Poultry Housing
and
Poultry House Equipment
by
Miss H. E. Cushman

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POULTRY HOUSING AND POULTRY HOUSE EQUIPMENT FOR MONTANA

By

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Money and effort spent on breed improvement and balanced rations are wasted unless poultry is properly housed and provided with the proper equipment. Plans and suggestions for poultry houses and equipment recommended for Montana conditions are contained in this publication.

The Montana Poultry House

The proper poultry house is not necessarily expensive. Local prices and the kind of material used will determine the cost. It is important that the house be properly ventilated but not drafty, dry, well insulated to be as little affected as possible by sudden outside temperature changes, well lighted, roomy, and convenient both for the birds and for the operator. The convenient house is apt to be a sanitary house.

Location

Since the location can materially affect the proper functioning of a house, the situation of the building should be studied before the foundation is laid. No house, however well built, will remain dry if the soil or air drainage is faulty. A house should no more be placed in a hollow, where air pockets exist, than it should be put on wet, soggy ground. The ideal soil is a light sandy or gravelly one. Where the house must be placed on gumbo or heavy soil, it is wise to put in tile to provide proper drainage.

If the house is built into the south slope of a bank, drainage ditches must be made to carry surface water away from the back and sides. The ideal spot for the house is on a knoll, but protected from wind and weather.

The house should face the south to assure maximum sun-

*Professor H. E. Murdock, Agricultural Engineer, Montana State College, assisted in the preparation of this bulletin.
light, a consideration which is particularly important during short winter days.

**Type of House**

The type of house is largely determined by the manner in which the housing principles are applied. For comfort and warmth the house should be as deep as possible, but if too deep sunlight will not reach the back. A distance of 20 feet from front to back is best for all purposes. It should never be more than 24 feet or less than 16 feet from front to back. Since square construction is cheaper than any other, a 20'x20' unit is prefer-
able for 100 birds. This allows 4 square feet per bird. If more birds are to be kept, additional units may be built on with inexpensive partitions between them to break house drafts.

The height is determined by the height of the operator. The warmest house is one that is only a foot or so above the birds' backs when roosting. Consequently, 6½ feet is about as high as the front of the house should be. This height gives the operator head room and gives sunlight a chance to get well back into the house during the winter when the sun slants low in Montana. The back wall should be not more than 4½ feet high.

To put a shed roof on such a house makes it exceedingly flat. Therefore the uneven or two thirds span roof is much more serviceable and lends itself admirably to the straw loft method of insulation which is advocated for this state. With one 20x20 unit, gable doors are sufficient. But with multiple unit houses, ventilators along the comb of the roof may be added as a supplementary means of carrying out the moisture that goes up through the straw loft. (See Fig. 4).

Since light as well as air is needed, a combination front of windows and curtains on sliding frames proves most satisfactory for the state as a whole. A front that is made up entirely of sliding curtains may be used in the western part of the state where moisture is a greater problem dur-
ing the winter and where temperature does not go as low as in eastern counties. (See Fig. 5).

Foundation

A concrete foundation is best for a permanent poultry house. This should be deep enough to prevent heaving from frost (12 to 18 inches) and should extend six inches to one foot above ground. A foundation that is about six inches wide will be able to carry a 20 x 20 unit. While the concrete is still wet, bolts which aid in anchoring the sills should be set into the foundation.

Floors

While a great many people try to worry along with dirt floors, the labor of keeping them sanitary is so great that the only practical floor is one of either concrete or wood. To keep a dirt floor safe at least six inches of dirt must be removed annually. This fouled dirt must then be hauled to some distant part of the ranch where hens never range, then a new top dressing of dirt or gravel is added and thoroughly tamped down.

The concrete floor is the most permanent and sanitary. It should be built with a drain to facilitate cleaning. If conditions are such as to cause a concrete floor to be damp, the difficulty can be overcome by first putting in a layer of crushed rock and gravel, covering with a coat of coarse concrete, placing on this a layer of tar paper and finishing with a fine cement about one to two inches thick on top of the tar paper.

If a wood floor is preferred it is well to have a double floor with building paper between.

Walls

For several years housing tours have been conducted in the state on sub-zero days. It was found that houses which had adequate provisions for ventilation and removing moisture coupled with well insulated walls and roofs, were functioning properly even at the lowest temperatures.

The ideal insulation is "still air." But merely boarding on either side of the studs does not provide "still air" unless the materials so used are air tight.

Ohio Extension Bulletin 94 gives a good comparison of the
insulating value of different commonly used materials. (See Fig. 6).

![Diagram showing thickness required to equal one inch ideal insulation]

THICKNESS REQUIRED TO EQUAL ONE INCH IDEAL INSULATION

Fig. 6—This chart shows the thickness of various materials having equivalent heat insulating values. The horizontal scale gives approximately the thickness in inches required to furnish insulation equivalent to 1 inch of the best possible practical insulation, called ideal in the figure.

This chart also indicates that it takes 6 inches of hard wood to equal 2 inches of fibrous insulating board in insulating value; in other words, that insulating board has the same insulating value as three times its thickness of hard wood. (Courtesy of Ohio Exp. Sta.)

The drawback to using many of the commercial insulating materials on the market is that the birds are apt to pick and eat them. Therefore, it is well to paint the walls, as high as the birds can reach, with gray cement paint. This is made "by mixing equal parts (by volume) of Portland cement and fine,
clean and sifted sand which is free from loam; add sour milk until a thick paint is obtained. Do not use any water in the mix. Mix only the amount to be used at once. Two coats of the paint should be used. Approximately 12 pounds of Portland cement, 12 pounds of sand, 1 gallon of sour milk will cover with two coats a surface of 80 square feet.

Front

As already indicated, the front which gives best results is a combination of windows and curtains on sliding frames. If the frame is exactly balanced by a window weight, the curtain may be regulated according to weather conditions. Being so arranged the operator may change the position of the curtain while standing either outside or inside the house.

It is better to have the frames slide up and down in grooves on the outside of the house and have the hen sized wire netting fastened on the inside, since this will prevent the birds from roosting on the frames when the curtains are part way open.

Either a heavy muslin or a glass substitute may be used in the frames. (See Fig's. 3 and 5).

Some prefer the windows which are placed at either side of the front of the house to be stationary, while others like the top sash hinged so that it may be opened to give further ventilation when necessary.

Ceiling

The ceiling over the roosts should be sealed and given the same insulation as the side walls. However, the ceiling for the rest of the house is the straw loft (about six inches to one foot deep). When the frame is being constructed every other rafter is tied across with a 2x4. These ties are added to strengthen the roof construction and also to provide a means for nailing the strips or wire used to support the straw in the loft. The wire or strips are attached to the under side of the ties in order to
lower the ceiling (which means a warmer house), and to make
the operation of changing straw easier. Where strips are used
instead of wire, they should be placed so that there is at least
a two-inch space between each strip to aid in the ventilation.

**Ventilators**

In a house with a straw loft the moisture in the foul air
filters up through the straw into the gable of the house where it
will remain until it condenses and rains down onto the birds
unless provision is made to carry it out. That is the reason the
doors are made in the gable ends. Through them a cross draft
is created above the straw and the moisture laden air is driven
out. The common error is to make these doors too small. They
should be from 18 to 20 inches square. They may be provided
with baffles to keep out snow and rain and should be covered
with wire netting to keep out sparrows.

**Roof**

Although in many sections of the country roofing paper
may be used for roofs, in most sections of Montana shingles
should be used because of high winds.

The rear slope of the roof is long and fairly flat, therefore,
it should be supported by at least two, 2x4 posts. When these
are placed four feet from the rear of the building, they in no way
interfere with the floor space and provide a place to fasten the
dropping board supports.

The house is provided with 18-inch eaves to protect the south
side as well as to carry the run-off from the roof away from the
foundation. With this length of eaves the sliding curtains can
be lowered a little even during storms.

In order to give plenty of room for cross ventilation above
the straw in the loft, a house that is 6½ feet high at the front
should be about 10 feet high at the comb of the roof.
Furnishings and Equipment

All interior additions to the house should be made so that they can be kept sanitary, and should be constructed as simply and as inexpensively as possible and yet serve the purposes for which they are built.

Roosts

Each bird should be allowed 8 to 10 linear inches of roosting space. At this rate, a house 20 feet wide which contains 100 birds must be provided with 4 roosts running the full width of the house. In order to put the birds in the warmest part of the house these roosts should be placed along the north side and should be spaced 14 inches apart in order to make room for heads and tails.

Rounded poles with no cracks where mites can hide make good roosts, (2x4's or 2x2's beveled fulfill the requirements).

If heavy inch mesh wire, known as "Fox wire," is fastened to the under side of the roosts and carried down to the dropping boards the birds can be kept off the droppings. This helps in the production of clean eggs. (See Fig. 2).

Dropping Boards

The dropping boards serve two purposes, one, to catch droppings, giving the birds more floor space, and, the other, to protect the birds while roosting. Therefore, there should be not more than six inches between the roosts and dropping boards. The roosts should be hinged so that they can be raised when the dropping boards are cleaned.

The dropping boards may be made in panels so that they can be removed when the house is cleaned. But whether they are made portable or stationary, the lumber used in their construction should be cut in 5-foot lengths and laid to run at right angles to, rather than parallel with, the back of the house. This facilitates cleaning. For building dropping boards it is best to use tongue and groove lumber or cheap flooring which will not warp or develop cracks between boards.
Nests

There are two types of nests—dark nests, where the birds enter the nest from the rear (See Fig's. 7 and 8) and open nests that are entered from the front. (See Fig's. 9 and 10). Both are efficient. With either type provisions can be made to keep the birds out of the nesting units at night. The type depends to some extent upon the location of the nests. Some prefer to place the nests under the dropping boards while other prefer them against the end wall.

In either case, at least one nest should be provided for every five birds. The nests should be roomy but not large enough for several hens to get into at once. For Leghorns a 12x12 inch nest is adequate. For larger birds it should be about two inches wider.
OPEN NESTS

Fig. 9—Open nest with hinged perch which serves also as door that can be closed at night to keep birds out of the nests.

Mash Hoppers

The old wall type mash hopper with a carrying capacity for a week or more has given way to the smaller portable hopper placed in the middle of the floor with feeding space on either side. By using a hopper that is filled daily, birds will eat more mash. Increased mash consumption results in increased egg production. A popular hopper of this type is made with either a rectangular or "v" shaped trough and is provided with a lip to keep birds from billing and wasting. Wires or a reel at the top will keep birds from roosting on the hopper and contaminating the feed. These hoppers are elevated about 18 inches from the floor so that litter can not be scratched into them. This elevation also permits the birds to use the floor space underneath. (See Fig's. 11, 12 and 13). A 20x20-foot house should have two, 4-foot hoppers. This gives 16 linear feet of feeding space.
MASH HOPPER

Fig. 11—Non-wasting Mash Hopper with reel.

Bill of Materials for Dry Mash Feeder

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 pieces 2x4—18&quot; long</td>
<td></td>
</tr>
<tr>
<td>2 pieces 1x4—24&quot; long</td>
<td></td>
</tr>
<tr>
<td>2 pieces 1x4—4' 2&quot; long</td>
<td></td>
</tr>
<tr>
<td>4 pieces 1x2—4' 2&quot; long</td>
<td></td>
</tr>
<tr>
<td>2 pieces 1x2—4' long</td>
<td></td>
</tr>
<tr>
<td>2 pieces 1x6—4' long</td>
<td></td>
</tr>
<tr>
<td>1 piece 1x12—4' long</td>
<td></td>
</tr>
<tr>
<td>2 pieces 1x10—12&quot; long</td>
<td></td>
</tr>
<tr>
<td>2 pieces 1x1—18&quot; long</td>
<td></td>
</tr>
<tr>
<td>3 pieces 2x8½x3½</td>
<td></td>
</tr>
<tr>
<td>4 plaster laths</td>
<td></td>
</tr>
<tr>
<td>2—2½ No. 10 screws</td>
<td></td>
</tr>
<tr>
<td>½ lb. 6d nails</td>
<td></td>
</tr>
</tbody>
</table>
Drinking Fountains

Probably more poultry diseases are spread through the drinking fountain than through any other channel. There are not only those diseases directly carried but there are a host of others that are traceable to damp litter caused by fountains which permit water to spill. Yet the drinking fountain is the piece of equipment that is most often neglected. A bucket of water on the floor is not satisfactory. The drinking fountain like the mash hopper should be elevated 18 inches and should be protected from contamination and spilling. In addition, for northern states at least, provision should be made to prevent drinking water from freezing, either by insulating the fountain or providing it with artificial heat. (See Fig's. 14, 15 and 16).
Miscellaneous Equipment

The well-equipped house should be provided with a dropping board scraper, a catching hook, (see Fig. 17) a catching crate (see Fig. 18) and a broody coop (see Fig. 19). Where electricity is available, increased egg production can be obtained by installing electric lights controlled by a time switch. Reflectors should be used and the light so arranged that roosts as well as all parts of the floor are reached. The lights should be placed half way between the front of the dropping boards and the front of the house and 5 feet from the floor. A 20x20 house should have two lights.

Fig. 17—Catching hook (California Exp. Sta.)
Remodeling

While many poultrymen will build new houses and take advantage of all the latest housing information, more will remodel houses already on the ranch.

Most old houses can be properly remodeled at little expense.

**High Houses:** Houses over $6\frac{1}{2}$ feet high, including the half monitor type, can be lowered inside by putting in a false ceiling and a straw loft.

**Narrow Houses:** If the narrow house is high at the rear, the back rafters can be spliced and the house extended to the rear. If the front is low it can be removed and set forward the proper distance. The upper end of the back rafters then are spliced to bring the comb about 10 feet above the ground. Front rafters are provided to connect the comb with the front of the house in its new position. This gives the approved uneven span type of house. The illustration on the cover show the remodeling process.

**Fronts:** If the house was built with curtain frames hinged to the plate, improvement can be made by changing to the sliding curtain type of front.

The house herein described will meet the varying weather and wind conditions of Montana but it is not fool proof. The operator must watch his birds. The litter
must remain dry and clean. Dampness or frost in any part of
the house indicates that more ventilation is needed; in which
case the curtains must be set to let in more air. When birds
huddle under the dropping boards this means there is too much
cold air, and then, temporarily at least, the curtains should be
drawn to close the windows.

While floor space per bird can be somewhat reduced where
larger than a one hundred-bird unit is being operated (a 10% increase is safe) crowding should be avoided. Everything that
has been done for the birds’ comfort and for efficient production
is lost when too many birds are housed on a given floor space.

Lastly, all that has been discussed concerning proper housing
will amount to nothing if the house is not kept sanitary.

Bill of Materials for 20x20 House

<table>
<thead>
<tr>
<th>Pieces</th>
<th>Kind</th>
<th>Length</th>
<th>For</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2x6</td>
<td>20'</td>
<td>Sills</td>
</tr>
<tr>
<td>13</td>
<td>2x4</td>
<td>12'</td>
<td>Front and rear studs</td>
</tr>
<tr>
<td>6</td>
<td>2x4</td>
<td>16'</td>
<td>End Studs</td>
</tr>
<tr>
<td>2</td>
<td>2x4</td>
<td>18'</td>
<td>Post for supports</td>
</tr>
<tr>
<td>1</td>
<td>2x4</td>
<td>16'</td>
<td>Plates (doubled)</td>
</tr>
<tr>
<td>5</td>
<td>2x4</td>
<td>20'</td>
<td>Rafters (rear)</td>
</tr>
<tr>
<td>13</td>
<td>2x6</td>
<td>16'</td>
<td>Rafters (front)</td>
</tr>
<tr>
<td>6</td>
<td>2x6</td>
<td>18'</td>
<td>Ties</td>
</tr>
<tr>
<td>6</td>
<td>2x4</td>
<td>16'</td>
<td>Ceiling board (to support straw in loft and for ridge pole)</td>
</tr>
<tr>
<td>35</td>
<td>1x4</td>
<td>20'</td>
<td></td>
</tr>
</tbody>
</table>

530 square feet insulating material, either insulating board of some sort or cheap flooring or ship lap.
665 Feet B. M.
18 bundles of shingles
1060 square feet building paper for sides—under insulating material and for roof over sheathing.
2 2x4 20' Dropping board supports
125 Feet B. M.
12 2x2 12' Flooring for dropping boards.
100 square feet “fox” wire for under roosts
2 windows 3'x4½’ Roost and roost supports
600 Feet B. M.
Siding
<table>
<thead>
<tr>
<th>Pieces</th>
<th>Kind</th>
<th>Length</th>
<th>For</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2x2</td>
<td>16'</td>
<td>For grooves for sliding curtains</td>
</tr>
<tr>
<td>2</td>
<td>1x4</td>
<td>16'</td>
<td>Sliding curtain frames</td>
</tr>
<tr>
<td>2</td>
<td>1x3</td>
<td>16'</td>
<td>Corner finish and window and end ventilator frames.</td>
</tr>
<tr>
<td>9</td>
<td>1x4</td>
<td>16'</td>
<td>Door.</td>
</tr>
<tr>
<td>1</td>
<td>3'x6'</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 weights and sash cords and pulleys
8 hinges
1 set of hinges
1 latch
30 sq. ft. chicken wire to cover inside of sliding curtains and gable ventilator doors.

5 lb. 7d nails
5 lb. 10d nails
1 lb. 6d flooring nails
15 lb. shingle nails
12 ½x8'' anchor bolts

400 sq. ft. tar paper

58 sacks cement
7½ yd. gravel
11 yd. sand

Bolting sills to foundation.
Between concrete and finishing coat.
Floor and foundation
Floor and foundation
Floor and foundation