



Litter management in poultry houses: An important issue in poultry production

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Litter means any bedding material which are used in the poultry to absorb moisture from droppings, to keep floor reasonably dry and clean, comfort of birds, and to provide insulation to the birds. An ideal litter material should release moisture quickly at the same time is should able to absorb the moisture of faeces and spilled water from the drinkers. Availability and type of litter varies from country to country. In every part of the world most common litter materials are chopped straw, paper mill by products, saw dust, wood shavings, sand, rice husk, sugar can pulp, sugarcane bagasse, oat hulls, corn cobs, ground corn cobs, dried leaves, coffee husk, peat moss etc. (Oliveira et al., 1975; Ghany et al., 1977). In Bangladesh, litters like rice husk, sawdust, chopped straw, sand ash etc. are used conventionally (Monira et al., 2004). Other materials like chopped rice straw, dried leaves, coffee husk though not good can be used in places where other good materials are not available (Rao, 1986). The litter material should be act as absorbent, soft, quick drying, devoid of sharp object and dust, non-cake forming, free from offensive odours and non-toxic to poultry. Many factors can influence ammonia volatilization from broiler rearing facilities such as season, ambient temperature and relative humidity, bird health and management practices (Coufal, 2005). For effective litter management and the reduction in NH₃ volatilization several Factors which must be taken into account are- air temperature, ventilation rate, humidity, age of the litter, litter pH, moisture content, litter temperature, and litter type (Elliott and Collins, 1982; Homidan et al., 1997 and Homidan et al. 1998).



It is also important that the litter age significantly affects N retention in the litter and, consequently, influences the N loss (Coufal *et al.*, 2006). The seasonality and correlation of ammonia concentration and ventilation rate become apparent with lower ammonia concentration and higher ventilation rate during warm summer conditions, while ammonia concentration tended to be higher during cold weather when low ventilation rates provided less fresh air dilution of ammonia (Wheeler *et al.*, 2006).

Good litter

Good litter material is essential for healthy flocks. Poultry birds are reared under different systems of housing among which deep litter system is the most prevalent. In this system chickens are kept on floor systems which are in direct contact with the litter. This can have a great impact on their performance. Efficient management will help in keeping it in good condition.

Litter material is a very important aspect in poultry growing, because birds are exposed directly to the litter and its contents such as microbes, moisture, ammonia, dust, odour, and texture from the first day of life till marketing. Litter should be managed properly otherwise there is a chance of the spread of certain infectious diseases leading to poor performance and ultimately economic losses. Condition of litter are associated with quality of litter material as well as other management problems.

Choice of good litter material

Good litter should possess the following properties

- It should be nontoxic to the birds
- It should free from mycotoxins
- It should be free of contaminants- like pesticides and metals
- It should absorb the moisture quickly
- It should have a reasonably short drying time
- It should have reduced thermal conductivity
- It should be suitable for use as soil fertilizer after being used as bedding material
- It should be easily available at cheaper cost round the year.

There are various types of litter materials commonly used for rearing of poultry such as rice husk, sawdust, pine shavings, hardwood shavings, pine or hardwood chips, peanut hulls, sand, crushed corn cobs, chopped straw, hay, or corn Stover, tree leaves, processed paper etc. These materials are usually used depending upon their availability and cost.

**Factors affecting litter condition:**

There are many factors responsible for maintenance of litter condition used in poultry farms. Some of the factors are discussed below.

1. Type of Housing

Birds reared in concrete floors is easier to clean and thereby better sanitation and hygiene can be maintained. In this housing systems performance of the bird is better and mortality is also less. On the other hand, those houses with earthen floors are very problematic to deal with. Disinfection after depopulation and removal of used wet litter with cake formation may be unsuccessful procedure, as the infectious residue and organic matters may remain adhered in the floor which will become a potent source of infection for the newly arrived chicks.

Wet litter problem in some houses constructed with locally available materials are associated with leakage in the roofs. Houses without proper insulation in the roof can cause to condensation which drips on the litter

2. Ventilation:

Houses with improper ventilation or without cross ventilation may also lead to wet litter problems as the stale air will remain inside the house. The poultry house should have adequate ventilation so that fresh airs are available all times to the birds otherwise there is chances of diseases. Less ventilation causes wet litter problem and problems of coccidiosis.

3. Temperature and humidity

When the in-house temperature is high along with high humidity then water vapour absorbed into the litter and cannot escape from the house. In that situation, mould and bacterial growth is enhanced leading to occurrence of diseases. High temperature and humidity, along with poor ventilation may also lead to ammonia build-up in the house. If the ammonia level exceeds 25ppm then it is unpleasant for workers and the birds. In severe cases, ammonia build-up will contribute to various disease problems such as coccidiosis, breast blisters, ammonia burns, and respiratory infections.

4. Type of Feed ingredients

Presence of Certain feed ingredients contains more fibre such as wheat bran, sesame cake, or corn grains, all of which are a laxative contributing to production of wet or badly smelling droppings. These type of ingredients should be mixed with other ingredients for proper balancing of the diet to



relieve such physiological effects on poultry. Sometimes feed I is to be spread on the litter which will helps to encourage birds to scratch the wet litter and break the cakes.

5. Feed energy level

When dietary energy increases, litter moisture decreases and the quality improves and this helps alleviate incidence of footpad dermatitis, paw lesions and other health problems. The reduced litter moisture and litter quality improvement with increased energy could reduce footpad dermatitis as seen by Kenny et al. (2010).

6. Mineral and salt level

Excessive certain dietary mineral and salt intake has been shown to increase water intake and excreta moisture which ultimately causes wet litter problems. Excessive dietary mineral intake has been shown to increase excreta moisture and water intake (Johnson and Karunajeewa, 1985).

7. Physical form and feeding system

Birds fed with pellets resulted in higher litter moisture and poorer litter quality than those fed with fines or mash feed. It is possible that the feed intake on pellets was higher, resulting in higher water intake. Feed restriction also results in higher moisture level and poorer litter quality as water intake was stimulated in this case because birds felt unsatisfied during feed restriction.

How to keep litter material in good condition.

1. Physical treatment

Litter material should be given UV treatment only before arrival of chicks, in order to avoid any adverse effects on health or activities of birds. The ultraviolet/short wave light operating at 400 nm per m² of the house area can be used which is effective against a wide range of bacteria and fungi.

2. Use of chemicals

Formalin could be used @ 3% against microbes which break down nitrogenous compounds in faeces and urine and release ammonia. Addition of formalin reduces the microbial population in the litter and also reduced the ammonia level. Acidification can improve litter quality and hence improves performance of chickens.

Mineral compounds such as lignite (a compound containing Fe₂O₃, SO₃, P₂O₅, Mn₃O₃, Al₂O₃, MgO, CaO, and SiO₂) could also be used to improve litter conditions.



3. Stocking density

The density becomes too high a birds grow older for the quantity of litter, resulting in a greater build-up of water admixed with nitrogenous products. Overcrowding also reduces scratching rates causing detrimental effects on the litter. Bird also gets vitamin B complex from scratching litter. The proper stocking density and thickness of litter should be maintained to keep the litter condition ideal.

Different litter material

Paddy husk

Paddy husk are readily available in almost every part of the country, and birds have performed well when paddy husk are used as bedding material. Paddy husk typically are free from excessive dust, and their size, thermal conductivity, and drying rate make them a good choice for bedding material. Paddy husk can be used alone or in combination with pine shavings.

Wood Shavings

Wood shavings from a softwood served as good source of litter material. But, this material has become expensive to use as litter in poultry rearing due to its increase in demand. Wood shavings now are being used to make fiber board, paper, and cardboard and to supply the horticulture industry with pots, compost, and mulch.

Sawdust

Saw dust is a good litter material for raising birds. Young birds can take sawdust as feed and choking problem may arises. Turkeys are even more prone to litter consumption than chickens, making sawdust a less desirable choice for litter in turkey housing.

Pine Straw

Pine straw are prone to cake formation. So, it was found to be a poor choice for bedding/litter material

Paper By-Products

Shredded paper can be used as an alternative litter material; however, it has a tendency to compact and cake formation during the first two weeks of use which reduces its efficacy. Old newspapers should be used, if required because some printing inks are toxic until thoroughly dried.

**Peanut Hulls**

Peanut hulls have been successfully used by broiler growers in some parts of the country, primarily in the Southeast, where peanuts are grown. However, aspergillosis is always a concern when peanuts are involved.

Ground Corncobs

Corncobs are popular in areas where large amounts of corn are produced. The corncobs must be cut, and pieces should be no larger than the size of a garden pea. If the pieces are too long, breast blisters can become a problem. Corncobs have a high capacity to absorb moisture, but wet cobs also form Mold.

Chopped Straw

Chopped straw is most commonly used as bedding material in cereal-producing countries. Wheat straw is most commonly used as a litter material. Straw is difficult to manage and is prone to caking. If straw is used, it should be chopped to one inch or less. Straw from ryegrass, perennial ryegrass, orchard grass etc. Can be chopped less than one inch size for using as bedding material. Straw is cheaper compared to other materials.

Sand

Sand can be used as a bedding material in commercial broiler houses. Some research has shown that broilers raised on sand performed as well as or better than those raised on pine wood shavings. Footpad quality also was improved. The houses where sand is being used as bedding has less dust, less caking, and improved house temperatures.

Leaves

Some small flock producers have used fallen tree leaves successfully as a seasonal bedding material for poultry production.

Conclusion

Many factors affect litter moisture in practice, including management and housing, disease and health status and nutrition. The nutritional factors, such as energy, balanced protein, mineral contents, feed form and feed physical quality, and feed restriction, have a substantial influence on litter moisture content and litter quality. Litter moisture significantly contributed to poor litter conditions and footpad dermatitis, which leads to welfare issues. Controlling litter moisture to



improve in-house environment is essential to improve broiler performance and nutrition has role to play in terms of improving litter conditions.

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