

MANAGING POULTRY ENTERIC CHALLENGES WITH PHYTOGENIC FEED ADDITIVES

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Virtually omnipresent in most poultry farm environments, coccidia parasites are one of the most common and costly poultry gut health challenges in the global industry. Sub-clinical coccidiosis results in damage to intestinal epithelial cells which limits nutrient absorption and reduces body weight gain, resulting in poor feed efficiency. Further coccidia infection – specifically that caused by *Eimeria maxima* – can predispose poultry to secondary bacterial infections, such as overgrowth of *Clostridia* leading to necrotic enteritis.¹



Managing coccidiosis is critical to profitability whether a producer uses a conventional or antibiotic free (ABF) poultry production system. Due to the limited pool of chemical coccidiostats and ionophores available for use, we have seen some decreased sensitivity of *Eimeria* to many products – leading producers to rotate between products to maintain their long-term efficacy.² This strategy of “resting” products is especially important in ABF systems, that limit or prohibit administration of ionophores and/or antibiotics. For ABF poultry producers, comprehensive coccidiosis management requires evaluation of multiple strategies – vaccination, alternative feed additives, etc. – to maintain efficacy of current chemical coccidiostats. When it comes to antibiotic alternative feed additives, no silver bullet is likely to exist today. However, certain antibiotic alternatives – like phytogenics – may represent a cost-effective, natural solution for enteric pathogen management in ABF systems.^{3,4}

Phytogenic Feed Additives

Phytogenic feed additives (PFAs) – also referred to as botanicals, eubiotics or phytobiotics – contain natural, plant-based bioactive molecules which may be sourced from a dried plant material, a plant extract or an extracted essential oil. In general, PFAs are all phenolic molecules, meaning they offer similar benefits to support poultry gut health including antioxidant, anti-inflammatory and antimicrobial activities. However, no two PFAs are exactly alike. Understanding the mode of action (MOA) of a PFA is critical to unlocking its benefits.

PFAs used in the poultry industry typically fall under three categories: essential oils, saponins or tannins.

Essential Oils

Composed of a mixed composition of volatile molecules, essential oils are concentrated oil extracts from spices or herbs like oregano, rosemary, garlic, cinnamon and thyme. Bioactive molecules – carvacrol, thymol, cinnamaldehyde, etc. – found in these essential oils can disrupt bacterial cell membranes causing ion leakage resulting in antimicrobial benefits towards certain poultry pathogens *in vitro*.⁵ Essential oils also have been linked to improved feed palatability and increased feed intake in poultry.

Saponins

Yucca and *Quillaja* plants are the major sources of saponins used as PFAs in the poultry industry. Traditionally, saponin-based feed additives have been used for managing noxious gases, such as ammonia. However, recent research has shown saponin-based feed additives can help improve nutrient absorption and inhibit development of protozoa by disrupting cholesterol metabolism. Studies have also indicated that saponins can help support performance of poultry exposed to enteric pathogens.⁶

Tannins

Tannins are natural polyphenolic molecules found in grains, tree wood, gallnuts and fruits. Known for their ability to bind proteins, tannins have traditionally been considered anti-nutritive when used in poultry diets. But, tannins represent a highly diverse group of molecules with variable structures and properties. Importantly, tannin source and tannin structure can greatly impact the nutritive or anti-nutritive properties of the tannin.⁷ Growing research indicates that dietary tannins – when used correctly – offer multiple benefits that support health and performance of poultry.

Benefits of Tannins for Poultry Gut Health

Environmental stress, inflammation or enteric pathogens can cause barrier breakdown leading to leaky gut syndrome, malabsorption of nutrients and depressed growth. The astringent (protein binding) property of tannins, can help tighten junctions between intestinal epithelial cells to help reduce intestinal lesion formation, thereby strengthening intestinal barrier integrity to support growth performance. As highly effective antioxidants, tannins can scavenge free radicals thereby helping to control oxidative stress as well as inflammation in the intestine.⁸

Tannins also have been shown to inhibit growth of several poultry pathogens *in vitro*, including *Campylobacter* spp.⁹, *Salmonella* spp.⁹ and *Clostridium perfringens*.¹⁰ The antimicrobial, anti-parasitic and anti-viral effects of tannins are likely related to tannin complexation with microbial enzymes and/or metal ions, like iron, that are required for normal pathogen growth and metabolism.¹¹ *In vivo* studies have also shown that feeding dietary tannins can help minimize the negative effects of coccidiosis and necrotic enteritis challenge on poultry performance.^{12,13,14}

Take Away

Phytogetic feed additives represent a cost-effective, natural solution for enteric pathogen management in ABF production systems. However, producers must recognize that differences in plant source, manufacturing, and active molecule levels can impact PFA efficacy under field conditions. Further, because enteric diseases are often inter-related, multi-ingredient PFAs with broader-spectrum MOA may provide better return on investment.

As a phytogetic and probiotic combination, VANNIX™ C4 serves as a multi-mode of action gut health solution to help minimize the effects of enteric challenges, as well as reduce the opportunity for secondary bacterial challenges, like *Clostridia*. For more information on how VANNIX™ C4 can support poultry intestinal health, visit Kemin Animal Nutrition and Health at kemin.com/vannixc4.

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