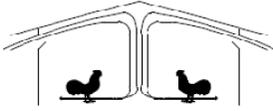




The University of Georgia

College of Agricultural and Environmental Sciences
Cooperative Extension



Poultry Housing Tips

The Relationship between Litter Moisture and Foot Pad Dermatitis

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Footpad dermatitis (FPD) is a condition affecting broilers and turkeys and is known by a variety of names including pododermatitis and contact dermatitis. This condition is characterized by inflammation and necrotic lesions on the plantar surface of the footpads and toes. Deep ulcers may lead to abscesses and thickening of underlying tissues and structures. Prior to the mid 1980's, chicken paws were of little economic value, and were rendered with feathers, blood, and other offal portions of the chicken. Rendering prices for these by-products were roughly \$0.01/lb in the mid 1990's.

In the past few years, chicken paw prices have skyrocketed due to an insatiable export demand for high quality paws, turning paws into the third most economically important part of the chicken behind the breast and wings. In 2009, the USA exported 421,000 tons (928,000,000 lbs) of chicken paws to China alone, worth about \$280,000,000. The state of Georgia exported nearly \$75,000,000 worth of paws. However, this is roughly only 40-50% of the paws that actually come into processing plants. It has been estimated that the USA poultry industry loses roughly \$250-300 million and the Georgia poultry industry loses roughly \$75-100 million annually from this product loss. The paws are condemned for a variety of reasons, some of which are from condemned carcasses, plant machinery mutilations, but most

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commonly from FPD. Roughly 99% of the downgraded and condemned paws are a result of FPD lesions.

The lesions attributed to FPD are a concern to the poultry industry as a source of product downgrades, food safety, and also as an animal welfare issue. Paw quality has been used for years in Europe as an indicator of bird welfare and has now become part of voluntary audits in the USA. Issues with food safety may arise from secondary bacterial infections in these lesions. The lesions could also serve as a portal of entry for *Staphylococcus aureus* and other microorganisms. Improving foot health not only provides opportunity for increased profit from more exportable chicken paws, but also ensures that the poultry industry continues to meet animal welfare standards that have been established.

Research in this area is extensive and goes back to the early 1940's. Early research looked at nutritional deficiencies such as biotin, riboflavin, and sulfur amino acids. However, the dermatitis produced from these deficiencies most likely is not the same dermatitis being observed today. Research branched from that early work to other areas of nutrition, environment, and genetic selection. Current work at UGA has focused on environmental factors, specifically looking at the relationship between litter moisture, litter depth, and subsequent paw quality. There has been contradicting results from previous research with litter depth and paw quality. Some report better paw quality with deeper litter and while others indicate less FPD with shallow depths. Data collected at UGA has shown that as the depth of litter increased, litter moisture decreased, and paw quality improved. Figures 1 and 2 show litter depth's effect on litter moisture and foot pad scores.

Figure 1 Litter Moisture (%) Day 42

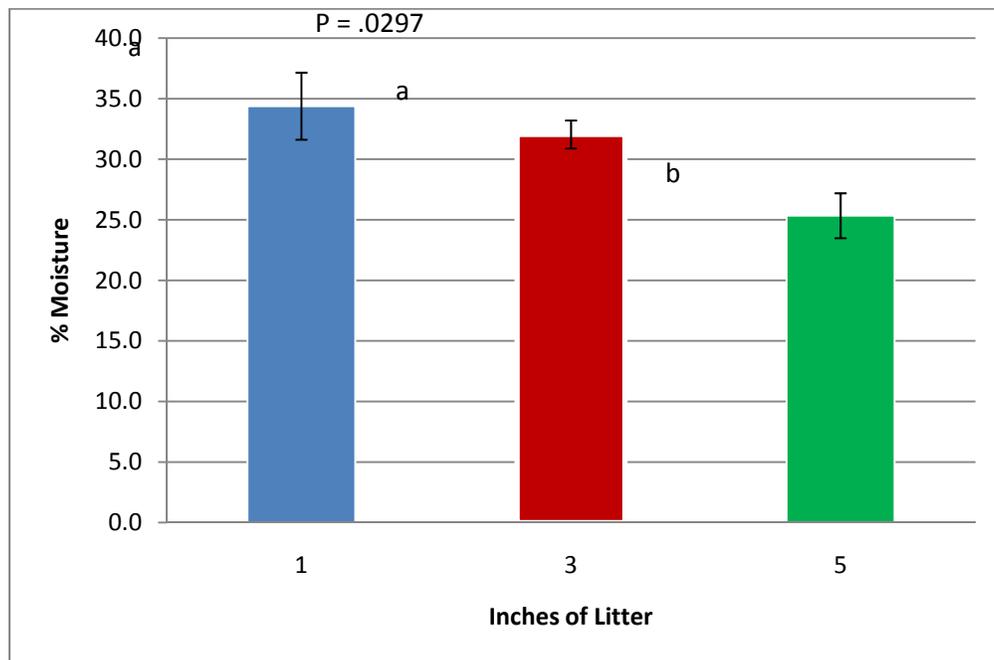
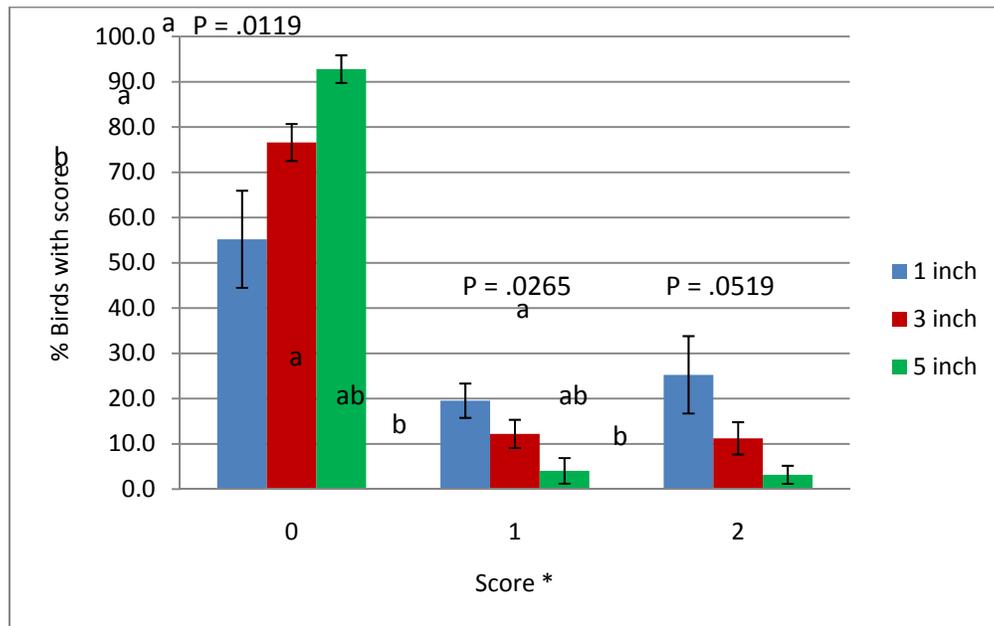


Figure 2 Paw Scores Day 42



(* 0=no FPD, 1=mild FPD and 2=severe FPD, Bilgili et al., 2006)

There are a number of studies that have reported increased incidence and severity of FPD as litter moisture increased in both broilers and turkeys. Standing on wet litter brings the feet in constant contact with moisture and has been suggested to cause the footpad to soften and become more prone to damage, predisposing the bird to developing FPD. Drying out the litter or moving birds from wet litter to dry litter lessened the severity of FPD. Foot pad dermatitis lesions are more severe as litter moisture increases, especially when the litter is wet and sticky. Recent work with broilers at UGA supports these earlier observations.

Bedding material typically used by the industry is increasingly expensive and difficult to secure. As a result, there are situations where inadequate amounts of shavings are being placed in broiler houses that routinely cleanout and the material is often spread unevenly throughout the house. Litter plays an important role in moisture management within the broiler house. It acts as a sponge absorbing moisture and allowing for the dilution of fecal material. The deeper the layer of litter, the more moisture it can absorb before the surface of the material becomes saturated. Litter must not only be able to absorb moisture but it should also have a reasonable drying time to get rid of that moisture via evaporation. With regards to moisture absorption and drying time, not all bedding materials are created equal. Ground door filler and mortar sand has better FPD scores than birds raised on pine shavings, bark, chipped pine, ground hardwood pallets, chopped straw, or cotton- gin trash. It was hypothesized that the moisture absorption capacity of the ground door filler and the mortar sand's ability to release moisture rapidly was superior to the other materials and contributed to better paws. Ultimately bedding material use depends on cost and availability, but when possible, materials with smaller particle sizes should be used as they have been shown to produce better paws.

There are several factors that are manageable by producers which can affect litter moisture such as bedding material type and depth, stocking density, bird health, ventilation, and drinker management.

The first step to control moisture actually occurs before chicks arrive in the house. If the broiler house is cleaned out between flocks, it is essential that there is a base of litter of at least three inches to accommodate the moisture load during the flock. If on a built-up litter program, it is important to remove the caked litter to allow the litter base to dry before chicks are placed. Operating fans during the day in between flocks will allow moisture to dissipate from the litter more rapidly. Making sure litter is evenly distributed throughout the entire house is one step in preventing “slicking over” of the litter beside the sidewalls.

Drinker line maintenance also plays a large role in litter moisture. Drinkers that are too low or have the water pressure set too high tend to result in wet floors. Particulates that build up in the drinkers result in leaky drinkers that constantly drip water onto the litter. Regular flushing and sanitizing of the drinker lines can reduce drinker leakage. Reducing moisture underneath the water and feed lines is especially critical due to the fact that the birds spend significant time in this area both standing and sitting. Keeping litter drier in these areas can reduce hock and breast burns in addition to lowering the incidence and severity of FPD.

Controlling the relative humidity in broiler houses is essential to keeping floors drier. FPD lesions have been found more frequently during cold weather than in warm weather and footpad condition has a high correlation with house relative humidity. A 28% increase in the incidence of hock burns in winter when compared to summer. These seasonal effects are attributed to an increase in broiler house relative humidity due to decreased ventilation rates. This is typically observed in cold weather which is associated with reduced ventilation rates due to low temperatures and increased heating costs. Attic inlets are one management option available to producers to increase ventilation rates without increasing heating costs ([Poultry Housing, Tip April 2007](#)).

Bird density throughout the house is also a factor involved with litter moisture. The sudden onset of poor litter conditions associated with higher bird densities is considered to be the biggest influence on the development of FPD. Litter conditions deteriorate rapidly as litter moisture increases with increased bird density. One way to combat this problem is to properly utilize migration fences year round, even in cold weather months. Migration fences put in place after birds are distributed evenly throughout the length of the house will allow for better litter management and temperature regulation. One simple, cost effective way to monitor bird density in the house is to add an additional water meter ([Poultry Housing Tip, July 2002](#)). Water meters for the front and back of the house can indicate bird densities by simply looking at daily water consumption. Higher water consumption in one end of the house would mean that there are more birds there than in the other section of the house.

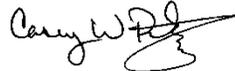
Controlling litter moisture is an important step to producing more high quality, unblemished paws. As paws become increasingly sought after in foreign markets and to make sure animal welfare standards are met, more pressure will be put on growers to produce better paws. Proper environment, house equipment, and bird management can go a long way to producing a healthier, more profitable flock.



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