Why the microbiome matters to healthy poultry production

by Xandra Smith, PhD, Research Manager,
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Imagine an ecosystem where wolves are the primary predators. Wolves suddenly disappear, causing proliferation of deer and other prey-animal herbivores. Exploding deer populations overgraze the available grasses and shrubs, leading to soil erosion and eventual herd starvation due to loss of food sources.

When a similar scenario plays out in a microbial environment, such as the gastrointestinal tract, it is called dysbiosis.

For example, a healthy population of beneficial commensal bacteria in the digestive tract combats harmful pathogens. Beneficial bacteria prevent pathogens from proliferating. But if pathogens overtake the beneficial bacteria, the resulting dysbiosis can lead to digestive upsets, disease and death – analogous to the example situation with wolves and deer.

Maintaining a healthy and stable balance of microbes in the digestive system is essential for efficient digestion and appropriate immune response. Microbiomes are ubiquitous in soil, water and living things but only recently are gaining attention as pathways to healthy, productive living for both humans and animals.

SEEKING A STABLE MICROBIOME

In poultry production, it is essential to maintain a stable microbiome in the bird's gut.

Under natural conditions, baby chicks are colonised by beneficial bacteria from the hen. However, with modern production systems, eggs are taken from the hens to be cleaned and transferred to a hatchery. This prevents transmission of diseases such as fowl typhoid caused by Salmonella gallinarum, but also prevents vertical transmission of beneficial bacteria from hen to chick. That leaves the young chick potentially vulnerable to disease-causing pathogens in the environment, such as avian pathogenic E. coli. In a worst-case scenario, these pathogens colonise and overtake beneficial bacteria as the predominant microbial populations in the gut.

STABLE MICROBIOME = RESILIENCY AGAINST CHALLENGES

The team at Arm & Hammer Animal and Food Production conducts extensive research on microbial succession in poultry. Research shows that it takes 2-3 weeks to develop stable microbiota in young chicks. The earlier that chicks establish a stable microbiome in their guts, the better they can respond effectively to disease challenges.

One way to improve succession of microbes is to introduce beneficial bacteria to chicks at a young age – before dysbiosis occurs. Researchers at ARM & HAMMER continually screen a library of 50,000 beneficial bacterial strains, seeking the best microbial products to support the immune system and help birds acquire a stable gut microbiota.

Understanding the microbial world is an ongoing process. The microbiome of the gut and the poultry environment is never static. That is why ARM & HAMMER studies microbiota across the globe to determine the pathogens present, understand how they work and find new microbial solutions to address challenges faced by poultry producers.

References for all research cited available on request

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Three ways to control salmonella in your poultry operation

by Sangita Jalukar, PhD, Technical Services Manager, Arm & Hammer Animal and Food Production

Despite the poultry industry's best efforts, 40% of tracked salmonella outbreaks come from poultry. Infected chicks are often asymptomatic and because salmonella is a difficult bacterium to eradicate, it can remain active in an environment for an extended time to infect other birds. If left unchecked, salmonella can also threaten human health and safety. However, producers can help control salmonella in their poultry operations with good management and by building resilience within the flock.

REDUCE PATHOGEN LOADS

It is important to practice proper hygiene and biosecurity to help manage the salmonella load entering the poultry house. Salmonella thrives in wet poultry litter with a high pH, and contaminated feed and water may also carry and transmit salmonella. Keeping litter dry and at a lower pH helps reduce its prevalence in houses. When one flock moves out, managers should allow recommended down time, and thoroughly clean and disinfect the houses and equipment before the next flock moves in to prevent further exposure.

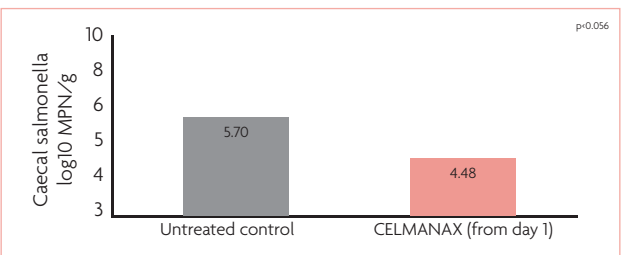
FEED FOR RESILIENCE

Feed additives have shown the ability to protect gut health and help birds build resiliency against salmonella. Multiple research studies and commercial trials have demonstrated feeding Refined Functional Carbohydrates™ (RFCs™) in CELMANAX™ promotes a healthy gut in poultry by preventing salmonella from adhering to the bird's gut, reducing bacterial colonisation and infection. The positive results of feeding CELMANAX are demonstrated across all stages of poultry production. Field trials show broilers fed CELMANAX had lower caecal salmonella levels compared with broilers fed a control diet. Supplementing CELMANAX in poultry diets has proven to be effective against multiple salmonella strains. In layers, research has shown CELMANAX supplementation reduced the pathogen load of S. enteritidis – a strain blamed for foodborne illness caused by contaminated eggs – by 1.2 logs compared to controls (see Fig. 1). Another commercial trial showed turkeys challenged by S. reading and supplemented with CELMANAX had a lower pathogen load by 1.77 logs compared to control birds.

VACCINATE

Vaccination is another important strategy to prevent salmonella infection in poultry. A recent study found that feeding CELMANAX did not negatively affect the ability of the live salmonella vaccine AviPro Megan Vac 1 to reduce colonisation. In fact, data suggest a synergistic or additive effect between the two interventions. Your birds are constantly at risk of salmonella exposure if it is left unaddressed, and this also poses a threat to human health and safety. However, you can control salmonella in your poultry operation and prevent its spread throughout the food chain with a stringent hygiene and biosecurity policy, and a robust feeding and vaccination programme.

Fig. 1. Salmonella log10 MPN/g in caeca of 17 week-old layers.



References for all research cited available on request

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Help birds battle mycotoxins from the inside out

by Sangita Jalukar, PhD, Technical Services Manager, Arm & Hammer Animal and Food Production

In a global survey, 85% of feedstuffs sampled were contaminated with at least one mycotoxin. Poultry are particularly susceptible to the detrimental effects of mycotoxins in the diet, meaning that your flock's performance – and ultimately, your profitability – could be taking a hit.

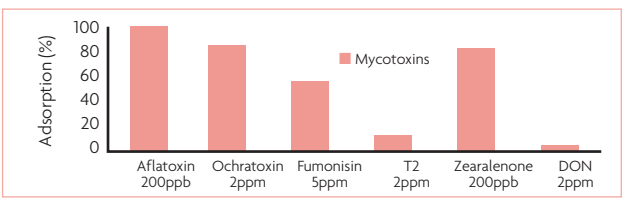
MYCOTOXIN-FREE FEEDSTUFFS?

Ideally, anyone involved in formulating poultry rations would have full confidence that feedstuffs are free of all mycotoxins or other contaminants that could prove limiting or dangerous to animals. However, this is rarely the case regardless of the source. Typically, it is almost impossible to obtain clean and consistent feedstuffs to feed birds. And because of that feed testing has become increasingly common. However, this process can be expensive and time-consuming. Plus, feed testing results are not always helpful due to time lags between testing and feeding. Adding mycotoxin binding products is one way to prevent the damage that can be done when animals unknowingly consume mycotoxins, but that strategy is effective against only a few mycotoxins. Adding Refined Functional Carbohydrates™ (RFCs™) to the ration, such as those found in BG-MAX™ from ARM & HAMMER™, can offer a comprehensive Prevent, Protect, Resilience (PPR) approach that can help poultry combat mycotoxins, regardless of feed source.

PREVENT (P)

Adding feed additives that bind mycotoxins prevents the mycotoxins from causing harm to the animal (Fig. 1).

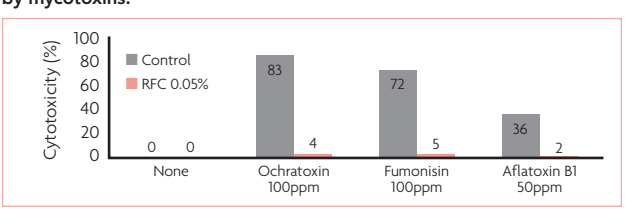
Fig. 1. Efficiency of mycotoxin adsorption with BG-MAX.



PROTECT (P)

Focusing on the protection needed against mycotoxins is another way to build a stronger herd. Mycotoxins, when ingested, damage the gut epithelial cell surface and then migrate to different organs. In vitro studies have demonstrated that the RFCs found in products like BG-MAX can prevent gut cytotoxicity caused by a variety of mycotoxins (Fig. 2).

Fig. 2. Effects of treatments of IPEC-J2 epithelial cells cytotoxicity caused by mycotoxins.



BUILDING RESILIENCY (R)

Protecting your birds at the cellular level builds a resistant flock ready to tackle the seen and unseen challenges which may be hidden in the ration. Protecting the gut from mycotoxin damage reduces opportunistic gastrointestinal pathogen colonisation. In addition, the prebiotic nature of RFCs supports the growth of beneficial micro-organisms, thus leading to a healthier gut microbiome.

References for all research cited available on request

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