

TANNIC ACID EXTRACT FOR INTESTINAL INTEGRITY



GUT HEALTH-BOOSTING PHYTOGENIC AND DIRECT-FED MICROBIAL INGREDIENTS

VANNIX™ C4 is a proprietary blend of tannic acid extract, phytogetic molecules, beta glucans and a probiotic or direct-fed microbial (*Bacillus subtilis*, PB6) designed to support overall gut health and minimize the impact of enteric challenges on poultry performance. During its development, numerous plant extract and direct-fed microbial combinations were evaluated, and synergies were identified. This research resulted in a novel phytogetic feed additive that reduces the impact of pathogens — like *Eimeria* and *Clostridium perfringens* — on poultry intestinal integrity and supports optimal performance. VANNIX C4 also helps coccidiosis-vaccinated poultry maintain performance.

VANNIX C4 can minimize factors that challenge intestinal integrity, thereby allowing birds to reach their full performance potential. **One key ingredient in VANNIX C4 is a proprietary Kemin tannic acid extract**, which supports intestinal integrity.

VANNIX C4 IS A COST-EFFECTIVE SOLUTION TO **SUPPORT GUT HEALTH AND PERFORMANCE.**

UNDERSTANDING THE 3 Ts

Not all tannins are created equal. There are specific distinctions between tannins, tannic acid and the proprietary Kemin tannic acid extract. VANNIX C4 employs tannic acid extract to reduce oxidative stress, enhance epithelial barrier protection and reduce performance losses resulting from enteric health challenges.

TANNINS are plant-derived polyphenolic molecules which are classified into two groups: hydrolysable tannins and condensed tannins. Feeding high levels of condensed tannins from sorghum is often considered anti-nutritive for poultry, but hydrolysable tannins from gallnuts offer **exceptional intestinal health benefits**.

TANNIC ACID is a type of hydrolysable tannin, which may provide benefits to intestinal health through antioxidant, anti-inflammatory and astringent activities. Additionally, tannic acid has known **anti-parasitic activity** and has been shown in research to **inhibit growth of several common poultry pathogens**.

TANNIC ACID EXTRACT (TAE) comes from tannic acid sourced from gallnuts (60-70% hydrolysable tannins), which is further processed in Iowa, to enhance bioactivity towards poultry pathogens. The resulting tannic acid extract has been shown to **consistently support intestinal barrier integrity**.

MODE OF ACTION

Tannic acid extract may help control oxidative stress and inflammatory response through modulation of pro-inflammatory gene expression, supporting redox balance and maintaining mucosal immunity. The astringent activity of tannic acid positively impacts the small intestine. When delivered to the small intestine, tannic acid can contract the mucus membrane, which can then prevent a leaky intestinal barrier.

The anti-pathogenic benefits of tannic acid extract are seen by the molecule acting directly on the organism to inactivate it, not allowing the pathogen to grow (Figure 1). **Tannic acid extract is effective at destroying sporozoite membranes and reducing their viability** — including those of *Eimeria tenella* sporozoites (Figure 2).

The tannic acid extract benefits on intestinal health are numerous, but one of the most intriguing could be its impact towards reducing enteric challenges. Tannic acid extract can be added for potential pathogen control at the intestinal barrier.

Tannic acid extract may inhibit parasitic enzymes, disrupt the parasite membrane or inhibit parasite metabolism.

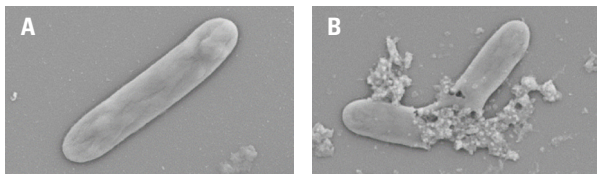


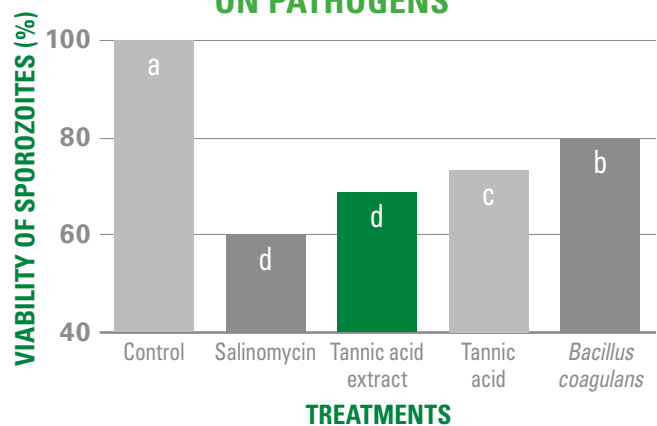
Figure 1: Disruption of the membrane of *Eimeria* sporozoites, reducing their viability. A: no TAE. B: with TAE.

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ONE OF THE MOST INTRIGUING TANNIC ACID EXTRACT BENEFITS IS ITS IMPACT TOWARDS REDUCING ENTERIC CHALLENGES.

EFFECT OF TANNIC ACID EXTRACT ON PATHOGENS



Means with different superscripts are significantly different ($P < 0.05$).

Figure 2: *In vitro* MTT assay for reducing the viability of *E. tenella* sporozoites, as shown in Figure 1.

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**GUT HEALTH
SOLUTIONS**

KEMIN

The Kemin Gut Health Triple Check program helps establish intestinal integrity and protection. Kemin offers products to **CLEAN UP** contaminants in feed and water prior to animal exposure, **BUILD UP** intestinal strength and immunity to reduce leaky gut and **KNOCK OUT** harmful pathogens for healthier and better performing poultry.

VANNIX C4 was developed for the **KNOCK OUT** category by supporting intestinal balance to inhibit or eliminate harmful pathogens from infiltrating the body.