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Housing Farm Poultry

By

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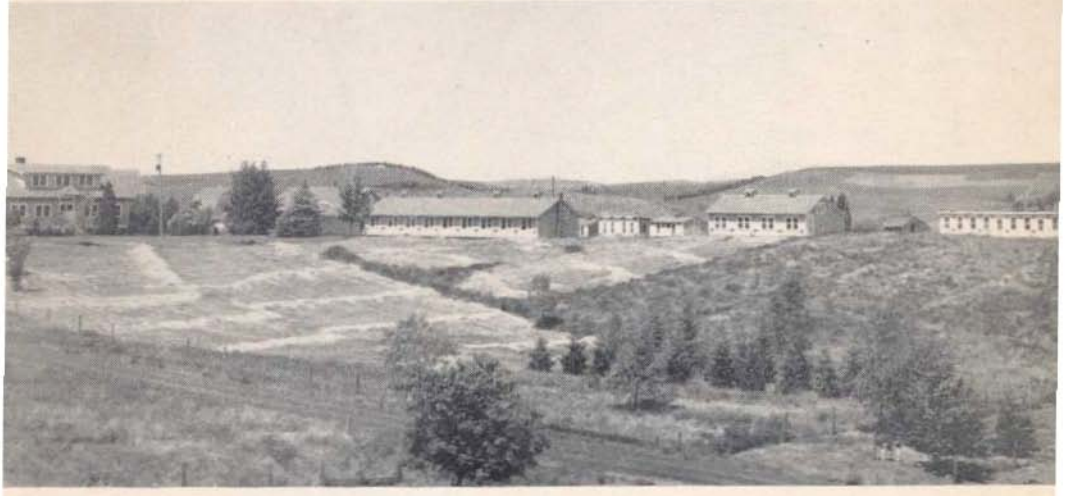

COOPERATIVE EXTENSION SERVICE IN AGRICULTURE AND HOME ECONOMICS OF THE STATE OF IDAHO UNIVERSITY OF IDAHO EXTENSION DIVISION AND UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING

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Housing Farm Poultry

PREN MOORE, K. R. FROST, C. E. LAMPMAN
and HOBART BERESFORD*

Essentials in Poultry Housing

THE essentials of proper poultry housing are : (1) protection from extreme heat, cold, or sudden changes in temperatures; (2) freedom from drafts; (3) sufficient ventilation; (4) abundance of light and sunshine; (5) sanitation and control of parasites; (6) sufficient floor space; (7) convenience in routine management; (8) protection against rodents and predatory animals; (9) economical construction; and (10) durability.

Protection from Weather Extremes and Sudden Changes of Temperature

Comfort for the layers becomes increasingly important as greater egg production is expected. In many instances the drop in egg production, following one or more cold spells, constitutes a financial loss in a single year equivalent to the additional cost of building for adequate protection. Since Idaho is subject to both extremes, cold in winter and heat in summer, the laying house must be well built and insulated to protect the laying flock. Proper housing is, therefore, a matter of real economy.

Freedom from Drafts

A drafty house is one of the principal causes for colds in the laying flock. This constitutes a special problem in those sections of the State where the prevailing winds are from the southwest or southeast. For this reason houses should be built deep from front to back, solid partitions added when necessary to stop the lengthwise drafts, and window openings adjusted according to the wind velocity.

Ventilation

The major problem in poultry house ventilation is that of moisture control during the *winter months*, specifically to maintain dry litter and to prevent condensation of moisture on the walls and ceiling. The excessive moisture given off by high-producing hens through respiration and droppings must be removed if the house is to remain dry.

Basic Principles of Ventilation. Satisfactory ventilation involves several basic principles.

1. Insulation of walls and ceiling is necessary to prevent condensation of moisture and to conserve the limited body heat given off by the birds.

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2. Outlets for the escape of damp, foul air should be located at or near the highest point in the ceiling. Flues or shafts need to be tightly constructed and should be of sufficient length or height to create a definite "pull" to establish a positive outflow of air.

3. Outlets should always be open. Window openings and intake flues should be regulated according to the weather.

Factors Influencing Ventilation. Gravity or flue ventilation systems cannot be applied to every house with equal results. The ventilation of a given house in its particular location constitutes an individual problem which requires the attention and study of the operator. Forced circulation with thermostatic control and supplementary heat may be used when gravity systems are inadequate. The major factors which influence the operation of any system are listed as follows:

1. Location of the building. Low spots are damp because of poor air drainage. High buildings or trees nearby often produce objectionable complications, such as down-drafts.

2. Construction and insulation of the building.

3. Wind pressure and velocity outside the building and across the top of the ventilators.

4. Direction of prevailing winds.

5. Difference in temperature of air inside and outside the building.

6. Variation of temperatoure within the house.

7. Available heat, either natural or artificial, for warming the air in the building. Supplementary heat stimulates air movement and has a drying effect in that as air is warmed its moisture-holding capacity is increased.

8. Personal attention given to the details of management of the ventilation system.

In restricted ventilation during cold weather emphasis is placed on the necessity of continuous escape of damp air through open outlets. The *rate of air movement* is controlled by adjusting the amount of air coming into the building. This is accomplished by regulating the openings of the windows and muslin frames. During extremely cold weather the air entering by infiltration and leakage around doors and windows will often be sufficient. In case the windows fit unusually tight and during mild winter weather additional air should be admitted by opening the windows or curtains at the top. Front wall intakes, such as those illustrated in Figure 4, are optional.

Outlet flues are shown at the front plate in the shed-roof house (*Fig. 4*) and at the high point of the ceiling in the gable ceiling insulated house (*Fig. 1*).

A continuous ceiling vent, designed to permit a uniform outward flow of air from all parts of the pen, is illustrated in Figure 3. In this plan a narrow opening two inches wide is provided at the peak of the ceiling and extends throughout the length of the building. The outlet flue on the ridge of the roof may be continuous or constructed as several individual cupolas four feet long and spaced every ten or twelve feet. In this system the foul air slowly diffuses up into the loft and then out through the flue in

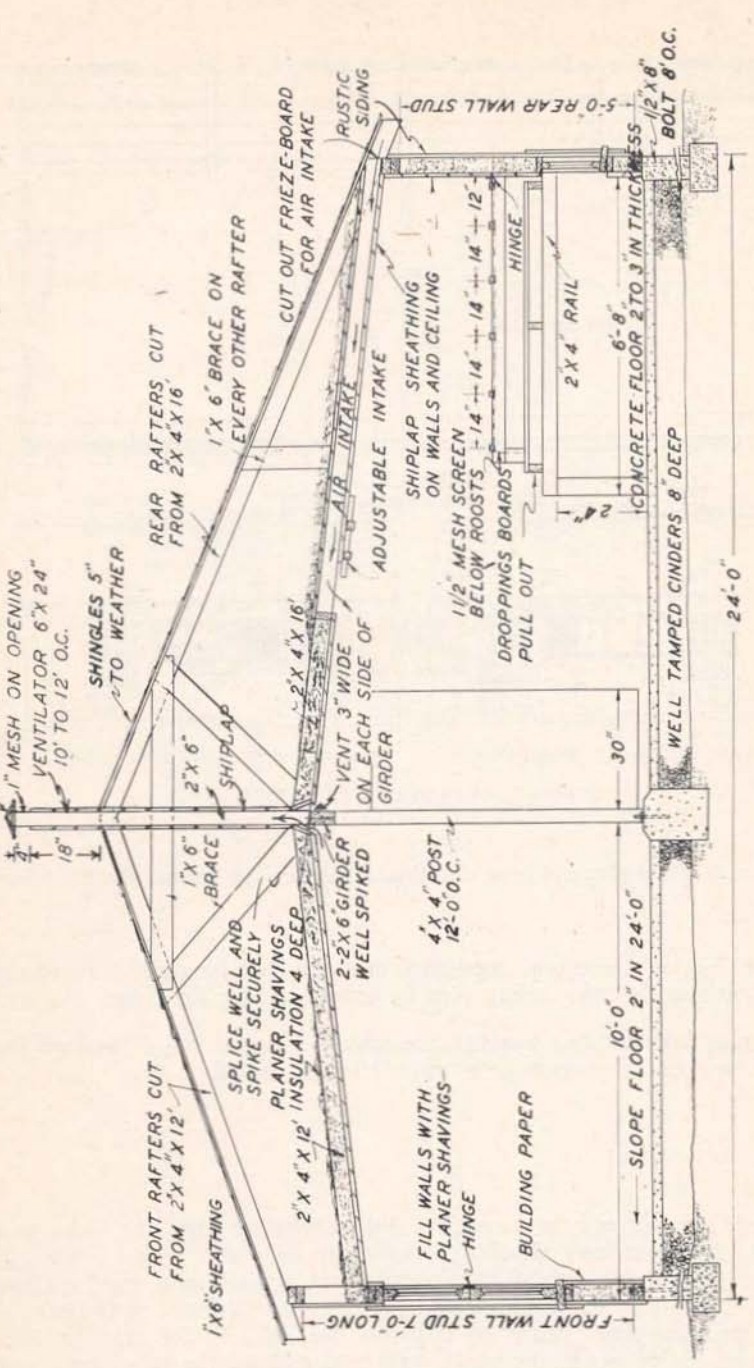


Figure 1—Framing section of gable ceiling insulated laying house.

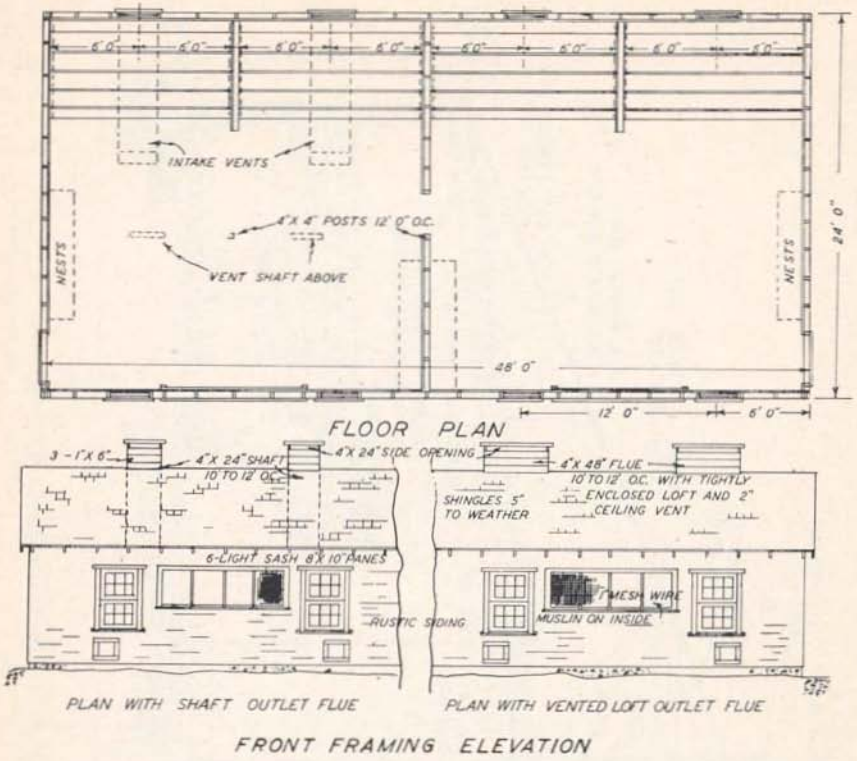


Figure 2—Floor plan and front elevation of gable ceiling insulated laying house.

the roof. It is, therefore, necessary that the loft be tight for successful operation and that the ceiling vent be directly under the ridge.

During hot summer weather the windows under the droppings board should be open to promote cross circulation of the air.

Light

Birds are naturally more active and feed better when the house is well lighted. The windows should be sufficient in number and so arranged that the light will be distributed to all parts of the house, even on cloudy winter days. The plans illustrated provide for windows in the rear wall below the droppings board to improve the light in the rear portion of the house. Windows in the north wall tend to keep the litter more evenly distributed and provide cross ventilation during summer months.

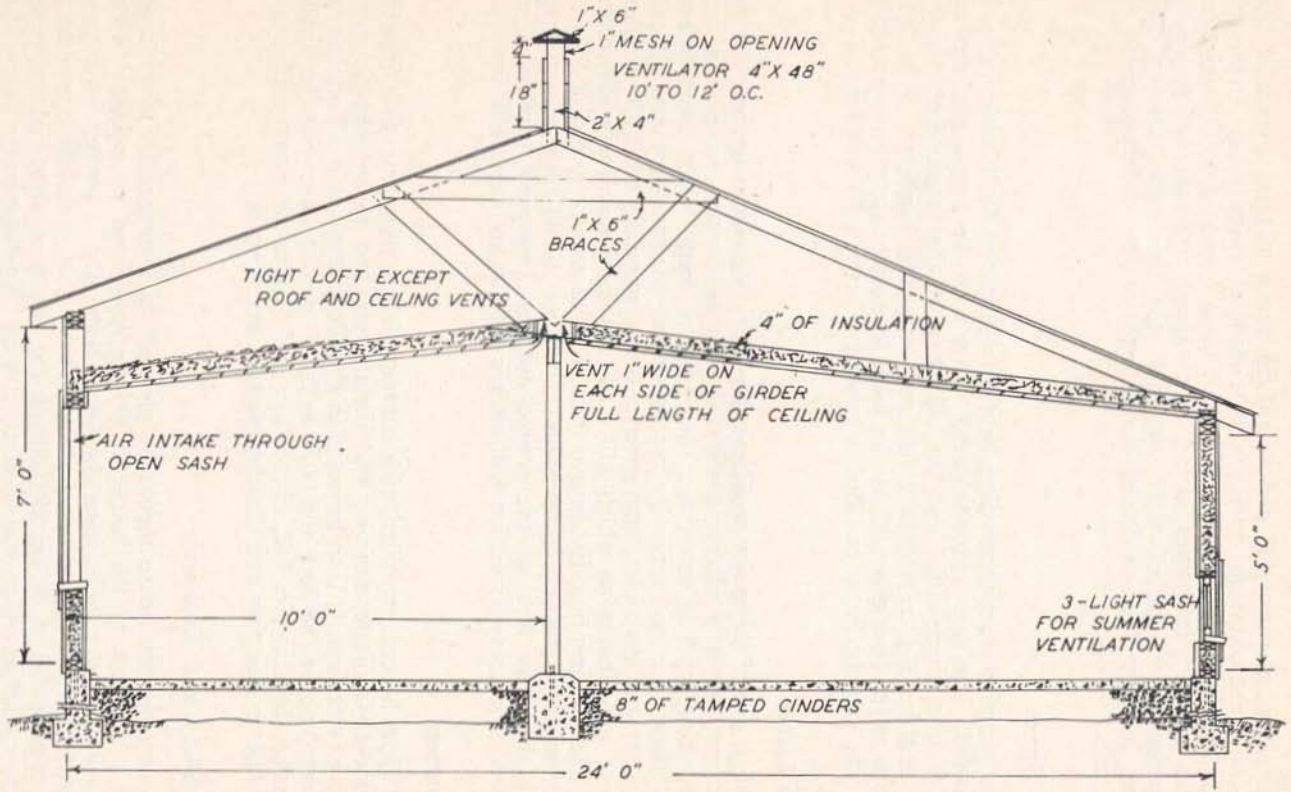


Figure 3—Framing section of gable ceiling insulated laying house showing alternate plan of ventilation incorporating the continuous ceiling vent throughout the length of the building.

Direct Sunlight

The ultraviolet rays of direct sunlight are a natural source of the calcifying agent concerned with adequate mineral assimilation. Inasmuch as ordinary window glass does not permit these rays to pass through, the windows and muslin frames should be arranged and operated to admit the maximum amount of direct sunshine into the house. During cold weather, however, high-producing hens should not be unduly exposed to cold drafts.

Floor Space

The practice of overcrowding hens is a common fault which should be avoided. The floor space required varies with the breed, the number of birds in a single unit, and the efficiency of the ventilation. Heavy breeds require 3½ to 4 square feet per bird, and Leghorns, 3 to 3½. Inamuch as the heat given off by the birds stimulates air movements, it is important that the house be filled to capacity during cold weather.

Damp Litter

This is one of the major problems of poultry house management during winter months. It is always associated with *inadequate ventilation* and overcrowding, and is sometimes the result of faulty floor construction. Board floors are not generally recommended because they are difficult to keep dry and are colder, than concrete floors, especially when the weather is severe. Any insulation which will make the floors warm will also make them drier. To insure a dry cement floor, a fill of rock or gravel of 8 to 10 inches under the concrete is advisable. The floor should always be at least a foot above the level of the ground outside. Improved ventilation as discussed in a previous section will always help to keep the floor dry.

Sanitation

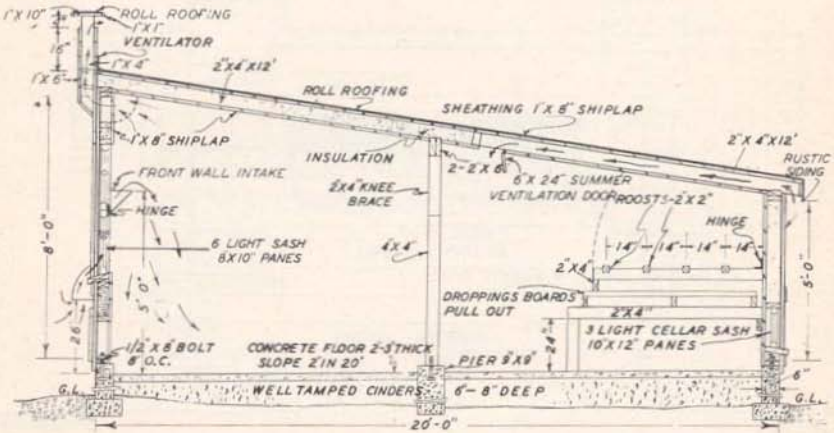
Modern houses, provided with concrete floors and removable interior equipment, facilitate cleaning and disinfecting and make possible more effective sanitation. It is to be noted in the illustrations that all equipment is elevated above the floor and built so that it can be removed. (See Idaho Extension Bulletin No. 142, *Prevention and Control of Poultry Diseases,* for details in cleaning and disinfecting the laying house.)

Durability and Economy

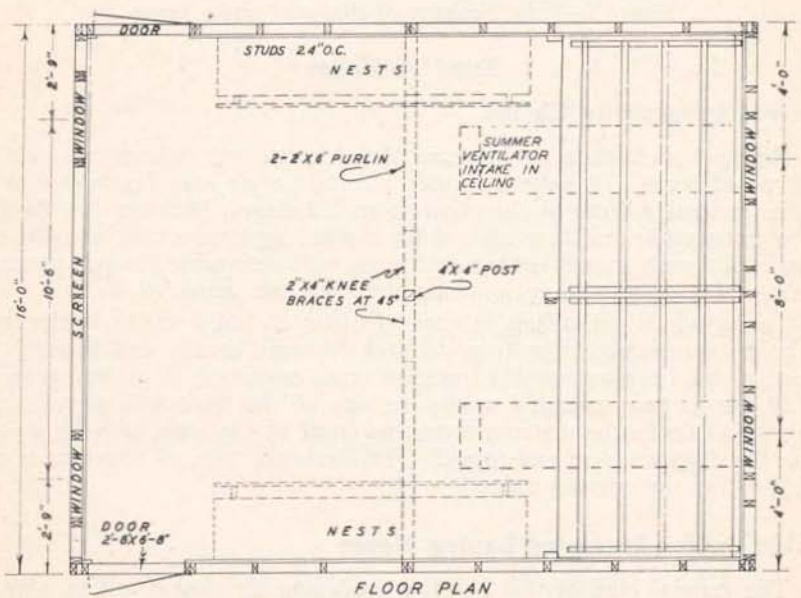
A new poultry house should be planned as a permanent investment; as such, the cost of the house should be considered in relation to the productivity and returns from the flock. Naturally, a greater investment is justified with a high-producing unit. Hens that maintain a consistent production of 50 to 60 percent during the winter months require better housing conditions than low-producing stock. An inexpensive house that allows the temperature to drop in cold weather to the extent of reducing the egg production from 50 to 20 percent for a period of several weeks

cannot be considered a good investment. The problem, then, is one of providing the necessary protection as economically as possible.

The actual cost varies considerably, depending on the variation in the cost of materials in different localities and the extent to which hired labor is used. Good materials and proper construction insure durability and are more economical as an investment in the long run. A concrete floor may add to the initial cost of construction but is more durable, more easily cleaned and disinfected, is rodent proof, and is, therefore, recommended in preference to wood floors.



FRAMING SECTION



FLOOR PLAN

Figure 4—Framing section and floor plan of shed-roof laying house.

Convenience

Every convenience which tends to facilitate the management of the flock and reduce the routine labor should be provided. Large mash hoppers that are convenient to fill, droppings boards that are easily cleaned, and convenient nests are recommended. Litter carriers, feed bins, and running water should be provided where possible. The careful manager will figure out many other conveniences that will apply to his own particular circumstances which will improve the management of his flock.

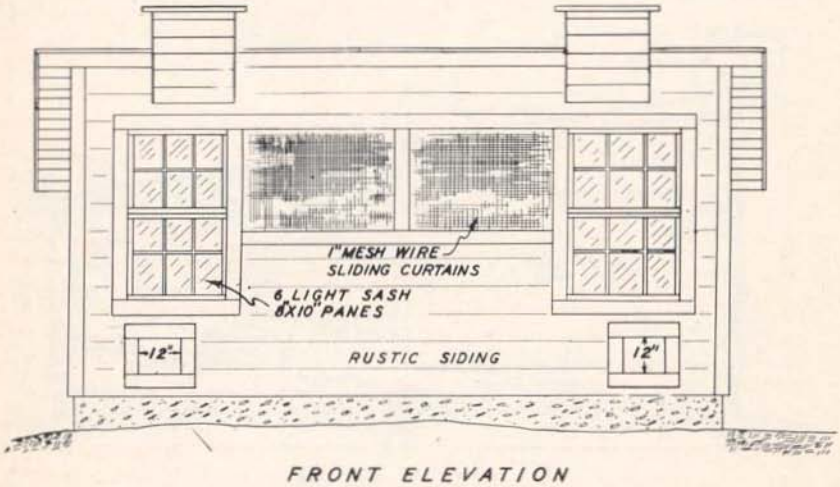


Figure 5—Front elevation of shed-roof laying house.

Type of House

Factors Influencing Choice

Personal preferences and nature of enterprise will influence the choice of type of house. In some instances a certain style may be desired to fit in the general scheme of the other farm buildings. Whether the flock is to be managed in one large unit, as for market egg production, or as several small units such as a breeding enterprise, will determine the pen arrangement, which in turn, may influence the type and depth of house.

Strong winds prevailing in some sections of Idaho make it necessary to build houses deep from front to back to avoid drafts, and to place the roosts as far back as possible from the front openings. A minimum depth of 24 feet is recommended where the size of the flock will permit. For very small flocks the distance from the front to the back may be greater than the distance from end to end. The shed-roof type of structure is well adapted for the smaller units.

Gable Ceiling Insulated Laying House

The general plan of this building including the sloped ceiling and the insulation has been designed to facilitate ventilation and provide maximum

protection from weather extremes. The air space between the ceiling and the roof provides additional overhead insulation, which makes a house of this type warmer in winter and cooler in summer than the shed-roof type of structure. Two different systems of ventilation have been discussed on page 4 and illustrated in Figures 1, 2 and 3. Although illustrated with a depth of 24 feet this type is adapted for houses ranging from 20 to 30 feet deep. In long units solid partitions should be used every 30 to 50 feet, depending upon the prevailing winds in the particular locality. The adjustable window openings allow flexibility in management.

Shed Roof House

This type has the advantage of being simple in construction and somewhat cheaper per bird due to the fact that less lumber per given floor area is required (*Figs. 4 and 5*). It is not adapted for houses deeper than 24 feet as it becomes necessary to build the front too high in order to secure additional depth. This style of roof should be ceiled on the under side of the rafter to secure the necessary insulation to promote ventilation and to prevent moisture and frost from accumulating. The flat roof of the shed type necessitates the use of composition roofing which occasionally requires repairs after strong winds. In localities with heavy snowfall it may be necessary to shovel the snow off to reduce the weight and keep the roof from sagging. In such localities it may be desirable to use a pitch steeper than is illustrated in Figure 4.

Location

The laying house should be located on a site that will afford good drainage of both surface water and air. The convenience of the operator, yarding system, and the relation to other farm buildings should be considered in the selection of the site. Protection from prevailing winds is desirable where possible if it does not exclude direct sunlight during the winter.

Details of Construction

Foundation and Walls

After the site for the poultry house has been selected the building corners should be located by the method illustrated in Figure 6. This method insures accurately placed corners for the construction of the building. The first step in the laying out of a building is to establish a base line representing an end or side. Stakes are then set representing two corners of the building, the other two corners are established, and the building squared up, using the 6-, 8-, and 10-foot triangle illustrated in Figure 6. After the corners have been located, strings should be stretched over the stakes and carried to batter boards. As a final precaution, the building diagonals should be checked to determine whether the building is square. The horizontal batter boards should be set at the

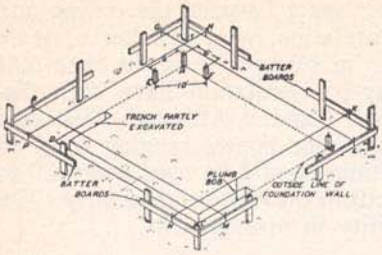


Figure 6—A method of laying out concrete foundations.

proposed foundation wall height. The batter boards should be far enough from the corner stakes to prevent their being disturbed by the excavation. Building lines may be projected from the strings by a plumb bob as shown in Figure 6.

The concrete footing should rest on solid earth and be placed below frost penetration to prevent upheaval and consequent cracking of the concrete. The foundation wall should extend approximately 12 inches above the ground. It is advisable to terminate the foundation in a "tee" or spread footing at least 12 inches wide and 8 inches thick. The mix for the concrete footings and foundation walls should contain not more than 6¼ gallons of water for each one-sack of cement. The maximum size aggregate should not exceed 1½ inches in diameter. A suggested trial mix is 1:2¾:4. The proportion of sand and gravel may be varied to secure the degree of workability desired.

The sill bolts are held in place in the forms during pouring of the concrete by short 2 x 4 blocks tacked to the forms. The blocks should be located according to the drawings prior to the pouring of the concrete. During pouring the concrete should be spaded well in the forms to insure a smooth wall.

Floor

A 2- or 3-inch concrete floor will be satisfactory, provided the subfloor is prepared properly and the mix is the correct one for that class of service. On high ground where the drainage is good, the concrete may be deposited directly on the ground after the trash has been removed and the area leveled and tamped. A recommended method of floor construction is to place the concrete on a well-tamped cinder or gravel fill. A layer of tar paper placed over the fill before concreting insures a dry floor. A mix containing not more than 5½ gallons of water per sack of cement will be satisfactory for poultry house floors. A rather stiff trial mix (1:2¼:3) is suggested. One course construction is recommended; that is, the full thickness of the floor is placed in one operation. The floor should be finished with a wood float to produce a smooth, dense surface. The concrete should be kept moist for several days to permit proper curing. When possible, floors should be placed in one operation to avoid construction joints. For large areas, the floor may be laid in section, 2 x 4's being used as forms for the sections. It is desirable to slope the floor toward the front of the house (2 inches to every 20 feet) to facilitate drainage when water is used for cleaning. A short section of 2-inch drain pipe, located 20 feet on center, should be placed through the front wall forms before the concrete is poured.

Framing

The average poultry house is of simple frame construction, not essentially different from the construction used in other small farm buildings. The 2 x 4 sills should be fastened to the foundation by means of sill bolts. The outside edge of the sill is set flush with the outside edge of the foundation to permit starting the siding 1 or 2 inches below the top of the concrete. This is done to keep the sill dry and insure maximum length of life to this structural member. The 2 x 4 studs are placed 2 feet on center. They should be doubled at all the larger openings. If the house is to be sealed inside, the conventional 3-stud corners are necessary.

The framing for the front and end walls will depend somewhat upon the type of window, door, or panel openings selected. The use of double plates is recommended for the added strength and rigidity imparted to the building. In erecting the building all framing members should be carefully aligned and plumb so the building will present a neat appearance when finished. All joints should be fastened securely with nails of the correct size. Generally No. 2 dimension will be satisfactory for framing members.

Roof

The rafters for the varous poultry houses illustrated are cut from either 2 x 4 or 2 x 6 stock. Number 1 dimension, placed 2 feet on centers, is recommended for rafters. In the gable ceiling insulated laying house, a triangular truss construction is used. For shed roofs and roofs with less than one-quarter pitch, it is advisable to use some type of prepared roofing in which case it will be necessary to use solid sheathing. Cedar shingles are recommended for roofs of one-quarter pitch or steeper. Sixteen-inch shingles may be laid 5 inches to the weather if a No. 1 grade is used.

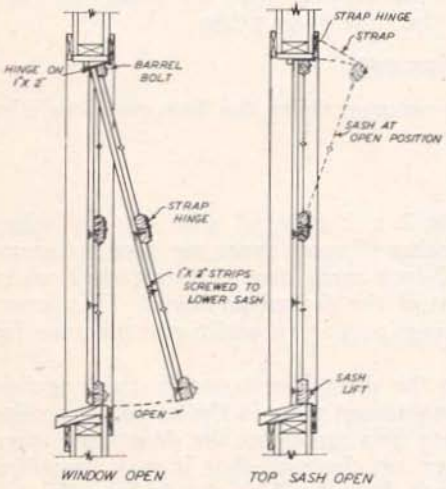


Figure 7—A suggested window arrangement.

Windows

The windows shown in the various plans are made up of standard sash listed in the stock millwork catalog and are carried by most lumber dealers. The windows are held in place by buttons or are hinged in such a way that the entire window may be removed or swung upward during warm weather.

A very convenient window arrangement is illustrated in Figure 7. It consists of two wood strips (¾" x 1½") fastened to the sides of the lower sash. The wood strips extend to the top of the upper sash and are fastened to the inside sheathing at the top of the window by strap hinges bent as illustrated

in Figure 7. The top sash rests on the lower sash and is hinged to it by means of small strap hinges. The top sash opens inward and may be held in any desired position by a chain or pipe strap. The entire window assembly may be swung upward and fastened to the ceiling.

Insulation

The value of insulation in connection with poultry house construction has been discussed under ventilation. In general, there are three types of commercial insulation: (1) rigid or semirigid, (2) blanket or quilt type, and (3) fill type. The efficiency of most insulating materials decreases rapidly with an increase in moisture content. For this reason a moisture barrier consisting of tar paper should be used between the studding and the siding, both inside and out, to prevent moisture from entering the wall section.

If planer shavings or straw are used for insulation, it is well to spray them lightly with a mixture consisting of 1 part creosote to 6 or 8 parts mineral spirits. If a fill type of insulating material is used, it should be packed well to prevent settling and consequent development of uninsulated areas. It is ordinarily a desirable practice to place one-half mesh galvanized hardware cloth under the sheathing for a height of 15 to 20 inches above the floor to prevent mice and rats from getting into the space between containing the insulation.

Painting

All exterior wood construction should be given at least two and preferably three coats of a good grade of outside paint. A good combination consists of a priming coat of aluminum paint and two finish coats of any desired color. The interior should be given at least one priming coat of light-colored paint to preserve the wood and make the interior lighter. All surfaces to be painted should be clean and dry. Most painting failures are caused by moisture coming through the lumber after the paint has been applied or moisture in the wood at the time of painting.

Equipment

All interior equipment should be elevated above the floor and should be removable.

Roosting Quarters

Roosts are usually made out of 2 x 2 material with the top edges beveled; as a general rule 6 to 8 inches of roost space per bird is recommended. Wire netting of 1½- to 2-inch mesh should be attached under the roosts and extended to the front of the droppings board. This serves to keep the birds out of the droppings and is an additional measure for obtaining clean eggs.

Under average conditions when the droppings board is tight against the rear wall, the roosting area is the warmest place in the house at roosting time during midsummer. To improve this condition, the droppings board may be constructed in units and rest on cleats so that it may be pulled away from the rear wall to the extent desired, which should be at least 1 inch in the winter and from 4 to 6 inches in summer.

Low roosts without a dropping board are an arrangement preferred by some poultrymen. The perches should be about 24 to 26 inches above the floor. The area underneath is closed off by extending wire netting under the roosts and down to the floor in front. The rear windows, small

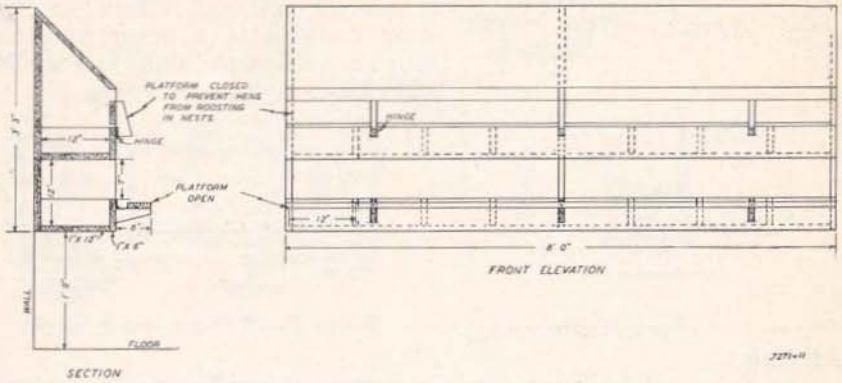


Figure 8—Wall nests arranged in tiers and showing a method of hinging jump board.

sized 3-light cellar sash, are placed above the roosts directly underneath the plate. The droppings are cleaned out when the litter is changed. This arrangement eliminates the routine chore of cleaning the droppings board. There is more odor and moisture, however, due to the accumulation of droppings.

Nests

Figure 8 shows a plan for nests arranged in tiers and suggests a method of hinging the jump board so that it may be tilted up to keep hens from roosting on the boards or in the nests. The platform is sometimes omitted except for the top tier; this prevents birds from walking along and picking at the hens that are laying. The nest should be deep, as illustrated, to hold a good depth of desirable nest litter—such as sawdust, shavings or fine straw. One nest should be provided for about every 6 or 7 hens.

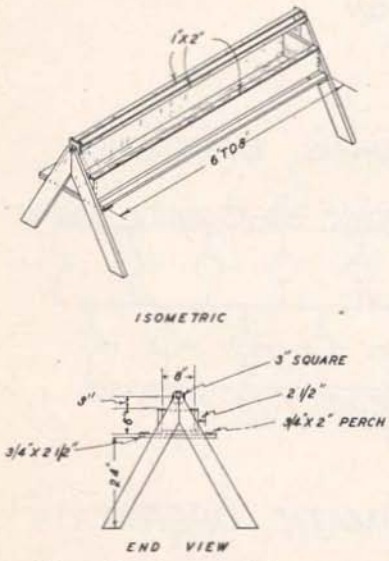
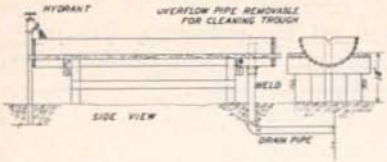


Figure 9—Open mash hopper.

Mash Hoppers

Two styles of mash hoppers are illustrated—the open top floor type, equipped with reel (*Fig. 9*), and the wall type with storage capacity (*Fig. 11*). The plans illustrated are designed to keep the birds out of the feed and to prevent waste. A minimum of 1 foot of feeding space for every 5 hens is required.



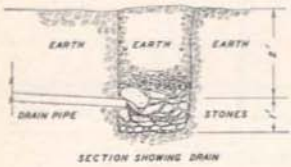


Figure 10—Sanitary drinking trough.

Watering Devices

Water and milk containers should be of a type that is easily cleaned, elevated on platforms, and so fastened as to prevent spilling. Where running water is available, a trough provided with an overflow and drain is a worthwhile labor-saving device (*Fig. 10*).

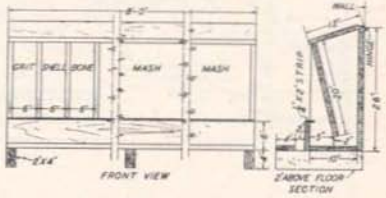


Figure 11—Wall-type mash hopper.

Lighting

The use of artificial lights for the purpose of lengthening the day and increasing the feed consumption during the winter months has become a

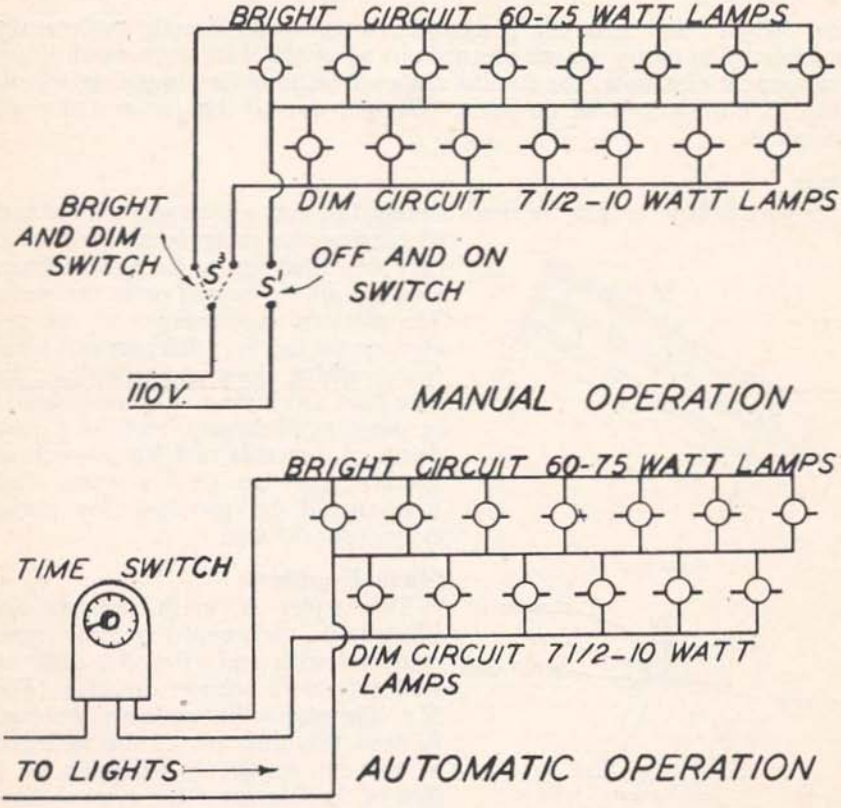


Figure 12—Three-wire two-circuit method of dimming poultry house lights.

standard practice. Electric lights should be a part of the regular housing equipment whenever electricity is available. Use 60- or 75-watt lamps, equipped with reflectors, spaced 10 feet apart.

The bright lights should be equipped with reflectors to concentrate the light on the floor and feeders. The size of the reflector will depend upon the wattage of the lamp and the floor area to be lighted. The enameled reflector is more efficient than the painted metal type; but regardless of the material finish, all reflectors should be kept free from dust and dirt by frequent cleaning.

The type of wiring required for a poultry lighting installation depends upon the value and permanence of the building and personal preference. Both the nonmetallic and the metallic sheath covered cable are well adapted to poultry house wiring.

The lamp and reflector units may be hung about 5½ feet from the floor so that the workmen can see them easily; otherwise they should clear the heads of the workmen or be located over feed hoppers or water containers.

In any system of evening lighting, it is necessary to dim the lights for about 15 minutes to encourage the birds to go to the perches. The most practical method of diming the lights is to use a three-wire two-circuit system in which lamps of 60 or 75 watts are used in the bright circuit and lamps of 7½ or 10 watts in the dim circuit. A wiring diagram for this arrangement, for both manual and automatic operation, is illustrated in Figure 12.

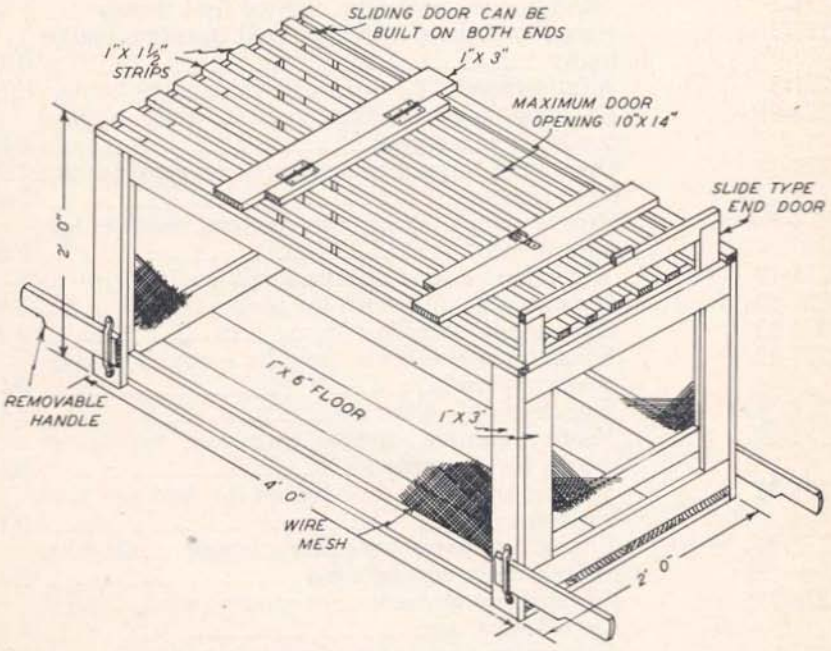


Figure 13—Catching crate with handles.

Poultry House and Equipment Plans

available from
Department of Agriculture Engineering
University of Idaho
Moscow, Idaho

Plan No.	Size	Description	Price
Laying Houses			
.727-2A	36 x 40	Modified straw loft half monotor laying house	$0.50
.727-4AA	24 x 48	Gable ceiling insulated laying house, enclosed shaft outlet flue from ceiling to roof	0.60
.727-4B	24 x 48	Gable ceiling insulated laying house, alternate ventilating system utilizing a continuous ceiling vent into loft throughout length of building	0.30
.727-15	16 x 20	Shed roof laying house	0.30
.727-17A		Details of window attachment, allows upper sash to open in at top, or entire window to open at bottom	0.10
.727-26	5 x 10	Small backyard poultry house	0.10
.727-27	4 x 12	Two-deck backyard poultry house	0.10
Brooder Houses			
.727-8	16 x 34	Permanent brooder house, underground furnace and flue	0.30
.727-11	10 x 14	Portable shed roof colony brooder house on skids	0.20
.727-19PR	14 x 18	Shed roof brooder house on skids, insulated	0.30
Equipment			
.7271-2		Mash hopper, wall type, limited feed storage	.10
.7271-3		Range mash hopper, limited feed storage capacity feeder	0.10
.7271-5		Alfalfa feeder, "L" type, wire front, tight bottom	0.10
.7271-9R		Catching crate, sliding doors at ends, sliding handles for carrying	0.10
.7271-11		Open nests, hinged jump board, arranged in tiers	0.20
.7271-17		Trap nests	0.10
.7271-18		Sanitary nests, sloped wire bottom, seperate egg compartment	0.10
.7271-19		Water heater, lead sheathed soil heating wire	0.10
.7271-20		Water trough and drain for poultry house	0.10
.7271-22		Open mash feeder for laying hens	0.10
.7271-23		Electric fan and heater unit for tempering air in poultry house	0.10
.7271-28A		Egg-cleaning equipment	0.10
.7271-29		Poultry lighting circuits, three-wire two-circuit system for dimming	0.10
.7271-30		Typical air movement diagram for shed roof laying house	0.10
.7271-34		Emergency homemade electric brooders, iron wire or lamp bulb heating units	0.10
.7271-35		Covered trough feeders for growing stock, 2 sizes, for different ages	0.10
.843-1		Egg cooler, electric fan, forced circulation	0.10
.845-3		Egg cooler, evaporation from wet burlap	0.10