

LITTER MANAGEMENT PRACTICE IN POULTRY INDUSTRY FOR BETTER GROWTH AND DEVELOPMENT OF BIRDS- A REVIEW

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Article Received on
17 Nov. 2016,

Revised on 08 Dec. 2016,
Accepted on 29 Dec. 2016

DOI: 10.20959/wjpr201701-7660

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ABSTRACT

Poultry litter constitutes one of the animal wastes that are produced in large quantity. Excessive applications of nutrients, however, can create environmental risks to water and air resources. Therefore litter management, becomes an important issue. The welfare of poultry and litter condition are closely linked. Many factors affect the condition of poultry litter. Any factors that increase litter moisture are likely to affect the birds' welfare adversely. Higher moisture means higher ammonia production and that can lead to problems with bird health as increased intake of ammonia will increase stress on the bird.

KEYWORDS: Ammonia, litter, Moisture, Management, Poultry.

INTRODUCTION

The poultry industry is one of the largest and fastest growing agro-based industries in the world. The poultry industry is currently facing a number of environmental problems due to accumulation of large amount of wastes, especially manure and litter, generated by intensive production. There is a need for waste management systems that make animal operations economically practical and eco-friendly which ensures higher profit to owners, recycling and sustainable use of nutrients with mitigation of environmental impacts^[1] Proper handling and storage of poultry litter is essential to preserve its nutrient value and prevent contamination of surface and ground water particularly when the litter cannot be directly applied to cultivated land.

Litter is defined as the bedding material that covers the facility floor, such as pine wood chips or rice hulls, with deposits of feces, feathers, spilled feed and water.^[2] Most of the poultry

litter is from broiler production. The litter may be from one crop of broilers or accumulated over several crops of birds. The quantity of poultry litter produced in a broiler unit depends on the litter (i.e. bedding material) management, and feed intake and its digestibility. The litter usually contains 20 to 25% moisture but it range from 30-70% moisture. When the litter is too dry (<30%), dust conditions may persist in the pen and birds' suffer from respiratory problems. If the litter material moisture exceed 70% moisture than it becomes an ideal environment for microorganisms to grow and multiply, increasing the possibility of pathogen exposure to the birds. Higher moisture also effect the bird health by ammonia production and that can lead to stress on the birds. As high ammonia levels can affect the bird physically as well in their upper respiratory tract, eye lesions from ammonia burn and the possibility of carcass quality being compromised.^[3] Excess moisture in the litter increases the incidence of breast blisters, pododermatitis, hock burn, soiled feathers, skin bums, scabby areas, bruising, and breast blisters or blisters and makes the litter more susceptible to mold growth.

For the effective managements of litter it is necessary to know actually how litters get moistened. In poultry industry litters get moistened in several ways, important ways are as follows:

- By release of moisture from bird's bodies through breathing and fecal discharge - about 20 percent of the water consumed is used for growth; most of it eventually reaches the litter as manure. So, the main input of water to the litter is via excreta, which is high in moisture and N^[4]
- Moisture is also added to the pen through the feed, as it normally contains about 10% moisture.
- Waterlines can introduce excess moisture into the pen through leaks, improper drinker height.
- Poor building maintenance with leaky roofs or openings where rain/water can enter add moisture to the poultry pen litter.

Good Litter Management Practices

Proper and periodic removal of caked litter

Caked litter must be removed at periodic interval with a housekeeping machine between flocks. The caked portion of the litter is very high in moisture and nitrogen content, so it is very important to get rid of it and must be removed from the house, as we know ammonia is

produced by microbial breakdown of fecal material in the litter and higher moisture levels result in higher ammonia production.

Types of Litter Material and its Depth

Selection of litter material is very important to control the moisture in poultry shed. How fast a litter material to absorb and release moisture is the key property in litter material and on this basis it is being ranked. Like softwood shavings that easily absorb moisture but also easily dissipates it into the open air as air moves across it. The most commonly used alternative is chopped straw. Litter should be of adequate depth for dilution of the poultry droppings and will provide sufficient moisture absorbing capacity. Irrespective of fresh or reused, it should be of three to four inches in depth throughout the house for proper moisture control and comfort to birds.

Proper air Change Rate

Change of air inside the poultry house is very important; an effective approach to maintain a proper litter moisture level, a minimum ventilation rate needs to be maintained which is 1 cfm/lb or 3.8m³/hr/kg. There should be gradual increase in minimum ventilation rate as the bird size increases. In most ventilation systems, there are a number of stages or series of fans that are turned on as pen temperature increases. The ventilation rate must always be maintained at a level sufficient to ensure that ammonia does not approach the threshold level of 25ppm.

Ventilation system

Improper and inadequate ventilation adversely affects the humidity of the poultry house. By maintaining relative humidity (RH) between 50-70% will maintain litter moisture at 25-30% and nominal amount of ammonia will be produced. However, once relative humidity crosses above 70%, litter moisture tends to rise and also increases ammonia generation.

Use of litter amendments

It falls into three categories: 1) acidifying agents that lower litter pH and thereby inhibit the bacteria that transforms manure nitrogen into ammonia, NH₃ volatilization can be reduced when the litter pH falls below 7.^[5] 2) clay-based products that absorb odors and reduce ammonia release by absorbing moisture, and 3) products that act by inhibiting microbial growth and enzyme production through competitive exclusion and enzyme inhibition. The majority of commercially available litter materials are after acidifying, which kills many

microorganisms and reduces ammonia emissions. Aluminum sulfate (alum) is added to poultry litter to precipitate soluble phosphorus, reduce ammonia emissions from poultry litter and also reduce the number of pathogens in litter. This acid converts ammonia to ammonium, which is not subject to volatilization and also help in reduction of litter pH. Alum is used as a cost-effective means to reduce ammonia volatilization from poultry litter in poultry houses^[6]

Maintenance of drinker line

Good management of the drinking water system is the best way to reduce the amount of caked litter formed. It is essential for drinkers to be at the optimum height for the birds. Closed system drinkers are the most efficient method of reducing cake production. Proper attention to watering system and regular nipple replacement as and when required will save water, improve production, reduce the ammonia production and the amount of caked litter formed. Installation of pressure regulators, water filter to valve clogs and proper leveling of waterer will further help in maintaining the moisture content in poultry shed.

Maintenance of proper stocking density

With intensive production system more number of birds raised per unit areas for better economic returns but by increasing stocking density of broilers income per bird often decreases primarily due to reduction in growth rate and increased proportion of low quality carcasses. Increased stocking density hampers the evaporation of moisture from litter consequently there is increases in temperature, humidity, and ammonia levels within the poultry house. So, stocking density changing from 10 to 17birds/m² is ideal to maintain the microbial loads in the litter samples within normal limits for better performance of broilers.

Feeding management

The feed we offered to birds also affects the moisture content in litter and affects the quality^[7]. Certain dietary ingredients (especially salt), when fed in excess, cause broilers to consume and excrete large amounts of water and result in wet litter conditions. A high dietary protein content^[7] or insoluble fibers in the diet, which can have a high water binding capacity in the GIT, can increase the water content of droppings. Poor quality dietary fat or rancid fat can lead to wet fecal droppings. Likewise, using feed ingredients such as wheat, barley, rye or cassava (tapioca or yucca) will often result in excessively wet droppings.

Reduce Litter Production

A partial cleanout between flocks that removes only caked material^[8] will substantially reduce the volume of litter that has to be handled, compared to a complete cleanout each time. Once-a-year total cleanouts are adequate for good production.

Direct Application to Fields

The most efficient method of handling poultry litter is to directly apply it to fields as it is being removed from the house. This reduces labor, expense and potential environmental problems. Apply poultry litter in amounts needed to supply the nutrient needs of the crop to be grown which lessens the risk for environmental contamination when these materials are applied to land.

Continually stir or replaced litter

Once the moisture contents increases the litter is allowed to become “sealed” and sealed litter is often referred as “caked.” This type of litter creates a physical barrier for the release of ammonia. So, Periodic removal of this “cake” litter between flocks remove excessive moisture and manure out of the house which, has benefit of reducing in-house ammonia release. It also promotes bird health and limit manure buildup^[8]

Others measures

Properly operate evaporative cooling pads, and prevent condensation on interior surfaces (walls, ceilings, and equipment).

CONCLUSION

In the broiler house, litter serves to absorb moisture, dilute fecal material, and provide insulation and cushion between the birds and the floor. Because birds are in constant contact with litter, litter conditions will significantly influence bird's performance and ultimately the profits of producers and integrators. Maintaining moisture levels of poultry house litter in the proper range is essential if the production potential of the flock is to be realized with prior planning and good management, the nutrient value of litter can be preserved and contamination of surface and ground water can be prevented with a minimum of added expense. Producers should choose what fits best in their situation and protects the environment. Currently, poultry integrator nutritionists are working on feeding strategies to reduce nitrogen excretion from litter.

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