Factors Affecting Floor/Litter Quality

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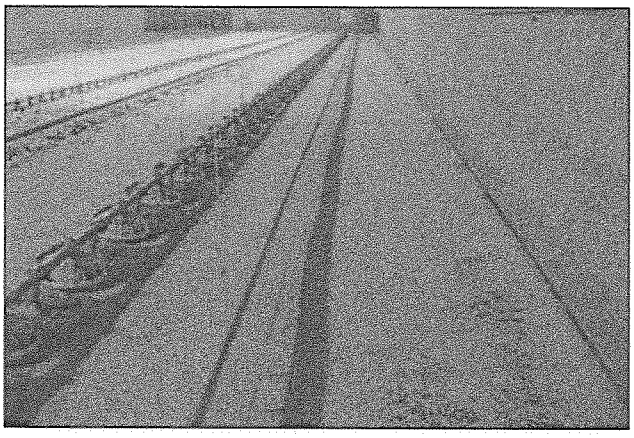


Figure 1. Inadequate litter depth next to sidewall.

A common observation in many broiler houses is the variation in litter quality throughout the building. Usually most people correctly identify this as a ventilation issue. It is possible that with improper inlet management during minimum ventilation that litter quality along the sidewalls is not as good as that in the middle of the house. However, recently several situations have been observed where ventilation is being properly maintained but litter quality is still varied throughout the house.

Why maintain good litter quality?

When poultry producers discuss litter quality is usually in the context of moisture content. As the moisture builds up, caked litter results. Litter quality directly affects poultry performance in a variety of ways. As litter quality deteriorates, it makes a better environment for the bacteria that break down the uric acid resulting in increased ammonia production. Ammonia has been shown to negatively affect growth, feed conversion, and disease susceptibility. Increased moisture in the litter has been associated with increased incidence and severity of breast blisters, dermatitis and foot pad dermatitis.

What is considered good litter quality?

Good quality litter will have litter moisture between 28-30%. When this litter is picked up by hand and squeezed, it will not stick into a ball in the palm of the hand but break back apart. Litter that is too moist will remain a ball when squeezed. Typically the floor will have less than 35% of the surface area as caked litter, with most of it being located under the feed and water lines. Below are factors that will have influence litter quality.

Litter Depth

The primary function of bedding material is to act like a sponge and absorb moisture. It also serves as an insulator from the cool floor, dilutes fecal material and provides some cushion for walking. As broiler houses get wider the uniform distribution of litter material becomes more difficult. A frequent sight found in many houses today is adequate litter depth in the middle of the house with 3-4 inches (7.5-10 cm) but only 1-2 inches (2-5 cm) along the sidewall (Figure 1). In short the "sponge" along the sidewalls is about half the size of the "sponge" in the middle of the house. This frequently results in litter that is wetter and cakes more often along the sides of the house while the middle of the house is able to maintain adequate litter quality throughout the flock with good management. In these cases, increasing or changing ventilation will not solve the moisture problem.

Figure 2 shows that litter depth in these houses were 1.50, 2.25 and 1.00 inches at the north, middle and south sides of the house respectively. The insulation required for adequate moisture absorption is marginal at best in this example. However, moisture is only going to be one issue that is going to be a concern at chick placement. The areas of the floor that have less litter depth also have less insulation and as a result will be cooler. Chicks are not able to maintain their own body temperature until around 10-14 days of age. The floors in this house were 5.5 F cooler at the side wall than in the middle of the house (Figure 3).

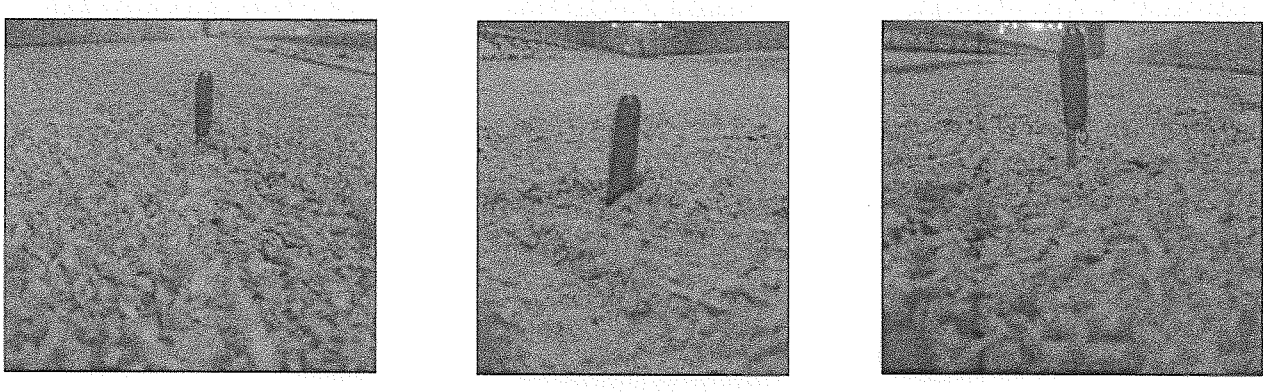


Figure 2. Litter depth of the north, middle and south areas of a 46 x 500' broiler house

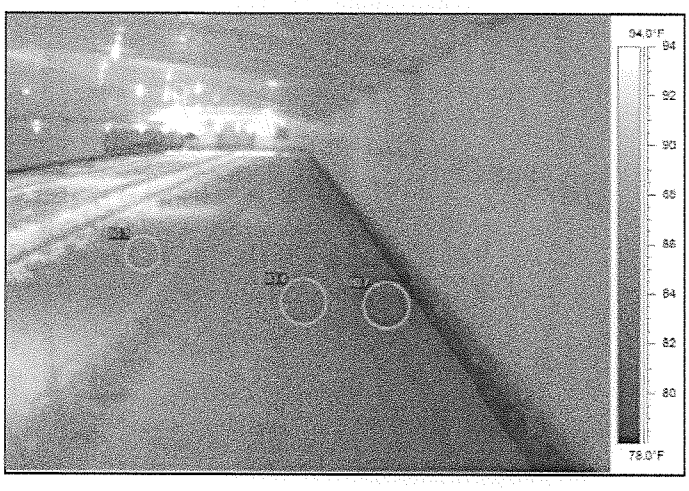


Figure 3. Litter depth is less at the sidewall resulting in cooler floor temperatures.

Litter type

Many materials have been used for bedding material in poultry facilities. However, they differ in their moisture holding capacity. Table 1 has a number of materials that have been used as bedding materials and their moisture holding potential. Typically, materials with smaller particle sizes hold up better because they not only absorb moisture, but are able to dry out well. Materials with lower moisture holding capacity will need to be applied to the poultry house in larger volumes.

Table 1. Moisture absorption of several bedding materials.

Litter Type	Initial Moisture (%)	Total Moisture Capacity (%)
Fresh shavings	15.3	194
Used shavings	21.4	168
Rice hulls	9.9	105
Peanut hulls	14.3	175
Gypsum w/ paper	11.2	121
Gypsusm w/o paper	9.3	40
Saw dust	5.0	197
Chopped wheat straw	9.9	298
Peat moss	41.7	318

Bird density

Controlling moisture successfully in a poultry house assumes that the birds are evenly distributed throughout the house. If 60% of the birds are in the front, and 40% are in the back, then 60% of the moisture is being deposited in same square area in the front as the 40% in the back. Odds are the litter type and depth are the same throughout the house and as a result, the front of the house will become wet more quickly that the rear of the house.

While ventilation is the main influence in controlling moisture, it assumes that the factors discussed above are consistent throughout the house. House should be ventilated to maintain relative humidity (RH) between 50-70%. It is not necessary to operate the house environmental controller off of RH, but a sensor or hygrometer is sufficient. Checking the RH when entering the house to check on birds and making ventilation adjustments when readings start to approach 70% will help to remove moisture and maintain adequate floor quality.

Additional Sources (these and more can be found at www.poultryventilation.com)

Monitoring litter moisture
http://www.poultryventilation.com/tips/vol23/n3
Improved growth rates can make it difficult to control litter moisture http://www.poultryventilation.com/tips/vol22/n11
The relationship between litter moisture and foot pad dermatitis
http://www.poultryventilation.com/tips/vol22/n6
Air leakage and litter caking
http://www.poultryventilation.com/tips/vol16/n13
Controlling litter moisture
http://www.poultryventilation.com/tips/vol9/n12
Simple chart to help determine minimum ventilation rates
http://www.poultryventilation.com/tips/vol23/n12