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Feeding KALLSIL™ Reduces the Effects of Naturally-Occurring Mycotoxins on Performance of Six-Week-Old Turkey Hen Poults[1]

Abstract

The purpose of this floor pen trial was to evaluate the ability of a natural zeolite clay feed additive (KALLSIL™) to lessen the effects of a mycotoxin-contaminated diet on turkey hen poult performance. Treatments included two rations (control and mycotoxin) either treated with KALLSIL (4 lbs./ton) or left untreated (no additive). Mycotoxin rations contained grains contaminated with naturally-occurring aflatoxin, deoxynivalenol and zearalenone. Feeding dietary mycotoxins significantly reduced body weight (BW) and increased feed conversion ratio (FCR) of turkey poults at 6 weeks. In both control and mycotoxin diets, poults fed rations containing KALLSIL exhibited ≥5-point improvement in FCR compared to poults fed rations without the feed additive. Based on these results, inclusion of KALLSIL may support overall performance of turkey hen poults, particularly when using feed grains which may contain dietary mycotoxins.

Introduction

Mycotoxins are naturally-occurring fungal metabolites which have been implicated in toxicity of animals and humans.[2] These toxins, produced by molds including *Aspergillus, Fusarium* and *Penicillium* species, are frequent contaminants of cereal grains used in the manufacture of livestock and poultry feeds. While crop monitoring can prevent grains with high mycotoxin levels from entering the food chain, feeding grains co-contaminated with low levels of toxins remains a significant challenge for the poultry industry.[3] Chronic exposure to low-level dietary mycotoxins has been reported to adversely impact body weight gain and feed efficiency, resulting in substantial economic losses to the poultry industry.[1,4] The use of nutritionally-inert adsorbents – such as aluminosilicate mineral clays – in the diet to sequester mycotoxins (reducing toxin absorption in the gastrointestinal tract) is one approach utilized to address the issue of dietary mycotoxins in poultry feeds.[4,5,6,7]

A study was conducted by North Carolina State University to evaluate the potential of mineral clay feed additives to lessen potential effects of a mycotoxin contaminated diet on turkey hen poult performance and physiology over 6 weeks.

Materials and Methods

Female Hybrid Converter poults (initial BW = 54 g) were placed in litter floor pens and assigned to 4 treatment groups (6 reps/trt; 30 poults per pen). Turkey starter 1 and 2 diets were formulated with either relatively clean grains or grains naturally contaminated with aflatoxin, deoxynivalenol (DON) and zearalenone. Feed for the two rations (control and mycotoxin) were prepared with either natural zeolite clay (KALLSIL™ Dry, Kemin Industries, Des Moines, IA) included at 4 lbs./ton or feed was left untreated (no additive). Rations were fed to poults to 6 weeks of age. Levels of mycotoxins were tested in each ration. Effects of mycotoxin diet and feed additive on mean body weight (BW) and feed conversion ratio (FCR) of turkey poults were evaluated at 6 weeks.

Results

Mycotoxin levels detected in turkey rations are shown in Table 1. Control feeds had no detectable aflatoxin; whereas, mycotoxin feeds contained 200 to 310 ppb. Zearalenone and DON were detected in both control and mycotoxin feeds.

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Table 1. Mycotoxin levels in starter 1 and starter 2 turkey poult diets.

Diet	Treatments	Aflatoxin (ppb)		Deoxynivalenol (ppm)		Zearalenone (ppm)	
		Starter 1	Starter 2	Starter 1	Stater 2	Starter 1	Starter 2
Control	No additive	ND*	ND	1.0	1.0	0.6	0.3
	KALLSIL™	ND	ND	1.2	1.0	0.5	0.4
Mycotoxin	No additive	240	200	1.7	1.8	0.7	0.4
	KALLSIL™	310	250	2.0	2.0	0.6	0.8

*ND = not detected.

At 6 weeks, feeding mycotoxin-contaminated feed significantly reduced turkey poult BW (Figure 1) and increased poult FCR (Figure 2). Diets containing KALLSIL did not significantly impact poult BW in either the control diet or the mycotoxin diet (Figure 1, P>0.05). In both control and mycotoxin diets, poults fed diets containing KALLSIL exhibited improved FCR compared to poults fed diets without the feed additive (Figure 2, P<0.05). Overall, turkey poults fed KALLSIL had ≥5-point improvement in FCR compared to poults fed no additive in both control and mycotoxin diets.

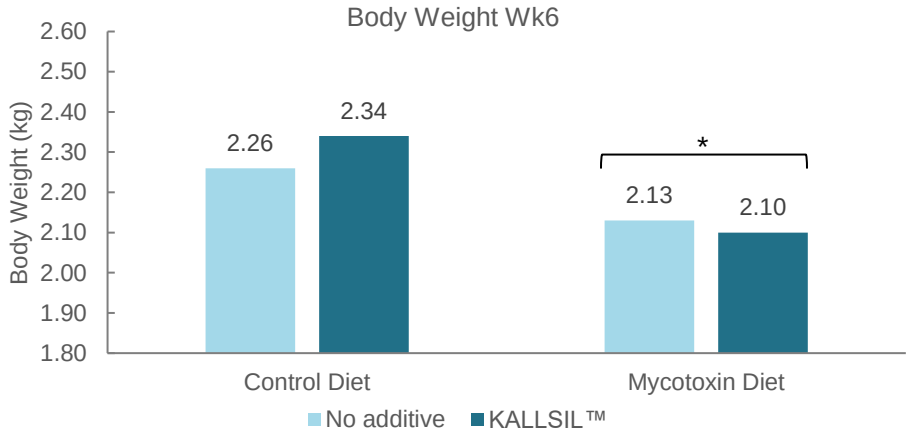

Figure 1. Body weight of 6-week-old turkey hen poults supplemented with KALLSIL™ in control and mycotoxin contaminated diets. *Indicates mycotoxin diet effect, (P<0.05).

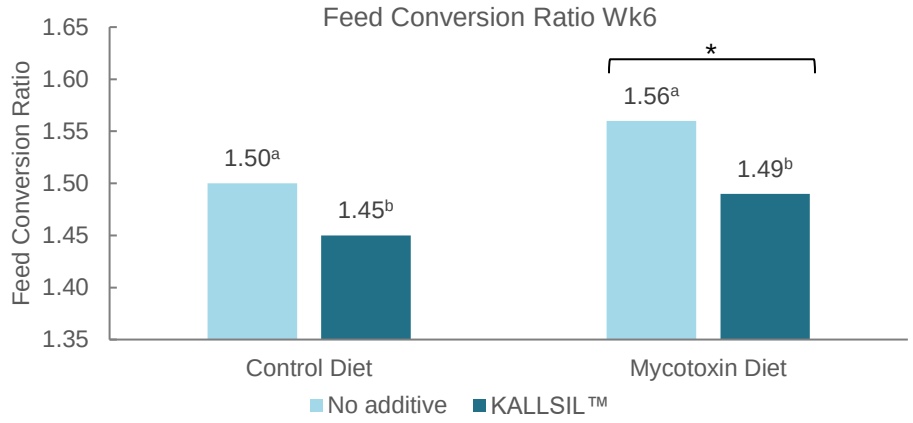

Figure 2. Feed conversion ratio of 6-week-old turkey hen poults supplemented with KALLSIL™ in control and mycotoxin contaminated diets. *Indicates mycotoxin diet effect, (P<0.05). [a-b]Means within control and mycotoxin treatment groups with different superscripts differ significantly (P<0.05).

Conclusion

The data from this study indicates that inclusion of KALLSIL in turkey hen poult diets may lessen the effects of a mycotoxin-contaminated diet on performance at 6 weeks. Compared to the control diet, dietary mycotoxins increased FCR of untreated poults by 6 points; whereas, inclusion of KALLSIL alleviated the effects of dietary mycotoxins, returning FCR to that observed in the untreated, control diet. KALLSIL also showed the ability to improve performance of poults fed diets with minimal mycotoxin contamination. Based on these results, inclusion of KALLSIL may support overall performance of turkey poults, particularly when using feed grains which may contain dietary mycotoxins.

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