REDUCE THE IMPACT OF MOLDS AND MYCOTOXINS ON INTESTINAL HEALTH AND PERFORMANCE

Managing mycotoxins in production animal diets and reducing mycotoxin absorption in the GI tract are critical to ensure optimal health and performance of livestock and poultry. A comprehensive mycotoxin management strategy should include the following practices:

- Use of mold inhibitors to control growth of storage mold
- Grain testing and approved handling procedures for contaminated grains
- Neutralization of mycotoxins through incorporation of absorbent flow agents in feed rations

KALLSIL™ Dry

Broad-spectrum fungal metabolite control to improve feed quality

KALLSIL is an enhanced zeolite-based mineral flow agent which supports performance by reducing the harmful effects of naturally-occurring fungal metabolites found in livestock and poultry feeds. By absorbing moisture from feed, KALLSIL also reduces caking, resulting in improved flow in feed and feed ingredients. Published research has demonstrated mold inhibitors used with anti-caking aids – including zeolite – may reduce the negative effects of mold and mycotoxin contamination on animal performance.[12,13]

Benefits:

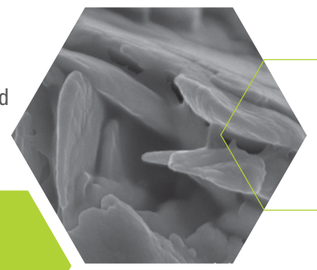
- Minimizes negative impact on animal performance from molds and mycotoxins
- Minimal binding of vitamins and minerals in feed
- Absorbs moisture in feed and feed ingredients
- Improves flowability of feed ingredients and complete feeds

Enhanced Zeolite Mode of Action:

- Zeolite has an infinite 3D, crystal framework with high moisture absorption capacity
- Channels and pores form cage-like structures that attract and trap small polar molecules
- Bound molecules are sequestered and removed from the body and/or the surrounding environment
- This structure is resistant to both heat and pH, which maximizes binding efficiency

Suggested Feeding Rates:

- Swine and Poultry: 2-12 lbs. per ton of feed
- Beef and Dairy: 1-6 oz. per head per day



GUT H3ALTH SOLUTIONS

A Comprehensive Approach to Gut Health

Our Gut Health Triple Check program serves as a support system to **CLEAN UP** contaminants in feed and water prior to animal exposure, **BUILD UP** intestinal strength to reduce leaky gut and **KNOCK OUT** harmful pathogens for healthier livestock and poultry.

KALLSIL™ is a **CLEAN UP** solution that supports performance by reducing the harmful effects of naturally-occurring fungal metabolites found in livestock and poultry feeds.

KEMIN

LEARN MORE AT
1-800-752-2864
kemin.com/guthealth
kemin.com/kallsil

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GUT H3ALTH SOLUTIONS CLEAN UP

ARE MYCOTOXIN-CONTAMINATED GRAINS IMPACTING YOUR ANIMAL'S HEALTH AND PERFORMANCE?

MINIMIZING ABSORPTION IS THE KEY TO SUCCESS

MYCOTOXINS: HIDDEN PROFIT-ROBBERS

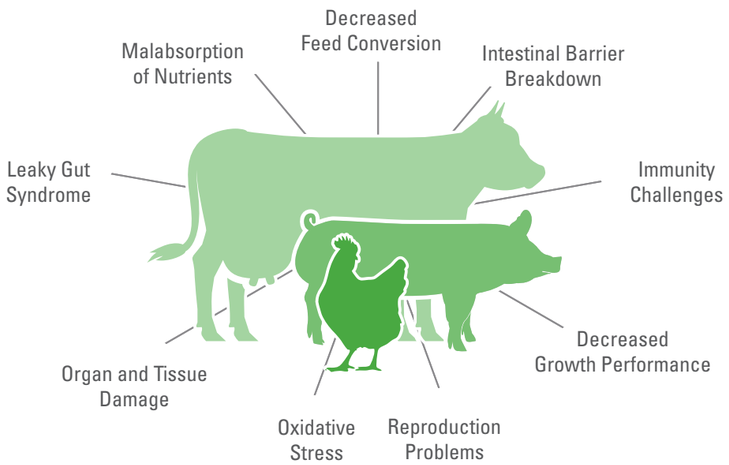
Mycotoxins are toxic substances produced by *Aspergillus, Fusarium* and *Penicillium* molds that are often found in grains fed in production animal diets. These toxins, even when fed at low levels, can have detrimental impacts on livestock and poultry production.[1,2]

The five major profit-robbing mycotoxins of concern to livestock and poultry producers in North America are:

- Aflatoxin
- Fumonisin
- Zearalenone
- T-2 toxin
- Deoxynivalenol

Contaminated grains frequently contain not one but multiple mycotoxins.[2] Research suggests that toxic synergies may exist with certain mycotoxin combinations.[3] Unfortunately, very little data exists regarding the health risk from multi-toxin exposure.[4] This means proactive management is crucial to maintaining animal performance and protecting your bottom line.

EFFECTS OF MYCOTOXINS ON INTESTINAL HEALTH AND PERFORMANCE:



GI TRACT: THE FIRST TARGET

Deoxynivalenol (DON) is well-known as a toxin which can reduce intestinal barrier integrity – resulting in leaky gut syndrome.[5,6] However, recent reports indicate other mycotoxins can also negatively influence intestinal function.[3,5] Absorption of mycotoxins by the intestine may result in immunological dysfunction, malabsorption of nutrients and ultimately, losses in weight and performance.[3] This means minimizing mycotoxin absorption by the intestinal tract is crucial to protect intestinal barrier integrity and support animal performance.

One common strategy used to manage mycotoxins is to sequester the metabolites by incorporating additives that contain minerals – like zeolite – into dietary rations.[2,7] KALLSIL™, an anti-caking flow agent, contains an enhanced zeolite mineral and has been shown to reduce the impact of molds and mycotoxins on performance of livestock and poultry.[8,9,10]

TRIAL: FEEDING KALLSIL™ REDUCES THE EFFECTS OF NATURALLY-OCCURRING MYCOTOXINS ON TURKEY PERFORMANCE[10]

Trial Purpose:

This trial was conducted by North Carolina State University to evaluate the ability of KALLSIL to lessen effects of a mycotoxin-contaminated diet on turkey hen poultry performance over six weeks.

Trial Design:

- Female Hybrid Converter poults (initial body weight = 54 g)
- 4 treatments × 6 replicates × 30 poults per pen
- Starter 1 and 2 diets included clean grain (control) or grains naturally contaminated with aflatoxin, deoxynivalenol and zearalenone (Table 1)
- Water and feed were available ad libitum
- Average body weight and feed conversion ratio of poults measured on day 0 and at 6 weeks

Table 1. Treatments and average mycotoxin levels in turkey poult diets

Diet	Treatment	Aflatoxin (ppb)		Deoxynivalenol (ppm)		Zearalenone (ppm)	
		Diet 1	Diet 2	Diet 1	Diet 2	Diet 1	Diet 2
Control	No additive	ND*	ND	1.0	1.0	0.6	0.3
	KALLSIL™ (4 lbs./ton)	ND	ND	1.2	1.0	0.5	0.4
Mycotoxin-Contaminated	No additive	240	200	1.7	1.7	0.7	0.4
	KALLSIL™ (4 lbs./ton)	310	250	2.0	2.0	0.6	0.8

*ND = not detected.

Performance Results:

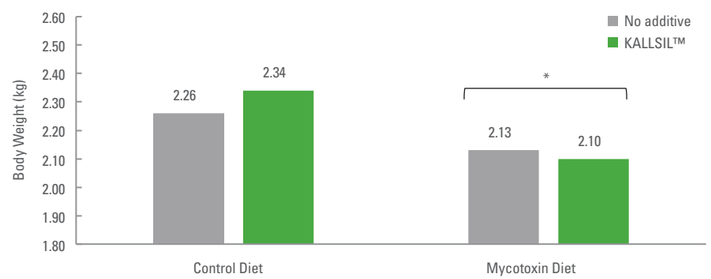


Figure 1. Body weight of 6-week-old turkey hen poults supplemented with KALLSIL™ in control and mycotoxin-contaminated diets. *Indicates mycotoxin diet effect, (P<0.05).

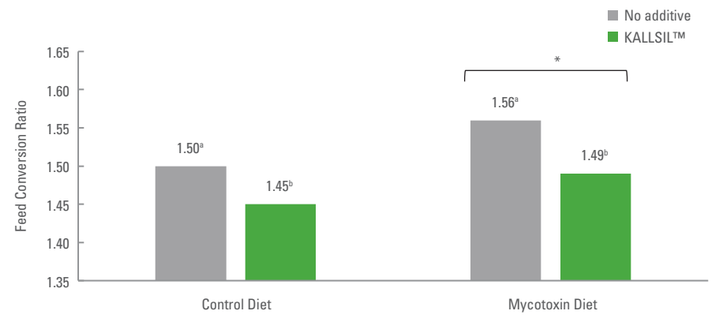


Figure 2. Feed conversion ratio of 6-week-old turkey hen poults supplemented with KALLSIL™ in control and mycotoxin-contaminated diets. *Indicates mycotoxin diet effect, (P<0.05). a-bDiffering superscripts within the control and mycotoxin diet groups indicate significant differences (P<0.05).

IN VITRO TOTAL BINDING EFFICIENCY OF ENHANCED ZEOLITE:

In vitro mycotoxin binding analysis was conducted using a two-phase model by an accredited, independent laboratory. Enhanced zeolite was dosed at a rate equivalent to 2 lbs. of product per ton of feed, and mycotoxins were tested at a concentration of 3 ppm in all experiments.

Total binding efficiency (TBE) for each toxin was determined by comparing percent toxin absorption under acidic buffer conditions (pH 4) with percent toxin desorption under neutral buffer conditions (pH 6.5). Analyses were conducted in triplicate, with average TBE results shown in Figure 3.[11]

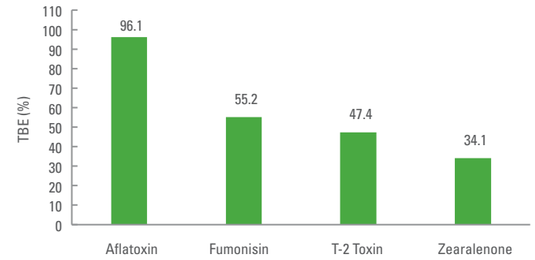


Figure 3. In vitro total binding efficiency (TBE) of enhanced zeolite towards aflatoxin, fumonisin, T-2 toxin and zearalenone. For all toxins, 100% = 3 ppm.

RESULTS SUMMARY:

IN VITRO TOTAL BINDING EFFICIENCY:

- Enhanced zeolite showed broad-spectrum binding efficiency for aflatoxin B1, fumonisin B1, T-2 toxin and zearalenone
- Additional in vitro studies show the enhanced zeolite used in KALLSIL does not bind vitamins or minerals found in feed[11]

IN VIVO TURKEY PERFORMANCE:

- Mycotoxin-contaminated diets reduced body weight and FCR of turkey poults
- Inclusion of KALLSIL improved FCR by >5-points in turkeys fed either the control or the mycotoxin-contaminated diets

CONCLUSION:

Inclusion of KALLSIL may support overall performance of turkey poults, particularly when using feed grains which may contain dietary mycotoxins.