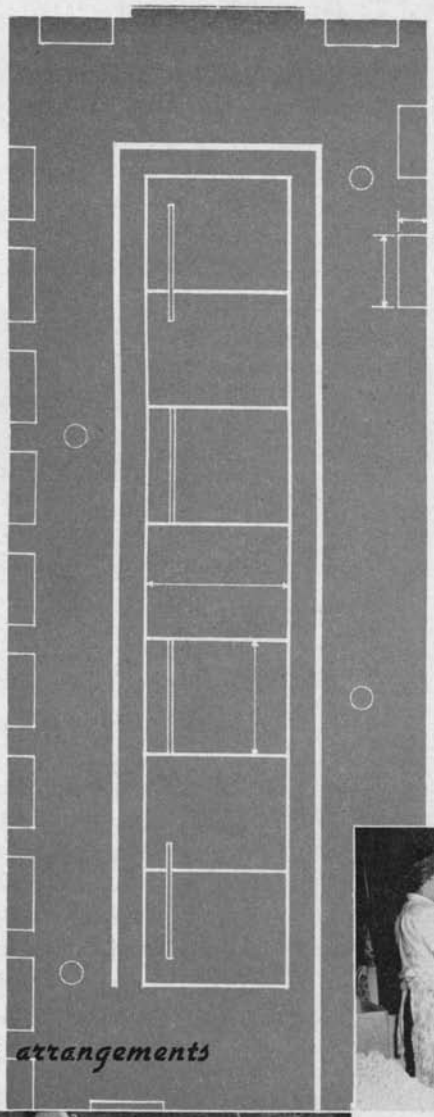

LESS LABOR in egg production

Better arrangements

Better work methods

Better equipment

By
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CIRCULAR 785

UNIVERSITY OF ILLINOIS · COLLEGE OF AGRICULTURE
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The authors are indebted to *Successful Farming* for the use of photos taken on several of the farms studied.

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LESS LABOR IN EGG PRODUCTION

ILLINOIS FARMERS SPEND MORE TIME ON laying flocks than on any other enterprise except corn and dairy. About three-fourths of the farmers in the state keep chickens. They spend about 250 hours a year on each 100 hens — about 220 hours taking care of the laying flock and about 30 hours raising replacements.

In other parts of the country where there are fewer alternatives to a poultry enterprise than in Illinois, poultrymen are developing large, specialized laying flocks; on these farms eggs provide a main source of income. But in 1954, the average size of flock on Illinois farms was only 140 hens. On an Illinois farm, a laying flock is not profitable unless it pays the operator as much for his time and money as he would get by investing them in other parts of the farm business. Poultrymen in the state will eventually need to enlarge their flocks and organize them to produce eggs at a cost and of a quality that will enable them to meet competition.

HOW CAN COSTS AND LABOR BE REDUCED?

Daily chores with the average Illinois flock account for about 165 hours of labor a year per 100 hens. Efficient poultry producers have been able to cut down the amount of time spent on daily chores to 30 or 40 hours per 100 hens by increasing the size of their flocks, by adding machinery and equipment to do some of the jobs, and by arranging the buildings and equipment to fit labor-saving methods.

Each poultryman must select the method of handling his flock that is best suited to his particular needs. Ways of doing chores are suggested here for different sizes of flocks, types of buildings, and kinds of equipment. The labor and equipment figures may help you to decide which system will be most effective for your flock. Beginning on page 23, seven plans for laying-house arrangements are presented. These recommendations are based largely on a study of 35 Illinois farms with laying flocks ranging from 300 to 2,500 hens.

TABLE 1 — HOW PRODUCTION AFFECTS LABOR*

Production (eggs per hen housed)	Hours of labor needed to care for 100 hens per year	Hours of labor needed to produce a case of eggs
Low (179)	115	2.45
Medium (216)	120	2.18
High (251)	120	1.99

* The detailed cost records which provided these data were supervised by W. N. Capener, formerly with the Department of Agricultural Economics.

High production cuts costs

If you want to produce a case of eggs for less, you need to keep up a high rate of production. It takes the same equipment and about the same amount of labor to care for a hen that produces 250 eggs a year as it does for one that lays only 180 (Table 1). The cost of producing a case of eggs, therefore, goes down rapidly as production of eggs per hen housed goes up.

Larger flocks mean lower unit costs

The amount of time and money required to produce a case of eggs or take care of 100 hens is usually less for large flocks. Much of the time spent on chores and investment in equipment is the same for large flocks as for small ones.

Going to and from the laying house to do the chores, for example, takes as much time for 200 as for 2,000 hens. The average poultryman spends 10 hours and walks 20 miles a year in making one daily round trip to the laying house. Since most poultrymen make the trip 3 to 5 times a day, up to 50 hours and 100 miles of walking are spent each year just going to and from the laying house. Many chores inside the laying house — opening and closing doors, servicing equipment, checking mechanical devices, and cleaning the eggroom — take about the same amount of time regardless of the size of the flock.

Equipment that requires about the same investment for different flock sizes includes the water sys-

tem and power lines leading to the laying house; the wagons, carts, carriers, elevators, and other equipment for handling materials; and most of the equipment for processing and storing feed and eggs.

Size of flock also figures in your ability to compete with the large, specialized egg producers. If you have a large flock, it will be easier for you to provide additional services such as packaging, delivery, and 30-day credit.

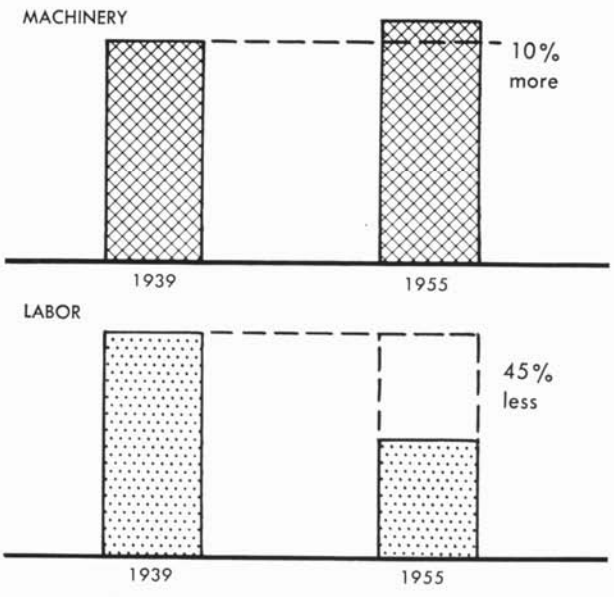
A large-flock owner also benefits from quantity discounts given on equipment and supplies.

Mechanical equipment and better work methods save labor

During the last few years, mechanical equipment has been developed that will take some of the work out of every major job in egg production. Current equipment prices and wage rates favor mechanization. The price of poultry equipment has doubled in the last 15 years, but farm wage rates are four times as high. This still does not mean that all flock owners should mechanize their chores, because a machine may be economical for 1,000 hens, but prohibitive in cost for a flock of 200 hens.

Even where mechanization may not be profitable, improvements can be made in the way chores are done. By arranging your equipment more conveniently, you may be able to cut down on labor and use your equipment more efficiently.

A CASE OF EGGS WILL NOW BUY MORE MACHINERY, BUT LESS LABOR THAN IN 1939



Management is important

No combination of buildings and equipment can be very effective without sound management practices. You can get up-to-date information on improvements in poultry management from your county farm adviser, the College of Agriculture, and the U. S. Department of Agriculture.

FEEDING AND FEED PROCESSING

The chore of distributing feed to 30 flocks studied in litter houses took from 1.3 hours and 0.4 mile of walking to 27 hours and 28 miles of walking each year for 100 hens. Since the average hen producing at a 60-percent rate-of-lay eats about 100 pounds of feed a year, a total of about 5 tons of feed must be distributed annually to each 100 hens.

Many poultrymen have been able to reduce feeding to a minor chore with mechanical equipment, efficient work methods, and a convenient arrangement of facilities. How efficiently you can carry out this chore depends to a large extent on the type of feed, type and arrangement of feeders, number of times a day feed is distributed, where the feed is stored, and how it is hauled. It is also influenced by the size of flock.

Many feeds and frequent feedings add time and labor

More feeding systems are used for chickens than for any other farm animal. Illinois poultrymen use as many as five different kinds of feed at the same time and the number of feedings varies from once a week (filling self-feeders) to five times a day (hand-feeding).

The choice of what type of feed or ration to use is influenced by the kind and cost of commercial feeds available and by the kind and price of grain on the farm. An all-mash ration, handled in bulk with mechanical equipment, takes the least time. It does not seem to be necessary to feed extra feeds as long as the hens are provided with a balanced ration. Each separate feeding of pellets or other

special feeds in a well-arranged setup adds 5 to 10 minutes daily for each 1,000 hens. This is an increase of 15 to 20 percent above the average time required for feeding mash. Unless additional feeds or many feedings are necessary to the health and high production of the flock, little gain will be realized from the extra effort.

Most poultrymen like to feed a small amount of scratch grain to keep the hens busy and the litter stirred and to use up small quantities of farm-produced grain. With convenient storage, this can be done in as little as 5 minutes a day per 1,000 hens by feeding the grain and gathering the eggs on the same trip through the house. It takes as much as 30 minutes in less efficient setups.

Oystershell and grit can be fed with the least effort by using large-capacity hoppers that do not need to be filled often.

Store feed in a convenient place

It is easy to provide a convenient place for storing feed, but many poultrymen neglect to do so. A large area is not needed. Most ground feeds weigh 40 to 45 pounds per cubic foot, so a bin of 80 or 90 cubic feet will hold a 10-day supply for 1,000 hens. All feed should be close to the feeding area, with the laying mash or bulk of the ration most convenient. Many poultrymen spend more time feeding scratch grain or pellets than the main part of the ration because of inconvenient storage.

A feed pail can be filled easily and quickly with bulk feed stored in a hopper-bottomed bin. The bin opens into the hen area, but is filled from outside.

The supply bin of a mechanical feeder is filled quickly from this overhead feed bin. The bin at the left holds scratch grain for feeding by hand.

For hand-feeding store all feed inside the laying house

The bin or feed room should open into the pen. For flocks of 600 hens or less, a feed room or storage bin at one end of the house is satisfactory; the center of the house is better for larger flocks. In multiple-story houses, store bulk feed in hoppered bins on the top floor with chutes leading to the lower floors (feed rooms on each floor take too much space). Bagged feed and other materials can be placed near the elevator on the first floor. A drive-in arrangement or an opening for a delivery auger can be provided as access to the storage area at ground level. An elevator, blower, or auger can be used to deliver feed to overhead bins.

Where feed is stored is not so important when the flock is not hand-fed. Feed can be hauled or blown into the supply bins of mechanical feeders, or hauled directly to self-feeders.

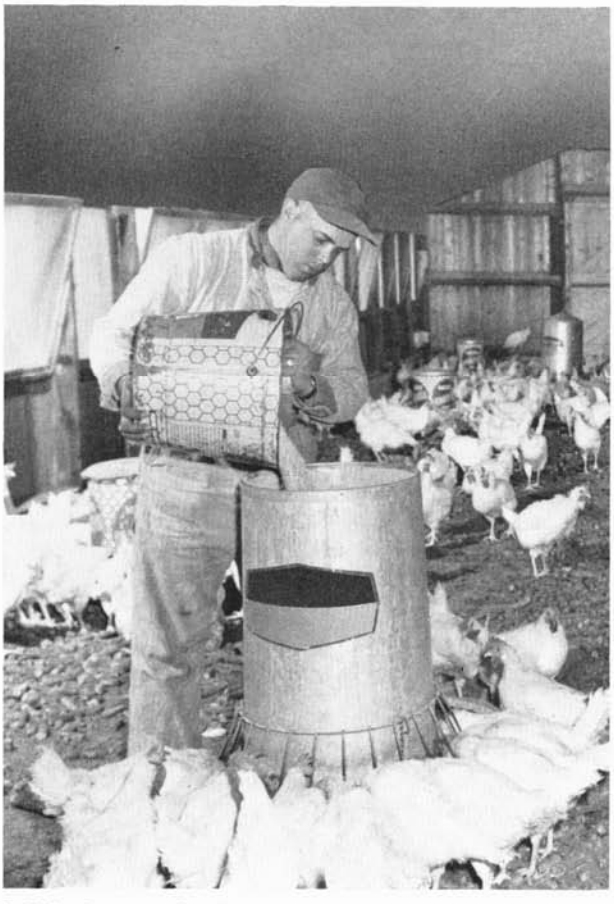
Open troughs need to be filled at least once a day

Open troughs — the most widely used type of poultry feeder — can be made on the farm or bought at low cost, but they need to be filled often. The chore cannot be simplified by filling the troughs with more feed at one time. If they are more than one-fourth to one-third full, a lot of feed will be lost in the litter. A lath lip nailed on the top edges of trough feeders will help to prevent billing out of feed.

Hand-feeding 1,000 hens averaged 20 to 30 minutes a day on 30 Illinois farms. The most efficient producers did the job in 15 minutes.

Self-feeders hold several days' supply of feed

Drum feeders or circular hoppers can be filled to capacity — usually 125 to 150 pounds. They must be checked daily, but you can save time by doing this while gathering eggs or feeding scratch grain. Filling and checking self-feeders for 1,000 hens took an average of 10 to 12 minutes a day (including hand-feeding of scratch grain). The time could be cut in half by filling the feeders once a week and by using carriers or hauling feed directly from the mill or processing area.



Self-feeders are filled, with little chance of spilling feed, about once a week. The feeders should be checked daily to assure a free flow of feed.

A self-unloading wagon brings feed from the processing center and augers it into self-feeders. The wagon can also be used for feeding other livestock.

Mechanical feeders greatly reduce feeding time

There are several types of mechanical feeders. Although they cost more than troughs or drum feeders, they keep the troughs about one-fourth full and require much less labor. Servicing and supervising mechanical feeders for 1,000 hens on the farms studied averaged about 6 minutes a day. One poultryman fed 1,000 hens an all-mash ration in less than 3 minutes. You can fill the hopper of a mechanical feeder easily from convenient ground-level storage, or by gravity flow from overhead bins.

Arrange feeders for easy feed delivery

Set trough feeders in parallel rows with a clear route to feed storage. They can be placed above the dropping pits if kept near the edge for easy filling.

Arrange drum feeders on the floor in rows to suit the type of feed-moving equipment. Rows on either side of a drive-through or drive-in are convenient for truck or tractor equipment. If an overhead monorail carrier is used, feeders can be placed directly below or on either side of it.

Mechanical feeders can be placed on the floor or above the dropping pits.

Mechanical feeders cost less and save more labor with large flocks

The investment in a mechanical feeder and the annual labor and costs required to operate it for each 100 hens are considerably less for large flocks. Care and supervision of mechanical feeders take about the same time for 500 as for 1,000 hens, so the average amount of labor for each 100 hens becomes less as size of flock increases. With hand-filled open troughs or self-feeders, however, there is only a very gradual decrease with larger flocks. In fact, as flocks become very large, more labor may be needed because of the greater walking distance.

The average investment in hand-feeding systems is not affected much by size of flock. Trough feeders for 100 hens cost about $28. Common types of large-capacity drum feeders can be bought for about $10 each; since three feeders are needed for each 100 hens, the average investment (including some hand tools) comes to about $30 to $35.

A mechanical feeder is rather expensive for a small flock. The basic unit studied costs about $300; the trough and fittings usually cost $1.25 to $1.50 a foot — an average investment of $139 per 100 hens for flocks as small as 250 hens. But since the feeder will service enough trough for about 2,000 hens, the average investment drops rapidly for larger flocks — to $39 per 100 hens for a flock of 2,000.

Most jobs and equipment in hand-feeding systems increase in proportion to increases in flock size. The annual cost of distributing feed under efficient conditions with a mechanical feeder varies from $10 to $40 per 100 hens, depending on size of flock. Electricity, maintenance, and annual overhead make up four-fifths of the total cost, the other one-fifth being labor. In self-feeder systems labor makes up one-half, and in trough systems, nearly two-thirds the annual cost.

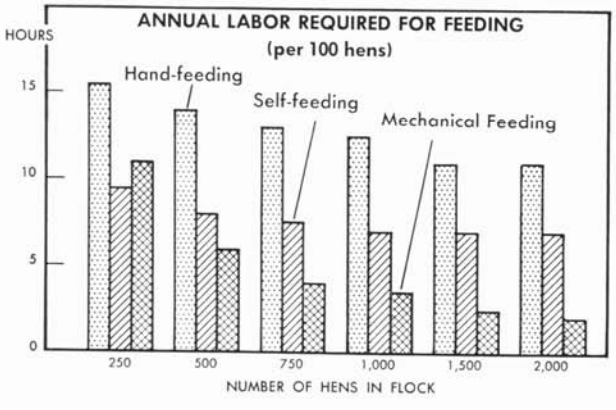
When is it economical to mechanize feeding?

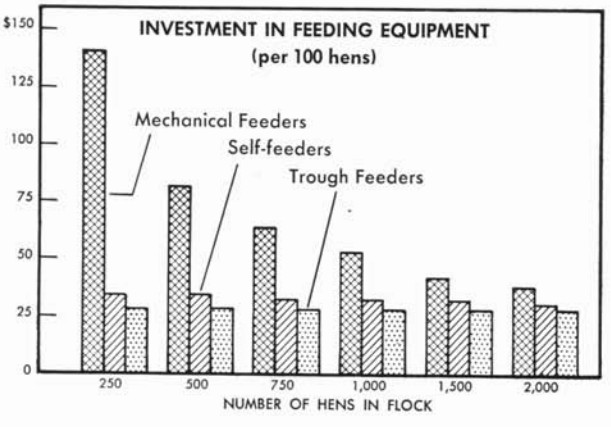
The size of flock that will justify mechanizing feeding depends on the current value of time and money. High wage rates and low interest charges (based on the return that could be earned by investing the same amount in other parts of the farm business) make mechanization profitable even in small operations, but low wages or high interest make it prohibitive except for large flocks.

Mechanical feeders require less annual labor and a lower investment per 100 hens with large flocks than with small ones.

With hand-feeding systems, the average annual labor decreases gradually as flocks become larger. But size of flock has little effect on the average investment in hand-feeding systems.

When labor and equipment costs are combined, the method of feeding that is most economical for each flock size can be shown. (Labor charged at $.90 an hour, interest at 5 percent.)





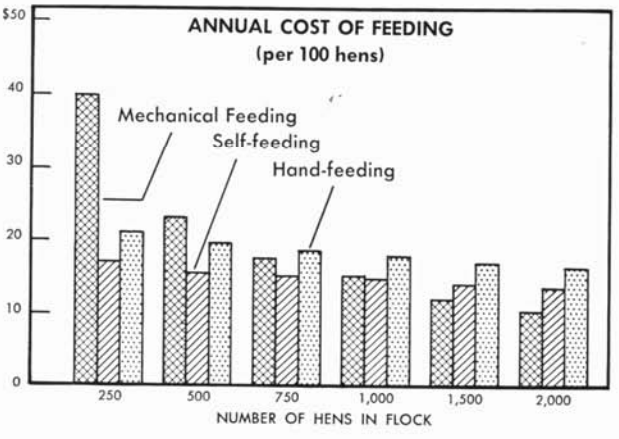


TABLE 2 — WHEN TO MECHANIZE FEEDING

If an hour of labor is worth	The number of hens needed to justify a switch from hand-feeding to mechanical feeding is, at an interest rate of			
	2½%	5%	10%	20%
$0.25	1,750	1,750	2,000	over 2,000
$0.90	650	700	750	900
$2.00	350	350	400	450

Table 2 and the charts on page 7 give guides to the size of flock that will justify a switch from trough feeding to mechanized feeding at several different wage and interest rates. With labor at 90 cents an hour and interest at 5 percent, a flock of at least 700 hens is necessary to justify mechanizing a hand-fed trough system. At the same rates, it is not worth replacing self-feeders with a mechanical feeder for a flock of less than 1,000 hens. A self-feeder system may be economical even with very large flocks, if a self-unloading wagon or other equipment is available for hauling.

Self-feeders are more economical to handle than trough feeders regardless of the size of flock. But the difference is not so great when both types are filled by hand.

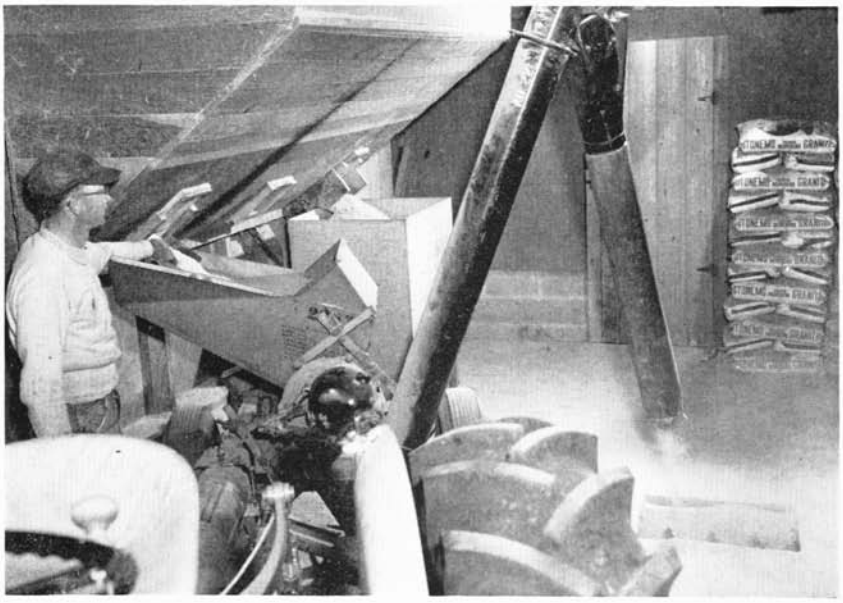
No method of processing or obtaining feed is most economical for all poultrymen

Unless all grains are fed whole, there is an expense for preparing the feed ration. The main factors to consider in deciding among commercial mash, custom processing, and processing on the farm are: volume of operation, available facilities both on the farm and in the community, and the price differences between formula feeds and their ingredients.

The difference between the costs of a commercially prepared ration and the supplement and grains required to build an equivalent ration varies by area, processor, and time of year. Poultrymen interviewed in 1955 reported differences ranging from a few dollars to as much as $20 a ton.

Feed mills that process farm grains for a fee commonly charge 20 cents per 100 pounds for grinding. Supplement is usually purchased at the mill, and the processing charge for mixing the complete ration is about 5 cents per 100 pounds. The total cost averages about $3.50 to $4.00 a ton. There are also the expense, time, and inconvenience involved in regular trips to the mill.

Custom operators that come to the farm charge about the same rates, but they may not be equipped to mix feeds. Frequently the poultryman must supply part of the labor. Timeliness and dependability are often a problem with custom operators.



This poultryman uses a portable feed mill to prepare the ration. Grains and supplements are dumped into the elevator pit at right and transferred overhead to the hoppered bin at left. The feed mixture flows into the mill; the ground feed drops back into the pit at right and is then elevated into the storage bin (third from left). Feed flows from this bin into the mechanical feeder by gravity.

The cost of processing feed on the farm depends on the volume handled and the arrangement of equipment

The best arrangement is provided by overhead bins to supply the grinder, and a blower or auger to deliver the ground feed. The usual tractor-powered farm mill costs about $200 to $500. It will grind an average of 2 to 3 tons of grain an hour. With an average layout, labor and equipment costs run $4 to $5 a ton for grinding small lots (25 to 30 tons a year), but decrease to about $1.50 a ton for as much as 300 tons. Using the same equipment to process feed for other livestock increases volume and helps to keep down the cost per ton. Power-operated feed mixers can be used to make an all-mash ration from ground grains and supplement.

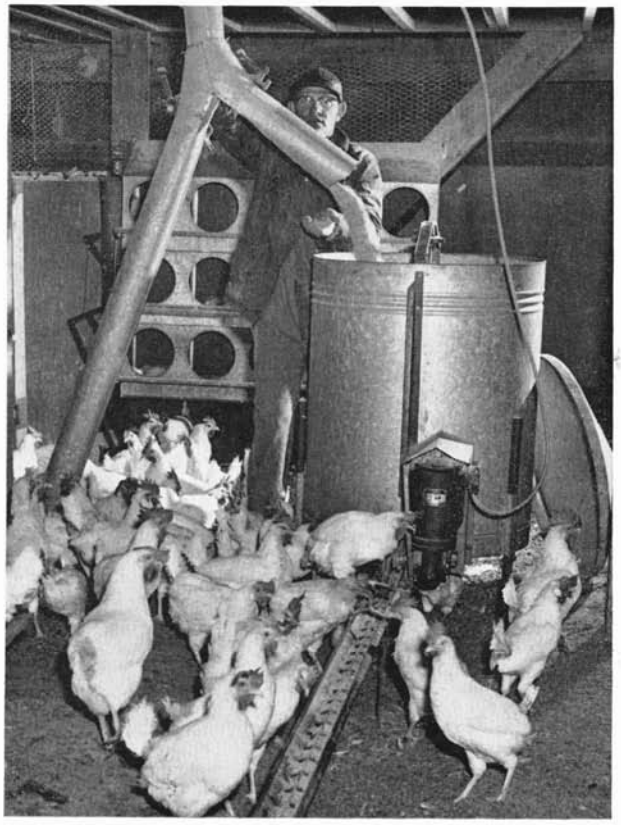
Grinding, mixing, and feeding are combined in a single operation with an electric blending mill, blowers, and mechanical feeders. Grain from overhead bins in the corn crib is mixed in the mill (above) into an all-mash ration, which is blown to the converted dairy barn where it flows directly into the mechanical feeders (right).

Cost of mixing a ton of feed averages about the same as the cost of grinding.

Electrically operated feed mills with blending units deliver a mixed ration automatically

These machines automatically meter accurate proportions of grain and supplements before grinding. They handle only about 1,000 pounds of feed an hour, but they operate without an attendant. With a mill, a blending unit, a blower, and mechanical feeders, the feeding chore is reduced to practically a push-button operation. A mill, blending unit, and controls sell for about $600. Installation of equipment, plus adapting overhead bins to supply the grinder, usually raises cost to $800 to $1,000, perhaps higher if new bins are needed.

Annual equipment costs are higher with the blending mill than with regular grinders, but labor is much lower. The total costs of grinding a ton of feed are about the same for each type of mill, but the blending unit eliminates the extra cost for mixing feed.



WATERING

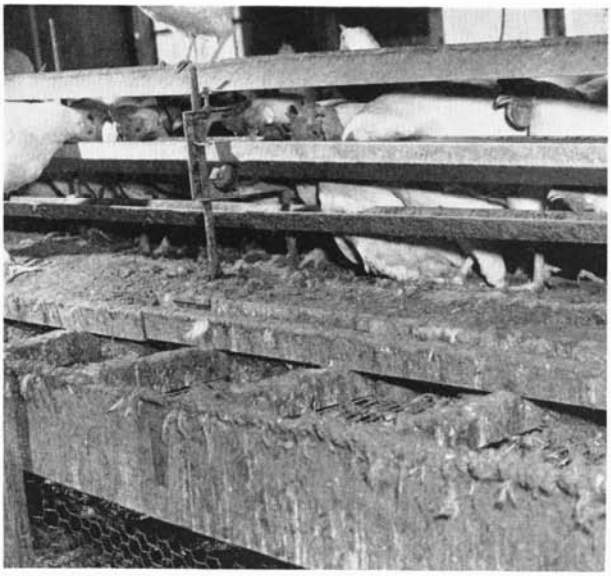
Carrying water by hand is the most time-consuming job in egg production. Each 100 hens use about 6 to 9 gallons of water a day; in a year's time, a total of 10 to 15 tons. Poultrymen who did the job by hand averaged 27 hours and 28 miles of walking a year for each 100 hens; one man spent 220 hours and walked 259 miles in the course of a year carrying water to a flock of 500.

With automatic fountains, little labor is needed

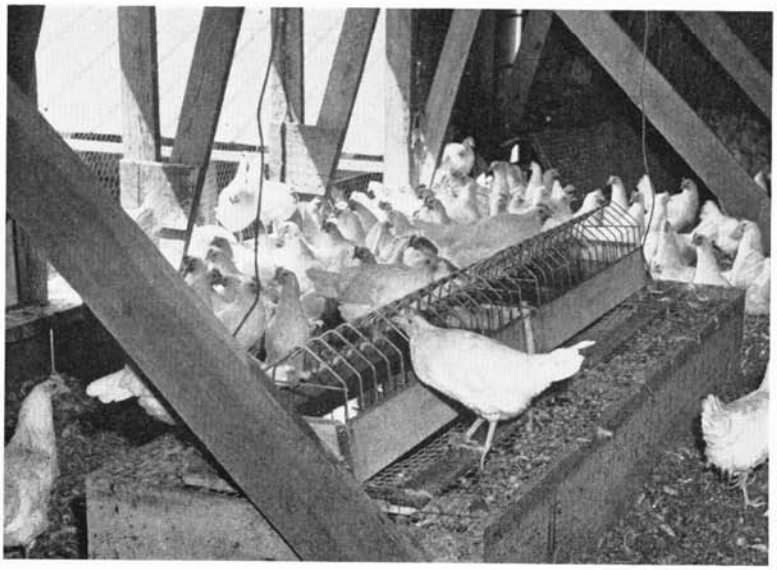
Piping water to a faucet in the laying house, then carrying it to fountains took 8 hours and 1.5 miles of walking a year per 100 hens. Adding a few feet of pipe and automatic fountains cut the chore time to 36 minutes and almost eliminated the need for special trips.

The automatic fountains are kept supplied with water by means of float-controlled valves. An overhead tank with float controls provides a constant supply by gravity flow. Continuous-flow troughs with drains to the outside of the building work if the water pressure is fairly constant, but uneven pressure may cause the trough to overflow at one time and be nearly dry at another. A pressure-break tank (see illustration on page 21) helps to assure constant flow of water and also provides a convenient means of adding medication to the water in an automatic system.

Labor for cleaning the watering troughs can be cut considerably by using shallow waterers (¼ to ½ inch of water). The job averages about 36 minutes a year per 100 hens, compared with 2½ hours required for cleaning deep troughs. Also, with shallow waterers, less water is shaken out onto the floor by the hens. By placing waterers on wire-covered plat-



Placing continuous-flow waterers below the mechanical feeder and over dropping pits helps to keep the litter dry. Spilled water goes into the pit; surplus water is drained to outside the building.



Automatic fountains with float controls provide a constant supply of water. Wire guards help to keep trash out of the water and prevent the controls from becoming clogged. The screened platform protects the litter.

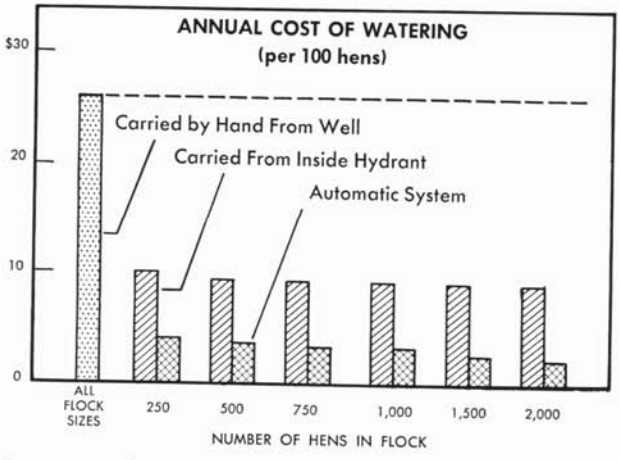
forms or over the dropping pits, excess moisture is kept out of the litter. Waterers over dropping pits should be serviced by flexible tubing so that they can be moved easily when the pits are cleaned. If a mechanical feeder is used and placed over the dropping pits, a good location for a continuous-flow trough would be beneath the feeder.

An automatic watering system is economical for all flock sizes

Regardless of flock size, an automatic system is least expensive even if labor is figured as low as 25 cents an hour. About $6 will buy ordinary troughs or fountains for 100 hens; pipe in place costs about 30 cents a foot; and automatic controls and heating devices add $1 to $3 per 100 hens. Heat cables, immersion heaters, and other electrical devices prevent freezing of pipes and fountains; the cost is negligible. Investment for a fully automatic system, including heating devices and all piping from the pump, ranges from $10 to $20 per 100 hens.

If the water supply is not enough to fill both livestock and family needs, some investment may be necessary to provide an adequate well and pressure system. A good shallow well and pressure system may not cost more than $150, but a deep well and pressure system may require $500 or more. The amount that is charged to the poultry enterprise, of course, depends on the proportion of water that is used for the laying flock.

Annual cost of operating automatic systems was only $2 to $4 a year per 100 hens, the charges being mainly for electricity and equipment. Doing the job by hand averaged $26 per 100 hens, with labor making up 90 percent of the cost. Average costs are about the same for all flock sizes because the amount of labor and most of the equipment costs change in direct proportion to the number of hens.



An automatic system is the most economical way of providing water for hens in any size of flock. (Annual cost includes charges for both labor and equipment with labor at $0.90 an hour and interest rate at 5 percent.)

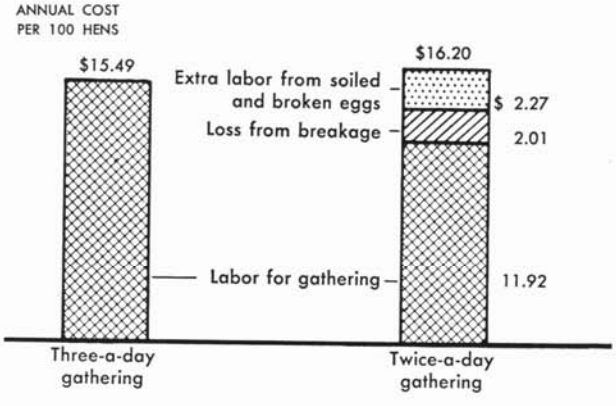
GATHERING, CLEANING, AND PROCESSING EGGS

The main problems in reducing time for gathering eggs are the lack of mechanical equipment to help with the work and the necessary exactness of the job. Wire egg baskets are standard equipment for gathering eggs on most farms. Setting the basket down at a convenient place lessens the load and leaves both hands free for collecting the eggs. Starting at the far end of the house and gathering toward the eggroom lessens the distance the eggs must be carried. In long houses, an overhead carrier with a platform or carrying hooks can ease this job.

Gathering eggs three times a day helps to insure good egg quality

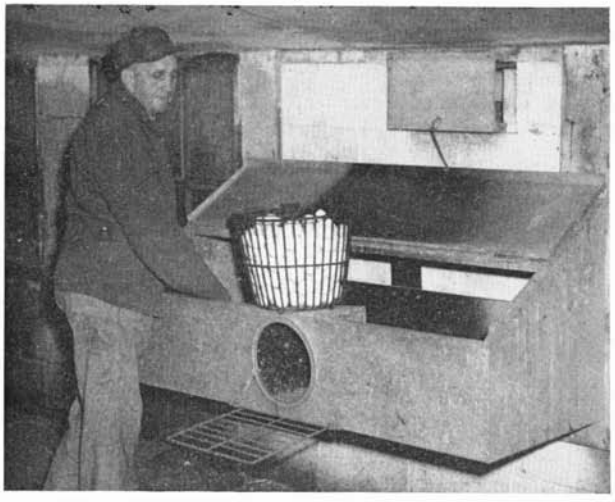
Frequent gathering means more clean, high-quality eggs, but it requires more time. Gathering eggs three times a day takes 30 percent more labor than twice-a-day gathering, but it prevents enough egg breakage in regular nests to pay almost entirely for the extra labor. Lower prices for more cracked eggs and the extra time required for cleaning addi-

GATHERING EGGS THREE TIMES A DAY TAKES MORE LABOR, BUT COSTS LESS THAN TWICE-A-DAY GATHERING



tional dirty eggs make twice-a-day gathering more expensive than three times a day.

By gathering three times daily, producers limit the time eggs stay in the nests to about 4 hours at the most. With two gatherings a day, some of the eggs are in the nests for 6 or 7 hours. In hot weather this can mean rapid deterioration of egg quality.



This community nest holds several hens at a time. Eggs can be gathered with both hands when a place is provided to set the basket.

Most of the cost of gathering eggs and use of nests is for labor

Labor costs make up 65 to 90 percent of the annual charge for use of nests and gathering eggs. The annual labor requirement for gathering, taking eggs to an eggroom inside the laying house, and servicing the nests, ranges from about 28 hours per 100 hens with small flocks to 15 hours with flocks larger than 1,000 hens. If frequency of gathering and percentage of floor eggs are the same, the total time required for handling eggs will be about the same for regular and roll-away nests. The annual cost per 100 hens decreases as the size of flock increases to about 1,500 hens.

Cleanliness is important to egg quality

Cleanliness of the shell is one measure of egg quality. Soiled eggs, even though they may have AA or A interior quality, usually sell as grade C at a much lower price than top-grade eggs. Cleaning eggs is very time consuming; the best way to reduce the chore of cleaning eggs is to produce a higher proportion of clean eggs. Good management helps, but it will not eliminate the problem of soiled eggs.

Gathering soiled eggs separately makes cleaning more efficient

Gathering clean eggs separately from heavily soiled ones saves time on the cleaning operation, especially if the eggs are cleaned with an immersion washer. You can do this by making a special trip for soiled eggs, or by putting them in a small, clip-on container on the side of the regular basket.

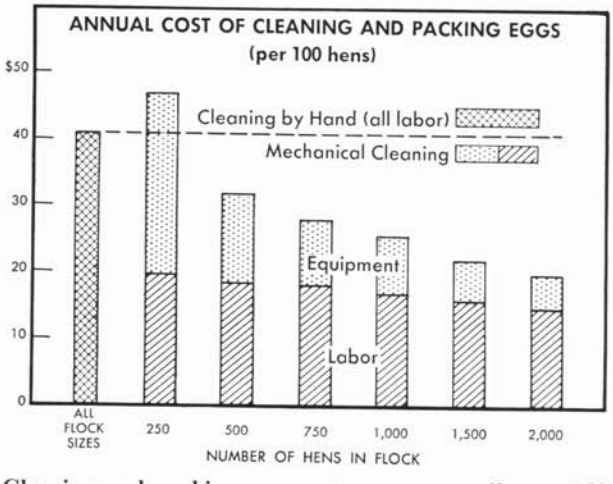
Inspecting eggs before cleaning by hand saves time

Hand-cleaning of eggs takes a large amount of labor — about one-half to three-fourths of the total time spent on all daily chores. Lightly soiled eggs can be cleaned with a soft-backed emery or sanding block. The job is easier with an electrically driven buffing wheel. Heavily soiled eggs usually have to be washed.

Since cleaning eggs by hand is monotonous work, it is easy to slip into a routine of sanding the entire surface of each egg, regardless of its condition. But most eggs are either clean or only slightly marked. If you must clean by hand, inspect the eggs, and sand or wipe only the soiled areas.

Machines for cleaning eggs cut labor

Immersion-type washers that clean a basket of eggs at a time are most popular in Illinois. The eggs do not have to be handled individually, and this type of machine is relatively inexpensive. Hand-cleaning and packing a case of eggs on 14 farms averaged 45



Cleaning and packing eggs costs more annually per 100 hens than any other job in egg production. Cleaning by hand is economical only for very small flocks. (Annual cost includes charges for labor and equipment with labor at $0.90 an hour and interest at 5 percent.)

Eggs are cleaned a basket at a time in this mechanical washer. The operator is filling the washer and adding an approved sanitizer-detergent. The eggs are packed into cases and stored on well-ventilated platforms (upper left). A refrigerator unit (center) keeps the eggroom cool and protects egg quality during storage.

minutes and took as long as 80 minutes. Poultrymen who cleaned eggs with immersion-type washers averaged 18 minutes; some did the job in as little as 10 or 15 minutes. Ordinarily, servicing the washer, assisting in the washing process, and cleaning equipment take less than 5 minutes and the rest of the time is spent packing the eggs.

Follow the manufacturer's recommendations for machine-washing exactly

Improper washing can damage the interior of the eggs. Proper washing means using an approved sanitizer-detergent, keeping wash water at the correct temperature, controlling the immersion period, and maintaining strict sanitation. To keep labor input low, yet maintain close control over the washing process, follow one of these procedures:

(1) Wash the eggs while packing those cleaned the previous day. (2) Or wash each basket of eggs immediately after it is brought from the laying house. The machine should be attended while the eggs are being washed to prevent over-immersion. A timer with an alarm will remind you to take the eggs out promptly.

TABLE 3 — WHEN TO MECHANIZE EGG-CLEANING

If an hour of labor is worth	The number of hens needed to justify washing eggs mechanically is, at an interest rate of			
	2½%	5%	10%	20%
$0.25	1,250	1,300	1,350	1,500
$0.90	300	300	300	350
$2.00	250*	250*	250*	250*

* These are the smallest figures available because flocks of less than 250 hens were not included in the study.

Machine washing may be economical for flocks of 300 hens or more

Annual labor required for cleaning eggs with a mechanical washer and for packing averaged 15 to 20 hours per 100 hens (producing at an average rate-of-lay), depending on the size of flock. This is a saving of 25 to 30 hours compared with doing the work by hand. When a high proportion of the eggs are soiled, the difference may be as great as 50 or 60 hours per 100 hens.

Hand-cleaning ordinarily requires practically no investment for equipment. The annual cost is entirely for labor and averages $41 per 100 hens, the same for large flocks as for small ones.

An immersion-type mechanical washer costs about $150 to $200. The annual cost of cleaning eggs with this type of machine is mainly for labor, which ranges from $15 to nearly $20 per 100 hens. Other costs include the usual overhead charges and upkeep of equipment plus electricity and a sanitizer-detergent. These, unlike labor, decrease from $28 per 100 hens for small flocks to only $6 for large ones.

Mechanically cleaned eggs can be packed faster

When eggs are cleaned by hand, they must be packed one at a time because the two jobs are combined. But you can pack four to six machine-washed eggs at a time, using both hands. Usually only 1 or 2 percent need extra cleaning, and when heavily soiled eggs are gathered and cleaned separately the packing routine is seldom interrupted.

Comfort and convenience in the eggroom help in cleaning and processing eggs

An eggroom in the basement of the dwelling is usually most convenient if the family takes part in the egg-processing chore, particularly when the work is done in the evening. A basement provides more moderate storage temperatures than an outside eggroom which does not have both refrigeration and supplemental heat. If the laying flock is large enough that eggs are processed during the day by the farm operator or hired help, an eggroom in the laying house is generally more convenient.

Many hours are spent in the eggroom, even with mechanical equipment and efficient work methods. It is worthwhile to provide a space heater in winter and a fan or other cooling system in summer for the comfort of the workers. Buffing wheels and other types of dry cleaners create egg-shell and emery dust which endanger health; use an exhaust fan to clear the work area.

Poultrymen who sell ungraded eggs packed in 30-dozen cases need space in the work area of the eggroom for an egg basket, egg case, flats and fillers, a container for cracked eggs, and some means of cleaning soiled eggs. All items of equipment should be kept within easy reach; the egg basket and egg case should be most conveniently located. The best arrangement includes a stool or standing place in front of a work table about 30 inches high. The egg case can be filled easiest if the bottom is placed 6 to 8 inches below the level of the work table.

Additional equipment is needed for grading

When eggs are graded on the farm, additional equipment is needed in the eggroom; this includes a grader, candler, container for eggs with blood spots, and separate cases or cartons for eggs of the various sizes. To save time, have plenty of work space and keep equipment and materials convenient to where they are used.

Candling and grading eggs by hand add about half an hour to the time needed to get a case of eggs ready for market

The time required for cleaning, candling, grading, and packing a case of eggs by hand totals about 75 minutes. Mechanical graders that can do the job in less time are available in a variety of sizes. One common type of farm machine costs about $500 and requires two attendants to maintain capacity operation of 1,200 to 1,500 eggs per hour. Whether it is done by hand or by machine, the job should be organized on a production-line basis with a continuous flow of eggs from cleaning to storage.

This family mechanically cleans, candles, and sizes the eggs, then packages them in dozen cartons for sale at retail outlets. By retailing they can increase the size of their business and sell their labor.

Mechanical graders are more economical to use when eggs are cleaned by machine

Annual labor required for cleaning, candling, grading, and packing eggs by hand averages about 72 hours per 100 hens. With a mechanical egg-grader the time is cut by about 3 to 10 hours per 100 hens, the larger savings being possible with larger flocks.

Eggs are handled slowly, one at a time, when they are cleaned by hand; grading by hand adds very little to the processing time, and a grading machine which operates at a much faster rate is of little advantage. But when the eggs are cleaned mechanically, a large number are ready at one time to be passed through the grading machine, and it can be run at capacity.

Grading by hand raises the annual cost of processing eggs to $66, an increase of $25 per 100 hens. With a grading machine the annual costs range from $35 to $70 per 100 hens, depending on the size of flock.

On the basis of going wage and interest rates, a flock of at least 750 hens is necessary to justify mechanical grading of eggs that are cleaned and packed by hand. But when the eggs are cleaned mechanically, a grading machine may be economical for flocks of 500 or more hens.

Grading on the farm may not be practical

Eggs can be graded before they are packed and sold directly to restaurants, hotels, and other retail outlets. Whether this is profitable depends on the available markets, price differences, and supply of labor. For some families grading provides employment for unused labor and helps to increase the volume of business. But a shortage of labor or lack of a readily available market often prevents retailing of eggs.

NESTING ARRANGEMENTS

Nests can be divided into individual compartments or designed as community nests that permit several hens to use one compartment at the same time. Both types can be bought with or without a roll-away feature — a sloping wire-mesh bottom in the nest that lets droppings and trash fall into a dropping pan while the eggs roll into a covered holding tray.

Roll-away nests help prevent soiling and breaking of eggs

Losses from egg breakage in regular nests are sometimes quite high, especially late in the season when some of the shells are low in quality. The holding trays of the roll-away nests keep other hens from breaking and soiling eggs and remove eggs from the body heat of the hens. This feature will not eliminate the need for cleaning the eggs, but it may reduce the number of soiled eggs.

Roll-away nests should be cleaned occasionally. Dust and manure accumulate on the mesh bottoms, and eggs are marked by the dirt on the wires. The situation is aggravated by rainy weather and wet litter. But, frequent cleaning is not worth the extra time because it does not prevent the eggs from becoming soiled.

Community nests hold litter better

Regular nests must be kept filled with a good litter or nesting material to reduce soiling and breaking of eggs. Crushed corncobs are about the best farm-produced material. Wood shavings, cane pulp, nesting pads, and similar materials can be purchased. Light, fluffy materials such as wheat straw are scratched out of the nests easily and may have to

Individual nests are favored by many poultrymen. Crushed corncobs or some other nesting material is used in this type of nest to prevent breakage and soiling of eggs.

be replaced as often as once a week, while heavy materials may last two or three months. Community nests are deeper and hold litter better than individual nests. If you use roll-away nests, you need to apply litter only once, at the beginning of the housing season.

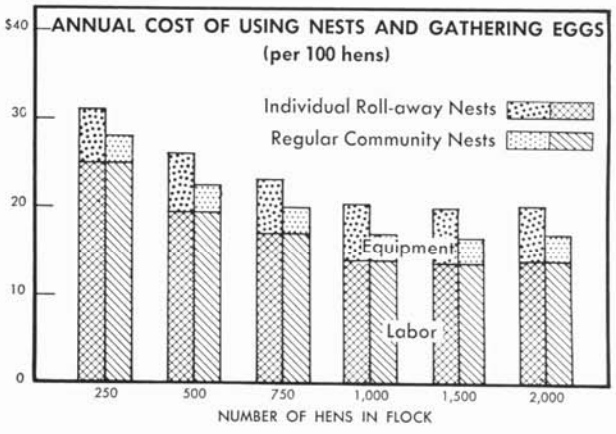
Choice of type of nest may depend on factors other than cost

The cost of nests for 100 hens ranges from $25 to about $70, depending on the type of nest and number provided. Roll-away nests usually cost about twice as much as regular nests.

Average annual costs for the least and the most expensive types of nest differed by only about $3 per 100 hens. Because they are so close in cost, a small difference in egg quality or the number of cracked, broken, soiled, or floor eggs may be sufficient reason to use one type of nest rather than another. Although producers are divided in their opinions as to the best type of nest, an inexperienced poultryman will probably have less trouble with regular nests. While the roll-away nest offers some definite advantages, success with this type requires more skilful management.

There should be ample nesting space

The general rule is to provide one individual nest or 1 square foot of space in a community nest for every five hens. More than five hens per nest results in more breakage, more soiled and floor eggs, and crowded conditions in the nest at gathering time. Too many nests will add to costs and make it difficult to arrange the nests conveniently. The full quota of nests should be placed in the laying house at the beginning of the housing period. Otherwise, hens tend to crowd into the original nests and make limited use of those added later in the year.

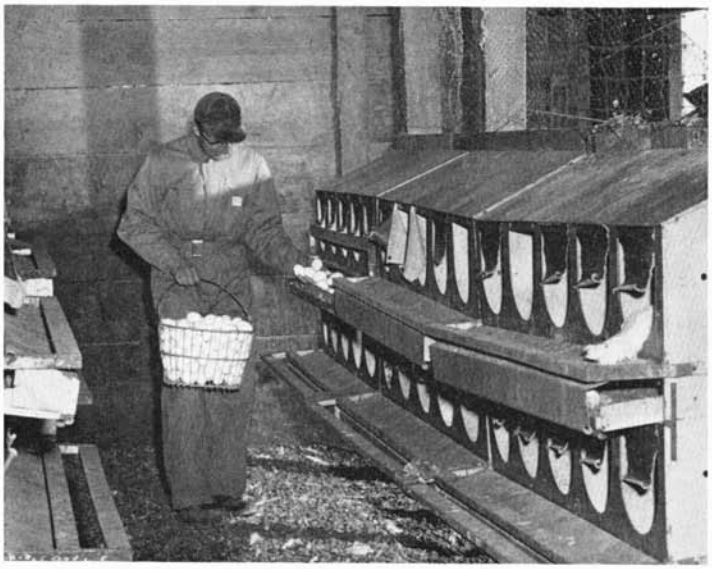


Equipment and labor costs for other types of nests are within the range shown in this chart. Average annual labor per 100 hens decreases as flocks increase up to about 1,500 hens, but equipment costs are the same regardless of flock size. (Labor charged at $0.90 an hour, interest at 5 percent.)

Convenient arrangement of nests simplifies gathering

Place nests at a height convenient for gathering eggs. If the nests are located either permanently or temporarily at ground level, it is more difficult to gather, and the number of floor eggs is not less.

A nesting room next to the eggroom cuts the distance eggs have to be carried, but gathering takes about the same time as for other nest arrangements. With successful management a nesting room saves labor, but the problem is the possibility of a high proportion of eggs being laid on the floor.



Eggs are gathered from the holding trays of these roll-away nests. The nests are grouped at one end of this multiple-story house — the area is secluded to make it more attractive to the hens.

The best compromise between simplifying the gathering chore and reducing floor eggs is to group all or most of the nests in the half of the house nearest the eggroom. Otherwise, it is desirable to distribute the nests throughout the pen, particularly if it is large.

Hens should be encouraged to use the nests

Providing ample nesting space, darkening the nesting area, placing nests on the range, and other measures encourage use of the nests and prevent the extra work involved with a large number of floor eggs. It is not known why some hens choose to lay eggs on the floor but habit is a strong influence.

Pullets that start to lay on the ground while on the range are likely to continue after being housed. You can discourage them by housing the pullets early, or by providing a few nests on the range. Use the same type that will be placed in the laying house, because the pullets may refuse a different type once they are housed.

Pick up floor eggs as often as you can, especially early in the season when they are more likely to cause other pullets to nest in the same place. If a nesting place has a chance to become established on the floor, it cannot be eliminated with success.

Get rid of undesirable nesting places before housing the pullets. Block dark corners, remove unnecessary equipment from the house, and locate useful equipment so that it does not provide a protected area. Provide an even distribution of light outside the nesting area.

A darkened nesting area can be provided by placing nests along the rear wall in two facing rows or by enclosing the nesting area with a partial partition.

Many poultrymen have used roll-away nests successfully, but sometimes hens refuse to use them, because the wire floors do not present a natural nesting place. Pullets can be encouraged to use the nests at the beginning of the housing period by using a nesting material; the material gradually filters through the bottom of the nest, and within a few weeks the roll-away feature can be used as intended. Artificial or "nest" eggs are used by some poultrymen with roll-away nests to encourage the hens to use the nests. They are not considered an advantage for use with regular nests.

LITTER, ROOSTS, AND DROPPING PITS

For clean eggs, litter must be in good condition

Nearly all commercial flocks in Illinois are handled on the deep-litter system. A layer of about 6 inches of litter is placed in the laying house in the fall before the new pullets are housed, and by winter it has been broken into small particles. The litter absorbs moisture and helps to keep the floor warm, but when it becomes wet, the number of dirty eggs and the labor required for cleaning them increase. The litter should not have to be removed more than once a year, except where it becomes damp around waterers.

To keep the litter in condition, be sure the laying house is well insulated and ventilated. Using screened dropping pits and placing roosts, feeders, and waterers over them help to keep excess moisture and manure out of the litter.

Some poultrymen condition the litter by stirring it with a fork or a rotary digging machine, but most prefer feeding scratch grain to encourage the hens to keep the litter stirred.

Litter should not be changed during the cold months of the year, but new litter can be added to increase the depth and thus keep down the concentration of moisture. Crushed corncobs are readily available and make good litter material; wood shavings, sawdust, chopped straw, and long straw are also used, but straw does not absorb moisture as well and it packs readily.

Dropping pits located in the center of the laying house make culling and cleaning easier

The pits can be located either in the center of the laying house or along the rear wall. A central location is preferable since it allows access from both sides, which helps in night culling and makes equipment easier to reach. The pit can be easily cleaned with tractor equipment and the rear wall is left free for nests. In addition, with dropping pits in the center of the house, feeders and waterers can be placed over them to help keep the litter clean. Dropping boards are sometimes used in multiple-story houses to prevent rotting of the floor boards.

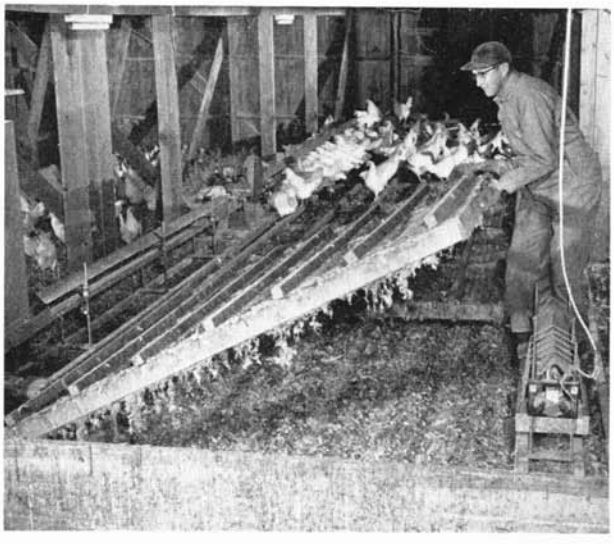
Dropping pits usually need cleaning only two or three times a year, and some poultrymen build large pits that need to be cleaned only once a year. The

Cobs from freshly shelled corn are ground and blown into the top floor of this converted barn (left). Here they stay in good condition while serving as insulation for the lower floors. When litter material is needed, it can be dropped to the lower floors through a chute (right).

manure can be removed from the house without disturbing the litter. A few poultrymen use mechanical pit cleaners to remove manure more frequently.

Placing roosts over dropping pits helps to keep excess moisture and manure out of the litter

Most poultrymen provide some type of roost for laying hens, although sometimes, as in broiler production, a flock is handled without roosts of any kind. Owners of small flocks often use perches made of poles and allow the hens free access below the roost. Wooden perches, 2 x 2 inches and spaced 12 to 14 inches apart above dropping pits covered with 1 x 2-inch mesh welded wire, are generally preferred. Multiple-level roosts can be used so that more hens roost above a particular area of dropping pit.



An enclosed manure chute on the side of a multiple-story house saves labor in loading the spreader. And it helps to keep the farmstead clean.

Screened roosting sections can be removed and the dropping pits cleaned without dismantling the mechanical feeder. The end section (foreground) lifts out and the pit is cleaned with tractor equipment.

CAGED LAYERS

Keeping hens in individual wire cages suspended above the floor is a new practice on Illinois farms. Although this system offers some special advantages to the poultrymen, preliminary studies indicate that labor and equipment costs are higher with a cage system than with a similarly mechanized litter house.

Daily chores take more time

Studies of five cage operations showed daily chores averaging about 25 hours more a year per 100 hens than in litter houses with the same level of mechanization. With a flock size of 1,000, feeding each 100 caged hens ranged from 18 to 30 hours annually. Taking care of water troughs between the rows of cages took 2½ hours per 100 hens a year — five times the average for the same chore in litter houses. Gathering eggs from caged layers took only half the time required with conventional nests, but keeping individual production records and cleaning the cages raised the total time to 26 hours per 100 hens, 10 hours more annually than in conventional systems.

Either more floor space or extra cleaning time is needed

Counting space in the alleys and at the ends of the house, single-deck cages on the farms studied took about 3½ square feet of floor space per hen. Double-decking of cages cut the required space to about 2 square feet per hen, but litter pans placed between the upper and lower cages had to be cleaned weekly. Over a year, this job totaled 20 to 30 hours per 100 hens, compared with the 6 or 7 hours required in litter houses or single-deck cage systems where droppings are usually removed only once a year.

Higher costs may not be the deciding factor

Cage equipment for 100 hens can be bought for $110 to $150. This can be compared with the cost of hand-filled feeders, automatic waterers, nests, and dropping pits in litter houses, which runs to about $90 to $100 per 100 hens. Egg processing and storage facilities are not affected by the system of handling the hens.

There are other factors to consider besides the labor and equipment requirements of a cage system. Among these are methods and benefits of close culling, salvage value of hens, nutrition and housing requirements, raising of replacements, and fly control. A more thorough study of the problem under midwestern conditions will be needed to determine whether the advantages of cages may outweigh the disadvantages.

Individual cages for laying hens are being used by some poultrymen in Illinois. This new practice offers some advantages — for example, in keeping close production records — but on the farms studied, labor and equipment cost more in cage systems than in comparable litter houses.

GUIDES FOR LAYING-HOUSE PLANS

The seven layouts presented on the following pages can be used as guides for making the most efficient use of different types of buildings, kinds of equipment, and work methods. Each plan is scaled for a specified number of hens, but most of the plans can be adapted to a wide range of flock sizes. If no single plan seems to suit your needs exactly, you may be able to combine features from several plans for an effective arrangement in your poultry house.

Style of building is unimportant

A practical laying house should provide the proper environment for good production and health of the flock for a long period of time and at a minimum cost. The style is unimportant as long as it provides the basic essentials of good housing. The choice should be based on how well the design and arrangement facilitate good management and effective use of labor and equipment. Materials can be selected largely on the basis of local prices.

Detailed plans for the construction of suitable laying houses have been prepared cooperatively by the state agricultural colleges and the United States Department of Agriculture. These plans can be ordered from farm advisers, who usually have illustrated catalogs. Other plans are available from dealers in building materials and publishers of poultry magazines.

A single-story plan is usually best for a new building

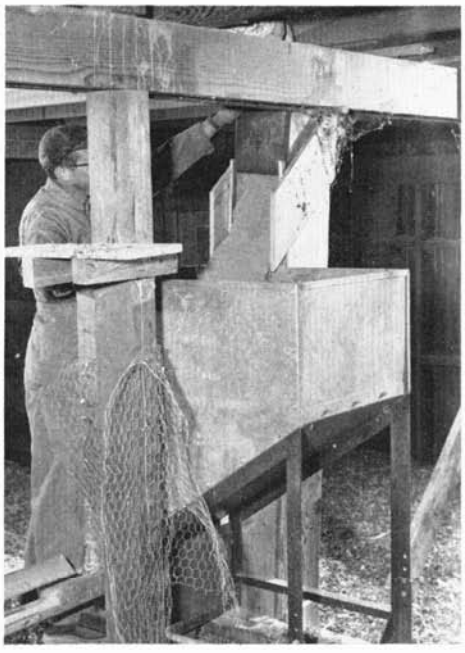
Space in a one-story house costs more, but the advantage in cost for a multiple-story house is greatly reduced by the necessary expense of special equipment for moving materials and supplies among the floors. These jobs can usually be done with standard farm equipment and a drive-through arrangement in a single-story house.

Construction costs for a fully insulated single-story house of good materials range from $1.50 to $2.00 per square foot of floor area. A multiple-story house of comparable quality can be put up for $0.25 to $0.50 less per square foot (depending on the number of floors), but an elevator or lift, augers, blowers, and similar equipment generally add $750 to $1,000 to the total investment. Without this equipment chores are made quite difficult.

A sound barn can be remodeled for poultry

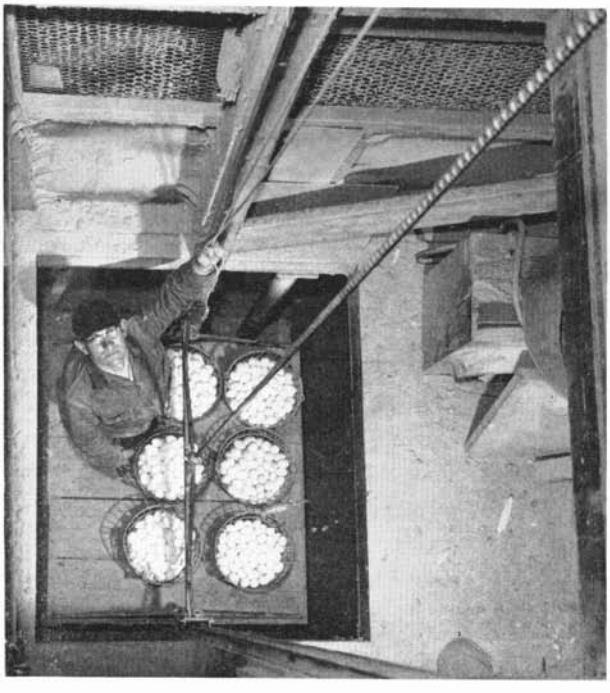
The choice differs when there is a sound dairy or general-purpose livestock barn on the farm that is not in use. It can usually be remodeled, even with complete mechanization, for less than the cost of constructing a new laying house of any type. Some farmers make use of the ground and loft floors for chickens and do little extra structural work. Others

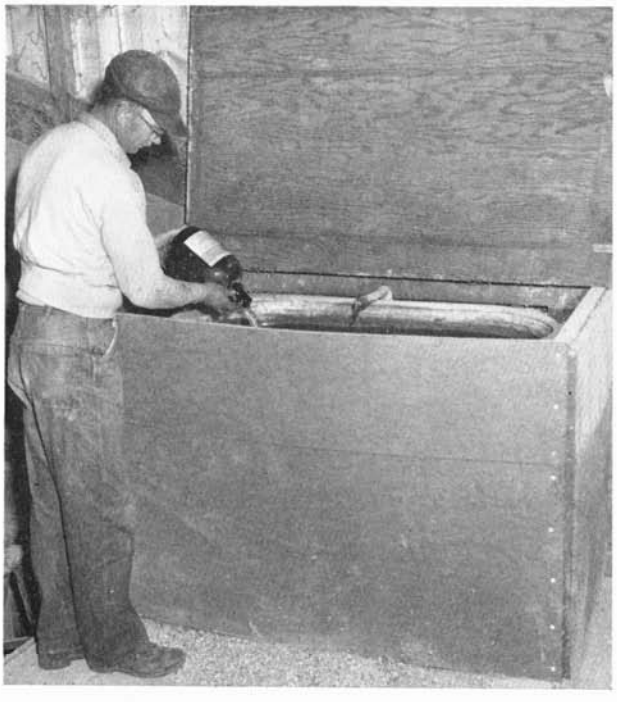
A one-story house with a drive-in or drive-through arrangement makes it easy to mechanize part of the chore work with general-purpose farm equipment. This type of building is well suited to a general-livestock farm.



Ground feed in bulk is hauled from a mill in the neighborhood and augered to a storage bin on the fourth floor of this multiple-story house (left). The feed then flows by gravity into mechanical feeders on the lower floors (right).

In a multiple-story laying house, an elevator or lift is almost essential for handling materials. It saves time and reduces hard work.





Adding medication to the water is easy with a pressure-break tank. This overhead tank with float controls provides a constant flow of water, in spite of uneven pressure.

Converting a livestock barn with a sound structure into a multiple-story laying house is an economical use of a fixed investment.

build one, sometimes two, floors above the loft floor. Before remodeling such a building, have its condition appraised by an expert.

The house should be convertible and expandable

For most farms in the Midwest, a laying house that can be converted to other uses is preferable to a highly specialized building. A one-story structure can be used for hogs, sheep, grain storage, shelter for machinery, and other purposes with just a minor amount of remodeling. The upper floors of a multiple-story house are largely lost space for most other enterprises. It is wise to provide for expansion or the construction of additional housing units.

All plans must provide for basic needs

Facilities that affect the production and health of the laying flock must be adequately provided in all types of buildings, regardless of the method used for doing chores. The following guides were used in setting up the seven plans.

Floor space. Hens are provided with 2 square feet of floor space each when the feeders and waterers are located over the dropping pits, 2½ square feet when one of these facilities is on the floor, and 3 square feet when both are on the floor.

Feeders. A minimum of 30 linear feet of trough space (counting both sides of the trough) is provided for each 100 hens. Three drum feeders with an average capacity for 125 to 150 pounds of feed and a base circumference of 6 to 7 feet are considered the equivalent of 30 feet of trough space.

Waterers. One round automatic waterer is provided for each 150 hens. Eight linear feet per 100 hens is the standard for trough waterers.

Nest space. Twenty individual nests or 20 square feet of space in community nests are provided for each 100 hens.

Dropping pits and roosts. Dropping pits cover about one-third of the floor space when both feeders and waterers are located above the pits, one-fourth when one of these facilities is on the floor, and one-fifth when both feeders and waterers are on the floor. The roosts over the top of the pits provide a minimum of 6 to 7 inches of perch space per hen.

Lighting. An average of 13 to 14 hours of light per day is generally recommended for laying flocks. Artificial light at an intensity equivalent to one 60-watt bulb suspended 7 feet above the floor is recommended for each 200 square feet of floor space. Window area may vary considerably, depending on the over-all provisions for lighting and ventilation.

Ventilation and temperature control. Proper ventilation is necessary to provide the hens with fresh air and to carry off excess moisture. Since the house should be kept at moderate temperatures, proper control of air flow and adequate insulation are needed. If detailed specifications for ventilation, insulation, and temperature control are not included with construction plans, consult a qualified engineer.

Storage for other equipment that is used only occasionally, such as marketing coops, sprayers, and sanitizing materials, is not provided in these laying-house plans. It is usually preferable to keep this equipment elsewhere. Such items as broody coops, an incinerator or special septic tank for disposing of dead hens, and provision for supplementary heat are not shown in the layouts, but they may be added where needed.

HAND METHODS FOR SMALL FLOCKS

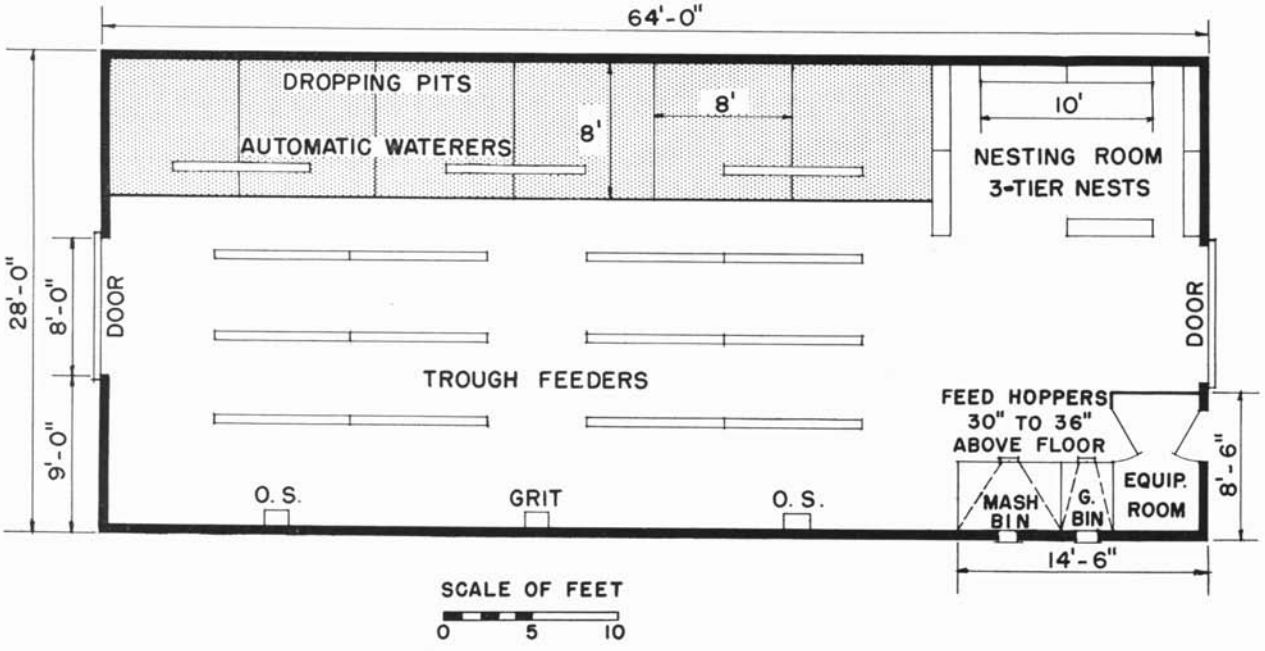
Much of the mechanical equipment and technical improvements available are not practical for use with small flocks. But even with hand methods of doing chores, a better arrangement of facilities can reduce labor input and lower the costs of handling the laying flock.

A convenient one-story layout for handling 550 to 600 hens largely by hand methods is shown in Plan A. The general plan can be scaled down for smaller flocks with as few as 200 hens.

Water troughs are placed over the dropping pits to help control moisture in the litter. Automatic waterers are used; they are usually more practical than hand-filled troughs, even with flocks as small as 200 hens.

The arrangement of nests in a group concentrates the gathering of eggs near the exit from the house. As the nests are next to the dropping pits, it is particularly important that the space above them be open for ventilation.

PLAN A



Hoppered bins that are filled from outside the house provide convenient storage for mash and grain. The bins are elevated above floor level to make it easy to remove feed. A small entrance room provides storage for equipment and supplies.

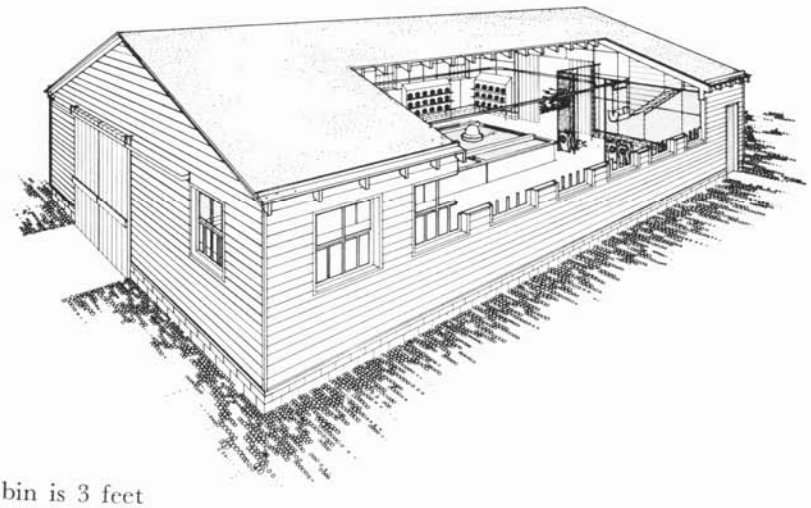
Trough feeders are shown arranged in parallel rows, forming a direct route to the storage bins. Drum-type feeders could be arranged similarly to serve as well at about the same cost.

This plan does not provide for an eggroom in the laying house, since the costs of building a properly equipped one may be prohibitive for a small-flock owner. Egg processing and storage facilities for a small flock are usually located at the dwelling.

A drive-through arrangement permits tractor equipment to be used for cleaning the house and hauling equipment can be moved close to the work area.

PARTIAL MECHANIZATION FOR MEDIUM-SIZED FLOCKS

Inexpensive conveying equipment and better arrangements of facilities simplify poultry chores and reduce the heavy work. A plentiful supply of labor often substitutes for full mechanization of chore work on a medium-sized flock. Plan B is scaled for 600 hens, but the general layout may be practical for flocks of 500 to 1,000 hens.



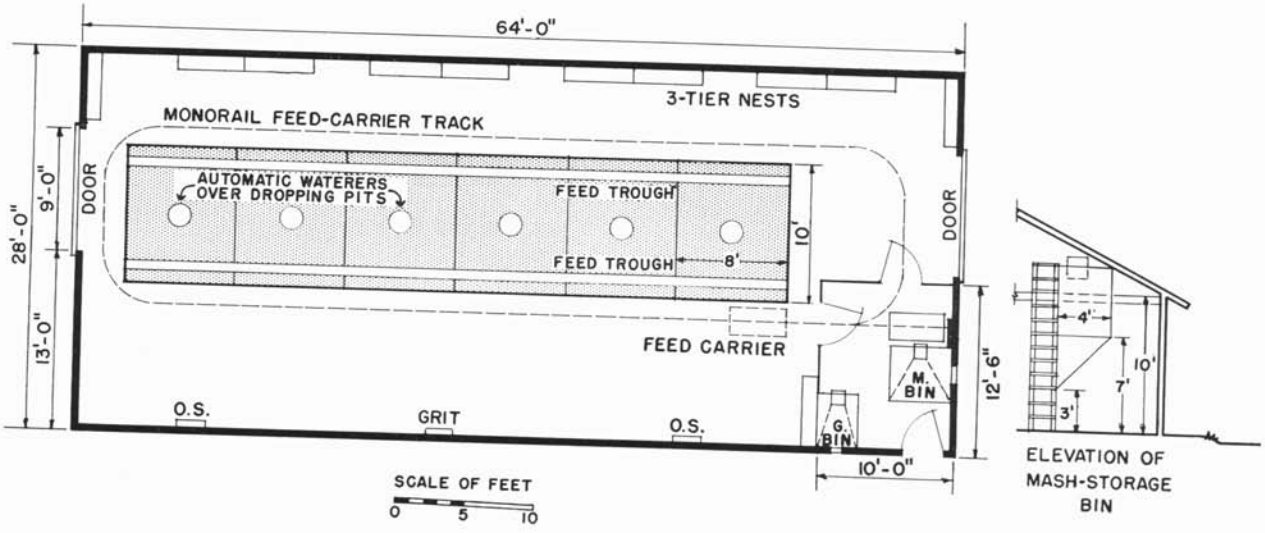
Mash and grain are stored in hoppered bins filled from outside the building. An overhead monorail carrier and trough feeders placed over the dropping pits reduce feeding time. The discharge spout of the mash bin is 3 feet above the floor, permitting the carrier to be filled easily. The carrier is kept near waist level to eliminate stooping and reduce spilling of feed; the ends of the carrier slope inward to allow easy removal of feed with a hand scoop. The carrier is run on a circular track and it can be diverted over a spur to the feed room by a switch. The entire set of equipment can be installed with unskilled farm labor, and some farm materials can probably be used.

The feed room is enclosed with wire to keep costs low, but if dust becomes objectionable the area should be enclosed with solid material.

Nests are distributed along the wall of the house. This is done to reduce the likelihood of hens laying eggs on the floor, but with careful management of the flock some time can be saved by using a nesting area closer to the feed room. Eggs are handled at the dwelling if a suitable place is available. Otherwise an eggroom such as the one shown in Plan C is necessary.

The centered dropping pit, built in movable sections, and the drive-through arrangement in this plan permit easy removal of manure with tractor equipment.

PLAN B



SELF-FEEDING FOR LARGE FLOCKS

Properly managed self-feeding systems are practical for flocks of any size, but they are more economical for large flocks. The one-story layout in Plan C is scaled for 900 hens.

Drum self-feeders large enough to hold a week's feed provide both feeding and storage space. A daily check by the poultryman assures the proper flow of feed. The overhead carrier holds 500 to 600 pounds of feed, and can haul a week's feed supply for 1,000 hens to the feeders in only four trips from the storage bin.

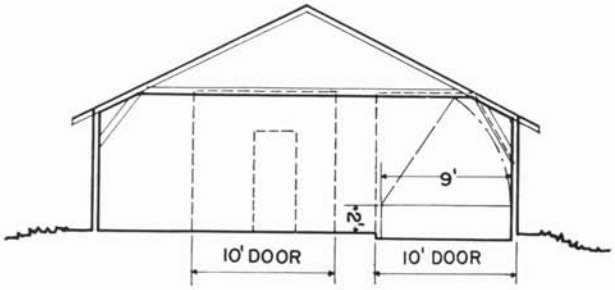
A drive-through arrangement could be made to replace the feed carrier and feed storage, and the feeders could be filled with a self-unloading wagon or truck.

In this plan the self-feeders are placed directly below the carrier track (the lower feeders in Plan C) and a carrier with a single, perhaps double, hoppered bottom is used to drop feed into the feeders as the carrier passes over the top. The feeders could be placed to one side of the carrier (the upper row of feeders in Plan C) and filled with a hand scoop. This arrangement eliminates raising and lowering the carrier but requires scooping the feed.

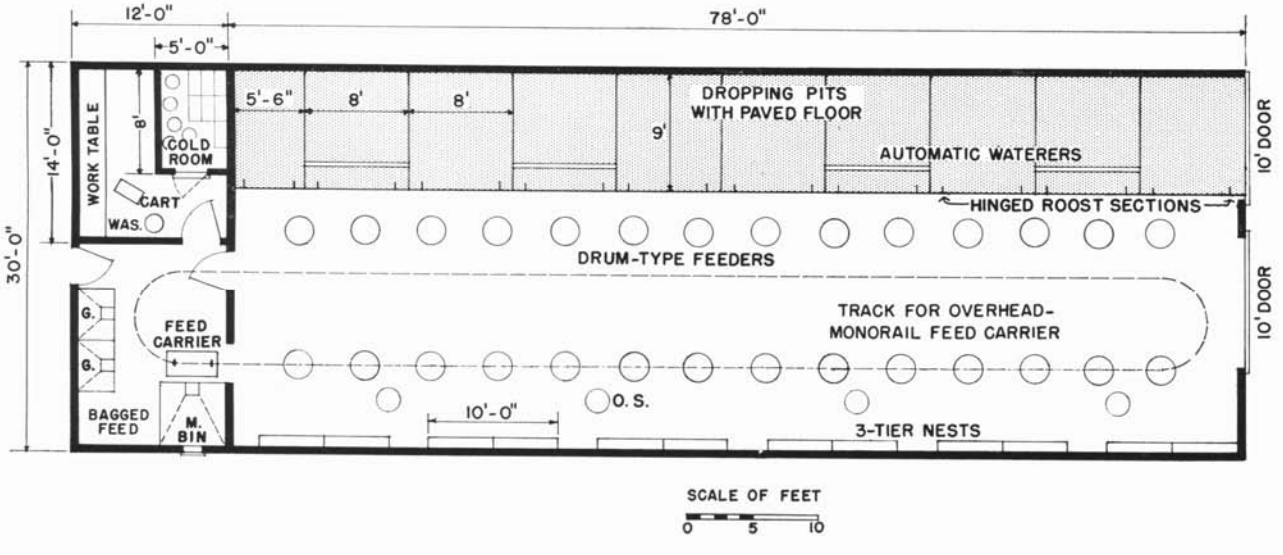
A hoppered storage bin that can be filled from outside the building is shown in this plan. Two bins for scratch grain are located near the entrance to the house. They will hold enough scratch grain for a flock of this size for a year. As an alternative, a wagon or truck load of feed can be brought through a drive-in door at the end of the house and parked just inside the building so that mash can be scooped directly into the carrier. Or a self-unloading wagon or truck could be used instead of a carrier. Either bagged or bulk feed could be distributed into the drum feeders by backing the vehicle into the house between the rows of feeders.

Waterers are placed over the pits and serviced by flexible tubing from a permanent water line. They can be set on the floor while the pits are being cleaned.

The dropping pit and roosts in this plan are located and designed so that manure can be removed with regular tractor equipment while the hens are in the house. The roosts are hinged on the inner side. They can be raised by hand or by ropes attached to guide pulleys in the ceiling. When raised,



PLAN C



the roost sections form a partition to prevent the hens from escaping. A bucket-type scoop on the front of a tractor or a rear-mounted scraper blade can be used to clean the pit.

Entering the dropping pit with tractor equipment in this way requires that the ceiling of the laying house be 9 to 10 feet high instead of 7 feet, the height of most poultry houses in Illinois. This can be done by adjusting the height of the ceiling joists, as shown in the end elevation of the house in Plan C.

Tractor equipment can be used in this house in two other ways. First, the roost sections can be hinged on both sides to open in the center. The outside sections can be raised and hooked to the wall, while the inside sections are handled as described above. The second alternative is to construct narrower dropping pits and multiple-level roosts. The smaller pits would, however, have to be cleaned more often.

Nests are located along one wall of the house, but they could be grouped at one end.

An eggroom is provided in this plan, with a work area, cleaning facilities, and refrigerated storage for the eggs from about 2,500 hens. It could serve multiple housing units if the additional units were grouped around the house.

FULLY MECHANIZED ONE-STORY HOUSES

The minimum size on most farms for complete mechanization of poultry chores is 750 to 1,000 hens, but mechanization is sometimes justified for as few as 500 hens. Two possible arrangements of mechanical equipment in one-story laying houses for 850 to 900 hens are shown in Plans D and E. Each plan provides adequate feed storage and eggroom area for a maximum of 3,000 hens. Thus either plan can be expanded by increasing the size of the house or by adding duplicate houses.

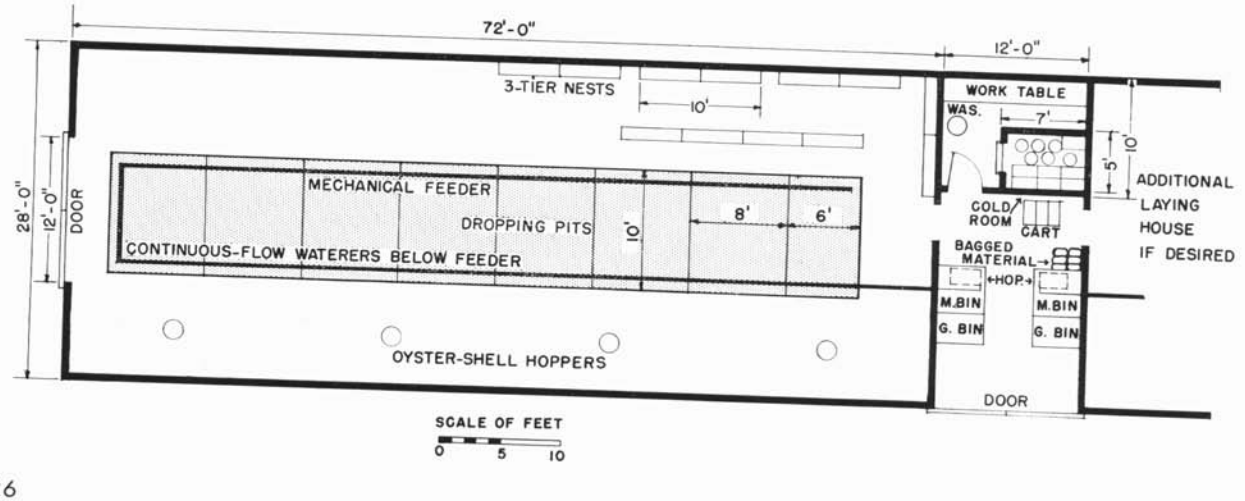
In Plan D, mash is stored in hoppered bins directly above the hoppers of the mechanical feeders. Feed can be placed in these bins by blowing it from an outside feed-processing area, using a self-unloading truck, or scooping it from a truck. Scratch grain is stored in separate bins.

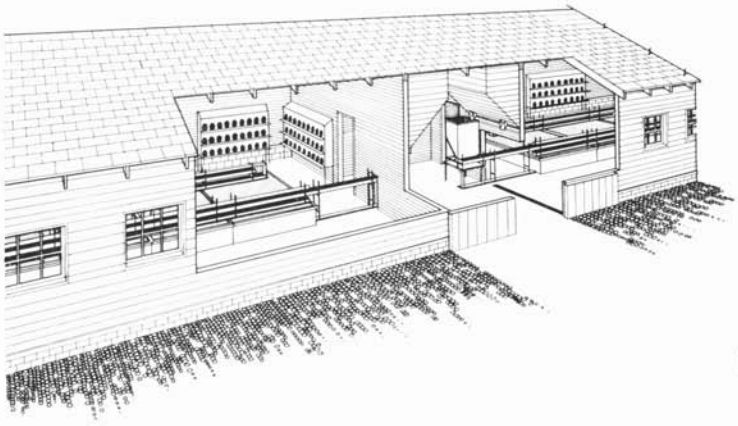
A convenient feed-grinding setup can be established with this type of bin. Installation of a horizontal auger or drag in the floor and a vertical elevator would permit the delivery of grain and supplement to a holding bin. The mixture could be moved by gravity into a portable or stationary grinder that could be set to discharge ground feed back into the elevator pit. The ground feed could then be elevated to the storage bins above the mechanical feeders. This conveying and grinding process would also mix the ration.

Plan E provides for storing bagged feed on a platform about 3 feet above ground level to reduce stooping and lifting in unloading the truck and filling the hopper of the mechanical feeder. Whole grain is stored in a hoppered bin filled from outside.

Mechanical feeders are located over the dropping pits in Plan D and on the floor in Plan E. Both arrangements are satisfactory. The pits can be cleaned more easily when the feeders are on the floor, but less manure gets into the litter when the feeders are over the pits.

PLAN D





Perspective of Plan D

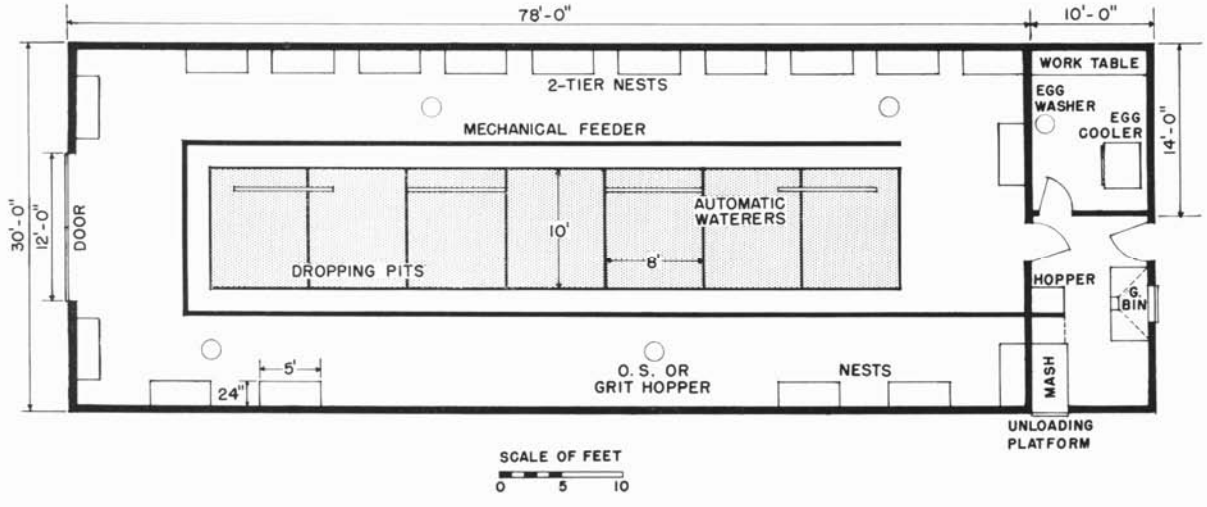
Automatic waterers are placed over the pits in both plans. Continuous flow, V-shaped troughs are installed below the feed trough in Plan D; conventional float-controlled waterers are used in Plan E.

The dropping pits occupy a third of the floor area where the feeders and waterers are above the pits (Plan D) and a fourth where feeders are on the floor (Plan E). The extra pit area in Plan D is needed to hold the additional manure that drops into the pit and to provide adequate roosting space.

The grouping of nests next to the eggroom in Plan D is better than an enclosed nesting room. Eggs are carried only a little farther than with a nesting room and the hens are much more likely to use the nests. Proper guidance of nesting habits of pullets is necessary for success with this arrangement of nests. In Plan E the nests are distributed around the walls of the house to minimize the number of floor eggs. This arrangement adds to the distance the eggs are carried, but it has little effect on total chore time. It does not require as strict management of the nesting program as does the grouped arrangement.

The eggrooms in both plans provide similar work areas for cleaning and packing eggs. Mechanical egg cleaners are included in both plans. A refrigerated cold room in Plan D provides storage for the weekly production of 2,500 to 3,000 hens plus space for cooling freshly washed or recently gathered eggs and for precooling egg cases. A rack for hanging baskets two or three deep saves room in the cooler. A cart is used for moving full cases from storage to the delivery truck. Some economy is attained in Plan E by using a portable cooler. It can handle as many as 12 cases of eggs a week, or the production from about 1,000 hens. A more permanent refrigeration system is desirable for larger flocks.

PLAN E

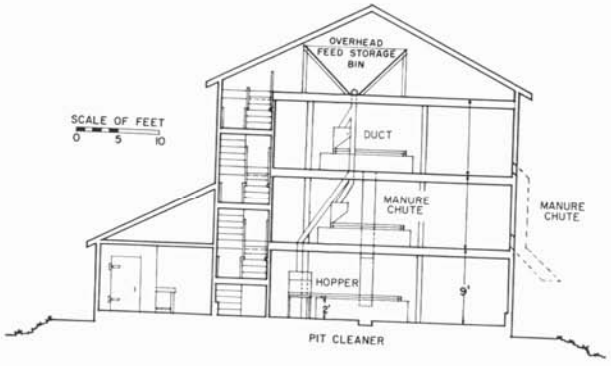


CONVERTED BARN FOR LARGE FLOCKS

Many farmers have structurally sound, general-purpose livestock or dairy barns that can be converted into suitable laying houses. Major new construction in these buildings usually consists of adding one or two floors above the original mow floor. The number of additional floors depends on the height of the barn and the shape of the roof. Since each old barn presents a different remodeling problem, a competent builder or engineer should be consulted concerning the condition of the building and plans for remodeling.

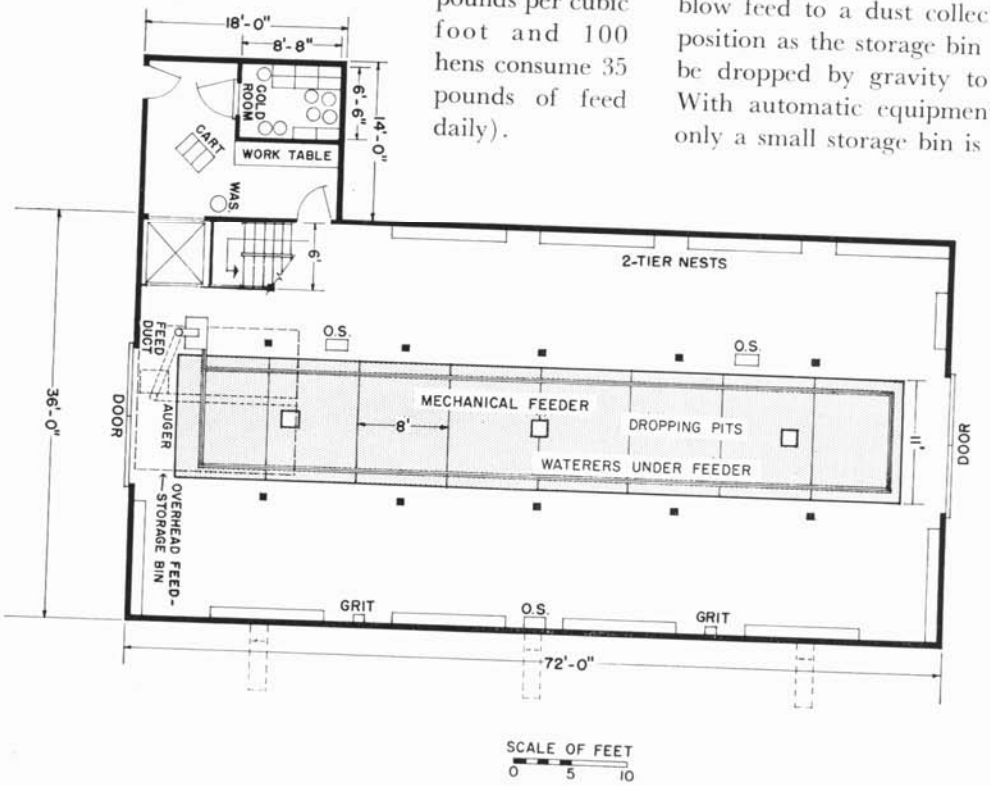
Plan F shows one method of converting a livestock barn of usual size into a laying house. Three floors are used to house 3,000 hens. The fourth or top floor is used to store feed and litter. It also provides insulation for the lower floors. The top floor is generally unsuited to housing hens because of the shape of the roof, excessive heat in summer, and the difficulty of mechanizing chores and providing proper ventilation.

Ground feed is stored in a hoppered bin on the top floor directly above the hoppers of mechanical feeders. The bin holds enough feed to last for at least 10 days (assuming that ground feed weighs 40 pounds per cubic foot and 100 hens consume 35 pounds of feed daily).



The storage bin is filled periodically with an elevator, auger, or blower. A small auger in the bottom of the bin moves feed to an 8-inch metal pipe, which delivers the feed by gravity to the lower floors. The auger can be operated from any floor. If feed does not flow freely, an electric vibrator or agitators can be attached to the bin. Bridging of feed is prevented by sloping two adjacent sides of the hopper, leaving the other sides vertical, and drawing feed from the bin at one corner.

A farmer who has an automatic blending mill and blower equipment installed at the corn crib can blow feed to a dust collector mounted in the same position as the storage bin in Plan F. Feed can then be dropped by gravity to the mechanical feeders. With automatic equipment and frequent grinding, only a small storage bin is necessary.



PLAN F

Convenient storage for scratch grain can be provided near the elevator on the first floor. Pails of grain can be taken to the upper floors by elevator.

Any of the feeder and dropping-pit arrangements shown in Plans A to E can be used in a multiple-story house. The feed-delivery pipes can be used to fill a feed pail, carrier, or mechanical feeder. Mechanical feeders are used in Plan F. Continuous-flow waterers are mounted below the troughs of the mechanical feeders. Drainage lines carry excess water to the outside of the building. Special care is needed to insure against spillage or overflow of water that would cause damage on the lower floors.

Nests are distributed around the walls of the house. Arrangement of the nests in a group near the elevator such as shown in Plan D may be satisfactory if management practices are adequate to prevent a large number of floor eggs. The two arrangements require about the same total time and travel.

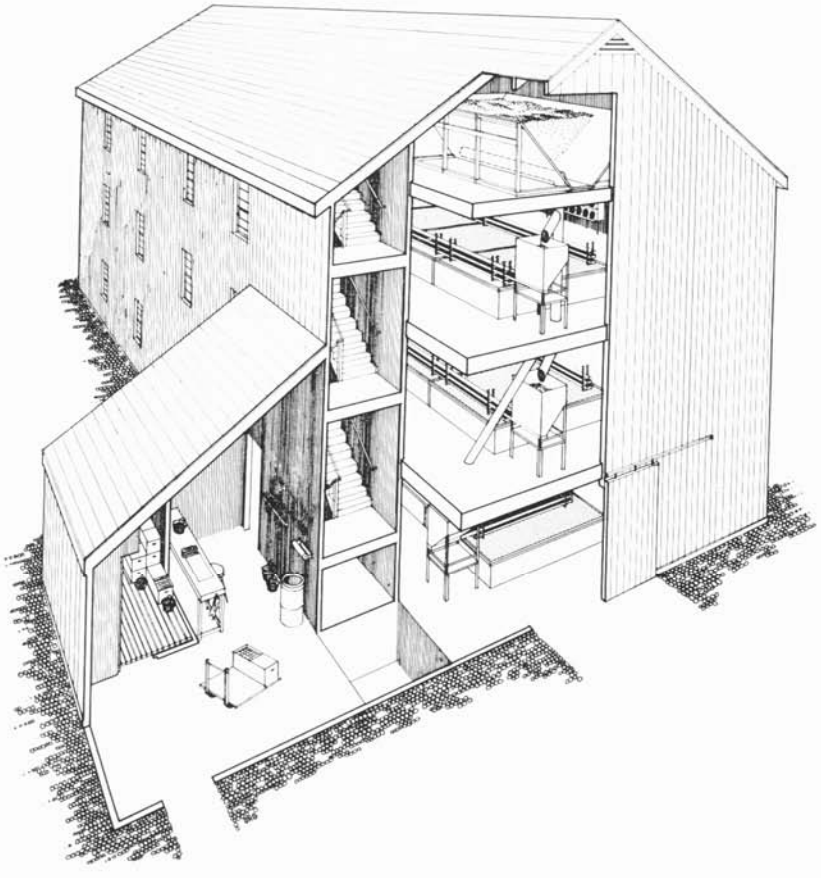
A freight elevator is installed to carry loads of as much as 1,000 pounds to the second and third floors. Stairs are included as a fire escape and as insurance against mechanical failure of the elevator. Flights of stairs are broken between floors to reduce space requirements. The elevator can be equipped with a mechanism for hand operation as an alternative to the stairs. If this is done, a ladder should be attached to the outside of the building as an added precaution. A dumb-waiter type of lift could be used for handling materials if a mechanical elevator is too expensive.

The eggroom is attached to the main structure. It could occupy a section of the ground floor of the laying house, but it would reduce the size of the lower laying house.

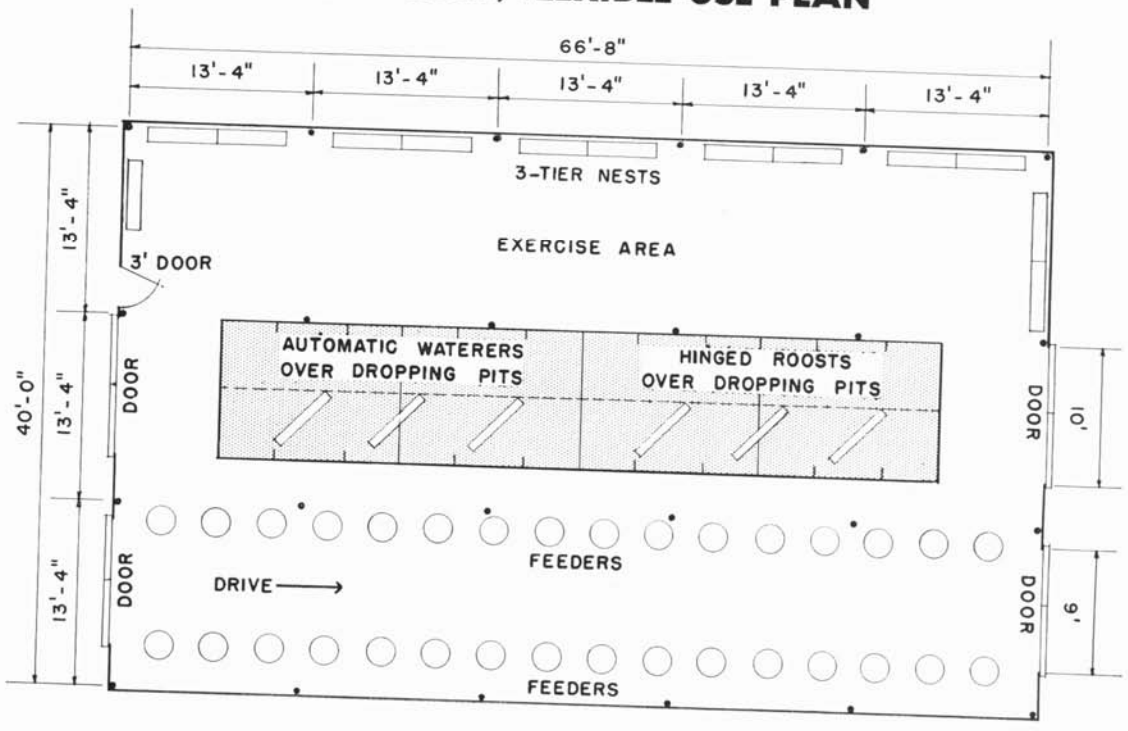
Ground corncobs or other litter material is blown to storage in the fourth floor. Floor openings covered with removable hatches or chutes between floors permit the litter to be dropped either loose or through the chutes to any of the lower floors.

Manure is removed from dropping pits on the upper floors through chutes leading to the first floor, where it is taken outside by a mechanical pit cleaner. A mechanical pit cleaner has been developed recently that makes it possible to remove manure often without disturbing the hens. This is an advantage since it means frequent removal of a great deal of moisture that otherwise is a burden on the ventilation system and hazardous to the litter; also more hens can be housed in a particular area with the moisture hazard reduced. However, the pit cleaner is a relatively expensive, single-purpose machine.

As an alternative to the cleaner, the dropping pit and manure chutes on the first floor can be arranged for a drive-through. The hopper of the mechanical feeder on the first floor would be installed at one side of the dropping pit for this purpose. The feeder trough could be installed on a narrow strip of permanent roost to keep dismantling of equipment at a minimum. Another alternative would be to install chutes on the outside of the barn as a means of loading part or all of the manure from the upper floors directly into a manure spreader.



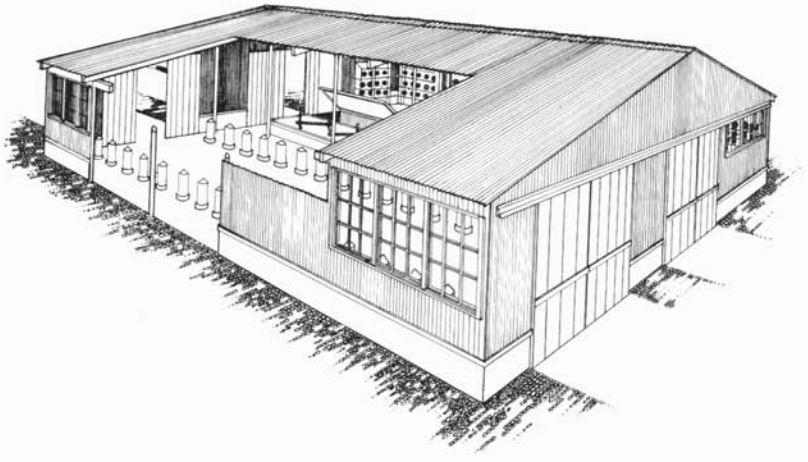
LOW-COST, FLEXIBLE-USE PLAN



PLAN G

A flexible type of building, such as is shown in Plan G, is generally most efficient in the Midwest. Where several livestock enterprises are so closely competitive, changes in economic and technological conditions may call for changes in the type or size of enterprise and a highly specialized building may lower efficiency. This plan has two advantages over the previous plans: it is a one-story pole frame building that can be constructed at a relatively low cost and can be used for many purposes with little modification, and the type and arrangement of equipment allow for mechanization of chores with standard farm equipment.

Ground feed is hauled directly to the feeders from a processing center, which in many cases has already been established at the corn crib. The self-feeders are filled about once a week by driving through the house with an ordinary or self-unloading wagon or truck. This arrangement is equally effective for delivery of purchased feed in bags or in bulk.



As the poultryman does routine chores or inspects the flock, he checks and shakes the feeders once a day. Hoppered bins for grain storage are located along one wall.

Split roost sections supported in the center and hinged to the sides of the dropping pits fold back against the pole supports of the building to allow an unobstructed drive-through for removing manure with tractor equipment. Use of movable screened panels at either end of the dropping pits keeps the

hens in the house while the pits are cleaned. This arrangement helps to keep the litter dry and, on most farms, requires little new outlay for equipment.

Waterers on the roosts are serviced by short, flexible lines attached to a permanent waterline along the edge of the pit. The waterers can be set on the floor while the pit is cleaned. Nests can be grouped or distributed in the house according to your preference and management ability.

This type of building and equipment is suitable for handling large commercial flocks. Plan G provides adequate facilities for about 1,000 hens. This plan could be enlarged or multiple units added for larger flocks. An eggroom similar to the one suggested in Plan D (page 26) could be attached to the laying house. If multiple units are used, eggs from several houses can be carted over hard-surfaced walks to a centrally located eggroom.

SUMMARY

Many poultrymen in Illinois need to adjust their methods of egg production to economic changes and rapid advances in the development of mechanical equipment. The availability of more and better machinery to take over some of the chore work on laying flocks, and the rise in labor costs in the past 15 years have made it feasible for more producers to reduce labor and production costs through mechanization.

Whether it is profitable for an individual poultryman to invest in machinery for his poultry enterprise depends on the size of his flock as well as the current wage and interest rates. For example, with labor at 90 cents an hour and interest at 5 percent, automatic watering is the most economical system for flocks of all sizes. But mechanical feeders, which reduce feeding time from about 42 hours a year per 100 hens (the time required for hand-feeding small flocks) to only 3 hours in large operations, would not be economical for flocks of less than 700 hens.

Even when it is not practicable for a small-flock owner to mechanize his operations, he can save labor by improving his work methods and arranging facilities in the laying house more conveniently. Hand-feeding can be made more efficient by reducing the kinds of feed and frequency of feeding, storing feed in a convenient place inside the laying house, and arranging the feeders in a direct route to storage. Drum-type self-feeders that need to be filled only once or twice a week save time and are economical for flocks of up to 1,000 hens.

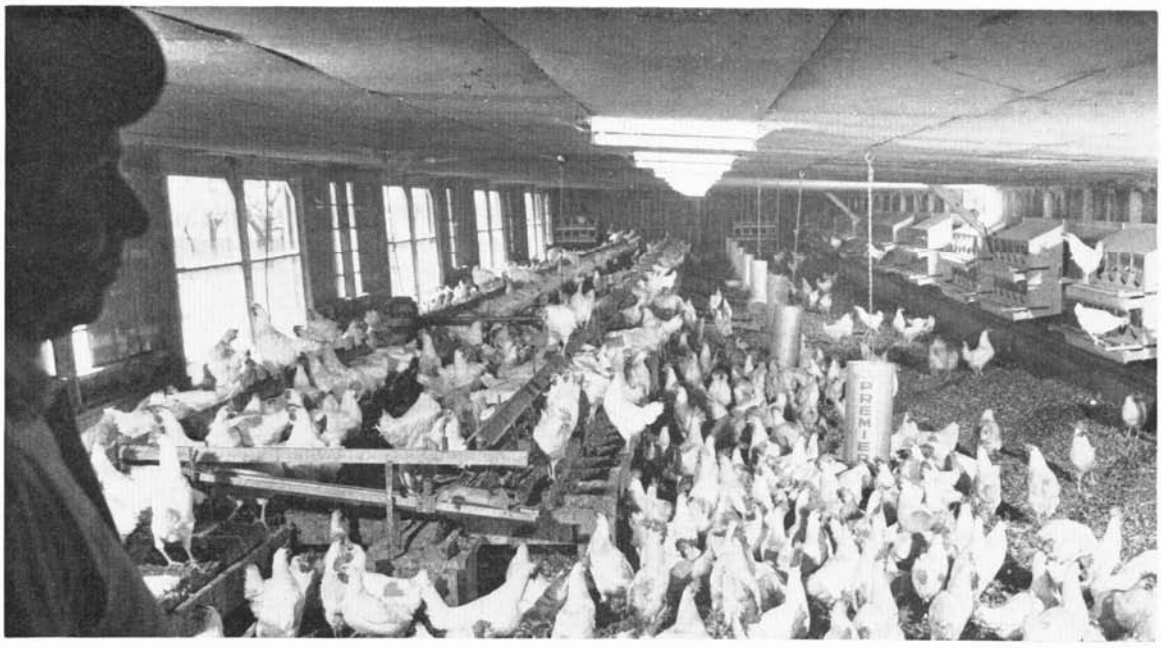
Most of the chore time is spent gathering, cleaning, and processing eggs. Mechanical equipment cannot help in gathering eggs, but the work load can be lessened if nests are grouped toward one end of the house, a place is provided to set the basket while gathering, and an overhead carrier or platform is used in long houses. Gathering three times a day takes more time than twice-a-day gathering, but prevents enough eggs from being broken or cracked to more than pay for the extra labor.

Immersion-type mechanical washers that clean a basket of eggs at a time save 25 to 30 hours of labor a year per 100 hens compared with cleaning by hand. This kind of equipment is economical for flocks of over 300 hens. Encouraging the hens to use the nests helps to keep down the number of floor eggs; keeping the litter in good condition aids in producing more clean eggs.

Keeping hens in individual wire cages has only recently been tried on Illinois farms. A few cage operations were studied and chores were found to take about 25 hours more a year, equipment to require a larger investment, than in litter houses with a similar level of mechanization. Cage systems will have to be studied further before it can be decided whether the advantages outweigh the disadvantages.

Housing and equipment for egg production on Illinois farms should be planned to fit into a diversified farming system. The buildings used for poultry should be readily adaptable to enterprises of other types or sizes with changes in prices and technical improvements. Generally, facilities designed particularly for handling chickens are worthwhile only for highly specialized poultry farms.

The plans presented for laying-house arrangements are designed for different sizes of flock, types of building, and kinds of equipment. Most of the plans can, however, be adapted to a wide range of flock sizes and features from several plans can be combined to meet special situations.



THIS ONE-STORY BUILDING WITH A DRIVE-IN houses 1,200 laying hens. The owner, a Livingston County farmer with 240 acres and 24 dairy cows in addition to his laying flock, has been able to save labor on the poultry chores by combining efficient work methods and equipment with this convenient arrangement.

The type of laying house shown above is well suited to a general-livestock farm. With a drive-in at one end (not shown) of the building, some of the work can be done with standard farm machinery — a saving in time without a special investment in equipment. The single-story building is flexible; it can be expanded or converted to other uses if economic conditions demand a change.

Mechanical feeders and continuous-flow waterers are at the left. Mounting both over the dropping pits in this way helps to keep the litter clean and in good condition. Nests are distributed along the wall at right. This arrangement requires a little extra egg-carrying, but this poultryman has been able to almost eliminate floor eggs by locating nests convenient for the hens.

With his setup, this poultryman gets the routine chores for his flock done in just over an hour a day. Gathering and processing the eggs takes about three-fourths of the time; feeding takes him only five minutes a day. He hand-feeds some scratch grain in the litter, but the bulk of the ration is mash made of farm-grown grain. Once a week he hauls grain to a local mill where it is ground and mixed with a purchased supplement. Then the hauling wagon with its load of bulk feed is parked in a feed room at one end of the house, beside the hopper of the mechanical feeder.

Next to the feed room this poultryman has an eggroom where the eggs are cleaned, packed, and stored under refrigeration until delivery. Using a mechanical washer that cleans a basket of eggs at a time saves him some hand work.

In this circular you will find more details about different types of equipment and work methods, and plans for several other types of laying houses ranging from hand methods for small flocks to fully mechanized arrangements for large ones.

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