1	1.1	2.6	44.4
AVERAGE	892	11.8	8.2	3.2	0.6	0.7	24.5
PER 100 CAGES		1.3	0.9	0.4	0.1	0.1	2.8

¹ Feeding, cleaning waterers, gathering eggs, and repairing houses and equipment.

² Cleaning, sorting, candling, and packing eggs.

³ Time spent hauling eggs from farm to market, and in selling.

⁴ These jobs are not always performed on a weekly basis, but are prorated on a weekly basis in order to show total labor requirements.

The greatest labor requirements on caged-layer farms were for performing daily chores, although handling and marketing eggs were almost of equal importance. If an operator grows five lots of replacements per year, each lot containing 400 pullets, with an average labor requirement of 7 hours per week, the average worker probably can care for 1,500 to 2,000 caged layers and raise the necessary replacements.

Generally, chore labor requirements per 100 cages were less on farms with the greatest number of cages. As shown below, time required for chores by operators with 2,000 cages or more was only about two-thirds of that required by operators with less than 750 cages.

Number of cages on farm	Hours of chore labor per week per 100 cages
Less than 500	3.2
500- 749	3.4
750- 999	2.6
1,000-1,499	2.8
1,500-1,999	2.7
2,000 and over	2.1

SOURCES OF LABOR

In Table 6 is given the percentage breakdown on sources of labor for various jobs on the caged-layer farm. Except for cleaning houses, the owner performed most of the work. Hired labor was important in performing daily chores on almost one-third of

TABLE 6. SOURCES OF LABOR FOR VARIOUS JOBS ON THE CAGED-LAYER FARM, 73 CAGED-LAYER FARMS, ALABAMA, 1954

Job performed by:	Daily chores	Handling eggs	Marketing eggs	Culling	Cleaning house
	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Owner	60	64	84	81	23
Owner and/or family	11	19	9	2	7
Owner and hired labor	10	4	0	5	10
Hired labor	19	13	3	5	60
Feed dealer	0	0	4	7	0
TOTAL	100	100	100	100	100

the farms, and in cleaning houses on almost two-thirds of the farms. The owner or his family performed most of the tasks connected with handling and marketing eggs and culling hens.

MARKETING PRACTICES

It is the opinion of many poultrymen that the caged-layer enterprise has certain advantages over conventional floor enterprises in marketing practices. This section deals with marketing practices from the standpoint of gathering the eggs, cleaning, sorting, packing, and selling.

GATHERING EGGS

Most caged-layer operators gathered eggs only once a day, Table 7. The proportion varied according to season, with a larger number gathering more frequently in the summer than in the winter.

Caged-layer operators apparently gather eggs much less often than do operators of floor flocks. A recent study in Alabama showed that over 90 per cent of the floor-flock operators gathered eggs twice daily or more often.⁵ Even during the summer, only

TABLE 7. FREQUENCY OF GATHERING EGGS DURING SUMMER AND WINTER, 73 CAGED-LAYER OPERATORS, ALABAMA, SEPTEMBER 1, 1953-AUGUST 31, 1954

Frequency of gathering	Percentage of operators	
	Summer	Winter
	<i>Per cent</i>	<i>Per cent</i>
Once daily.....	65	81
Twice daily.....	25	17
Three or more times daily.....	10	2
TOTAL	100	100

⁵ "Marketing Practices of Commercial Egg Producers in Alabama." A.P.I. Agr. Expt. Sta. Bul. 291. p. 6. August 1954.

about one-third of the caged-layer operators gathered eggs twice daily or more often. The two main reasons for less frequent gathering of eggs are (1) less breakage, and (2) more rapid cooling of eggs in cages. With floor flocks, eggs in nests are more likely to be broken the longer they remain in the nest, and eggs in a nest do not have an opportunity to cool so long as hens remain on the nest. Even though most caged-layer operators gathered eggs only once daily, this Experiment Station recommends gathering eggs at least twice daily, especially during hot weather, because egg quality may suffer if they are allowed to remain in cages during the heat of the day.

The proportion of cracked eggs varied among farms. Fifty-three per cent of the operators reported cracked eggs as being 1 per cent or less of the total eggs produced; 34 per cent said the proportion was 2 to 3 per cent; and 13 per cent reported cracks as being more than 3 per cent of the total. The weighted average was 1.6 per cent. Four-fifths of the operators stated that all cracked eggs were consumed in the home, whereas the remainder reported that some of them were sold.

One reported advantage of the caged-layer operation is the reduction in number of dirty eggs. Fifty-one per cent of the operators reported less than 5 per cent dirty eggs, 24 per cent reported between 5 and 10 per cent, 11 per cent reported between 10 and 20 per cent, and 14 per cent reported over 20 per cent of their eggs were dirty. On a weighted basis, 10 per cent of all the eggs were classified as dirty. This was approximately half the percentage reported for floor layers in Alabama.⁶ Operators reported considerably more dirty eggs during wet weather than at other times.

CLEANING, SORTING, AND PACKING EGGS

All poultrymen reported having some dirty eggs. Seventy-nine per cent reported that they cleaned only the dirty eggs, and the remaining 21 per cent cleaned all eggs. Over half of those cleaning eggs washed them, and almost one-third used a damp cloth. The remainder used sandpaper or other means for cleaning. Only two farms had mechanical egg washers.

Not all caged-layer operators sorted eggs for size and color. Eighty-three per cent sorted for size, and 17 per cent did not.

⁶ Ibid. p. 8.

The grading equipment varied from simple hand scales to rather elaborate automatic equipment ranging in price up to \$150. The farms with automatic equipment had large flocks, which probably justified the larger capital outlay. On 60 of the farms visited (82 per cent), eggs were all of one color. On the remaining 13 farms, 3 operators sorted by color; 10 did not.

Fresh eggs are candled to reduce the number of eggs with blood and meat spots. Forty per cent of the caged-layer operators reported candling their eggs. The remaining 60 per cent did no candling.

About three-fourths of the poultrymen reported packing eggs the same day that they were gathered. The remainder packed eggs the following day or later. It has often been recommended by authorities that eggs be cooled before packing. With the caged-layer system, the eggs produced during winter and spring become cool in the cages and, therefore, can be safely packed the day they are gathered. However, during the hot summer and fall months, there are many days during which the temperature in the cage house reaches 90° F., and, if eggs remain in the house, some loss of egg quality may occur.

Ten of the 73 farms visited had refrigeration equipment to keep eggs cool until marketed. The remaining poultrymen held eggs in unrefrigerated egg rooms, feed rooms, or in their dwelling houses.

More than one-third of the caged-layer operators reported packing all of their eggs in cartons. The remainder packed some in cartons and some in cases.

SELLING EGGS

FREQUENCY. Caged-layer operators made a practice of marketing their eggs several times a week; in fact, 68 per cent marketed eggs three times a week or more, and 22 per cent marketed twice a week. Only 10 per cent marketed eggs once a week. This is in contrast to a recent study of floor flocks in Alabama, which showed that most producers marketed their eggs only once a week.⁷ There appeared to be little difference in the frequency of marketing during the spring, summer, fall, and winter seasons. There was no relationship between the number of layers and the frequency of marketing. Frequency of delivering to the buyer depends a great deal on local situations.

⁷ Ibid. p. 9.

OUTLETS. Forty per cent of the eggs were sold to retail grocers, 31 per cent to wholesale handlers of eggs, and about 10 per cent to each, feed dealers, eating places, and directly to consumers, Table 8. Operators with small flocks sold a larger proportion directly to consumers and eating places, whereas the larger flock owners sold to retail grocers and wholesale handlers of eggs.

TABLE 8. PROPORTION OF EGGS SOLD THROUGH VARIOUS OUTLETS, BY SIZE OF FLOCK, 69 CAGED-LAYER FARMS, ALABAMA, 1954

Number of hens in cages	Outlets for eggs						Total
	Wholesalers	Retail grocers	Feed dealers	Eating places	Direct to consumers	Other	
	<i>Percentage of total</i>						<i>Per cent</i>
Less than 500	21	12	16	19	32	0	100
500-999	33	38	10	10	9	0	100
1,000 and over	31	45	10	7	6	1	100
AVERAGE OR TOTAL	31	40	10	9	9	1	100

DISTANCE TO MARKETS. The distance to markets ranged from less than 5 to over 60 miles. The distances were as follows:

<i>Distance from farm to market (miles)</i>	<i>Percentage of farms</i>
5 or less	16
6-10	16
11-20	13
21-40	26
41-60	12
Over 60	17
	100

It is obvious that a large proportion of the caged-layer operators had to travel long distances to market their eggs. A person making two 30-mile trips a week would travel a minimum of 120 miles (round trips), and under the best conditions would take 3 to 5 hours in travel.

PAYMENTS. In general, caged-layer operators were paid weekly or more often for eggs. One-half of the operators were paid for eggs on delivery, one-fifth were paid weekly, one-tenth monthly, and the remaining one-fifth were paid in a combination of ways.

Although prices were very low during a portion of the year when this study was made, 92 per cent of the operators reported

that they had no difficulty selling their eggs. However, 8 per cent did experience problems. Ninety-five per cent planned to continue selling through the same outlet.

MARKETS USED FOR PRICING. Given below are the primary markets used for pricing by the caged-layer operators:

<i>Market used for pricing</i>	<i>Percentage of caged-layer operators</i>
Local	28
Atlanta, Georgia	15
Montgomery, Alabama	11
Chicago, Illinois	10
Birmingham, Alabama	7
Jacksonville, Florida	5
Other	24
	100

One-fourth used the local market for pricing, and about the same proportion used markets other than local or the large markets listed above. Most operators received a premium when the quotation was based on the large wholesale markets.

COSTS AND RETURNS

Caged-layer operators are primarily interested in the profit from their operations. If profits are not forthcoming or if they are low in relation to profits from alternative enterprises, operators will discontinue their caged-layer businesses.

Cost and return data for producing and marketing eggs were obtained on 21 caged-layer farms, and will enable a limited evaluation to be made of the profitableness of the caged-layer operation during the period covered by this study. The average cost per 100 layers was \$881 per year, or 52 cents per dozen eggs, Table 9.

Feed was the largest cost item, followed by labor and flock depreciation. Marketing items, such as cases and cartons and hauling, amounted to almost 6 per cent of the total cost.

Gross returns totaled \$891.29 per 100 layers, or 52.6 cents per dozen eggs, Table 10. Egg sales accounted for 96 per cent of the total receipts from the caged-layer enterprise. Inasmuch as most caged-layer operators used feed that was delivered in paper bags, practically no income was derived from the use or sale of feed bags.

The profit on these 21 farms was 0.6 cent per dozen, Table 11. If an operator used no hired labor, his return for labor and management was about 8.8 cents per dozen eggs produced, or 82.5 cents per hour for producing and marketing eggs. This amounted to a labor return of \$1.02 per layer.

TABLE 9. EGG PRODUCTION COSTS PER 100 CAGED LAYERS AND PER DOZEN EGGS, 21 CAGED-LAYER FARMS, ALABAMA, SEPTEMBER 1, 1953-AUGUST 31, 1954¹

Item	Average costs		Percentage of total costs
	Per 100 layers	Per dozen eggs	
	Dollars	Cents	Per cent
Feed.....	521.24	30.8	59.1
Labor.....	138.19	8.2	15.7
Flock depreciation.....	86.97	5.1	9.9
Laying houses.....	30.23	1.8	3.4
Cases and cartons.....	30.17	1.8	3.4
Miscellaneous ²	22.30	1.3	2.5
Hauling.....	22.16	1.3	2.5
Equipment.....	19.74	1.1	2.3
Taxes and insurance.....	4.65	.3	.5
Land.....	3.19	.2	.4
Other buildings.....	2.62	.1	.3
TOTAL.....	881.46	52.0	100.0

¹ Average rate of lay of 21 farms 203 eggs.

² Medicine, electricity, water, etc.

TABLE 10. GROSS RETURNS FROM EGG PRODUCTION, 21 CAGED-LAYER FARMS, ALABAMA, SEPTEMBER 1, 1953-AUGUST 31, 1954

Source of receipts	Average returns		Percentage of total returns
	Per 100 layers	Per dozen eggs	
	Dollars	Cents	Per cent
Eggs sold	852.63	50.3	95.7
Eggs consumed	8.27	.5	.9
Feed bags sold or used	.72	¹	.1
Manure credits	29.67	1.8	3.3
	891.29	52.6	100.0

¹ Less than 0.1 cent.

TABLE 11. COSTS AND RETURNS, 21 CAGED-LAYER FARMS, ALABAMA, SEPTEMBER 1, 1953- AUGUST 31, 1954

Item	Costs and returns
	Cents
Receipts per dozen eggs.....	52.6
Costs per dozen eggs.....	52.0
Profit per dozen eggs.....	.6
Labor return per hour.....	82.5
Labor return per layer.....	101.7

On the farms where the rate of lay was less than 200 eggs per hen per year, averaging 185, the net loss was 8.4 cents per dozen, whereas, on the 13 farms where the rate of lay was more than 200 eggs per hen per year, averaging 213, the net profit was 4.7 cents per dozen eggs. Although the flocks averaging less than 200 eggs per hen returned a net loss when all costs (including labor at normal wage rates) were included, they did return something for labor. This return amounted to 21 cents per hen per year for these flocks, compared with \$2.08 per hen for the 13 flocks averaging 213 eggs.

REPLACEMENT PROGRAM

The replacement program for caged layers differs markedly from that for floor layers. With the latter, a brood of chicks is generally started in February or March and housed in July or August. Normally, no other replacements are raised during the year. In the caged-layer program, several broods of chicks may be reared at regular intervals during the year in order to keep the cages filled with productive birds at all times. The timing of the replacement program is all-important to the success of the enterprise.

NUMBER OF LOTS PER YEAR

The number of lots of replacements grown per year will depend on several factors, some of which are (1) culling rate, (2) amount of equipment available, and (3) availability of labor. In Table 12 is given the number of lots per year on 52 caged-layer farms.

There was a decided tendency for operators growing only a few lots per year to raise a larger number of replacements at one

TABLE 12. AVERAGE NUMBER OF CHICKS PER LOT, BY NUMBER OF LOTS PER YEAR, 52 CAGED-LAYER FARMS, ALABAMA, 1954

Number of lots per year	Number of farms	Average number of cages	Average number of chicks per lot
	<i>Number</i>	<i>Number</i>	<i>Number</i>
2 or less.....	5	709	460
3.....	8	847	265
4.....	23	1,107	280
5.....	1	1,000	200
6.....	14	1,003	200
7 or more.....	1	1,000	130
TOTAL OR AVERAGE.....	52	997	270

time, whereas those growing five or more lots raised fewer replacements at one time. It appears that cage operators start enough chicks each year to equal the number of cages on hand.

BREED AND SEX

White Leghorn was the predominant breed used as caged layers, being used by over 85 per cent of the caged-layer operators. Leghorn-crosses and hybrids made up most of the remaining types of caged layers. The Auburn, Ghostley, Keystone, and Babcock, in that order, were the most popular of the White Leghorn strains used.

Only one caged-layer operator purchased straight-run chicks; the remainder used sexed pullet chicks. The cost for White Leghorn chicks generally ranged from 30 to 43 cents, with an average of 36.5 cents. The cost for crosses ranged from 50 cents upward.

METHODS OF REARING

Pullet replacements can be grown in several ways. They can be grown on the floor in brooder houses, in batteries, or they can be grown in a combination of the two methods. About 90 per cent of the caged-layer operators visited grew replacements on the floor, later transferring them to cages. The remaining operators grew replacements in batteries prior to placing them in cages.

Given below is the distribution of ages at which replacements were placed in cages:

<i>Age when placed in cages (weeks)</i>	<i>Percentage of farms</i>
Less than 15	16
16-17	32
18-19	18
20-21	32
Over 21	2
	100

It is obvious that many of the pullets were placed in cages prior to start of lay, whereas others were placed in cages after they had begun laying. Actually, all replacements are not generally placed in cages at the same ages. The more precocious ones usually go in first, perhaps at around 16 weeks of age, and are followed by the slower maturing pullets as these begin to lay.

REPLACEMENT MORTALITY

Of over 23,000 replacements started by 60 caged-layer operators, 84 per cent of that number were placed in cages. Of the 16 per cent that were not caged, approximately 12 per cent died, and the other 4 per cent were culled. It is possible that some of the culls had salvage value and did not represent a total loss. Approximately 45 per cent of the operators caged 90 per cent or more of the pullets started, whereas almost 20 per cent caged less than 80 per cent of the pullets started.

COSTS OF REARING

Each caged-layer operator was asked to estimate the cash cost of raising replacements to laying age. The range in estimates was from \$1.00 to \$2.25 per bird, the average was \$1.77, Table 13.

TABLE 13. ESTIMATED CASH COSTS OF RAISING REPLACEMENTS, 66 CAGED-LAYER OPERATORS, ALABAMA, 1954

Range in cost	Number of operators	Average estimated cost
	<i>Number</i>	<i>Dollars</i>
Less than \$1.50.....	6	1.19
\$1.50-\$1.74.....	12	1.62
\$1.75-\$1.99.....	29	1.79
\$2.00 and over.....	19	2.04
TOTAL OR AVERAGE.....	66	1.77

Detailed information was obtained on the cash costs of producing 12 lots of replacements. The range in cost was from \$1.66 to \$2.12, with an average of \$1.75. Although actual cost data were limited to these few observations, the results seemed to verify the opinions of many caged-layer operators in the State as to the cash cost of growing replacements.

LABOR REQUIREMENTS

Caged-layer operators were asked to estimate the amount of labor used daily in growing replacements to 10 weeks of age and from 10 weeks until housing. The estimated average labor to 10 weeks was 35 minutes per day for an average of 100 chicks, 58 minutes for 244, 86 minutes for 564, and 120 minutes for 2,000 chicks, Table 14.

Labor requirements for growing replacements were slightly less from 10 to 20 weeks of age, partly because of fewer birds to care

TABLE 14. ESTIMATED LABOR REQUIREMENTS FOR REARING REPLACEMENTS, BY SELECTED SIZE GROUPS, 64 CAGED-LAYER FARMS, ALABAMA, 1954

Number of chicks	Period					
	1 to 10 weeks			10 weeks until housing		
	Average per flock	Amount of labor		Average per flock	Amount of labor	
		Per day	Per 100 chicks		Per day	Per 100 chicks
	<i>Number</i>	<i>Minutes</i>	<i>Minutes</i>	<i>Number</i>	<i>Minutes</i>	<i>Minutes</i>
Less than 200	100	35	35	91	27	30
200- 499	244	58	24	227	53	23
500- 999	564	86	15	507	76	15
1,000 and over	2,000	120	6	1,803	86	5

for but primarily because birds of this age require less care. During this period, replacements consume more feed and water but do not have to be brooded, which requires considerable labor.

The minutes spent per 100 birds declined rapidly as the number of birds reared increased. For example, an operator growing 100 replacements spent 30 to 35 minutes per day per 100 birds, whereas an operator rearing an average of 564 chicks used only 15 minutes per day per 100 birds. Consideration of the labor requirements for replacements as well as for the laying flock is essential to the development of an efficient caged-layer enterprise.

SUMMARY

A study was made of 73 caged-layer farms in Alabama. The period covered was September 1, 1953 through August 31, 1954. Farms were visited during November and December, 1954.

The caged-layer enterprise is relatively new on Alabama farms as shown by the fact that over half of the farms visited began caged-layer operations in 1954, and one-fourth began operations in 1953.

The capital investment in land, buildings, equipment, poultry, livestock, and other items averaged \$30,514 per farm. Sixteen per cent of this was in poultry, poultry buildings, and equipment.

Sixty per cent of the caged-layer operators used their own funds to build poultry houses and to buy cages and other equipment. About 35 per cent borrowed money and paid cash for building materials, cages, and equipment. The remaining operators were financed by feed dealers.

The average investment was \$1,743 in caged-layer houses, \$911 in cages, and \$110 in other poultry buildings and equipment, or a total of \$2,764 per farm. The average investment in caged-layer houses, cages, and equipment was \$2.91 per cage. Investment costs per cage were almost one-third higher in northern Alabama than in southern Alabama.

The amount of floor space per cage ranged from 2 to over 6 square feet, with an average of 3.6.

Caged-layer operators utilized between 85 and 96 per cent of their cage capacity during the year. The average utilization for the year was 90 per cent of capacity.

Eighty per cent of the caged-layer operators used an all-mash feeding program, and over half of the operators fed only once a day.

Nineteen per cent of the operators culled weekly, 36 per cent every 2 weeks, 27 per cent monthly, and the remaining 18 per cent either culled continuously or followed no regular pattern. On the farms where complete data were available, the culling rate was 66 per cent. In addition, 10 per cent of the average number of layers on hand died; therefore, three-fourths of the layers had to be replaced during the year.

The monthly rate of lay ranged from 51 to 62 per cent, with an average of 56 per cent for the year, or 203 eggs per layer.

About half of the operators considered flies a major problem on their farms. May through October were the months when caged-layer operators were most bothered by flies. Malathion was the major agent used to control flies.

Lights were used by all the caged-layer operators. Twenty-five per cent reported that they used lights only in the mornings, 19 per cent used them only in the evenings, and 56 per cent used both morning and evening lights.

The estimated labor requirements for producing and marketing cage-laid eggs ranged from 12 hours per week on farms with less than 500 cages to 44 hours on those with over 2,000 cages. Labor requirements per 100 cages declined from 3.2 hours per week on farms with less than 500 cages to 2.1 hours for those with over 2,000 cages.

Most caged-layer operators gathered eggs only once a day. This is in contrast to the practice with floor flocks, where eggs are gathered twice daily or more often. The proportion of cracked eggs averaged 1.6 per cent; and dirty eggs, 10 per cent.

Caged-layer operators made a practice of marketing their eggs often. Sixty-eight per cent marketed eggs three times or more a week, and 22 per cent marketed twice a week. Forty per cent of the eggs were sold to retail grocers, one-third went to wholesalers, and one-tenth each to feed dealers, eating places, and directly to consumers.

Cost and return data were obtained on 21 caged-layer farms. Returns per dozen eggs averaged 52.6 cents, and costs averaged 52.0, leaving a net profit per dozen eggs of 0.6 cent. Labor returns per hour averaged 82.5 cents.

Twenty-five per cent of the operators raised three or fewer lots of replacements a year, 44 per cent raised four lots, 29 per cent raised five or six lots, and 2 per cent raised seven or more lots. White Leghorn was the predominant breed used as caged layers, with Auburn, Ghostley, Keystone, and Babcock strains being used most often. All operators except one purchased sexed pullet chicks. White Leghorn sexed pullet chicks cost an average of 36.5 cents each.

Eighty-four per cent of the chicks started were placed in cages. Of the 16 per cent that were not caged, 12 per cent died and 4 per cent were culled.

The estimated cash cost of raising a replacement to laying age was \$1.77. On a number of farms where detailed information was available, the average cash cost was \$1.75 per bird housed.

The average labor requirements for approximately 100 replacements from brooding to 10 weeks of age were about 35 minutes per day. For 2,000 replacements the labor requirements were 120 minutes per day, or 6 minutes per 100 chicks. Raising approximately 90 replacements from 10 weeks of age until they were ready for caging required 30 minutes of labor per day, or 33 minutes per 100 chicks. Approximately 1,800 replacements required 86 minutes per day, or less than 5 minutes per 100 chicks.

CONCLUSIONS

The caged-layer enterprise in Alabama has expanded rapidly in the past several years. Of a sample of caged-layer farms in the State, 85 per cent were established in 1953 or later. At the time the caged-layer operators were visited, the economic situation for egg producers was very unfavorable. Even so, about one-third of the operators were planning to expand their operations. This appears to be a significant trend.

The investment in cage houses and equipment was about \$3 per cage on those farms averaging around 900 cages. The investment in houses and equipment was about one-third higher in northern Alabama than in southern Alabama. Most of this difference was due to higher housing costs in the northern area. It is significant that the most recently established cage farms are in south central and southern Alabama. Part of this trend may be due to lower housing costs in these warmer areas of the State.

Half of the operators fed once a day, while the remainder fed two or three times daily. Data are not available in this study to determine the effects of feeding once or more than once daily. Feeding once daily saves labor; feeding more than once daily probably saves feed, and perhaps results in more attention being given the layers.

The systems used for culling caged layers varied considerably among operators. Most followed the rule of culling a hen when the rate of lay dropped below 50 per cent for a 2-week period. From this study, it appears that the rate of culling varies according to the price of eggs and the difference between the cost of a replacement and the value of the culled hen. Caged-layer operators maintained a high rate of lay during the fall and winter of 1953-54, when egg prices were favorable. During the spring and summer of 1954, egg and poultry prices were low and the rate of lay dropped. Evidently layers were kept that had low rates of lay because the cost of replacing them was too great.

The number of eggs per layer averaged 203 on 21 farms that kept complete records. Although this is fairly high, it is significant that five farms averaged over 240 eggs per layer. These farms had an average labor return per hen for the year of \$2.08, whereas eight farms averaging only 185 eggs per layer had an average labor return per hen of only 21 cents. Buying the best replace-

ment stock available is essential to maintaining the highest possible rate of lay.

The average labor requirements for 1,000 caged layers were about 29 hours per week for daily chores, handling eggs, marketing, culling, and cleaning houses. To raise enough pullets to replace all layers would require about 6 additional hours per week, for a total of 35 hours per week. This would be slightly less than a full work week. If a person cared for 2,000 caged layers, he would spend about 44 hours in daily and weekly chores and an additional 15 hours per week raising four lots of replacements a year. This is equivalent to a 9-hour day, 6 days a week, and a half day on Sunday.

Most caged-layer operators gathered eggs only once daily. During cool weather, gathering once daily may be sufficient. However, during half of the year, temperatures in Alabama are often above 80° F., and, although the egg is not under the hen, the hot air probably reduces egg quality. Inasmuch as 80 per cent of the eggs are usually laid by 2 p.m., it is recommended that eggs be gathered by that time. This will result in fewer eggs in the cages during the 3 to 4 hours that are the hottest part of the day.

Many caged-layer operators sold eggs three times a week or more often. Each trip to a market requires time, and costs money for transportation. A poultryman making three trips to a market 20 miles distant can save over \$100 per year in transportation costs by reducing the number of trips to two. This saving can be put into refrigeration equipment, which will reduce quality loss on the farm.

On the basis of a limited amount of cost and return data, it appears that caged layers offer opportunities for profit, even during unfavorable years, to operators that maintain high efficiency in production and marketing. It appears that a caged-layer operator who does an efficient job can reasonably expect a labor income per hen of \$2.00 per year during periods of normal price-cost relationships.

