Deep litter for poultry- part 2

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DEEP LITTER FOR POULTRY

Part 2.—The Deep Litter Poultry House

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Well-designed poultry houses are essential if good results are to be obtained from the deep litter system, especially where the birds are intensively housed. The heavy concentrations of droppings falling on restricted floor areas call for a technique of litter management in which the design of the buildings plays a very important part.

This will be readily apparent if we remember that the moisture content of the droppings may comprise 70 to 85 per cent. of the total weight.

About one-third of the total dry matter consumed by hens on standard poultry rations is passed out in the excreta, so that 100 laying birds consuming six tons of dry feed in a year would void about two tons of dry matter in their droppings. Add to this some five to ten tons of moisture and it will be readily realised that the maintaining of the litter in a satisfactory condition presents some problems.

Since most of the moisture must be eliminated by evaporation, poultry houses should be designed to give full play to such natural drying elements as sunshine and free ventilation.

GABLE-ROOFED HOUSES

In the past it was general practice to house laying birds in small units, and narrow skillion-roofed sheds were suitable for the purpose; but with a changeover to intensive farming, the wide gable-roofed poultry house for accommodating a large number of birds has come into prominence. This type of shed is particularly well suited to the deep litter system because it can be easily and cheaply designed to keep out the rain while at the same time admitting the abundance of fresh air and sunlight so necessary for maintaining the litter in a dry condition.
SUNLIGHT VENTILATION AND SHELTER FROM RAIN ARE ESSENTIAL

Most poultry farming districts in Western Australia experience mild winter conditions, so that the main consideration in housing poultry during the winter months is to afford shelter from rain. Under the deep litter system it is of utmost importance to ensure that driving rain cannot penetrate into the shed. Rain-sodden litter is very difficult to dry out in a damp winter atmosphere and, unless removed from the shed, damp litter can be a real menace. It is a relatively simple matter however to make a gable-roofed shed rain-proof by extending the overhang of the roof at the eaves. Naturally, the weather side of the building requires most protection from wind-swept rains and it may be necessary for the lower section of the wall facing the weather to be closed in.

As a general rule, poultry houses should be erected with their longest measurements running approximately north and south, with the front of the house facing east so that during winter when the sun's rays reach the earth at a low angle in the early morning and late afternoon, they are directed below the eaves of the gable roof allowing parts of the floor to be bathed in sunlight for a few hours every day. Direct sunlight is an excellent drying and disinfecting agent and is a source of ultra-violet light. The birds delight in dust-bathing in the sunlit areas of the floor and the farmer is thus relieved of the necessity for continually stirring these portions of the litter.

Open wire-netted walls provide ideal ventilation for a deep litter shed. A continuous circulation of fresh air over the floor permits surface evaporation and removes harmful fumes and odours. Strictly speaking, recourse to the closing-in of the wall of a long house should only be taken as a protection against rain, as protection from the cold is not usually necessary.

Fig. 6.—This sketch shows some of the main constructional features of a large gable-roofed shed sited to give protection from north-westerly rains. The eastern and western walls are of wire netting and are protected by the substantial overhang of the eaves. The lower portion of the western wall is closed in to prevent rain driving on to the litter. If movable frames covered with flat galvanised iron or asbestos-cement sheeting are used for closing in the western wall it is a simple matter to adjust the ventilation or shelter according to the requirements of the season.

The shed is built on a concrete foundation extending about 10 inches below ground level with a concrete upstand or low wall built up 10 in. above the concrete floor. The upstand is interrupted at the northern end where a wide doorway permits the entrance of a vehicle for cleaning out the shed. A length of 10 in. plank drops into slots at the bottom of the doorway and serves to retain the litter. It can be lifted out to allow a vehicle to enter.

Two sliding doors are fitted, one a frame covered with wire netting to admit air and sunshine, the other a solid sheeted door to give shelter from rain or cold winds. Windows or glass louvres high in the wall admit sunlight and air.

Ventilation ridge-capping is used to cover a 4 in. gap at the ridge of the roof.
under local conditions. Winds are not a problem with gable-roofed houses in well-chosen situations.

It will usually be necessary to close in the north and south end walls of the shed unless a verandah is built to cover in these sections. The northern end will be facing the sun for a large part of the day and sunlight should be admitted by installing glass louvres or windows high up in the wall. A large sliding door in the centre of the north end wall will allow the entry of the farmer's vehicle when the time arrives for the shed to be cleaned out. This doorway could also be used to admit sunlight, if a door or pair of doors, made from wire netting stretched over a light timber framework, are made to fit in the place of the sliding wooden door.

Sunlight and fresh air are beneficial to deep litter and stock alike. They are freely provided by nature and the farmer should endeavour to exploit their usefulness.

THE RETAINING WALL AND CONCRETE FLOOR

One of the first steps in building the ideal deep litter house is to put in concrete foundations to a depth of about 10 in. below ground level. These footings should be put in around the perimeter of the shed and should be about 6 in. wide. The upper surface of the foundations should be at least 1 in. above the highest point of the surrounding earth. A concrete wall or upstand 4 in. wide should be erected on top of the footings and should rise to a height of 10 in. above the projected floor level. This wall serves the dual purpose of retaining the litter and providing the strong foundation for the walls of the shed structure. It also greatly reduces the risk of white ants and wood-rotting fungi damaging the building timbers.

A flat concrete floor at least 3 in. in thickness with a smooth cement surface should then be laid. Concrete is preferred to a dirt floor as it facilitates cleaning out operations and lessens the risk of dampness impregnating the litter.

EQUIPPING A DEEP LITTER SHED

In equipping a deep litter shed with such items as waterers, feeders, perches and nests, an allowance of about 6 in. must be made for the depth of litter in order to maintain the equipment at a suitable height above the litter, the depth of which will naturally vary from time to time.

Fig. 7.—A skillion-roofed poultry house measuring 32 ft. by 16 ft. The back and ends of the building are closed in, while the front of the building facing away from the weather has the lower portion built of asbestos-cement sheeting and has an overhanging roof to protect the litter. This design is not suited to maintaining a dry, friable litter as very little direct sunlight reaches the floor and ground ventilation is poor.

Note the drinking platform extending outward from the wall with the water-trough in front, a grid of vertical steel rods.
Waterers

Particular attention must be given to installing the watering system as damp areas around the drinking vessels can be breeding places for internal parasites. In order to avoid water spilling on the litter, the waterers are installed just outside the house, but are accessible to the birds from the inside. The birds stand on a slatted platform made of two 2 in. x 1 in. boards spaced 1½ in. apart. This extends outwards above the concrete floor. The birds reach the water by poking their heads through a grid of vertical rods spaced 2½ in. apart. Any water that adheres to the wattles and bills as the birds are drinking, falls out-

side the shed and damp patches in the litter are avoided.

A concrete dropping trap situated beneath this outside platform is used for retaining the manure that falls between the slats as the birds are drinking.

Where the birds are provided with outside runs, a similar platform is built on the other side of the drinking vessel.

Feeders

Trough feeders are the best for providing adequate feeding space inside the poultry house, but there are two problems associated with deep litter that must be overcome. Firstly, there will be a concentration of droppings around the feeders and with the birds constantly treading on this area of the floor, the litter has a tendency to pack down. Avoid this by changing the position of the troughs, stirring the litter around the feeders frequently and replacing it with dry, friable litter from other parts of the floor. The second problem is to prevent the litter getting into the feeders. By placing a house brick under each end of the trough so that the bottom of the latter stands about 2 in. above the litter there is less chance of the birds scratching the litter into the troughs and furthermore the bottom of the trough will last longer. An anti-perch roller will discourage the birds from walking over the troughs and soiling the feed.

Perches

It is common experience to find that the perches in a deep litter shed are too close to the surface of litter because allowance has not been made for the increasing depth of litter material. This is a serious oversight and may result in ammonia fumes causing irritation to the birds. Also when the perches are low the birds are reluctant to walk beneath the perches and the droppings are more likely to cake on the surface. To overcome these difficulties and to facilitate culling, the perches should be arranged at a uniform height of 3 ft. 6 in. from the concrete floor.

Nests

If suitable and adequate nesting accommodation is provided in the shed just prior to the start of lay, very few eggs will be laid on the floor. A few birds will invariably choose to make their own nests in dark areas of the litter, but by placing some obstruction in the way of each nesting place they will eventually use the proper nests. Eggs laid on dry floor litter will be only very slightly soiled. The bottom of the nest is usually placed about 3 ft. above the concrete floor.
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Removing the Litter

At some time during the year, more usually when the new season’s pullets are approaching the lay, the deep litter house is cleared of stock and this is an appropriate time to remove all or part of the old litter. Sometimes the farmer has occasion to do this when the litter becomes extremely damp or when outbreaks of certain diseases or an infestation of internal parasites occurs. Most poultrymen prefer to remove all the litter when cleaning out time arrives, rather than leave a small quantity of the old litter to promote a quick build up of a micro-organism population in the new material. This is a judicious practice as it enables the farmer to thoroughly disinfect the buildings each year and the new stock is not exposed to any carry-over of harmful organisms.

If the fresh litter material is introduced during the summer there is no urgency for rapid decomposition to take place as the litter is easily managed at this time of the year. When only a shallow depth of litter is used at the start, the whole body of material soon decomposes and by winter time it should be in a highly absorbent condition.

CHEMICAL ANALYSIS OF DEEP LITTER

The fertiliser value of deep litter samples can be determined from chemical analysis but it would be impossible to give an average analysis which could be used as a general standard. Such variable factors as stocking rate, housing system, age of litter, and the method of management and treatment of the litter will all affect the levels of the various elements present. Obviously there is a greater accumulation of manure in the floor litter when the flock is intensively housed throughout the year than when the birds are provided with a run. Obviously too, the concentration of manure will be greater when less litter material is mixed with it. The management of the litter must also influence the retention or loss to the atmosphere of volatile substances such as ammonia. It was mentioned previously that the addition of superphosphate in preference to hydrated lime might reduce the escape of ammonia. If this were the case, both the nitrogen and phosphorus levels of the litter would be increased by the addition of superphosphate.

PERCENTAGE COMPOSITION OF TWO SAMPLES OF DEEP LITTER

<table>
<thead>
<tr>
<th></th>
<th>Sample 1</th>
<th>Sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture On Dry Basis</td>
<td>9.31</td>
<td>9.22</td>
</tr>
<tr>
<td>Organic matter</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td>Nitrogen (N)</td>
<td>1.69</td>
<td>2.01</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>2.80</td>
<td>4.24</td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>1.32</td>
<td>2.27</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>0.83</td>
<td>1.09</td>
</tr>
<tr>
<td>Ash insoluble in acid, mainly silica</td>
<td>32.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Total ash</td>
<td>45.5</td>
<td>39.5</td>
</tr>
</tbody>
</table>

The analyses show that Sample 2 contains considerably higher levels of N, P and K compared with Sample 1. The deep litter of Sample 2 was taken from a large intensive poultry house where the flock was permanently confined. Sample 1 was taken from a similar large poultry house but the birds were confined only when weather conditions did not favour allowing them out to run. The management and treatment of the two deep litters were not identical.

PRINCIPAL ELEMENTS OF DEEP LITTER

<table>
<thead>
<tr>
<th></th>
<th>Sample 3</th>
<th>Sample 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>2.12</td>
<td>1.77</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>3.09</td>
<td>2.58</td>
</tr>
<tr>
<td>Potassium</td>
<td>0.88</td>
<td>0.79</td>
</tr>
<tr>
<td>Calcium</td>
<td>2.85</td>
<td>2.64</td>
</tr>
<tr>
<td>Sulphur</td>
<td>0.22</td>
<td>0.18</td>
</tr>
<tr>
<td>Iron</td>
<td>0.28</td>
<td>0.58</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.37</td>
<td>0.34</td>
</tr>
</tbody>
</table>

The analyses show that deep litter contains moderate amounts of a wide range of the elements utilised by plants in addition to supplying a large quantity of organic material in a partly decomposed state.
Owing to the difficulties in standardising the fertiliser value of deep litter the product is generally sold at a uniform price which does not recompense those farmers producing samples of litter of superior fertiliser value. Both buyer and seller should give more consideration to the conditions under which the deep litter has been developed and relate this to the price of the product. In this way the farmer would be given an incentive to produce a high quality litter of considerable fertiliser value and would receive a greater remuneration. A mutual arrangement should exist between the poultry farmer and the purchaser of deep litter so that greater benefit can be derived from this valuable poultry by-product.

**THE USE OF LITTER IN THE BROODER HOUSE**

The majority of chickens in this State are brooded on the floor under a wide variety of brooding systems. Most brooder houses are provided with a concrete floor covered with 3 to 4 in. of clean dry litter material such as sawdust and buzzer chips. These are good insulating materials which absorb and retain heat from the brooder and mix with and assist in dissipating the moisture in the droppings.

Damp litter is even a greater hazard in the brooder house than in the laying quarters, and although there is not such a great accumulation of excreta on the floor, the brooder compartment generally holds a moist atmosphere and the litter tends to become damp in places underneath and around the brooder. Chickens camping on damp litter, with ammonia fumes being liberated, can suffer from chills and pneumonia, and although the birds may survive, growth may be seriously retarded. Furthermore, coccidiosis which is a very prevalent disease in chickens, thrives under moist conditions, and a quick build-up of the organisms responsible can cause irreparable damage. With a little care and attention to the condition of the litter, these risks can be minimised.

Firstly, only perfectly dry litter material should be used and this should be heated by the brooder for several hours prior to introducing the young chicks. Watering fonts should be placed on grids which stand on the cement floor for rigidity and the litter underneath should be removed so that any drops of water will spill on the cement floor. After the first two or three days, the litter underneath the brooder should be inspected and if there are signs of dampness or of droppings accumulating on the surface, a light application of hydrated lime to the litter, followed by forking-in, will maintain the litter in a dry state. It may be necessary to replace the damp litter underneath the brooder with dry material from another area of the compartment.

It should be emphasised that strict attention must be constantly directed to the condition of the litter during the brooding period. Although the brooder house must be kept comfortably warm and free from draughts, this does not preclude admitting adequate ventilation and sunlight on to the floor. Baffled ventilators, sections of louvres and "window-light" are invaluable for this purpose if placed in the correct position.

With respect to the rearing of chickens on old built-up litter carried over in the brooder house from year to year, this practice has gained prominence in the United States where all-the-year-round hatching
lends itself to this system of rearing. In this State with few exceptions, the litter is renewed with each new batch of chickens as this method is simpler and disease control is more certain.

Particular care in the management of deep litter and a thorough understanding of the way in which it functions is essential if the deep litter system is to operate successfully in the brooder house. If the farmer is unable to satisfy these conditions, it would be most unwise for him to take the risk of rearing a large number of chickens on deep litter. Many authorities maintain that chickens benefit considerably from old litter, claiming that it absorbs moisture more readily; it contains certain growth-promoting nutrients and it can be used to control the build-up of coccidiosis so that the chick acquires a gradual immunity against the disease early in its life. These claims can only be verified by controlled experiments, but from local observations there is reason to believe that deep litter under good management may assist in controlling heavy chick losses, caused by a sudden and heavy infection of coccidiosis. If this can be shown to be the case under local conditions, then more chickens will be reared on deep litter in the future.

Fig. 10.—Fertilising pasture paddocks with poultry deep litter. This photograph was taken in April by Mr. E. R. Bocquet on his property in the Albany district where he runs poultry, sheep and a few head of cattle. In the establishment and maintenance of high quality pastures, Mr. Bocquet considers that the deep litter from his poultry houses supplies practically all the fertiliser requirements of his soils. On the poorer sandy class of land, the application of deep litter has enabled him to develop outstanding pastures in a very short space of time. Mr. Bocquet uses the straw from his pastures as material for his deep litter.
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