

## LITTER MATERIALS IN BROILER BREEDING AND THEIR IMPORTANCE

Serkan Yazarel<sup>1</sup>, Sedat Karaman<sup>1\*</sup>, Zeki Gokalp<sup>2</sup>

<sup>1</sup> Gaziosmanpasa University Agricultural Faculty Biosystems Engineering Department, Tokat, Turkey

<sup>2</sup> Erciyes University Agricultural Faculty Biosystems Engineering Department, Kayseri, Turkey



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### Abstract

*The welfare and health of the animals that are grown are an important issue and they have a direct effect on their performance. In studies conducted with the use of insufficient litter may occur with diseases; effects of materials such as herbal, wood, soil and recycled products on the performance of litter were investigated. The broiler produces 153 grams of fertilizer per kilogram of weight during the growing period. The negative effects of the manure produced on the animal health by the litter used is partly important in terms of animal health and performance. Therefore, litter management is an important issue in aquaculture. Used bedding materials are a problem for the environment. For this reason, it is necessary to reuse the used substrates by various operations and to manage this process in a suitable way. Problems with the negative environmental effects of the materials that have completed the process of use as a base are emerging. There are problems with the negative environmental effects of the materials that have completed the expected life of them. In addition, litter transmutation and new litter costs create an output for the grower. After transmutations, expected life of idle litter; was informed about the possibilities of use as farm manure.*

*Keywords: broiler breeding, litter materials, poultry house.*

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### 1. INTRODUCTION

Animals are highly affected by environmental factors in broiler breeding. Negative environmental conditions affect animal welfare, therefore affect the feed consumption values of animals, quality of meat produced and production quantities. In animal welfare controls in Europe, foot, elbow, knee and chest burns and wounds are often used as an indicator of shelter conditions and general welfare of broiler chickens (Haslam et al., 2007).

The pollutants such as ammonia, moisture and dust in the environment affect animal health significantly, resulting in a decrease in meat quality and quantity, and an increase in morbidity and mortality in animals. In broiler breeding, litter materials have a small share of input in terms of production, but they play an important role in animal welfare, health and development. These materials, which are in direct contact with the animals, should be able to maintain the appropriate levels of heat, moisture, microorganism activities and ammonia due to animal faeces (Aksit et al., 2000).

Utilized litter materials cause significant environmental problems due to storage away from the farm, pollutants such as ammonia content and cause additional production inputs. For this reason, reuse of litter materials or as a by-product in other agricultural and industrial activities is an important issue. Reuse of litter is often seen in broiler breeding. According to the study conducted

by Kaygısız and Çörekçi (2003), reuse of the same zeolite-based litter in broiler production had no negative effect on broiler performance. According to Sarıca and Çam (1998), the second use of sawdust, husk, slag, stalk and mixtures used as litter did not adversely affect broiler development. Litter which is cannot be used in broiler breeding, can also be used as farm manure. Fertilizer is an important input in crop production. In today's agriculture, fertilizer should be used in order to obtain high and quality yield. As a result of the use of fertilizers which are produced as a waste material in broiler farms can be used in plant breeding, the effect of pollutants such as ammonia on the environment and human health will be reduced and it will cause the production cost to decrease due to the use in plant production. According to a study conducted by Yüksel (2006), it was determined that a compost produced from chicken manure had a high impact on the growth and development of clover and onion plants. As a result of using litter material directly as fertilizer, it has negative effects such as burning in plants (Yenilmez et al., 2012). Therefore, farm fertilizers should be kept aside for a while and matured.

Chicken manure contains feces, feathers, litter material and feeds with high mineral and protein content. After the microorganism activities in the fertilizer are prevented by sterilization and pasteurization processes, they can be used as additives to the rations provided that they are carefully balanced (Daniel and Olson, 2005).

According to TUIK data, in Turkey in 2018, about 230 million units of broiler were grown in broiler farms. Each animal produces 0.022 tons of fertilizer per year and considering the number of animals, approximately 5 million tons of fertilizer is released. It is known that under suitable conditions, 78 m<sup>3</sup> of biogas can be produced per ton of fertilizer (Figure 1). Considering the amount of fertilizer released and biogas production per ton, approximately 400 million m<sup>3</sup> of biogas can be calculated for 2018 (Koçer et al., 2006; Anonymous, 2018).

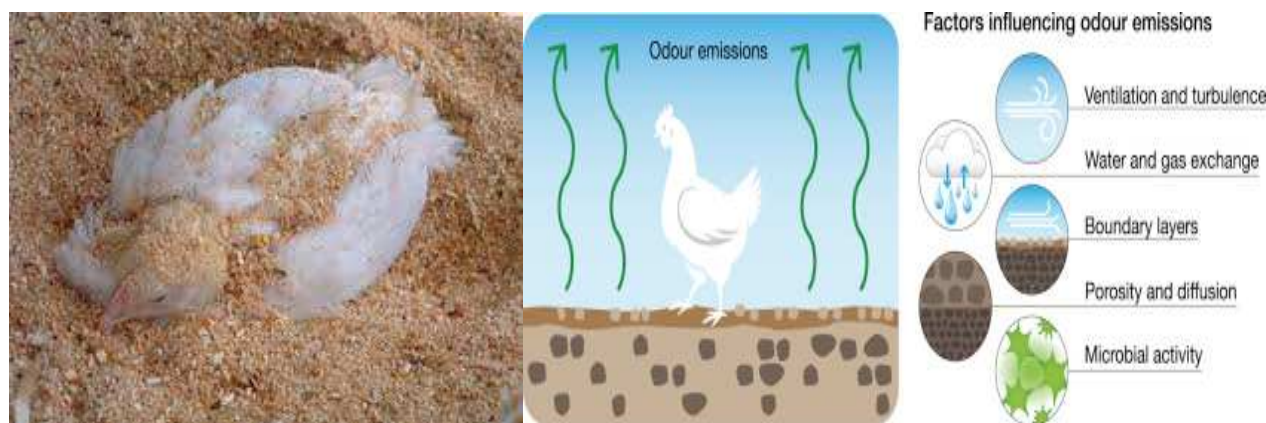


Figure 1. Poultry litter (source: <http://www.poultryhub.org/>)

## 2. THE LITTER MATERIALS USED in BROILER BREEDING and THEIR IMPORTANCE

The mats used in broiler production are generally classified under 4 main headings. These are wood-based materials such as soft and hard chip shavings, shells; materials such as paddy husks, stalks, straw, safflower, as a by-product of plant production, diatomite, zeolite, clay, pumice, soil-based materials and foam, and paper industry wastes are used (Figure 2). A wide variety of studies have been carried out on the substrates and mixtures, in which one or more kinds of materials have been applied raw or mixed with the other materials and applied in different thicknesses. Although sawdust is the most commonly used material in general, studies have shifted to other materials that

may be an alternative to sawdust due to the difficulty of reaching it especially during the winter months.



Figure 2. Different bedding materials used in poultry houses (Source: <https://www.farmingmagazine.com/livestock/poultry-bedding-options/>)

The litter used has a direct impact on animal welfare, thus yield. Moisture content should be between 20–25%, pH should be between 8–10 and ammonia content should not exceed 25 ppm (Gençoğlan and Gençoğlan, 2017). The high amount of moisture causes the ammonia and pH values in the environment to increase, skin fires in broilers, water collection and diseases that directly affect the yield and quality of the animal welfare (Sözcü and Koyuncu, 2015). Dehydration occurs in chicks if moisture goes down. If it increases, the humidity of the air inside the shelter increases and the insulation property of the litter is deteriorated (Figure 3). In addition, the moisture content of the litter; hair growth rate, growth, feed utilization, coccidiosis control and affect the level of ammonia in the shelter (Bessei, 2006).

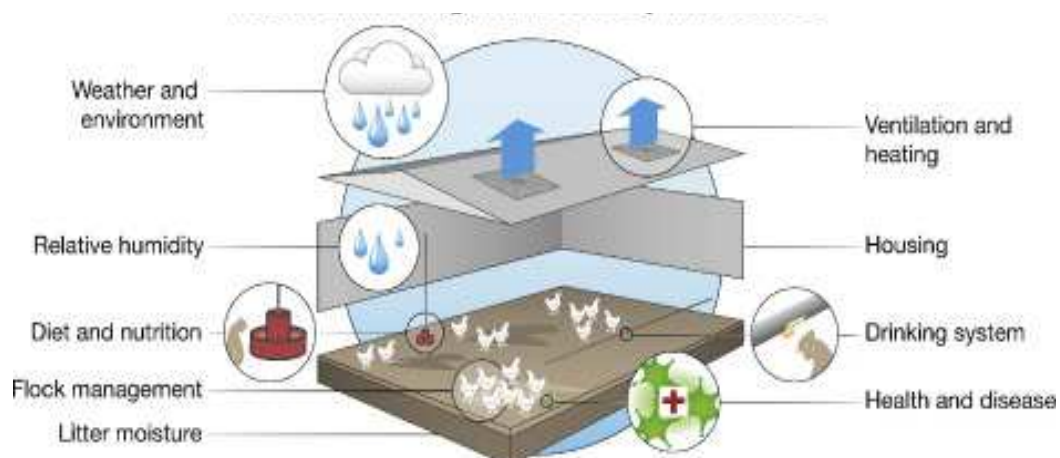


Figure 3. Factors influencing and affected by litter wetness (Dunlop et al., 2016)

### 3. SOME DISEASES ENCOUNTERED in THE USE OF POOR QUALITY LITTER MATERIALS

*Foodpad dermatitis and Hock burns:* Footpad dermatitis and jaw burn lesions are a form of contact dermatitis, which is a condition in which the skin areas come into contact with inappropriate or irritating material. Contact dermatitis is a common problem that reduces the welfare of broilers and is believed to affect broilers (Kaukonen et al., 2016).

*Breast blisters:* Cystic and the cyst is usually filled with a clear, clear liquid with dark color in advanced cases. It is a disease that affects carcass structure and quality (Figure 4) (May and Cox, 1970).

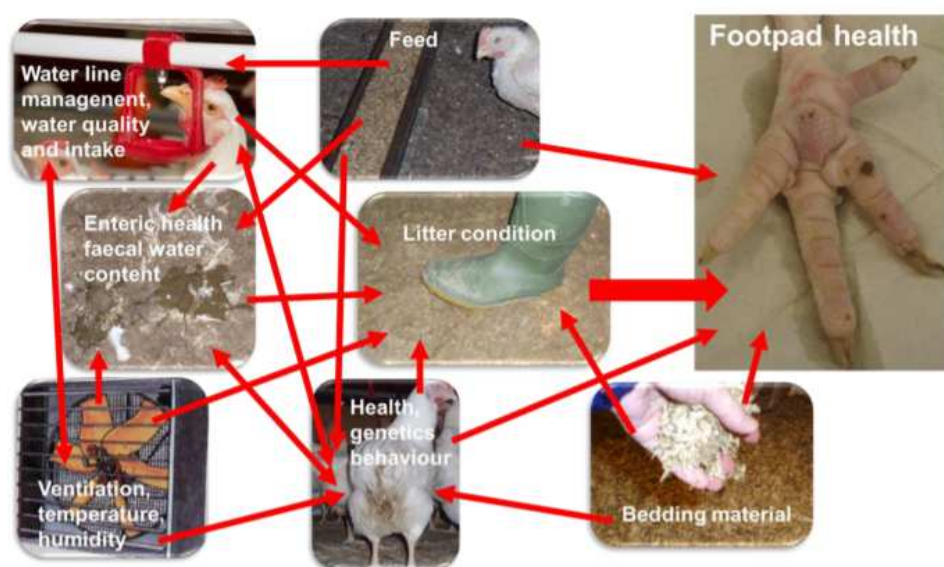


Figure 4. Poultry litter-induced diseases (Source: <http://www.poultryhub.org/causes-wet-litter/>)

### 4. POSSIBILITY OF REUSE OF LITTER MATERIALS

In various studies, it was stated that the litter materials can be reused by drying. According to the study conducted by Kaygsız and Çörekçi (2003), reuse of the same pad with zeolite added in broiler production did not have a negative effect on broiler performance. It was determined that the number of use did not adversely affect broiler development. According to the study conducted by Şekercioğlu et al. (2013), litter materials can be used 5 times and their performance decreases in subsequent uses.

Factors such as harmful gases and moisture released during broiler production are problems for human and animal health both inside and outside the shelter. While it has a direct impact on animal health and welfare within the shelter, its faulty storage also affects human health due to insufficient storage facilities. Due to insufficient storage of fertilizers, liquid precipitations and infiltration in the fertilizers mix with the groundwater and prevent the usability of the water. As a result of faulty storage of gubs, ammonia gas is transported by factors such as wind and affects human health and welfare. In addition, due to inadequate and faulty use in crop production, it disrupts the structure of the soil and can make it unfit for crop production (Karaman, 2006; Yenilmez et al., 2012).

Chicken manure contains all the necessary nutrients such as potassium, calcium, magnesium, copper and zinc, and especially nitrogen, phosphorus and organic matter more than other fertilizers (Mızrak, 2016). Under natural conditions, fertilizer loses useful nutrients for 8-24 months and during this transformation adversely affects human, plant and animal health, pollutes underground and surface waters and disrupts soil structure. Fresh fertilizers should be turned into suitable fertilizers for vegetative production without exposing them and subjecting the organic substances to the composting process in a fast-controlled manner (Figure 5) (Kütük, 2013).

The need for energy in the world increases in parallel with the increasing population. Alternative and cleaner sources are needed due to the harmful substances released by the use of fossil fuels and the limitation of their reserves. One of these sources is biogas, which is a renewable energy source. According to data for 2018 broiler manure originating in Turkey from about 400 million m<sup>3</sup> of biogas produced. Considering that 4.70 kWh of energy can be generated from 1 m<sup>3</sup> of biogas, a total of 1880 million kWh, 6 768 000 GJ of energy can be generated. According to a survey conducted by TEIAS in 2011, the annual average electricity consumption of a family of 4 people was calculated as 3036 kWh (Anonymous, 2011).



Figure 5. Poultry litter composting and biogas production (Source: <https://beacs.org/>)

## 5. CONCLUSION

As a result, in broiler production, mat types and usage is an important input, but the end-of-life materials are of great importance. Although these end-of-life materials are considered as waste in broiler production, they are important as a by-product and main product for other animal production types, plant production and biogas production. Poultry litter can be turned into a valuable source of organic matter in agricultural soils through composting. In light of these data, the annual energy needs of approximately 620,000 households can be met by using broiler manure as biogas.

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