Clostridial Diseases in Broilers. How can we control them?

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The most common clostridial diseases seen in broilers are necrotic enteritis (NE) and gangrenous dermatitis (GD). The number of broiler farms experiencing problems associated with these clostridial diseases has increased in recent years. This has prompted more research into the understanding and prevention of these clostridial diseases.

Clostridial Diseases

Clostridial diseases are caused by an overgrowth of pathogenic bacteria of the Clostridium family. Clostridia species are soil borne organisms that have the capabilities to produce deadly toxins that can cause disease and death. *C. botulinum* produces a deadly toxin that causes botulism. *C. tetani* produces a toxin that causes tetanus. In broilers *Clostridium perfringens* Type A and C are known to produce a tissue damaging alpha toxin and have been associated with NE and GD. *Clostridium septicum* also produces an alpha toxin and has been implicated with GD. The destructive nature of the alpha toxin is what causes the lesions seen in both NE and GD not the clostridial bacteria.

Where do the bacteria come from?

Clostridium bacteria are a normal part of the microflora of poultry intestines. Many are harmless and may even serve important roles in the normal digestion process. Sub-therapeutic antibiotics and ionophore anticoccidials have been used to control NE. Surprisingly, though, recent research has demonstrated that several *Clostridium spp.* actually increase in the presence of some antibiotic growth promoters and the ionophore monensin (Lee, et. al. 2004).

Necrotic Enteritis (NE)

What triggers a necrotic enteritis outbreak?

Many factors can contribute to an overgrowth and toxin production by *C. perfringens.*

Coccidiosis

E. acervulina and *E. maxima* are the species most commonly associated with NE in broilers. *E. maxima* causes a deeper damage to the lining of the intestine than other cocci species. This means lesser numbers are required to trigger an NE outbreak.

Wheat, Barley, Rye

Small cereal grains are more difficult for the broiler to digest resulting in intestinal irritation and potential for the right conditions to cause a clostridial bloom. Birds on wheat diets are more prone to NE than birds on corn based diets.

Intestinal Microflora Imbalance

The intestinal flora of broilers goes through complex changes during the short grow out period. Establishment of the microflora is dependent on the early exposure seen by the chicks at hatch and in the broiler house. The developing microflora of young birds makes them more susceptible to NE than older birds that have an established microflora.

Factors disrupting the establishment of a stable microflora population:

Feed changes

Feed outage

Ration formulation

Poor quality ingredients

High pH Soils and Water

NE is much more common in regions with high pH soils – where limestone cliffs, caves or soils are typical. High pH appears to favor the growth of toxin-producing Clostridia.

Broiler Field Management

House management factors can favor conditions leading to NE breaks.

Wet Litter
High Density flocks
Lighting Programs
Overeating Behavior
Multiple Simultaneous Trigger Factors

How can we control an NE outbreak?

NE is the result of a bacterial infection, so it is treated with antibiotics.

How can we control NE?

Prevention is always better than treatment. In-feed medications are largely responsible for the control of NE:

Sub-therapeutic Antibiotics

Bacitracin and virginiamycin in poultry feed are a key to the prevention of NE. Tylosin and lincomycin can also provide significant control of NE. Unfortunately,

C. perfringens bacteria will develop resistance to these antibiotics over time.

Anticoccidials

There are two types of anticoccidial: chemical and ionophore. Chemical anticoccidials are effective against coccidiosis, but resistance to the chemical can develop quickly and there is no antimicrobial activity. The ionophore anticoccidials have antimicrobial activity and provide some degree of NE control in addition to their ability to control coccidiosis. NE is seen more often on a chemical program than on an ionophore program.

NE Prevention Measures

Maximize Coccidiosis and Bacterial Control

Understand Coccidiosis Challenge Level

Responsible Rotation of Anticoccidials
Avoid dilution of in-feed medications
Consider Live Coccidiosis Vaccination
Creative Use of Anticoccidials – Chemicals and shuttles

Control House-Management Triggers

Control Litter Moisture

Ventilation management
Density
Nipple drinker systems

Manage Disruption of Feeding Behavior

Enhanced Lighting During Brooding

Encourage establishment of microflora

Feed Mill Actions

Use of high quality feed ingredients

High NE Risk Flocks

Antibiotic-free flocks, flocks in high pH soil areas and flocks in heavy rainfall areas are at high risk for NE. Additional steps can be taken to augment NE control:

Water Acidification

Probiotics, Competitive Exclusion Cultures

Special Feedmill Alternatives
- Mannan-oligosaccharides
- In-feed organic acids
- In-feed natural antibacterials

On the Horizon
C. perfringens Type A Toxoid

Gangrenous Dermatitis (GD)
What causes an outbreak of GD?

Gangrenous dermatitis has been shown to be associated with C. perfringens, C. septicum and Staph aureus. These bacteria are thought to be introduced under the skin by scratches causing the subcutaneous lesions and late mortality (2-4%) between 30 to 40 days. In addition to the bacterial agents isolated from the lesions the literature states that immunosuppression is a key factor in expression of this disease. The remedy was thought to be good control of immunosuppressive diseases (IBDV, CAV, and others). Recently research has suggested that the pathogenesis of this disease may be similar to NE with disruption of the intestinal tract as the portal of clostridium into the chicken. The lack of GD in birds vaccinated with coccidial vaccines or strategic use of effective chemicals tend to support this hypothesis.

How to treat a GD outbreak?
Gangrenous dermatitis outbreak is treated with antibiotics effective against the isolated bacteria.

How can GD be prevented?

By minimizing immunosuppressive affects on young broiler through a good breeder and broiler vaccination programs.

IBDV, CAV and MD

Coccidiosis control

Maximize control late in the grow out period (30 – 40 days)
- Extension of medicated grower feeds
- Strategic use of chemicals during the GD period
- Use of coccidial vaccines

Conclusion

The recent increase in NE and GD may be the result of reduced sub-therapeutic antibiotic use and reduced efficacy of anticoccidials due to resistance. These factors along with public pressure to reduce antibiotic use in poultry will require new strategies for long term effective control of clostridial diseases in broilers.