Understanding the many causes of gangrenous dermatitis

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Gangrenous dermatitis (GD) can be an insidious disease, surprisingly quick to strike, and challenging to prevent and control. Outbreaks of GD spread quickly and can devastate flocks with mortality rates as high as 60%.1 For many producers, by the time they realize the culprit, the damage is done.

By learning more about GD and how it’s spread, producers can take early steps to prevent the conditions that predispose flocks to infection. Understanding the warning signs to watch for can also help stem outbreaks and minimize the mortality in your flock.

In this issue, we’ll take a closer look at this swift, deadly disease and offer some tips for protecting your flock.

What is gangrenous dermatitis (GD)?

GD is caused by the toxins produced by Clostridium perfringens and Staphylococcus aureus.1 Clostridium perfringens is a normal inhabitant of the bird’s gut and litter, and it’s the same bacterium that causes necrotic enteritis.

GD can affect chickens from 17 days to 20 weeks of age, but it’s most prevalent in 4-8 week-old broilers. The disease tends to be seasonal, normally peaking in late winter to early summer. Mortality can reach as high as 1% per day2 and 60% overall.1

How does GD infection occur?

One of the challenges in understanding GD (and being able to devise effective ways to manage it) is that the disease is notoriously difficult to reproduce for study in a “real world” fashion. To date, researchers have only been able to reproduce the disease by directly injecting Clostridium perfringens into the veins of chickens. However, there are two prevailing ways we know GD infection can happen.

“Inside-out” infection happens when there is a disruption in the intestinal integrity of the bird or a shift in its intestinal microflora. This happens when poor intestinal integrity allows bacteria and toxins to leak from the gut and then travel to the skin where they cause GD lesions.

“Outside-in” infection happens when bacteria enters through a disruption in the skin barrier, such as a wound or scratch. In this model, the bacteria typically come from the litter.
What is intestinal integrity?
Intestinal integrity is the optimal function of the intestinal tract, producing efficient and uniform growth. The intestinal system has been described as “the engine that drives all others” and keeping it healthy is critical to helping the bird express its full genetic potential. Intestinal integrity also reduces the incidence of costly infections like coccidiosis and bacterial enteritis.

Compromised intestinal integrity:
- Declining animal health and welfare
- Poor feed conversion
- Reduced growth and yield
- Lost processing efficiencies
- Reduced food safety

How does GD present?
As we mentioned earlier, infection and mortality can happen very quickly. That’s because during active disease, the infecting bacteria produce large amounts of toxins. These toxins cause rapid cell death, leading to fluid accumulation and crepitus, which feels like air trapped under the skin, often in the thigh and lower breast. The illness can happen so quickly that many producers don’t even notice sick birds, just dead ones that look as if they may have already been dead for a day.

Physical signs also include:
- severe atrophy of the bursa
- dark, moist areas on the skin including the wings, breast, abdomen and legs
- foci necrosis in the liver
- cutaneous sloughing or feather loss
- gas production or blood tinged fluid beneath the affected area

Sick birds will also display depression, prostration, weakness, lameness and loss of coordination.

Recognizing and mitigating predisposing factors for GD
There are many, and diverse, factors that can predispose birds to GD. Below, we’ve listed these factors in general categories, which is helpful in examining where your operation might have more risk.

Category 1: Compromised immunity
In the past, an increased susceptibility to GD has also been associated with immune system dysfunction most frequently associated with “early” infections with Infectious Bursal Disease (IBD) and Chicken Anemia Virus (CAV), among others. There are a number of factors to watch for that may suggest a compromised immune system in a broiler, including unusual infections (such as inclusion body hepatitis), “early” bursal, thymus and spleen damage, increased reactivity to common live vaccines or a failure to clear a vaccine virus (prolonged reactions or “rolling” reactions), late breaks (indicating a loss of vaccine efficacy, complicated respiratory disease such as colibacillosis and poor performance.

Category 2: Housing and Management
Like so many other health issues, GD risk increases when housing and management are not at their best. Overcrowding, a lack of migration fences, lack of water sanitation, poor ventilation, poor litter quality, poor water nipple management and nutritional issues can all make birds more susceptible to GD.

Overcrowding and lack of migration control not only puts healthy birds in more proximity to sick ones, it increases the chance of scratches and wounds where bacteria can enter. Dust, feces, litter and mucous membranes are all potential sources for contamination. Prompt removal of dead birds is also critical to reducing infection risk.

Litter management is also key: Wet litter (sometimes a seasonal issue) breeds more bacteria. Operations with a history of darkling beetle infestation also have a higher risk of infection.

Nutrition of course plays a role in overall health, but when it comes to protecting against GD, it may be particularly relevant as a poor diet can contribute to intestinal integrity issues. Feed outages, poor-quality ingredients (rancid fats, meat and bone meal, moldy corn, fermented bakery) and presence of mycotoxins contribute to predisposing a broiler to GD infection.

Category 3: Intrinsic variables
Some risk factors for GD are intrinsic to the animal or the environment. As we mentioned before, risk goes up in late winter to early summer. This is due to wetter litter conditions which help bacteria flourish. Some broiler breeds are also more susceptible to GD, particularly those that are slow-feathering. Poor chick quality in general, for any breed, is another predisposing factor for GD. Hatchery open navels can be a factor as well.

If an outbreak does occur
First, it’s important to take action quickly to mitigate damage to your flock. A simple, but critical, step is to remove dead birds often: four times a day is recommended. These dead birds should be removed completely from the house, and ideally, removed entirely from your farm. You should then apply litter and pad acidifier (such as PLT®) between flocks and
underneath where any dead birds were removed. You can also use a treatment like PLT with the birds present. You may also want to consider cleaning out the entire house and salting the floors (use 100 lbs. of salt per 1,000 square feet).

If you have a darkling beetle issue, treat to eliminate these insects as another carrier of the disease. Do an in-flock treatment if necessary.

Since immunosuppression can be a factor in susceptibility to GD, submit your birds for a full diagnostic work-up. If you discover an immunity issue, you may be able to address it to reduce the risk of future outbreaks.

Finally, there are some nutritional strategies that can help lower susceptibility.

Adding organic selenium or copper sulfate to drinking water can help, as can varying the caloric values in your birds’ diets. Varying the protein levels in feed from the grower to withdrawal stage is another tactic to try. A diet that helps maintain intestinal integrity can ward off the “inside out” form of GD infection.

**Look for risks now, to avoid future trouble**

If you think your operation is vulnerable to even some of the risk factors outlined in this article, you’ll want to take action before GD appears in your birds. As it’s often hard to look critically at our own processes and procedures, bringing in expertise from an outside consultant can help. They can help identify particular areas of vulnerability and devise a plan for protecting your flock. Investment in time, services or changes in feed today could protect your operation from a costly outbreak.

I hope this article has given you more insight into the nature of gangrenous dermatitis and the many factors that can predispose a flock to infection. By understanding these risk factors and taking steps that are specific and relevant to the conditions of your operation, you can reduce your vulnerability to this costly, deadly disease.

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**FIGURE 1. Potential causes of gangrenous dermatitis**

GD can be caused by a number of factors, making it challenging to prevent. Many of these factors can be mitigated to help reduce the risk to your flock.

- **Bird**
  - Poor chick quality
  - Breed genetics (slow feathering)
  - Age: infection usually occurs at 28-48 days

- **Health**
  - Infections (coccidiosis, respiratory signs, IBDV, colibacillosis, RSS, etc.)
  - Immune system compromise from vaccines and viruses

- **Feeding/Water**
  - Water sanitation
  - Poor nipple management
  - Nutrition/feed ingredients (fish meal, poultry byproducts)
  - Mycotoxins
  - Meal time feeding
  - Feed outages

- **Housing**
  - Overcrowding
  - Poor migration fence management
  - Failure to promptly remove all dead birds from farm
  - Poor ventilation
  - Litter issues: poor quality, high moisture and/or old/contaminated
  - Darkling beetle infestation

- **Other**
  - Seasonal variation (peaks late winter-early summer)
  - Farm has experienced outbreaks before
Full Value Poultry™

GO is one important threat to producers’ ability to maximize the potential in their operation. At Elanco, we believe in looking at the big picture of many operational variables to help create total solutions for better profitability. We call this concept Full Value Poultry and it’s an approach that looks at production from many angles.

Full Value Poultry isn’t a product or service. It’s an entire support system based on core business principles focused on:

**HEALTH:** Identify, quantify and reduce the impact of disease on production

The effects of disease cause bird growth, uniformity and feed efficiency to suffer, affecting not just the birds, but your bottom line. Full Value Poultry focuses on intestinal integrity and respiratory integrity, to help operations avoid costly illness and produce birds that reach their growth potential.

**FEED:** Getting more value out of your nutritional strategies

As feed costs continue to rise, more operations are tempted to turn to low-cost feedstuffs. This strategy, however, can have consequences on animal health and growth. Full Value Poultry looks at ways to offset these issues, ensuring animals get the full nutritional benefit of their diets, for optimal performance.

**ACCESS:** Managing market challenges to maximize opportunity

The poultry industry has a bright future, with predictions of increased poultry consumption over the next 15 years. However, this potential can only be realized by ensuring the industry continues to meet market access challenges. Full Value Poultry understands these challenges and how to navigate them to ensure ongoing market access.

**OUTPUT:** Delivering the right product at the right time to maximize profitability

Full Value Poultry helps producers identify the causes of missed margin opportunity and to quantify and understand the impact of variation, so it can be reduced to improve business performance. Full Value Poultry works to ensure producers use the right amount of feed to get birds to the right weight at the right time for maximum profit potential.


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