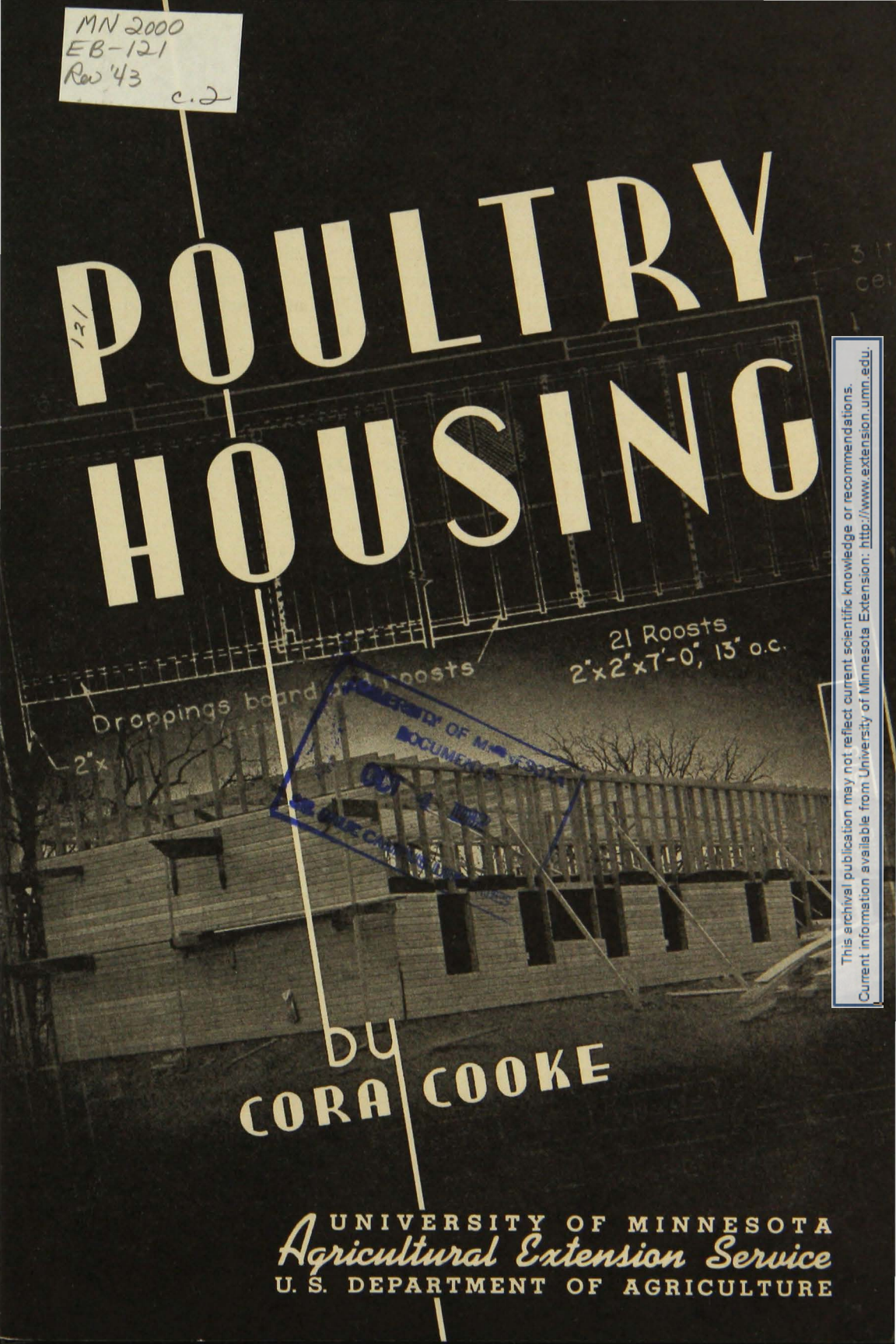
POULTRY HOUSING



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TRULY the old red hen has undergone a remarkable change since she emerged from the jungle. In those days she laid only during a short period in the spring—and then only just enough eggs to perpetuate the species on the face of the earth.

Nowadays we expect her to fit into a regular working schedule of 12 months' employment with vacation (with pay). Improved feeding and breeding have played an important role in achieving this, but no less important has been the housing provided for her. Surely, one of the reasons why the hen did her laying in those spring months was because the weather conditions were peculiarly suited to her needs for production.

So today, in our effort to keep her working month in and month out, one of the requirements is a house that fools her into thinking it is still spring—a house that is never too hot and never too cold—a house where she can live and eat and work from day to day unaware of the changing seasons. That is the kind of house where hens can make the best use of good breeding and good feeding with the owner rewarded by steady and sizable returns.

Not that this house will be perfect. Such a thing would be costly even if it were possible of attainment. But hens do not ask for perfection. Their requirements for comfort are really quite simple. To build a house that meets these simple needs and yet that doesn't tax the flock with an unreasonably large overhead is both possible and practical.

Suggestions in this bulletin have withstood the test of practical use on many farms in Minnesota. Types of houses and features of houses that have been successful in only a few cases have been deliberately omitted as being too uncertain to be worth trying. Hens are peculiar in that they prefer safety and comfort to adventure and change. If their house is like their neighbor's to the last nail they do not care, so long as they are not subjected to constant change of environment.

The wise builder can, then, go ahead with his construction on these well-tried plans, secure in the knowledge that, having served many flocks well, they are reasonably safe for his flock.

Poultry Housing

A HEN'S requirements for comfort are very simple. Give a hen room enough in a house that is insulated to avoid sudden changes of temperature and where she can see well enough to eat, and she will make fairly good use of her feed and care. The flock manager will, of course, need to consider those things that affect cost and his own convenience. Fortunately all these features can be combined in one house.

Whether a new house is to be built or an old one remodeled, the principles are the same.

PRINCIPLES OF HOUSING

Style and Shape of House

The more nearly square a house can be built, the more it conserves building materials and heat. Therefore, a house that is wide in comparison to its length will be both more economical and more comfortable than the long narrow houses that are commonly built. An exception to this rule may lie in the fact that a square house may not divide into pens of convenient shape, and this point should be taken into consideration when planning to build. Both hens and pullets will lay better if kept in separate pens, as will also hens of heavy and light breeds. Where such a combination is desired the house plan should be such that it can be divided into suitable pens.

In height it need be only high enough for the operator to work in comfortably. The hens would be entirely comfortable in a house half that height.

The type of roof chosen depends partly upon the style of buildings on the farm where it is located, but more particularly on the method of ventilation to be used. The straw loft type of house recommended here makes some sort of gable roof practically essential. The loft must not be too shallow or ventilation will be inadequate.

Size

Crowding the flock is one of the most common and expensive mistakes made. A full 3 square feet per bird for Leghorns and 4 square feet for heavy breeds is the allowance that means greatest profit and best use of feed. Culling poorly developed pullets before rather than after housing in the fall is the best insurance against development of culls later on.

The 24 x 24 foot straw loft house described in this bulletin is a good standard farm poultry house for Minnesota. It will accommodate 200 Leghorns or 150 heavy hens, a suitable unit for the average Minnesota farm. A larger flock can be provided for by increasing the length. This house has an even gable roof. The height of the gable, 6 feet from false ceiling to ridge, allows ample circulation of air above the straw, thus reducing the danger of condensation of moisture on roof boards. In other words, this is a house combining economy of construction with conservation of heat, good ventilation, and convenience of operation.

Other types of houses may give good satisfaction under certain conditions. More often than not it will be more economical to remodel the old house than to build a new one. In these cases it may be possible to use straw loft ventilation, or it may be necessary to use some other type.

Whatever the method of ventilation, the general principles of wall and floor construction, lighting, interior arrangement, and furnishing that follow will

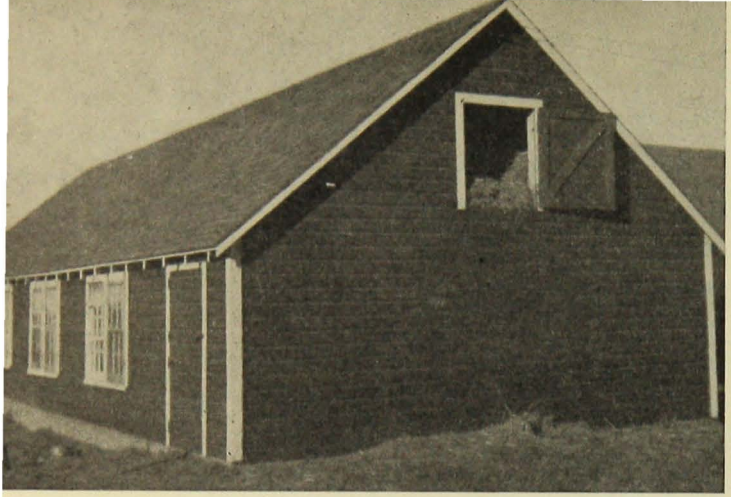


FIG. 1. A practical straw loft house for a farm flock

apply. For simplicity the 24 x 24 foot straw loft plan shown on pages 8-9 will be described in detail. Variations from this plan and application of the general principles to other types of houses will be considered separately.

Wall Construction

Of all elements in the comfort of a flock, probably none is more important than an even temperature—a temperature which rises and falls gradually in spite of sharp changes which may be taking place outside. Hens can stand both extremes of temperature provided they do not come too suddenly. This requirement is growing more important as the practice of keeping hens housed in summer becomes more common.

Satisfying this all-important requirement calls for good insulation. It is known from experience that double boarding outside the studdings is far from adequate. The improvement in insulating value made when the layers of boards are nailed to the inside and outside of the studding is slight, and the room is still subject to rapid changes in temperature. The air space thus provided is far less effective as an insulator than is commonly supposed.

Fill materials offer a very practical solution. Both flax straw and shavings are economical for this purpose, though commercial fill insulation materials can be secured. Ground corn cobs have been used with good results.

Figure 2, based on information from the U. S. Department of Commerce, shows how different types of wall construction vary in effectiveness.

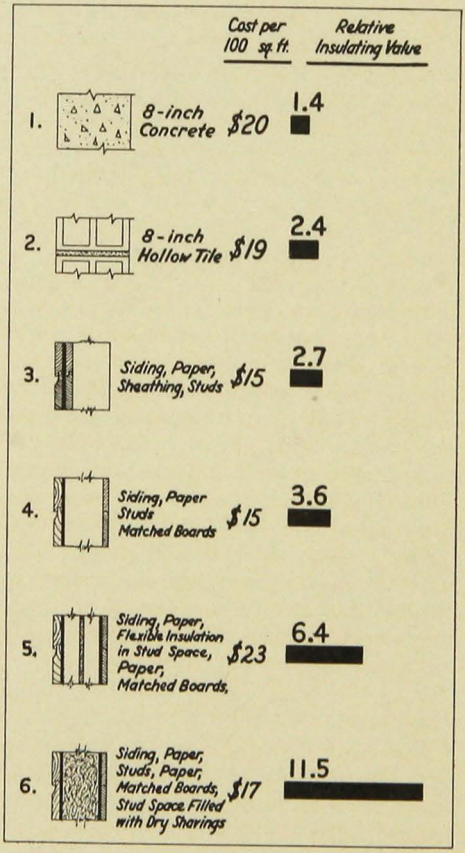


FIG. 2. Types of wall construction showing advantages of wall insulation

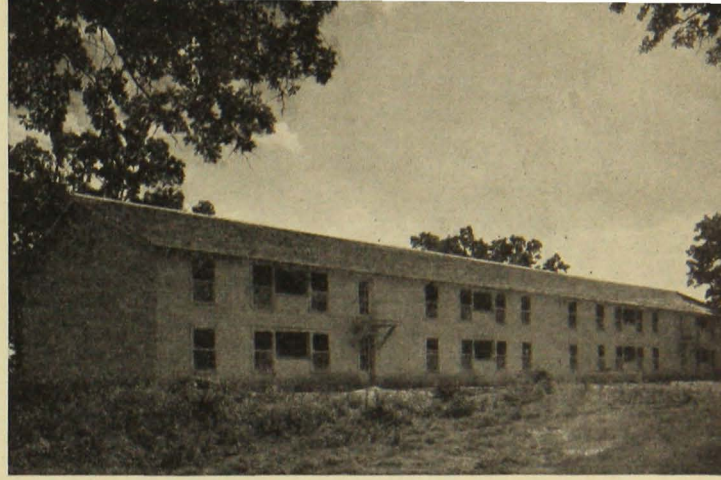


FIG. 3. A practical two-story house for a commercial flock

It can be seen how the addition of a cheap fill material (type 6) multiplies the insulation value of an otherwise unsatisfactory wall.

Recently several houses of double-wall tile with a 2-inch space between walls have been found satisfactory.

For practical purposes, then, the filled wall is both well insulated and reasonable in cost. A wall with a 6-inch fill provides far more insulation than a 4-inch fill. Hence 6-inch studdings are recommended at least for the northern two thirds of the state.

Waterproofing

Moisture collecting in the fill material may cause rotting of both fill and framing if precautions against it are not taken. Such moisture comes from the inside of the house, passing into the fill material in the form of vapor. To guard against this, a layer of asphalt-coated paper is placed between the studdings and the inside sheathing. This type of paper should *not* be used on the outside—between studdings and siding—but rather a layer of ordinary tar paper, which serves to stop wind and rain.

Ventilation

Adequate ventilation calls for a movement of air rapid enough to avoid condensation and yet not enough to cause drafts. This is difficult in a poultry house for several reasons. Heat is necessary to the movement of air, yet hens give off little heat because their feathers provide such efficient insulation. In addition, the space to be heated is about double that actually required by the hens since it is necessary to make the room high enough for the comfort of the operator. Moreover, the amount of moisture which must be carried out by ventilation is excessive, since nearly all the water consumed by the flock is thrown back into the air in the breath and droppings of the birds. In other words, by comparison with other livestock, more moist air must be moved and less heat is available to move it.

Experiments have failed to work out satisfactory methods of heating poultry houses economically, but where buildings are well insulated, the right number of chickens housed, and ventilation systems take advantage of natural conditions, artificial heat is not needed. Three types of ventilation systems are commonly found. The first (see page 13) consists of openings in the front of the house; the second provides flues as intakes and outlets; the third has a layer of straw spread over an open ceiling through which the moist air passes into the loft overhead.

The first two systems do not ordinarily prove satisfactory because on still days they are likely to have little effect, while on windy days they cause too rapid movement of air and loss of heat. Of the two, the front ventilation is usually more effective.

The third, or straw loft system, has

FIG. 4. A long straw loft house with roof vents

been chosen for the standard house because it provides for a constant flow of air under all conditions and requires little adjustment. Circulation depends chiefly on the height of the loft, the amount of straw used in the loft, and the size of outlets, but this is readily regulated. In addition to providing a means of ventilation, the straw also provides excellent insulation both winter and summer. Because of its adaptability to a great variety of conditions, the straw loft system is recommended wherever conditions permit.

Features of the Straw Loft House—In the house recommended for the average Minnesota flock, these specifications provide desired conditions:

1. Ceiling at about 6½ feet.
2. Ceiling boards spaced one inch apart.
3. Straw over the entire ceiling at least 2 feet deep (*not* flax straw or hay), with room for air circulation above. The ceiling boards to the *front and back* are laid with no space between.
4. Loft at least 6 feet from false ceiling to the ridge.
5. An opening in each end of the gable to carry off the moisture from the loft. This is made 30"x36", large enough to permit easy entrance for refilling and repair work. The size of the openings can be regulated by sliding doors which can be raised and lowered as needed. These doors should never be entirely closed.

Such rules must be subject to some variation since conditions vary greatly in different sites. The depth of straw in the loft cannot be prescribed for every house in every locality, but a 2-foot layer provides safety until it is learned what changes are necessary.

The air in the poultry house should have a fresh, clean smell, yet there should be no drafts. If the air in the house is heavy and stale, it may be because the end openings are not large enough or because the straw fill is too deep, or packed too tightly. If the house is drafty, it would be wise to add more straw. A thick layer of straw with end doors kept open wider is better than small openings with a thin layer of straw. The straw may be left in the loft indefinitely and still provide good ventilation. It is important to remember that the straw is needed in summer as well as winter.

Enlarging the House—A larger house can be provided by adding to the length sufficiently to accommodate the desired number of birds. However, it is necessary to provide extra outlets by means of roof vents—one vent 10 to 12 inches square for each additional 10 feet in length. These vents open directly from the roof and should never be extended by means of a flue into the house or loft.

Adapting Plan to Conditions Prevailing—Poles or wire netting will replace the boards in the ceiling satisfactorily, although it may be necessary to provide a thicker layer of straw.

A house with a shallow loft, such as is common in the broken gable type house, may give trouble because of insufficient circulation above the straw, causing moisture to condense on a portion of the roof. This can be prevented to some extent if the space between the ceiling and roof boards at the front

and back is packed tightly with straw or other insulating material.

Thus, the straw loft can be varied to suit many conditions. With windows in the front of the house hung for easy operation, there is never any need for poor ventilation.

Foundation and Floor

A permanent poultry house deserves a good foundation and floor to promote dryness, reduce labor, and insure long life to the building. Lay the foundation deep enough to reach uniform soil (at least 18 inches) to avoid heaving and cracking from frost. Extend the foundation about a foot above ground to permit a fill of several inches before the floor itself is laid. This fill to a depth of about 8 inches is of coarse gravel. Such a fill makes the floor warmer, and thus reduces condensation of moisture with the resulting damp litter. However, even a properly constructed floor may be damp if insulation and ventilation are not adequate, or if litter is not deep enough.

Tar paper is laid on top of the gravel, followed by a 4-inch layer of concrete, smooth-surfaced for easy cleaning. A half-inch layer of "expansion joint" next to the foundation reduces heat loss and allows the concrete to expand, reducing danger of cracking. Laying the floor so that it slopes slightly to one front corner will aid in cleaning.

It is always well to bank the foundation for winter in order to eliminate condensation on the inside.

Anchor bolts must be set in the foundation before concrete hardens. For tightness around foundation, spread fresh mortar on the foundation before laying the sills, and nail siding so that it covers the sill-foundation joint.

Windows and Doors

Windows should be limited to the amount necessary to provide light for eating. More than this makes for loss of heat in winter and overheating in summer. It is poor economy to spend money for insulation and then lose much of its benefit by using an excessive amount of glass. The house plan considered here provides only one square foot of glass in the south side of the house to 32 square feet of floor. Including the windows under the droppings boards, the allowance is one square foot to each 25 square feet of floor space. Artificial lights may be used during the winter to lengthen the day beyond the daylight hours.

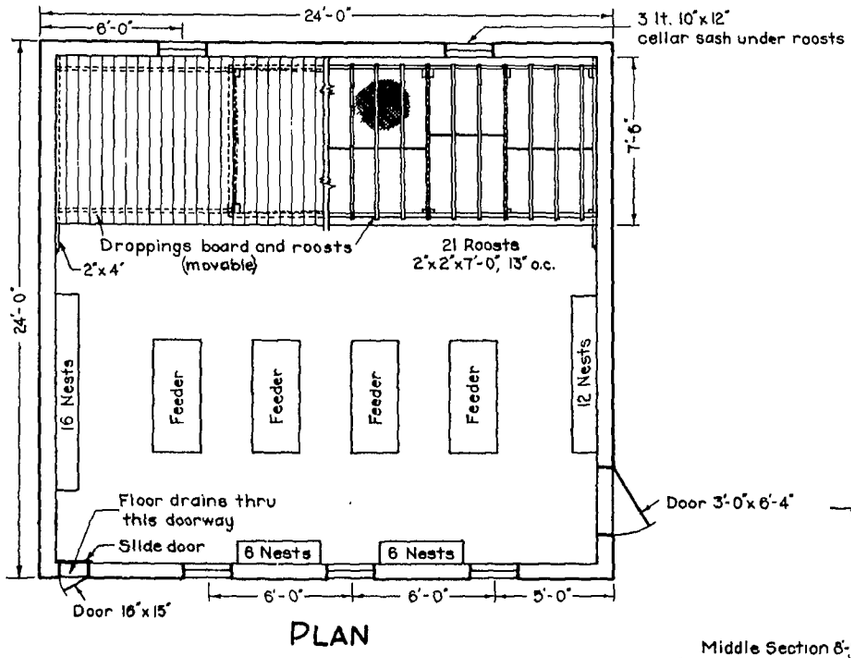
To get the best distribution of light over the entire floor with this limited amount of glass, the windows are hung with the top flush with the ceiling, with double sash, one above the other, and spaced at intervals along the south side of the house. Regulation house windows, with 9″x12″ or 10″x12″ panes give about the right height for the average poultry house. The sash are hung on weights and pulleys so that ventilation can be easily regulated.

In houses deeper than 18 feet from front to back, it is usually necessary to provide windows other than those on the south. Basement sash placed under droppings boards in the rear of the house help to light the floor so that hens will make use of all of it, but their chief purpose is to improve ventilation in summer when cross ventilation is sometimes very necessary. In winter these windows may be boarded up and insulated to save heat loss.

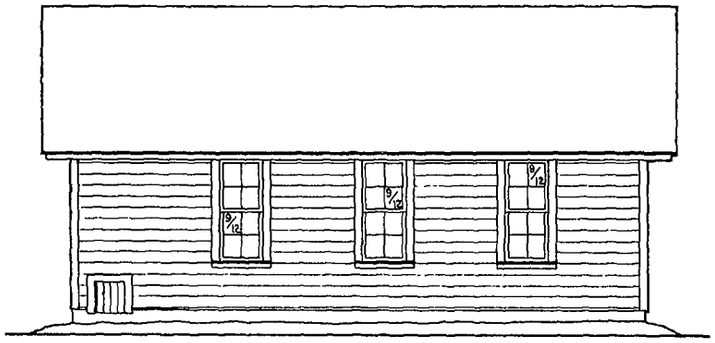
Doors

Poultry house doors need to be wide enough to permit entrance with straw and large equipment. In single-pen houses one door is adequate, but in longer houses a door at each end will make work easier.

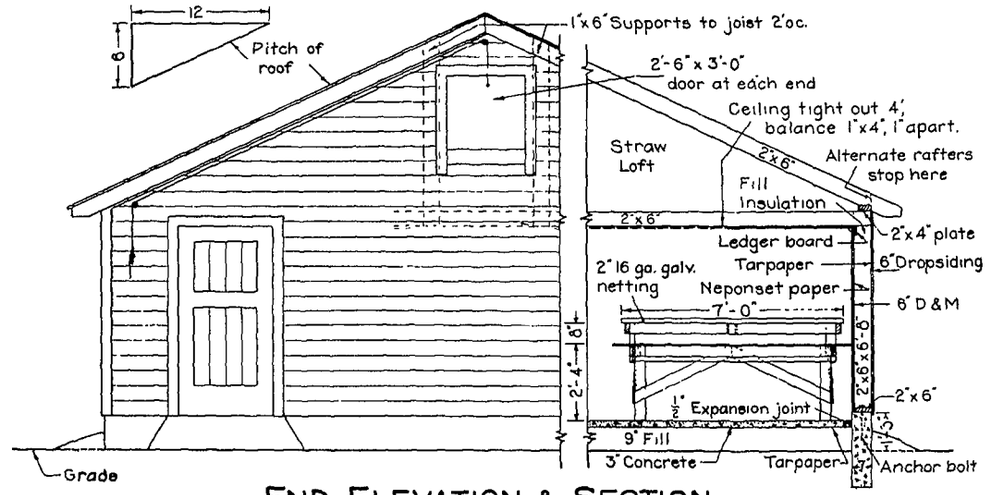
A small exit door in each pen will simplify catching all the birds, as is necessary when culling the flock. The birds can be driven into a crate placed



PLAN

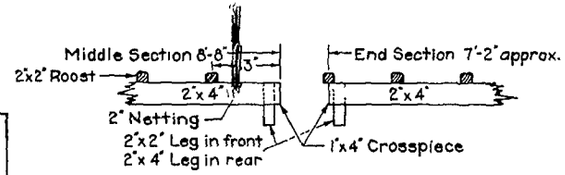


FRONT ELEVATION



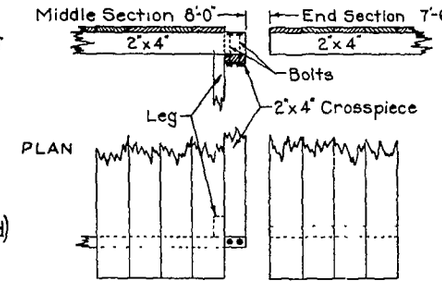
END ELEVATION & SECTION

Scale: $\frac{1}{4}$"=1'-0"



ROOST SUPPORT

FRONT



DROPPINGS BOARD SUPPORT

DETAILS

(Sections Separated)

Scale: $\frac{1}{2}$"=1'-0"

STRAW LOFT

POULTRY HOUSE

(24 x 24 FEET)

Scale: $\frac{1}{16}$"=1'-0"

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PLAN Nº 200 | SHEET "S"

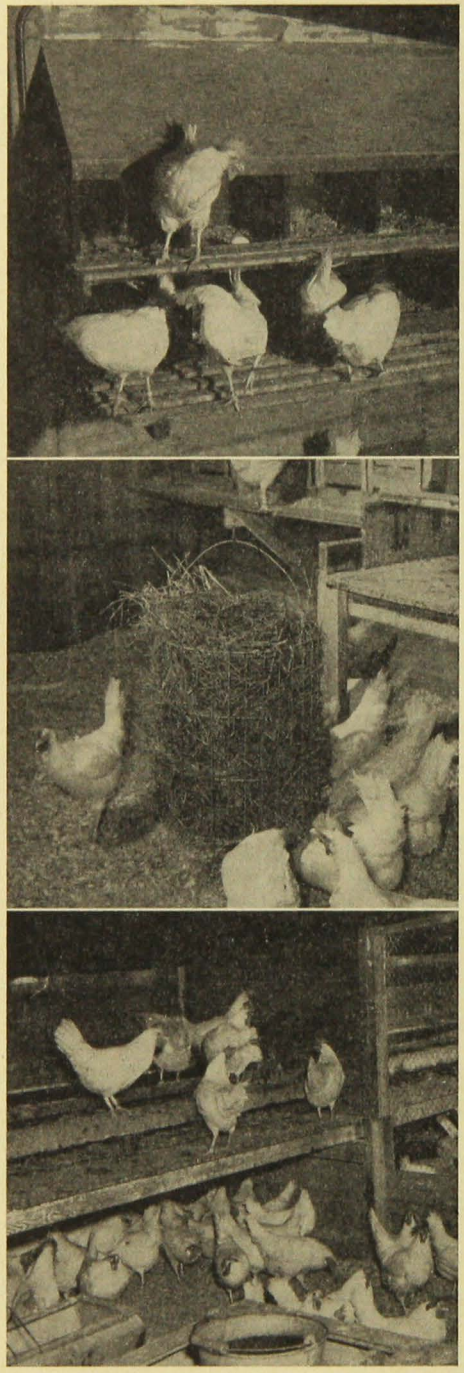

FIG. 5. Top—Convenient nests
Middle—A wire alfalfa rack
Bottom—Wire under roosts promotes cleanliness

outside the door, and handled outside the house with a minimum of disturbance. The door in this house is 15"x16" and is placed in the front wall in the corner opposite the entrance door. Place a sliding door on the inside of the house for ease in closing it behind the birds. A tight door outside will also be needed in winter.

The bottom of this exit door is at floor level so as to provide drainage when the floor is being washed.

FURNISHING THE HOUSE

Furnishings should be arranged for the comfort of the chickens and convenience of the operator.

Roosts

Roosts are best placed along the entire length of the rear wall. Such an arrangement keeps birds out of drafts and provides open working space in front. Allow 7 to 8 inches of roost space per hen. Space is wasted and the floor darkened by providing more than the required roost space.

In the house shown, the 8-foot droppings board is divided into three sections for easy removal and cleaning. The center section is made in the form of a table which serves as a support for the inside ends of the end sections. Boards run crosswise for ease in cleaning. In summer the droppings boards can be drawn out from the wall to improve circulation. Two by 2-inch roosts, 7 feet long, run from front to back, over 2-inch mesh, 16-gauge chicken netting.

Each roost section is framed separately and can be raised and hooked to the ceiling for cleaning.

Droppings pits have gained popularity as a laborsaving device since they can be left without cleaning for

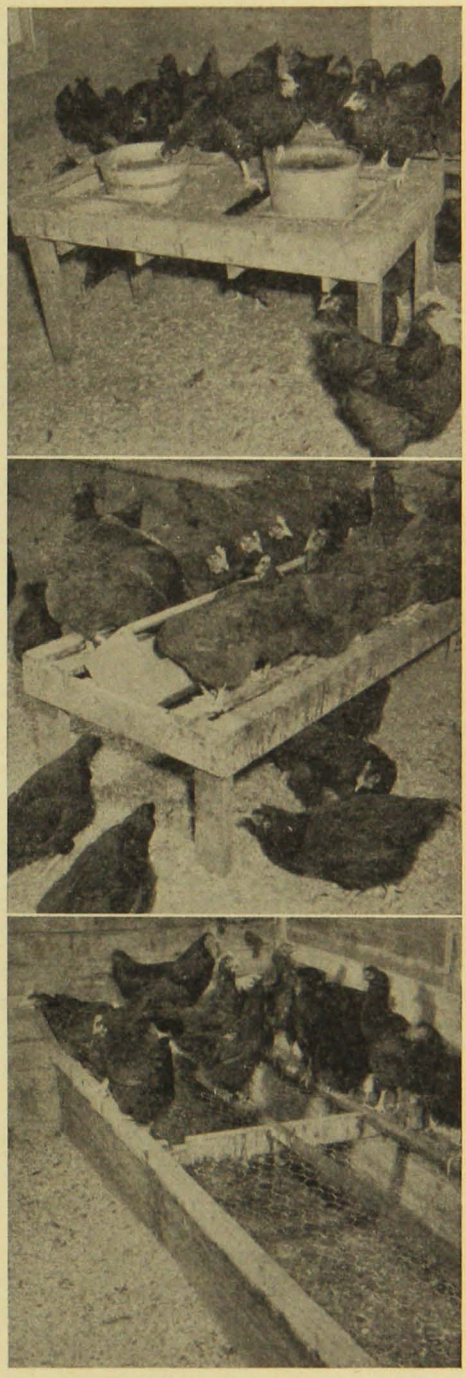

FIG. 6. Top—Stand provides for clean water supply
Middle—Homemade feeder
Bottom—Droppings pit

several weeks. The roost platform described above, wire netting and all, is lowered to hang by hinges a foot to 18 inches from the floor. The front is closed off to keep the hens out by a wire-covered frame or by boards. Made with front and platform all in one piece, the 8-foot section can be easily raised for cleaning. Write for blueprint 363.

Nests

One nest for every five hens is the requirement of the laying flock. Grouped together, in double-deck formation at front and ends of the house, they save floor space and the operator's time. A simple nest, easy to clean, is shown in figure 7. The nest section has no back so that the nesting material can be cleaned out by pulling the bottom of the nest section out from the wall. When nests are arranged in two or more tiers, it is always necessary to provide a perch or lighting board for each row. In figure 7, the perch is hinged so that it can be closed at night against broody hens. An additional stationary perch is used for the lower nest section to provide easy access for the birds. If nests are placed so that the hens cannot go to them from the droppings boards, there will be fewer dirty eggs. The sloping top of the nests keeps the birds from roosting there.

Feeders

One of the best investments in poultry equipment is plenty of feeder space. Most flocks are so crowded for feeder room that only the most active birds are able to get all the feed they want. Hence a comparatively small number of hens do most of the laying. Additional feeder space will frequently make profitable layers out of hens that

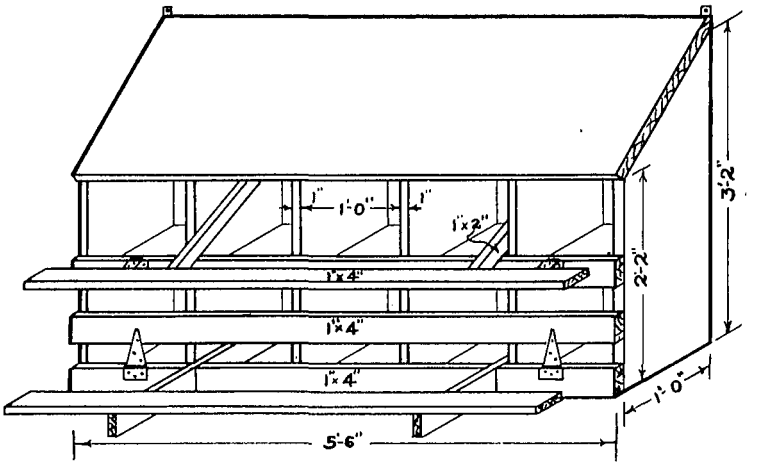

FIG. 7. A good plan for wall nests

formerly were considered culls. Enough room should be provided so that birds can find room at the feeders at any time and not have to wait their turn. At least two running feet of feeder opening is necessary for each 10 hens, or two 5-foot troughs open at both sides, for 100 hens. This is neither difficult nor expensive if a good type of homemade feeder is used.

Water Stand

With water constituting more than 60 per cent of the egg, the water supply is as important as the feed supply. Ready access to fresh, clean water means increased use of mash and higher egg production. As with all other furnishings in the poultry house, the drinking vessels should be placed about 15 inches above the floor. This not only saves floor space but also helps to keep the water clean. Whatever type of drinking vessel is used, there should be room for as many birds as may wish to drink at one time; fountains with a single small opening on one side are undesirable. Heated fountains are good if properly built, as they insure water in a drinkable condition at all times. A slatted stand like that shown in figure 6 disposes of spilled water quickly and keeps the platform from becoming wet and foul. This stand may be adapted for use with any of the different types of drinking vessels.

Complete directions for making suitable feeders and water stand are given in plan sheet M-102.

Alfalfa Rack

A rack fastened to the wall or suspended from the ceiling to hold alfalfa or clover hay is useful. It may be slatted or made of woven wire.

Artificial Lighting

The lighting of poultry houses during the winter months is a reliable means of increasing the number of eggs laid in the period of highest prices.

The chief precaution is the need of regularity in handling birds under lights. Use of lights is usually begun when birds are put into winter quarters and discontinued about April 1.

There are two main systems of lighting poultry houses: bright lighting and dim lighting. The bright lighting system lights the entire house for a limited period to give the birds a 12 to 14-

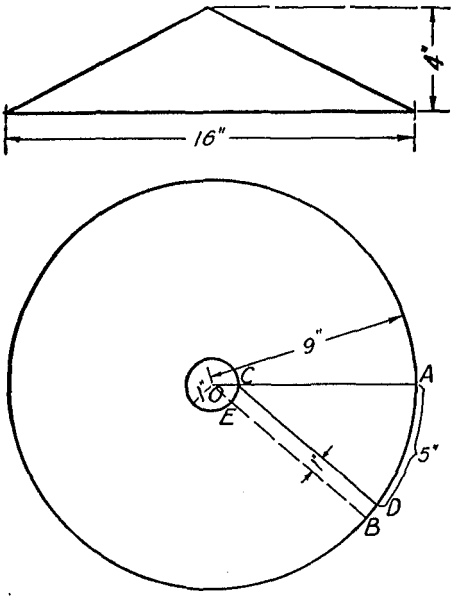

FIG. 8. Suitable light reflector

hour day. With this system the purpose is to stimulate activity of all the birds for the given period. Floor and roosts must be well lighted. Dim lighting provides a dim light shining directly on the feeders throughout the entire night, enabling birds to eat at will but to sleep undisturbed most of the night. A 10-watt bulb is used.

The bright lighting system is more commonly used, as morning light, evening light, or evening lunch light. The morning light is preferred by many as it is possible, by means of an alarm clock that throws an electric switch, to have the lights turned on without any inconvenience at the desired time in the morning. With the evening and the evening lunch lighting, it is necessary to have a dimming system, which adds to the cost of the equipment. There is more work connected with these two methods. The method chosen will depend on the convenience of the operator and his arrangements for his other work. Whatever method of lighting is used, there should be absolute regularity in turning lights on and off and in supplying feed.

To light the floor sufficiently and evenly and light the roosts so that all birds will come down to feed, a reflector is necessary and the placing of lights is important. At Cornell University a simple type of reflector and some standard rules for placing lights have been worked out so that the best results are obtained. The reflector, which can be made by any tinner, is made of light galvanized iron and the reflecting surface is painted with aluminum bronze paint. It is cone-shaped, 16 inches in diameter at the base and 4 inches high, to be attached to any standard electric light socket.

Lights should be hung so that the bottom of the reflector is 6 feet from the floor. This is high enough to be out of the operator's way and gives the right intensity on the floor when 40-watt bulbs are used. Lights should be placed half way between the front of the house and the front of the droppings boards and about 10 feet apart, placing one light 5 feet from the east wall and one light 5 feet from the west wall.

REMODELING THE HOUSE

Frequently an unsatisfactory house can be remodeled at reasonable cost. The most common fault is dampness, which can be remedied by improvement in insulation and ventilation. The type of wall insulation described on page 4 can be added to buildings already constructed. A house that is not worth such permanent improvement can be insulated by banking with straw or similar material. Poles and netting set 18 inches from the walls along the north side and the ends will hold the straw in place. Install a straw loft if the house is high enough.

Front Ventilation

In remodeling an old house, there may sometimes be insufficient height to

FIG. 9. A front-ventilated house

permit installing a straw loft. This is true of the shed roof house so commonly built in the past and of many of the low-pitch gable houses where the loft is very shallow. The lower story of two-story houses may also be considered in the same class, as well as laying quarters in large buildings where a straw loft is not practicable.

Under such conditions front ventilation becomes a practical necessity. This type calls for more frequent adjustment than does the straw loft. However, reasonably good results can be expected in remodeling a house if transoms covered with a single thickness of burlap are used. Here advantage must be taken of the fact that the warm air given off by the birds rises, so that the best outlet is as close to the ceiling as possible.

For this reason, three important construction features of this type of house are necessary.

1. The ceiling must be sloping, with the highest level in front.
2. The top of the ventilator openings must be flush with the ceiling.
3. Both ceiling and side walls must be well insulated.

In such a house, good insulation is particularly important because of the fact that the air movement is more sluggish and the outlets necessarily smaller than in the straw loft house. Thus it is imperative that cold surfaces which invite condensation be minimized. At least 4 inches of fill material in walls and ceiling are necessary.

The transom frames are 16 inches high and are hung on pivots at the sides so that they tip out at the top and in at the bottom. All these features are important in promoting good ventilation.

Space requirement for the transom is about one square foot for every 48 square feet of floor space. This means that a 16x30 foot house requires three 16″x30″ transoms or the equivalent. Transoms may be placed above the windows or in the space between.

Front ventilation by means of large, sliding, muslin-covered frames is proving satisfactory in some large two-story houses. However, the danger of heavy loss from sudden storms makes it obvious that such a house requires close attention.

Substitute Building Materials

Home-sawed lumber and local insulating materials can be used satisfactorily in building any of the types of houses already described.

Straw Houses

For temporary or emergency use, a house may be built of straw. It is important that a thick layer of straw be tightly packed and that the building be well braced.

A frame front is always desirable to insure good lighting, as is also a sill made of railroad ties or similar framing material to retard rotting of the lower bales.

For the rear and end walls, baled flax straw gives good results. Corner posts set in the ground can be used to brace the building. Wires fastened to

FIG. 10. A straw house

these corner posts and drawn tightly between the bales will hold the house rigid.

Another good type of wall consists of a frame of poles set well into the ground, with girders fastened to the tops of the posts, and with a gable roof and straw loft resting on this framework. The back and ends are of baled straw protected by old woven wire fencing tied together through the straw. For temporary use only, straw topped with hay may form the entire roof. If piled high in center, to shed rain, such a roof gives good protection. See Extension Bulletin 227, "Straw Sheds," for details.

MANAGEMENT OF HOUSE

No house will give the greatest return on the investment unless put to good use.

Year-round confinement of hens is a practice that is growing in popularity because those who use this method experience consistently higher egg production as well as larger eggs or better quality, finer flavor, and greater uniformity.

Since the old hens are the chief offenders in spreading diseases, such a practice will make it easier to provide clean ground for the chicks and insure healthier, more vigorous pullets.

Year-round confinement of hens is also one of the most important steps in controlling tuberculosis in both poultry and hogs.

Old hens, even though very good producers, might better be disposed of if they cannot be kept separate from the pullets. Similarly, unless Leghorns and heavy breeds can be kept in separate pens, it is preferable to keep only one breed.

Pullets should be placed in laying quarters as soon as they start to lay. This will permit them to become accustomed to confinement before they have to contend also with cold weather and greatly shortened days.

Before pullets are placed in the laying house, all repairs and fall cleaning should be attended to, to avoid unnecessary disturbance after laying starts. Culling out all undersized and unthrifty pullets at the time of housing is a protection against overcrowding, which is a frequent cause of colds when pullets are first housed.

Regular cleaning and care and regularity in the use of lights insures best use of house and equipment.

Questions and Answers

Can a house be built into a side hill and thus save some of the heat lost through the wall?

This cannot be expected to give good results. The concrete wall that would be required for the north and end walls permits condensation on the walls. Also, drainage is likely to be poor. For these reasons, such a house is usually damp.

Why is the gable roof recommended in preference to the shed roof?

Primarily because it permits straw loft ventilation. Also because, if a house is wide enough for economical construction, the roof will be stronger and not require as frequent repair. A gable roof permits the use of shingles which are more durable than composition roofing.

Is sawdust a good insulating material?

Sawdust packs too tightly to be desirable for side walls. It settles, leaving an uninsulated strip near the ceiling. Frequently there is rotting of the studdings at the base.

What materials other than lumber can be used for interior finish?

Plywood or hard-surfaced composition boards. Porous insulating boards require special treatment to keep the birds from pecking holes in them. They are also likely to warp due to absorption of moisture.

Are cinders and crushed rock suitable for a fill under the floor?

Either or both may be used if well tamped before concrete is laid.

Is cement-sawdust concrete as good as ordinary concrete?

It is subject to pitting and is not likely to make as permanent a floor.

How can a concrete floor be reinforced to prevent cracking?

Three-eighths inch steel rods can be laid in the concrete two feet apart in both directions. Heavy woven wire fencing laid in the concrete will give similar protection.

Are glass substitutes preferable to glass?

No. Winter sunlight does not provide enough ultraviolet light even though the birds were exposed to it directly. It is, therefore, necessary to feed cod-liver oil or other source of vitamin D, regardless of the type of window used.

Are storm windows economical?

With the small amount of glass recommended, they are of secondary importance. Also, they interfere with opening windows for ventilation. Double-pane windows on the south side reduce heat loss without this objection.

How can sparrows be kept out of a straw loft house?

Any poultry house will be kept more free of these pests if three-quarter inch mesh hardware cloth is placed over doors, windows, and ventilators. They also permit ventilation while keeping birds confined. The screen door should be made to open inward, hung to swing clear of the litter. The window screens should be removable. In winter the screen door should be replaced with a tight wooden door.

Is a straw loft a harbor for mites?

Mites may be kept at a minimum if roosts and nests are treated frequently.

Are houses of more than one story satisfactory?

For flocks of 1,000 and upward, they have some distinct advantages. Cost can be lower because one roof and one foundation serve a larger amount of floor space. Users like the compactness of working space. Write for blueprint No. 361.

Is an outdoor runway or yard necessary?

Laying and breeding hens can be economically and successfully housed without an outdoor yard.

Are scratch sheds advisable?

They represent an unnecessary expenditure and, as frequently used, constitute a health hazard.

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