Agrarian® SOLUTIONS

The Effect of DTX™ on Lactating Dairy Cow Performance

INTRODUCTION

DTX™ is research-proven to protect against mycotoxin-related inflammation leading to increased milk yield and improved reproductive performance in dairy cows.[1,2] Plant phytogenic technology has moved beyond traditional herbal medicine to plant molecules with specific effects. This study evaluated the combined effects of Agrarian Solutions' proprietary bacteria technology and a proprietary blend of plant molecules when fed to lactating Holstein cows fed a diet with a medium risk level of mycotoxin contamination.

PROCEDURES

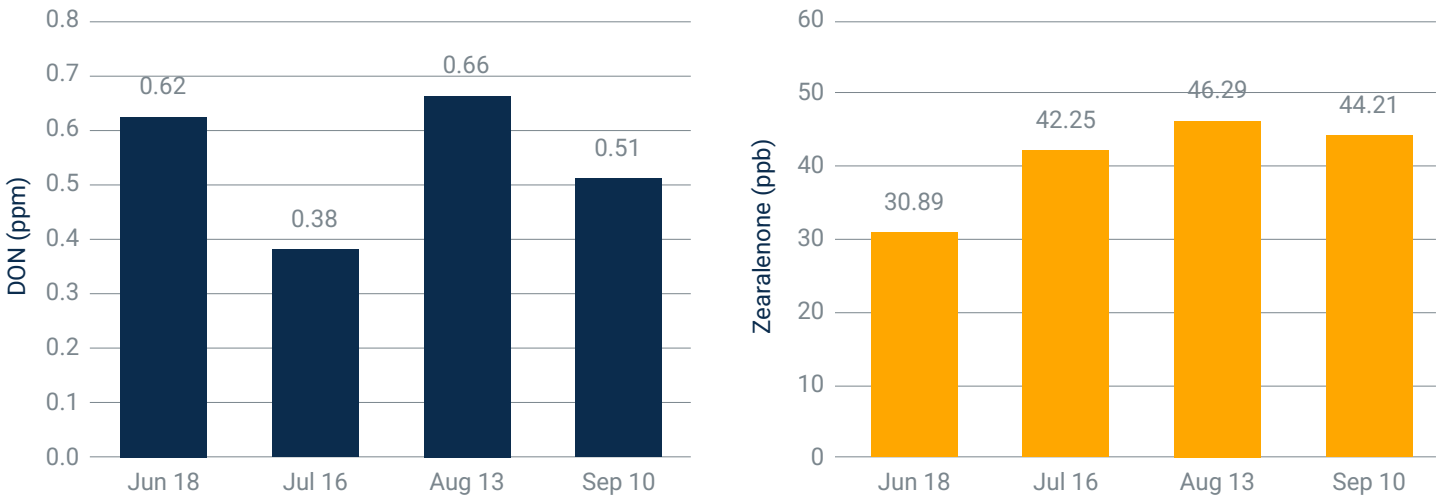
Sixteen multiparous Holstein cows on a commercial research farm were blocked by calving date, lactation (average 3.38), previous 305-day milk yield (average 35,931 lbs), and average test-day SCC (average 42,000) and randomly assigned to one of two treatments. Treatments were 14 g per cow per day of Select DTX[3] top-dressed in 100 g of soybean meal (DTX) or a control treatment of a top-dress of 100 g of soybean meal (CON). Treatments were fed once daily from the day of calving through 91 days-in-milk. Cows were housed in one free stall pen and fed ad libitum in BioControl® feed tubs. The TMR was sampled biweekly and analyzed for mycotoxins at Dairyland Laboratories. Cows were milked three times daily and milk was sampled one day weekly from three consecutive milkings for yield, components, and milk fatty acid analysis. Two trained individuals recorded BCS on d 1, 45, and 90 after calving, and body weight was measured after each milking. The dairy utilized CowManager® ear tags for continuously measuring rumination, eating, and activity from d 3 to the end of the experiment on d 91 of lactation.

RESULTS AND DISCUSSION

TMR Mycotoxins

The mycotoxin contamination of the TMR is presented in Figure 1 and averaged 0.54 ppm DON and 41 ppb zearalenone, which are considered to pose medium- and low-risk levels, respectively.

Figure 1. TMR Mycotoxin Concentration



Mycotoxin concentrations in the total mixed ration (TMR) across four sampling dates. DON is reported in ppm; zearalenone is reported in ppb.

[1,2]Roth, L. D., et. al. 2024. J. Dairy Sci. 107(Suppl 1):426.
[3]14 g of Select DTX provides the same bacteria technology and phytogenics as 9 g DTX Concentrate.

Feed Intake and Milk Response

Figure 2. Dry Matter Intake

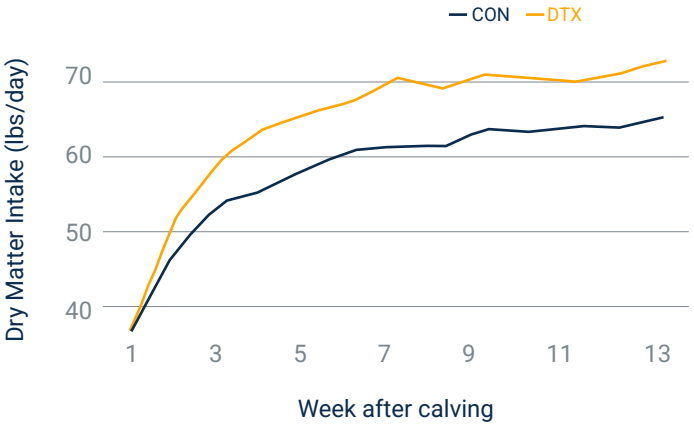
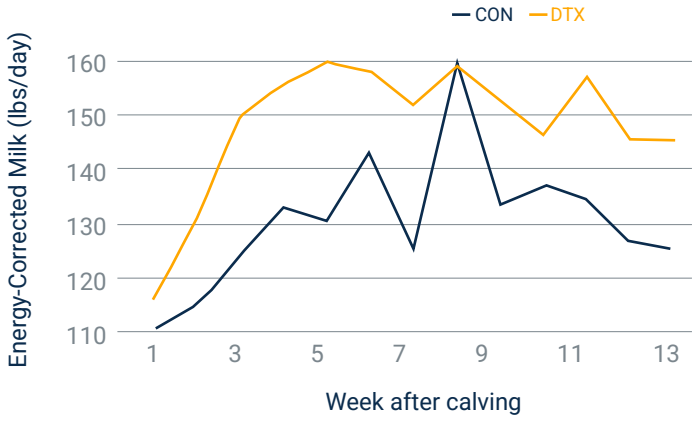


Figure 3. Energy-Corrected Milk



Body Weight and Feeding Behavior

There were no differences in body weight (average 1,470 lbs) or body condition score (average 3.40) between the treatment groups throughout the experimental period. Daily dry matter intake was significantly (P=0.04) increased 6.4 lbs per day by feeding DTX compared to the control group (64.6 lbs vs 58.2 lbs, Figure 2). Mycotoxins alter ruminal bacteria and damage cells lining the digestive tract, potentially decreasing feed intake.

Enhancing gut integrity and protecting against mycotoxin damage allowed the DTX cows to quickly increase feed intake after calving. Rumination (average 562 minutes), eating minutes (average 219 minutes), highly active (average 315 minutes) and inactive (average 199 minutes) time were the same between treatments, and active time was higher in the DTX fed cows (164 vs 140 minutes, P<0.01).

Milk Yield and Composition

Milk yield and component data are presented in Table 1. While test date milk yield was not significantly different, there was a numerical increase of 11 lbs for cows fed DTX (124 lbs vs 113 lbs, P>0.05). Milk fat percentage was greater for DTX-fed cows (5.31% vs 4.99%, P<0.01) which contributed to higher fat yield (6.4 lbs vs 5.5 lbs, P<0.01) and higher ECM yield of 148 lbs vs 129 lbs (P<0.01, Figure 3). Milk protein percentage was not different between treatments. Milk fatty acids were analyzed at each test date and showed a similar significant increase for cows fed DTX (P<0.01, Table 2).

Table 1. Milk Components

	CON	DTX	P-value
Milk Yield, lbs	113	124	0.06
ECM Yield, lbs	129	148	<0.01
Milk Fat, %	4.99	5.31	<0.01
Milk Fat Yield, lbs	6.4	5.5	<0.01
Milk Protein, %	2.97	2.97	0.41
Milk Protein Yield, lbs	3.33	3.64	0.12

Table 2. Milk Fatty Acid Analysis

	CON	DTX	P-value
De novo Fatty Acids, %	0.58	0.68	0.09
De novo Fatty Acids Yield, lbs	1.28	1.5	<0.01
Mixed Fatty Acids, %	1.56	1.66	0.07
Mixed Fatty Acids Yield, lbs	1.74	2.03	<0.01
Preformed Fatty Acids, %	0.84	0.96	0.01
Preformed Fatty Acids Yield, lbs	1.83	2.11	0.1

Energy-corrected milk yield and milk fat yield likely increased in DTX-fed cows due to increased feed intake and proper nutrient allocation due to resolving mycotoxin- and other dietary-related inflammation. There were no differences in BCS or body weight throughout the treatment, and DTX-fed cows also had greater de novo and mixed fatty acids. An increase in de novo and mixed fatty acid groups indicates the increased milk fat production in cows fed DTX resulted from diet and intake. De novo fatty acids derive from ruminal fermentation and the diet, while preformed fatty acids come from body fat mobilization or diet-supplied C:18 fatty acids, and the mixed fatty acid group comes from a mixture of the two other groups[4]. Because all three fatty acid groups were increased similarly, and BCS and body weight were the same between treatments, increased dietary intake of feed and fatty acids, as well as nutrient reallocation, were the main contributing factors towards higher milk fat, not simply mobilizing body fat.

CONCLUSIONS

Feeding DTX helped defend and protect from mycotoxin-related inflammation and potentially other diet-related inflammation during the vulnerable post-calving period, enabling fresh cows fed DTX to eat more feed and reallocate nutrients to make more milk and components while maintaining body condition.

[4]Barbano, D. M., et. al. 2014. Proc. Cornell Nutrition Conf. 105-113.