

Why Broiler Growers Should Be Concerned about Paw Quality

Footpad dermatitis is a major welfare concern in broiler chickens and is used as an audit criterion in the U.S. and Europe during animal welfare audits. However, there seems to be less concern among many broiler growers as to the paw quality of birds in their care than to other audit issues, such as air quality, temperature control, feed conversion, and weight gain.

This is understandable, to some degree, because most growers think they have no financial incentive to improve paw quality in the same manner that they have to improve weight gain or feed conversion. Growers are paid on good, sellable pounds of meat produced, excluding paws. Their check will be the same whether their flock has 90 percent Grade A paws or 10 percent Grade A paws.

Integrators, on the other hand, do have reason to be concerned about paw quality. Today, paws are a huge potential profit opportunity for integrators because of the increasing demand for paws from the overseas market. Therefore, growers may be looking at this paw situation all wrong. Let's consider some of the reasons why this might be the case.

Paw Incentive: Yes or No?

While it is true that growers are not paid a “paw incentive” in the same manner they may be paid a “tunnel ventilation incentive” or “new house incentive,” they are paid for pounds of meat produced and for a better feed conversion. Broiler chickens make numerous trips to the feeders and drinkers each day, except during dark periods when the lights are off. They are constantly exposed to litter conditions that may not always be conducive to maintaining good paw quality.

Footpad dermatitis is often associated with **wet litter or poor litter conditions**. Severe footpad dermatitis is generally considered to be painful for the birds (Michel et al., 2012), which may limit the number of trips affected birds make to the feeders and drinkers each day. If it is painful to walk, birds may decrease their walking activities to limit the pain until the wound heals. Limited trips to feeders and drinkers is likely detrimental to weight gain, feed conversion, and overall flock performance.

In fact, de Jong et al. (2014) concluded that increased litter moisture not only caused severe footpad dermatitis, but also reduced broiler performance and carcass yield and had a negative effect on other welfare aspects. Anything that hurts weight gain and performance will likely decrease the amount of the check when the flock sells. Therefore, even though it doesn't appear that growers are being paid a “paw incentive,” they may actually be receiving one that is cleverly disguised as better weight and improved feed conversion.

Maintain Litter Quality

Because **footpad dermatitis is closely associated with litter quality**, it likely affects other welfare aspects, as well, such as gait score, breast blisters, and hock burns. Litter quality has never been more important than it is today. It is causing integrators and growers to rethink how litter is managed.

There was a time when new bedding was thought to be the ideal situation in terms of litter. However, that no longer appears to be the case in some situations. In fact, in many cases today, a total cleanout and **new bedding yields poor quality paws** for the first two to three flocks grown on the litter, with the very first flock often producing the worst paw quality of all.

The **bedding material itself is also a major concern** today. Competing markets for commonly used bedding materials such as pine shavings, rice hulls, and others are driving up price and driving down availability and quality of these products. Poor-quality bedding that may be more chips, chunks, and splinters than shavings will only worsen paw quality.

More attention is likely focused on paw quality at the end of the flock near market age, but paw damage can begin early, even during the first week. A baby chick's tender feet can be damaged easily by sharp edges, large chunks, and splinters of poor-quality bedding material.

In addition, the high cost of bedding material means growers may skimp on how much new bedding goes back in the house. Any **fewer than 4 inches is likely not enough**. Add to this

the fact that growers tend to underventilate with new bedding because ammonia is usually not an issue with new bedding. Unfortunately, underventilating allows moisture and humidity levels to build rapidly in the house and in the litter, quickly leading to damp or wet litter, which is further detrimental to paw quality.

Furthermore, birds excrete uric acid in the manure, which may be converted to soluble ammonia through a series of enzymatic reactions. Soluble ammonia is corrosive and capable of “burning” the footpad. Ammonia burns appear to be a combination of moisture, high ammonia levels, contact with manure, and possibly other chemical compounds found in the litter.

The problem can be exacerbated by current conditions in the broiler industry if proper management procedures are not followed. High stocking densities and fast-growing genetic strains may increase the risk. Today, many birds are grown to heavier weights to meet the increasing demand for high-quality, conveniently priced, further-processed, and quickly prepared chicken products. This means birds may be on the farm longer, which can lead to **wetter litter unless ventilation is closely monitored, maintained, and controlled.**

While new bedding material may have its share of problems in terms of paw quality for the first couple of flocks, old litter is not without its faults, unless managed properly. Growers may sometimes take out too much litter between flocks, leaving fewer than 4 inches on the floor, which is not enough for adequate cushioning/insulation and moisture absorption. If this is the case and old litter becomes damp and caked, the same issues arise as with less-than-adequate new bedding. However, the problem is made worse by the fact that there is more potential ammonia to deal with because there is more manure on the floor with old litter than with new bedding.

But ammonia is not the sole cause of poor-quality paws.

Wet litter alone can ulcerate footpads. Moisture can soften the footpads, making them more susceptible to damage, which can lead to the development of dermatitis. This is often seen with new bedding where inadequate ventilation allows relative humidity to remain high (even though ammonia levels are low) and litter to slick over.

A different problem can arise if you have too much litter on the floor. If litter is too deep—say more than 6 to 8 inches—it becomes difficult to adequately prevent a hardpan from forming near the dirt floor. This **hardpan will be a source of moisture** and may help generate huge amounts of ammonia as the house and litter are heated to prepare for baby chicks. This increased

ammonia production will be a threat not only to the birds’ feet, but also to their eyes and respiratory systems. Strong ammonia is also a threat to the eyes and respiratory systems of poultry growers.

Many growers now try to windrow litter between flocks to help dry the litter and break up the hardpan. It is important to incorporate the hardpan into the windrow. Make sure you get all the way to the floor and are able to **expose as much of the dirt as possible to the air** to assist the drying process. However, be careful not to dig into the floor with your windrowing equipment and create a floor that is no longer level. Windrowing requires time and the proper equipment, but it does offer benefits over not windrowing, if done correctly and if windrow temperatures reach at least 130 degrees Fahrenheit. Many integrators now encourage their growers to windrow litter and work with them as best they can in terms of flock placement schedules to allow adequate time for windrowing.

An important point to consider is that **litter conditions can vary greatly** from one end of the house to the other. Migration fences often divide the house into four quadrants, and each quadrant may have a different quality of litter. Especially during warmer weather when cool cells are often in use, litter in the cool cell quadrant will usually be wetter and have more cake than in the other quadrants. The fan quadrant of the house may stay drier unless foggers are used. In that case, litter in the fan quadrant of the house may also become wet as part of the fog is pulled to the end of the house and discharged by the fans.

This difference in litter quality can result in varying degrees of paw quality throughout the house. In most cases, the drier the litter, the better the paw quality. However, there are times, such as during the hot summer with big birds, when dry litter is difficult to maintain. During these times, you must **do what is necessary to keep the birds comfortable**, knowing it may not be the best thing for the litter. This means that litter management between flocks becomes even more important. Drying litter between flocks will be critical to getting the new flock off to a good start. Excess litter moisture when a new flock starts will make it difficult to maintain quality litter as the flock ages.

It is likely that greater attention will be placed on litter management in the future. There is no shortage of things to be concerned about on the farm, and in the past, litter has not always been at the top of every grower’s list of worrisome items. However, due to the importance of the paw market (which practically did not exist 20 years ago) and the increased emphasis being placed on animal welfare issues, litter quality has to be considered a high-priority item today. Chickens spend almost

their entire lives in close association with litter material on the floor. The type, quantity, and quality of that litter has a huge impact on bird performance. And **bird performance determines how big the chicken check will be** when the flock sells. Therefore, perhaps broiler growers are paid, to some extent, on paw quality and aren't actually aware of it.

Management Is Critical

Preventing damaging lesions to the tender footpad area depends on how well you manage 1) relative humidity in the house to prevent moisture and cake buildup in the litter, 2) drinker lines to minimize leaks and spills, and to maintain the correct height and pressure, and 3) the pH of the litter early in the flock by use of one of several acidifying agents. Humidity should be kept in the 50–70 percent range, if possible. Humidity levels of 75 percent or greater for an extended period will result in damp, caked litter and increased paw problems.

Pay special attention to seasonal effects. **Winter is a time of increased incidence of footpad issues.** Ventilation rates are usually reduced in an effort to save fuel. However, as mentioned previously, decreased ventilation leads to increased humidity and rapid moisture buildup. Consider using stir fans to move air around in the house and promote litter drying. The proper amount of ventilation coupled with adequate litter depth (at least 4 inches) will help maintain low levels of ammonia and moisture.

Excess water from the drinkers due to spills, leaks, or improper pressure may add to the wet litter problem. Closely **manage flow rates and water pressure** to match the age of the birds. Nipple height is critical to avoid water waste and caked litter under the drinker lines. It is also tied closely to bird age. Keep in mind that birds can't swallow the same way humans can, and they require gravity to help them drink. Therefore, nipple height must be such that water can easily run down their throats and not onto the litter.

Take immediate action to repair or replace leaking nipples. Follow a routine maintenance program on your water system that includes regular line flushing and sanitation to prevent biofilm buildup, which can cause nipples to leak. If you suspect a problem with your water, collect a sample and send it off for a microbial and/or mineral analysis. MSU Extension Service personnel can help you collect a sample, provide information on where to send it, and help you interpret the results.

Litter Treatments

Acidifying agents that lower the pH of the litter seem to be the most effective of the litter amendment products (Ritz et al., 2014). Treating litter chemically to lower the pH usually yields varying degrees of success. Most **products only work for a short time**, in most cases fewer than 3 weeks. While this does have advantages during the brooding period—helping control ammonia and, thereby, save on fuel usage—it does little to help control ammonia levels later in the flock.

Be aware that damp or wet litter may decrease effectiveness of litter amendments. Therefore, litter with a high moisture content when a new flock starts or litter that has slicked over by the time chicks are only 1 week old may not see 3 weeks of protection from the litter amendment. Also, **using a litter amendment is not a free pass to reduce ventilation rates.** You must maintain adequate ventilation to take full advantage of litter amendments.

Summary

Paw quality has become a major issue in the poultry industry in recent years due to the overseas paw market and the financial opportunities associated with it. Often, it seems that growers are less concerned with paw quality than are integrators. This is due, in part, because growers do not think they see financial incentive to improve paw quality. However, this may not actually be the case. If poor paw quality results in slower growth rates, lighter bird weights, poorer performance, and less financial compensation, then there actually is **financial incentive for growers to improve paw quality.** It may be disguised in the form of heavier bird weight and better feed conversion, but it is most certainly there. Litter quality, to a large extent, determines paw quality. Litter is not the only factor affecting paw quality, but it is likely the biggest factor. Efforts to properly manage relative humidity, drinker systems, and litter pH will go a long way to maintaining litter quality, improving paw quality, and optimizing flock performance.

References

de Jong, I. C., H. Gunnink, and J. van Harn. 2014. Wet litter not only induces footpad dermatitis but also reduces overall welfare, technical performance, and carcass yield in broiler chickens. *J. Appl. Poult. Res.* 23:51-58.

Michel, V. E. Prampart, L. Mirabito, V. Allain, C. Arnould, D. Huonnic, S. Le Bouquin, and O. Albaric. 2012. Histologically-validated footpad dermatitis scoring system for use in chicken processing plants. *Brit. Poult. Sci.* 53(3):275-281.

Ritz, C. W., B. D. Fairchild, and M. P. Lacy. 2014. Litter quality and broiler performance. University of Georgia Extension Bulletin No.1267. University of Georgia, Athens.

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Publication 2859 (POD-12-21)

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Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. GARY B. JACKSON, Director