



Supplementing DTX™ to Early-lactation Holstein Cows Challenged by Mycotoxins Improves Pregnancy Rate

Feeding mycotoxin-contaminated diets to early-lactation dairy cows often impairs reproductive success. Dairy producers and nutritionists have been supplementing the **DTX™** product to lactating dairy cows and observing improved pregnancy rates for over 25 years. This study was conducted at a large, high-performing Holstein herd to demonstrate the reproductive benefits of feeding DTX to early-lactation dairy cows when challenged by deoxynivalenol-(DON) and zearalenone-contaminated diets¹.

PROCEDURES

The study was conducted as a randomized controlled trial from August 29, 2022 to May 28, 2023, in New York, at a 3,600-cow commercial dairy farm experienced in conducting commercial feed additive research. After entering the dry pen, Holstein cows were blocked by lactation group, expected calving date and stratified by lactation (1st, 2nd, 3rd+), and then randomized to research groups with dietary treatments beginning at calving. Depending upon the research group assignment, upon freshening the cows entered either a control group (base ration without DTX; control; 463 cows) or a treatment group (base ration with DTX; DTX; 463 cows). The study was conducted with a control premix (no DTX) or a DTX premix (providing a minimum of 9 g DTX/cow/d to the lowest DMI pen (1st lactation. 50 lb DMI/d) with an average DTX intake of 10.34 g/cow/d for all cows.

Feeding practices and recording, as well as milking procedures and measurements are reported in a separate technical report. Samples of each pen's TMR were obtained initially twice per month and then monthly for mycotoxin analyses (ActLabs).

A standard presynch-ovsynch program was utilized to synchronize cows for first service at 73+3 DIM. Approximately 90% of 1st-lactation and 99% of 2nd- and 3rd-lactation cows received an embryo at first breeding, with the remainder being of exceptional genetic value and being serviced by artificial insemination (AI). All 4th- and greater-lactation cows were serviced with conventional beef semen. The initial pregnancy diagnosis was at 28-34 d post-service and final pregnancy determination at 61-67 d post-service. Records of breeding method, date, technician, as well as date and outcome of pregnancy diagnosis were recorded in DC305.

Statistical analysis was conducted with individual cows as the experimental units. Pregnancy outcomes were analyzed with mixed linear regression models with terms for treatment, lactation number, breeding method and the interactions.

RESULTS AND DISCUSSION

The description of cows by lactation and research group utilized in the study are listed in Table 1.

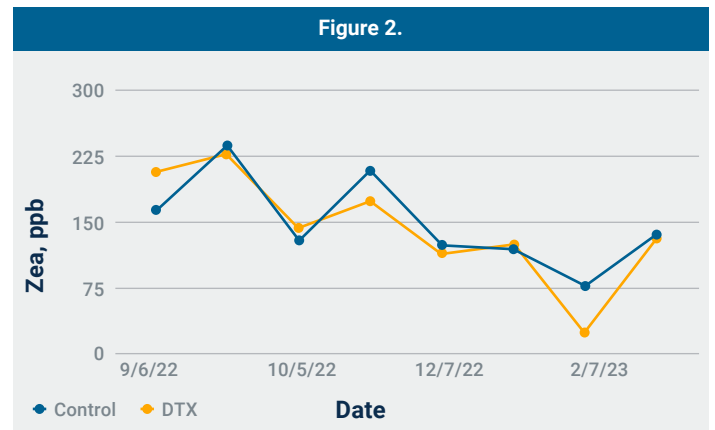
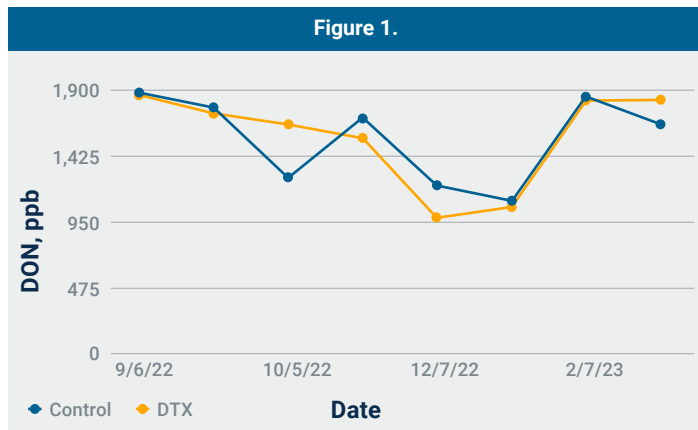
The TMR contamination levels of DON (Figure 1) and zearalenone (Zea) (Figure 2) recorded throughout the study did not differ between the research groups for DON (P=0.60) (1,572 ppb and 1,560 ppb for control and DTX, respectively) or Zea (P=0.08) (150 ppb and 143 ppb for control and DTX, respectively).

Table 1. Number of Holstein Cows by Lactation and Research Group.

Lactation Number	Control	DTX
1	133	131
2	118	127
3+	212	205
Total	463	463

¹Dairy Health and Management Services

Total Mixed Ration Contamination Levels of Deoxynivalenol (Figure 1) and Zearalenone (Figure 2) by Measurement Date.



A summary of reproductive outcome as influenced by DTX supplementation and service technique is displayed in Table 2. A greater proportion (P=0.035) of DTX cows (45.0%) were initially pregnant (d 28-34 post-service) at first service than control cows (37.7%). The control cows (19.6%) and DTX cows (19.1%) did not differ (P=0.83) for pregnancy losses at d 61-67 post-first service. The final proportion of cows pregnant d 61-67 post-first service tended to be greater (P=0.06) for DTX cows (36.4%) than control cows (30.3%).

	1 st - Lactation		2 nd - and Greater Lactation		All Lactations		P - values		
	Control	DTX	Control	DTX	Control	DTX	Trt	Lact	TxL
Cows serviced, % (No. serviced/No. available)	94.0 (125/133)	94.7 (124/131)	85.5 (282/330)	89.8 (298/332)	87.9 (407/463)	91.1 (422/463)	0.37	0.004	0.64
DIM 1st Service	73.5 ± 0.4	73.4 ± 0.4	72.9 ± 0.2	73.1 ± 0.2	72.9 ± 0.2	73.1 ± 0.2			
Service technique, % (No. tech./No. serviced)							0.97	<0.001	0.66
Estrus, %	4.8 (6/125)	4.8 (6/124)	4.6 (13/282)	5.0 (15/298)	4.7 (19/407)	5.0 (21/422)			
ET ¹ , %	87.2 (109/125)	85.5 (106/124)	62.8 (177/282)	63.4 (189/298)	70.3 (286/407)	69.9 (295/422)			
TAI ²	8.0 (10/125)	9.7 (12/124)	32.6 (92/282)	31.5 (94/298)	25.1 (102/407)	25.1 (106/422)			
Initial Pregnancy, % (No. preg/No. serviced)	32.8 (41/125)	41.1 (51/124)	39.9 (122/282)	46.6 (138/298)	37.7 (153/407)	45.0 (189/422)	0.04	0.09	0.79
Preg. Loss, % (No. lost/No. Preg)	17.1 (7/41)	21.6 (11/51)	20.5 (23/122)	18.1 (25/138)	19.6 (30/153)	19.1 (36/189)	0.83	0.99	0.48
Final Preg., % (No. Preg./No. Serviced)	27.2 (34/125)	32.3 (40/124)	31.7 (89/282)	38.2 (113/298)	30.3 (123/407)	36.4 (153/422)	0.06	0.15	0.89

¹Embryo Transfer • ²Timed artificial insemination

Table 3 displays reproductive outcomes as influenced by DTX supplementation and service technique at first service. For both artificial insemination and embryo transfer techniques, DTX supplementation improved the initial and final pregnancy rates. There was not a statistical interaction between DTX supplementation and service technique.

	Service Technique ¹				P - values	
	Artificial Insemination		Embryo Transfer		ST ¹	TRT x ST
	Control	DTX	Control	DTX		
Initial Pregnancy, % (No. preg/No. serviced)	45 (54/120)	52.0 (65/125)	34.6 (99/286)	42.0 (124/295)	0.02	0.98
Pregnancy loss, % (No. loss/No. preg)	18.5 (10/54)	9.2 (6/65)	20.2 (20/99)	24.2 (30/124)	0.04	0.15
Final pregnancy, % (No. preg/No. serviced)	36.7 (44/120)	47.2 (59/125)	27.6 (79/286)	31.9 (94/295)	0.01	0.47

¹Artificial Insemination vs. Embryo Transfer

CONCLUSIONS

Supplementing DTX to lactating Holstein cows when consuming a mycotoxin-contaminated diet during the first 150 DIM increased the initial pregnancy rate at d 28-34 post-first service and tended to increase the final pregnancy rate at d 61-67 post-first service. The improved initial and final pregnancy rates due to DTX supplementation was evident for both artificial insemination and embryo transfer.