commercial egg production

TEXAS AGRICULTURAL EXTENSION SERVICE
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Contents

COMMERCIAL EGG PRODUCTION

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THE SUCCESSFUL MANAGEMENT OF A POULTRY flock for egg production depends upon maintaining a good performance level for the major factors that influence production cost. Six of these factors will be discussed in this publication:

1. SIZE OF FLOCK. The size of a laying flock should be determined by the amount of earnings planned by the poultryman. Earnings are measured best by the profit per dozen of eggs sold. If a poultryman wishes to net a $50 labor and management income per week and can average 5 cents per dozen net profit he has to produce 1,000 dozen eggs each week. At a 65 percent average rate of lay, this will require the egg production of nearly 2,700 hens.

The minimum size of a commercial flock is 1,000 laying hens. At least this number of birds is needed to carry the costs of egg cooling, housing, equipment and time that will earn a reasonable profit return for the investment.

2. LIVABILITY. While livability usually refers to freedom from death loss, it also implies good general flock health, with no bird retarded in egg production due to disease or parasite infestation. Death losses and reduced flock health must be carried by the hens remaining in the flock. The maximum egg production capacity of a flock is determined by the number of healthy pullets in 50 percent production at the start of the laying year and the maintenance of a high rate of lay by each bird throughout that laying year. In this area, a sound vaccination, health and comfort program is profitable. A death loss of over 1 percent of the flock per month is excessive in its effect on the average annual cost per dozen eggs.

3. FEED EFFICIENCY. The pounds and cost of feed required to produce a dozen eggs provide the most accurate measure of overall flock management. This represents over one-half of the total cost of producing eggs. Body size, rate of lay and feed waste determine the amount of feed required to produce a dozen eggs. Hens weighing 4 pounds require ½ pound less feed to produce a dozen eggs than those weighing 5 pounds. Hens of the same weight producing eggs at a 70 percent rate require ½ pound less feed to produce a dozen eggs than birds laying at a 60 percent rate. Feed waste may be due to rodents, sparrows and spillage from torn sacks, but the major waste comes from overfilled feed troughs. A reasonable goal is 4½ pounds of feed per dozen eggs on an annual flock basis.

4. LABOR EFFICIENCY. The time and cost of labor for producing a dozen eggs is influenced by the convenience of equipment arrangement and the amount of mechanical equipment used. The use of mechanical waterers and the location of feed bins near the center of the house are basic essentials.

Time studies show that collecting and cleaning the eggs require one-half to two-thirds of the flock labor. This indicates that clean nests and good nest arrangement reduce labor needs. Over 4 minutes of total labor per dozen eggs produced is considered excessive.

5. RATE OF LAY. A high annual flock average rate of lay is essential for it determines the annual volume of eggs. A higher rate of lay gives more dozens of eggs to share the production costs with a wider margin for profit. The higher rate of lay lowers the average cost per dozen eggs for feed, flock replacement, labor and facilities. (Figure 1.)

Keep production information on a flock basis, especially where several flocks are started per year. This provides management information to be used in deciding when to cull and when to sell the flock at the end of the laying year. Birds kept too long will lay at a lower rate that may be unprofitable enough to eat up profits earned earlier in the laying year.

Commercial poultrymen aim at an annual production of at least 20 dozen eggs per pullet housed. Less than 18 dozen eggs indicates need for improvement.

6. MONEY INVESTED. The commercial poultryman not only must manage his time and labor but also must manage skillfully the money invested in his enterprise. The follow-

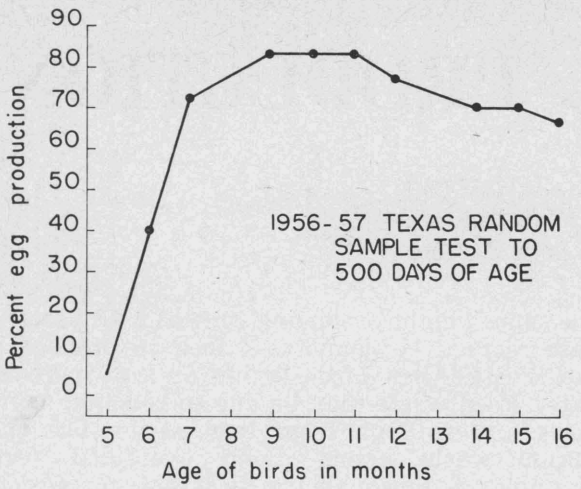


Figure 1. Average monthly egg production.

ing investment breakdown will serve as a basis from which to work:

Land	**5%**
Real estate (including laying house, brooding and range houses and feed and egg rooms)	**45%**
Poultry stock (including young and old)	**35%**
Equipment	**10%**
Feed and supplies	**5%**
Total	**100%**

The total investment is excessive if it exceeds one and one-half times the total annual gross receipts from eggs and hens.

Money invested in a poultry enterprise should return an income comparable to the earnings of a similar amount of money invested in stocks or bonds.

An approximate distribution of egg production costs is:

Feed	**53%**
Flock replacement	**21%**
Labor	**14%**
Buildings, equipment, capital	**12%**
Total	**100%**

The poultryman should be concerned first with minimum feed cost and usage consistent with a high production rate. Then the cost of flock replacements, which is tied closely with rate of lay and livability, must be recognized and controlled.

Labor costs are being reduced constantly by successful poultrymen through mechanization. Mechanical feeders, waterers and egg cleaners are in common use today. Correct arrangement in the laying house will reduce the time needed to distribute feed, clean waterers and gather eggs.

Investments in buildings and equipment have increased recently. Before reductions in cost are attempted, the poultryman should be sure that he is not increasing feed, labor and flock replacement costs through lowered performance.

To manage the poultry flock as a business enterprise, base management decisions upon information that is made available currently by good accounting. The poultryman may turn over his income, expense and production information to a qualified accountant for the preparation of regular accounting statements.

Providing good feed to good birds, adequate labor and comfortable housing should result in a high rate of lay of fine eggs at a minimum cost. With favorable markets the poultryman should close his business year with a profit. In addition, he should realize the satisfaction of providing the husbandry which will stimulate maximum performance by every hen in the flock.

PULLET REPLACEMENTS

Good growing care of well-bred chicks will produce a uniform flock of replacement pullets at housing time. The pullets should be housed when the flock reaches approximately 10 percent production. With a good pullet replacement program, about 95 percent of the pullets at this age should be of housing quality.

The cost per pullet at 50 percent production is the starting basis for calculating the flock depreciation cost of egg production. Caution should be exercised in using this figure since the minimum cost at 50 percent production is not always the optimum cost.

A method for figuring the cost of flock depreciation per dozen eggs at the close of the laying year follows:

No. birds		Values
1,000	Cost of pullets (at 50% production)	
800	Less returns from hens marketed (80% livability)	$ 400
Total	flock depreciation	$1,600
900	(av. no. birds per year) x 18 (doz. eggs per bird) = 16,200 dozen eggs	

$$\text{Total flock depreciation} - \$1{,}600 \quad = 9.9¢ \text{ flock depreciation per dozen eggs}$$
$$\text{Total dozen eggs} - 16{,}200$$

In estimating current flock depreciation some poultrymen use ½ cent per hen day as a basis for weekly estimates of production costs.

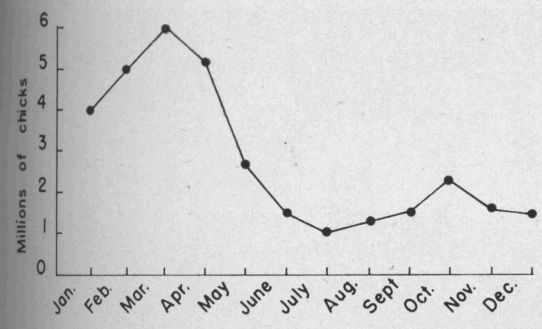


Figure 2. Texas chicks hatched. Egg production, unsexed, for flock replacement, 1956. Total 28,223,000.

The depreciation cost is not as obvious from day to day as the feed cost, but it is just as real and represents nearly one-fourth of the cost of producing eggs.

Figure 2 shows the hatching date of egg strain replacement chicks in Texas. Since eggs are eaten at a nearly uniform rate 12 months of the year, it would be advantageous for the poultryman to stop putting down three-fourths of the chicks in February, March and April.

A more uniform placement of chicks throughout the year also distributes the egg production below 24 ounces per dozen which should result in more favorable prices for medium and small eggs. By starting replacement pullets at least twice a year, capital investments in housing and equipment are reduced proportionately. Labor also is distributed more evenly throughout the year.

Many well-bred strains of egg production chicks are available to Texas poultrymen. It is not unreasonable to set an annual goal of 20 dozen eggs per hen housed. During the full laying year the eggs produced by size should approximate:

28% extra large	**— 27 oz. and over**
45% large	**— 24 through 26 oz.**
20% medium	**— 20 through 23 oz.**
5% small & pullet	**— 19 oz. and under**
2% inedibles	**— determined by candling**

With good egg care at least 80 percent of the eggs should be marketed U. S. Grade A or better. The number of top-quality eggs marketed per bird per year measures the success of poultry farm operation. This success is determined by a high degree of flock livability and egg production for the entire year, and is evidence of good bird breeding and husbandry by the poultryman.

HOUSING

Good poultry housing need not be extravagant but good engineering is necessary to provide protection for the birds from extreme heat or cold, extreme dampness or dryness and extreme wind or lack of ventilating air currents.

Good management requires prompt response to weather changes by adjusting the position of windows, ventilating panels and doors.

Many Texas poultrymen are using houses with a continuous ridge row ventilator and roof line and floor line ventilator panels on the side walls. (Figure 3.)

The ridge of the poultry house is set east and west so the roof overhang will shade the floor and side walls during midday and the ends of the house will protect the birds from the morning and afternoon sun during summer.

Provide 2½ square feet of floor space per bird in egg strain flocks and 3½ square feet per bird in heavy breed flocks. The commercial laying flock is kept confined to the laying house throughout the laying year.

EQUIPMENT

Feeders

Since feed cost is the major item in egg production it is necessary to provide good

Figure 3. Houses with a continuous ridge row ventilator with roof line and floor line ventilator panels on the side walls.

distribution of feed troughs so every hen has easy access to a fresh feed supply. In the floor plan sketch, feeder space is furnished by the use of fifteen 8 foot and five 4-foot feeders per 1,000 hens. This provides 3⅓ inches of feeder space per hen. Birds often give better results when provided additional feeder space which allows up to 6 inches of feeder space per hen.

Feed waste often is a major source of loss. Feeders should have a 1-inch lip and should not be filled to more than 2 inches below that lip. The height of the feed trough should be adjusted so that the top will be at the shoulder height of the hens. These precautions help to prevent the hen from "billing" feed out of the trough and wasting it in the litter. A 10 percent reduction in feed waste may amount to more money than half the labor cost of caring for the laying flock. (Figure 4.)

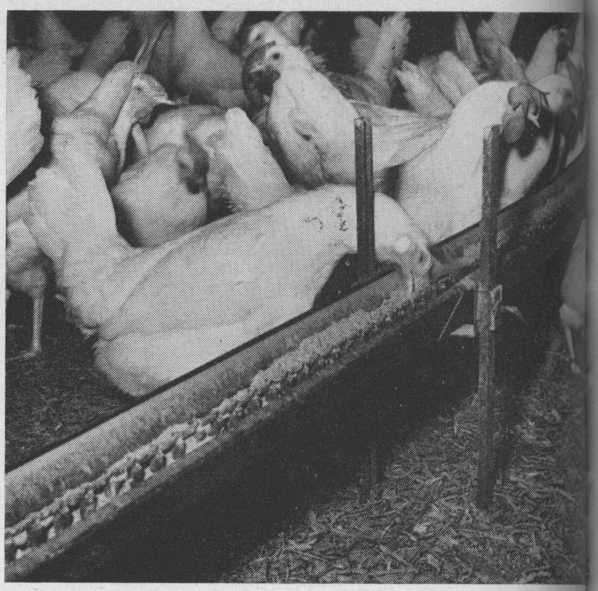


Figure 4. Adjust feeder height to reduce waste. Feeders should have a 1-inch lip and should not be filled to more than 2 inches below that lip.

Waterers

Laying hens drink 2 to 3 pounds of water for each pound of feed they eat. The water supply should be distributed throughout the laying house so that a hen never has to travel more than 15 feet for a drink and at least 1 inch of water trough space should be provided for each hen. This space is supplied with five 8-foot water troughs per 1,000 hens. (Figure 5.)

A real saving in labor and wet litter can be made by running a 4-inch drain tile below floor level. Arrange the water troughs so that the overflow end is fitted into a drain tile opening.

An overflow nipple will handle waste water if the automatic water valve sticks. At cleaning time the nipple can be removed to drain the rinse water from the trough.

Nests

Provide nests of open construction that allow good air movement. One nest for four hens should be considered for high-producing strains. Single nests should be open front and back to prevent heat prostration in hot weather. Minimum recommended dimensions for single nests are 12 inches wide, 14 inches deep and 14 inches high. The front of the nests should be approximately 5 inches high so that a good layer of nesting material will be held in place. (Figure 6.)

The nesting material should consist of small particles that are highly moisture absorbent such as shavings, oat hulls, sawdust and excelsior pads.

Many poultrymen use open community-type nests. They should provide about 1 square foot for each four hens. (Figure 7.)

Roosts

Provide 8 inches of roost space for each hen. Roosting sections that are open and portable are convenient for cleaning the litter from the house. A 10′ x 12′ roost section with poles 14 inches apart will accommodate 200 hens.

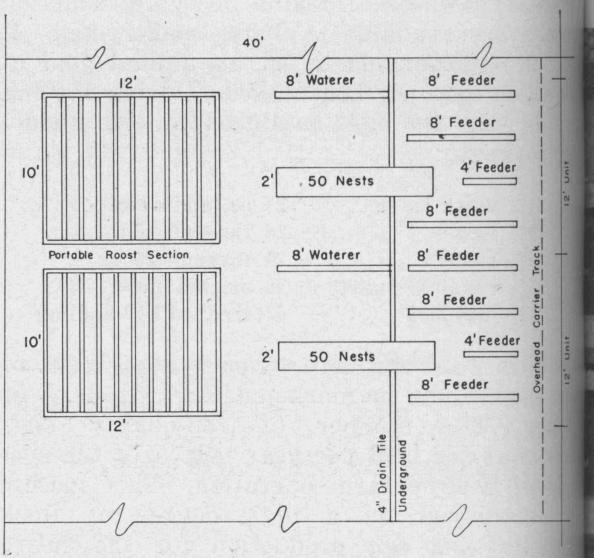


Figure 5. A suggested floor plan for laying house.

Summary of housing and equipment requirements for 1,000 hens as shown in Figure 5:

Floor space —	2,560 square feet (40′ x 64′)
Feeders — 15	(8-foot)
5	(4-foot)
Waterers — 5	(8-foot)
Nests — 10	(15-hole)
10	(10-hole)
Roosts — 5	(10′ x 12′ sections)
Lights — 12	(60-watt bulbs evenly dispersed over ceiling area—about 200 square feet per bulb)

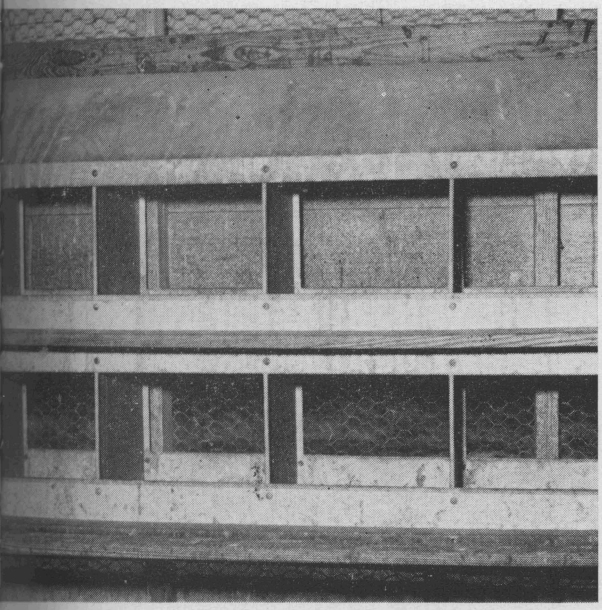
LITTER

Litter absorbs moisture from droppings and then gives this moisture to the air brought in by ventilation. The dried droppings then work through the loose litter to the floor underneath the litter. A good litter is highly absorbent and fairly coarse, which prevents packing. The litter should be free of mold and contain a minimum amount of dust.

The kind of litter to be used should be determined by the availability and cost in the area. Some common litter materials are shredded cane pulp, softwood shavings, peanut hulls, ground corn cobs and peat moss.

A 6-inch layer of litter will be deep enough to keep the birds off the floor and provide enough volume to function properly in drying. It takes about one bale of litter to cover 100 square feet of floor with 6 inches of litter.

Figure 6. Individual nests with open backs to allow good air movement.



LIGHTING

Research has shown that 13 hours of light per day are required by the hen for maintaining a high rate of lay. The light is transmitted by the optic nerve to the pituitary gland and stimulates hormone production. This hormone is carried by the blood stream to the ovary and activates it into egg production.

The light intensity should be at least 1 foot candle at the bird level. To accomplish this, one clean 60-watt bulb 7 feet above the floor will cover 200 square feet of floor area. The lights should be distributed so that the entire house will be lighted uniformly. On dark cloudy days it may be necessary to use the lights all day so that the hens will get the required 13 hours of light. (Figure 8.)

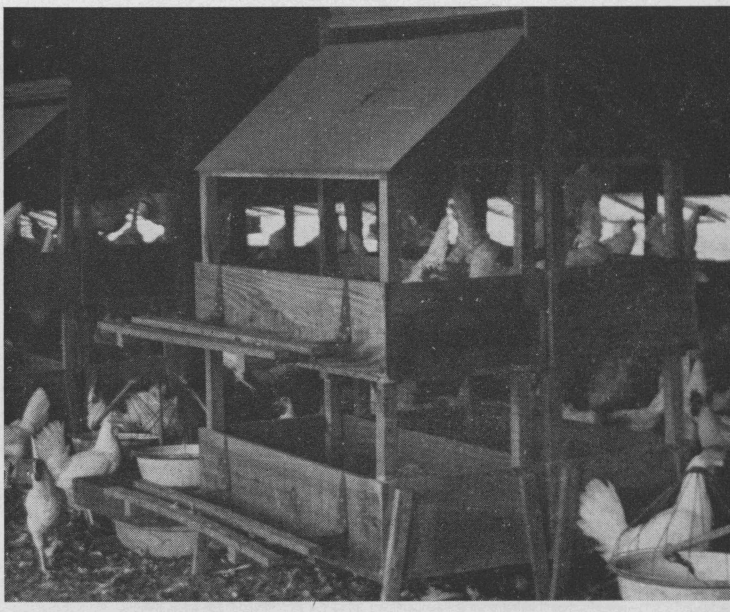
The hours of artificial light are controlled best by an electric time switch. Any change in the amount of light should be gradual—not over 15 minutes a day nor 30 minutes a week.

LAYING HOUSE COOLING

Summer heat causes retarded egg production and often results in death losses. Well-ventilated houses help, but when temperatures become extreme, artificial cooling is necessary.

The most available method of cooling in an emergency is sprinkling water over the hens with a garden hose, using a fine spray. This will help keep down deaths due to heat

Figure 7. Open community-type nests. Provide about 1 square foot for each four hens.



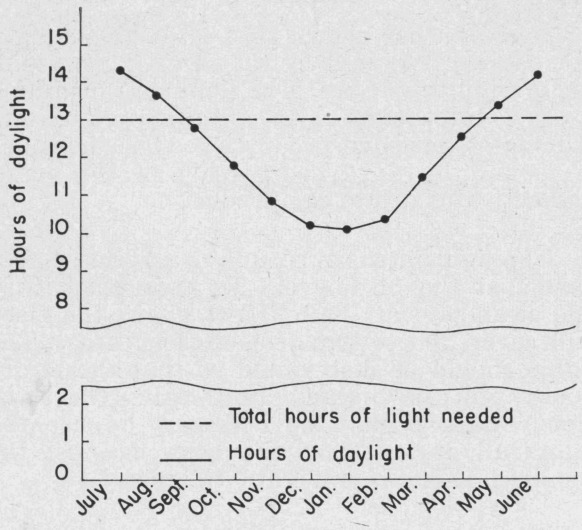


Figure 8. Daily light needs of laying hens.

prostration if enough breeze is available to evaporate the water and cool the birds.

The pad and fan method of cooling reduces poultry house temperatures as much as 20 degrees F. The effectiveness of this system depends upon the relative humidity of the outside air. Strong exhaust fans on one side of the air-tight house draw moisture through water-laden fiber pads on the other side. The evaporation, as dry air is "inhaled" through the wet pad, produces the cooled air. Refinements for this method of cooling are being studied by engineers as well as poultrymen. (Figure 9.)

FEEDING

Because the successful poultryman realizes the importance of the feed cost in producing a dozen eggs, he carefully watches the things which increase the cost.

Increased knowledge of poultry nutrition has been gained by research at the agricultural experiment stations of the land grant colleges. A modern laying ration contains over 20 ingredients that are used in exact amounts and thoroughly mixed so that every pound contains each of these nutrients.

Energy sources, such as sorghum grains and corn, are still the major constituents and make up about two-thirds of the total cost of the ration. The sources of protein, minerals, vitamins, antibiotics, growth stimulants and unidentified factors are added in proportion to the energy content of the ration. The calorie-protein ratio is an accepted basis of feed formulation.

Feed manufacturing is one of the major industries of our nation and approximately 60 percent of the manufactured feed is for poultry. About 60 percent of the total poultry feed is used for egg production. Because feed manufacturers recognize the importance of feed, their research staffs constantly study poultry nutrition progress and promptly apply new developments in the formulation of their commercial poultry feeds. This makes it important for the poultryman to follow closely the feeding program recommended by the feed manufacturer.

The most common commercial practice is to feed a complete feed to laying hens. Where grain is available at favorable prices, the poultryman may mix ground grain with a commercial feed concentrate in the proportions recommended by the manufacturer. Another system is to feed whole grain with a commercial supplement or balancer.

Commercial feeds are available as mash, crumbles or pellets. For laying hens the mash form of feed has performed as well as the others and provides a saving of the cost of pelleting, or pelleting and breaking these pellets into crumble form.

Always purchase fresh feed and prevent accumulation of old feed in the troughs or the feed store room.

Feed is expensive, so every care should be taken to prevent waste. This applies to care in handling and filling the troughs as well as having an effective rodent and sparrow control program.

The amount of feed consumed by a hen varies with her body size and the rate at which she lays eggs. (Table 1.)

The estimated chemical fertilizer value of poultry manure is 37 cents per hen per year. This is the actual chemical value and does not include the added value of the organic matter. Poultry manure is valuable in fertilizing the farm land for crop or grass production and

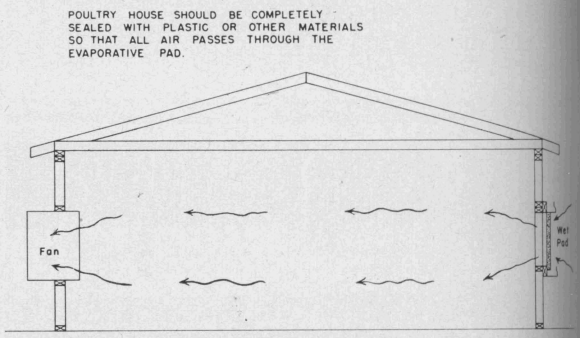


Figure 9. Pad and fan cooling arrangement.

TABLE 1. FEED REQUIRED BY CHICKENS OF DIFFERENT LIVE WEIGHTS FOR MAINTENANCE AND FOR THE PRODUCTION OF 0, 100, 200 AND 300 EGGS, RESPECTIVELY, PER YEAR*

Average live weight	Average total feed required per bird per year for maintenance and production of the indicated number of eggs			
	0 eggs per year	100 eggs per year	200 eggs per year	300 eggs per year
Pounds	Pounds	Pounds	Pounds	Pounds
3.0	47	61	75	89
3.5	52	67	81	95
4.0	57	71	85	99
4.5	61	75	89	104
5.0	65	80	94	108
5.5	70	84	98	112
6.0	74	88	102	116
6.5	78	92	106	120
7.0	81	96	110	124

*National Research Council, Publication 301, 1954

should be considered a credit against the feed cost.

HEALTH MAINTENANCE

Every hen represents an investment that will pay off only by live hens laying consistently at a high rate. Death loss of over 1 percent a month is excessive.

A good vaccination program will place pullets in the laying house with a better chance of survival.

Prompt diagnosis is essential in disease control. A competent poultry diagnostician should be located before any need arises. Many diseases require culture methods which take several days to identify but often symptoms exist which immediate treatment may correct.

Clean premises and strict sanitation contribute to poultry health, but often are neglected. Disposing of dead birds is a problem. The most practical method is using a disposal pit. One hundred cubic feet of pit space will care for a 1,000-hen flock for several years. The effectiveness of a pit is determined by the porousness of the subsoil. If the pit fills, dig a new one and cover the old one with dirt. (Figure 10.) Effective commercial incinerators are available but their use requires more time and expense than a pit.

The rate of culling a laying flock has changed with improvements in breeding. The only culling recommended until the ninth month of lay (15 months of age) is to remove the unthrifty and unhealthy birds. After the ninth month of production the birds that show pigmentation and poor handling qualities should be culled as they are located. If they are out of production, they will not come back in time to pay for their board while completing an early molt or regaining weight. If they are still in production, they likely are laying at such a low rate that culling will be justified.

If the birds go out of production before the ninth month, unsatisfactory environment and the feeding, health, lighting, housing and other management factors should be checked and corrected.

LABOR REQUIREMENTS

A good standard for measuring the labor requirements of laying hens is 1 hour a year per hen, including raising replacements. Another standard is 4 minutes per dozen eggs for care only of the laying flock.

Studies show that nearly two-thirds of the labor time is spent collecting and caring for the eggs. It takes a lot of time to clean dirty eggs properly. This emphasizes the need for good nest care with clean nesting material and clean floor litter to keep the number of dirty eggs to a minimum.

Each poultryman should study the use of his time. A planned work schedule with convenient arrangement of equipment and materials will prevent a lot of drudgery and help keep all work current.

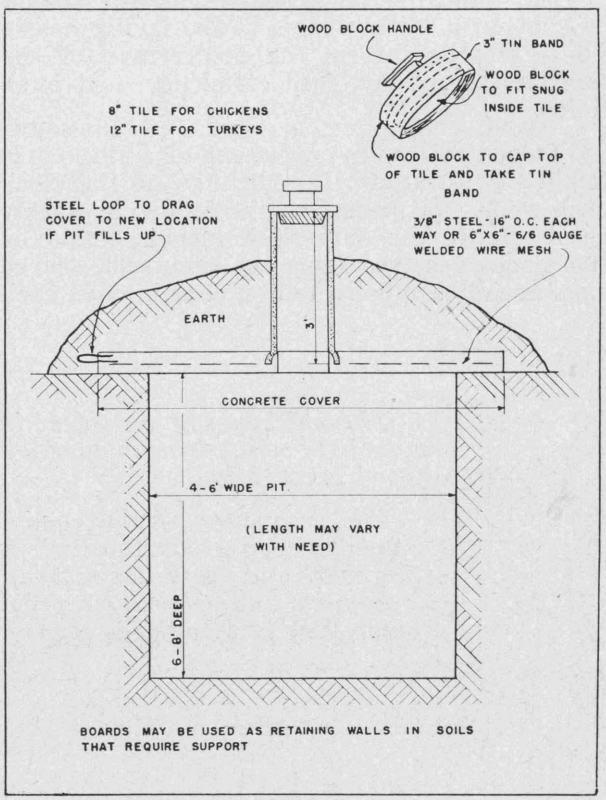


Figure 10. Poultry disposal pit.

RECORDS

It has been said that a poultry business without adequate records is like a chicken with its head cut off—dead! Every successful competitive business should know the items of cost and income. Records are not only useful to determine the earnings of the flock but are necessary to measure the performance level in the various factors that affect earnings and for use as a basis of sound management and husbandry.

The best management decisions can be made by using separate records on each age group of birds. This practice is recommended strongly. It provides a basis for determining the pullet cost to 50 percent production and at the end of the laying year determines the point at which flock production becomes unprofitable necessitating replacement. The final average figures should be made on a hen-housed basis for this measures the capacity of the house.

The total number of eggs produced per year is the most important single figure to a poultryman. A flock may produce at a high rate most of the year but if production drops for several months because of sickness or because of poor planning, the poultry house is empty for 2 months, the annual production is reduced and the fixed cost per dozen eggs is increased.

The following performance records should be kept on a weekly basis in the laying house. These records inform the poultryman of the current rate of lay, feed efficiency, and mortality.

To control the management of a flock it is important to know the earnings of the flock each week. In preparing the following weekly result figure the only flock income would be the money received from the eggs sold. Since eggs usually are delivered on certain days each week, it is recommended that day be used as a weekly cut-off date at which time all of the eggs are cleaned and sold. Thus, the dozens of eggs sold are shown on the sales ticket and the total dollars received for these eggs during that week will be the figures entered in the income section.

Three items are considered in this cost figure. The actual pounds of feed for the week as determined by the weekly flock record, multiplied by the average cost of this feed, will give the number of dollars spent weekly for feed. The second figure, flock depreciation, is determined by multiplying the actual dozens of eggs sold during the week times an average price per dozen of about 9¢, which experience has shown is typical for the flock.

The third cost figure, other expense, is determined by experience. It represents the depreciation and repair of buildings and equipment as well as utilities, medication and supplies. In some flocks it has averaged about $15 per week per thousand laying hens.

The difference between the gross income for eggs sold and the total of the expenses will be the labor and management income for the week.

WEEKLY EARNINGS

INCOME

Egg sales ..... dozen $ ..... average price $ .....

COSTS

Feed $.....

Flock depreciation

..... dozen eggs @ ..... ¢

(estimated average) $.....

Other expense (estimated) $.....

Total costs $.....

LABOR AND MANAGEMENT INCOME $.....

The chicken egg provides the most nutritious natural food that is available to man. It is an appetizing food and is adapted to many methods of food preparation.

The production of fine eggs requires many skillls of the poultryman. Commercial egg production will continue to offer opportunities for interesting work and profitable returns to those who use good business methods to recognize and solve their problems and sound husbandry practices to provide their hens with the conditions favorable to maximum performance.

WEEKLY LAYING FLOCK RECORD

Week ending _____

Month / Day	EGGS GATHERED	TOTAL	NO. HEAD DIED	REASON	HEAD CULLED	FEED MASH	FEED GRAIN
Mon.							
Tue.							
Wed.							
Thurs.							
Fri.							
Sat.							
Sun.							
Total							

No. hens at start of week _____ Eggs laid this week _____

No. hens removed _____ = _____% production

No. hens at end of week _____ No. of hens (end of week x 7) _____

	MASH	KIND OF GRAIN		TOTAL FEED
Pounds of feed on hand at start of week				
Pounds of feed bought during the week				
Total				
Pounds of feed fed during week				
Pounds of feed on hand at end of week				

Total pounds feed used _____

= _____ Pounds of feed per dozen eggs.

Total dozen eggs laid _____

Flock notes:

EGG PRODUCTION FLOCK RESULT SUMMARY

EXPENSES	Value	Per pullet housed	Per doz. eggs produced
No. _____ pullets (50 percent production)	$_____	$_____	$_____
Litter	$_____	$_____	$_____
Electricity	$_____	$_____	$_____
Medicine	$_____	$_____	$_____
_____	$_____	$_____	$_____
(_____ lb. Egg mash _____ % protein	$_____	$_____	$_____
(_____ lb. Egg crumbles _____ % protein	$_____	$_____	$_____
(_____ lb. Egg pellets _____ % protein	$_____	$_____	$_____
Feed: (_____ lb. Grain _____ Kind	$_____	$_____	$_____
(_____ lb. Grain _____ Kind	$_____	$_____	$_____
(_____ lb. _____	$_____	$_____	$_____
(_____ lb. _____	$_____	$_____	$_____
Total _____ lb. feed	$_____	$_____	$_____
Total expense	$_____	$_____	$_____

RECEIPTS			
Eggs _____ dozen pullets	$_____	$_____	$_____
_____ dozen medium	$_____	$_____	$_____
_____ dozen large	$_____	$_____	$_____
_____ dozen extra large	$_____	$_____	$_____
_____ dozen _____	$_____	$_____	$_____
Total _____ dozen	$_____	$_____	$_____
No. _____ weight _____ hens marketed	$_____	$_____	$_____
Total receipts	$_____	$_____	$_____

NET RETURNS	$_____	$_____	$_____

Av. weight of pullets housed (50 percent production) ..... _____ Date _____

Av. weight of hens marketed ..... _____ Date _____

Livability of hens _____ % Pounds of feed per dozen eggs .... _____ lb.

Av. egg production per hen housed ..... _____

FLOCK DEPRECIATION PER DOZEN EGGS

Cost of pullets ..... $_____

Less returns from hens marketed ..... $_____

Total flock depreciation ..... $_____

Total flock depreciation _____

_____ = $_____ Flock depreciation per dozen eggs

Total dozen eggs _____

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