Corn stover feedlot diets with elevated mycotoxins and binder effect on cattle performance

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Introduction

- Harvested corn stover can support feedlot operations in intensive corn producing regions of the U.S.
- Single-pass stover harvest is a method whereby combine harvester tailings consisting of cob, stalk, leaf, husk and tassel fractions are collected and baled without coming into contact with soil
- Mycotoxin producing fungi can be present on corn plants due to wet conditions
- Mycotoxins inhibit animal performance

Materials and Methods

- Grow Trial: Randomized complete block design, 3 x 2 factorial arrangement of treatments
- 72 black British x Continental steers, 12 pens with 6 steers per pen
- Grow phase basal diet DM: 52% corn silage (CSIL), 20% DDGS, and 8% supplement
- Treatments were an additional 20% diet DM from corn silage, conventional corn stover (CST), or single-pass bale stover (SPB) and Engage-M fed at 0 or 14 g hd^{-1} d^{-1}
- Finish Trial: Diet DM was 12% corn silage, 72.1% high-moisture corn, 13.1% DDGS, and 2.8% supplement with Engage-M fed at 0 or 14 g hd^{-1} d^{-1}

Approach

- Observe effects of a mycotoxin binder, Engage-M (United Animal Health, Sheridan, IN), on cattle performance when consuming grow and finish diets with elevated mycotoxin levels
- Engage-M contained hydrated sodium calcium aluminosilicate

Single-Pass Bale Stover Harvest

Results

Table 1. Treatment diet mycotoxin levels and associated action level[1]

Mycotoxin	Grow Diet Concentration[2]			Action Level[3]
	CSIL	CST	SPB	
Fumonisin B1, ppb	536	459	1433	30000
Fumonisin B2, ppb	ND[4]	ND	296	30000
Zearalenone, ppb	518	2130	2402	5000
Vomitoxin, ppb	5663	9868	9250	10000

[1] Individual feed ingredient samples were taken over a three day period, composited, and mailed to North Dakota State University Veterinary Diagnostic Laboratory for mycotoxin analysis.
[2] Mycotoxin concentrations were calculated for each diet based on the mycotoxin concentration in each ingredient and the respective diet DM formula.
[3] Action level is the complete diet specified level of contamination at which the United States Food and Drug Administration (US FDA) is prepared to take regulatory action.
[4] Not Detected, less than the Practical Quantitation Limit.

Table 2. Grow trial and Finish trial steer weights and diet dry matter intakes (DMI)

	Control	Engage-M	*P*-value
Initial, kg $steer^{-1}$	483	477	0.40
Final, Grow, kg $steer^{-1}$	514	509	0.52
Grow Gain, kg $steer^{-1}$ d^{-1} (27 d)	1.26	1.35	0.17
Final, Finish, kg $steer^{-1}$	621	623	0.90
Finish Gain, kg $steer^{-1}$ d^{-1} (51 d)	1.90	2.07	0.09
Overall Gain, kg $steer^{-1}$ d^{-1}	1.68	1.82	0.08
Finish DMI, kg $steer^{-1}$ d^{-1}	12.9	12.9	0.83
Finish DMI/Gain	6.83	6.25	0.06

Conclusion

- Evidence that feeding a mycotoxin binder may increase cattle performance when diets have elevated levels of mycotoxins
- Longer duration trials are needed to be more conclusive
- In vitro testing of hydrated sodium calcium aluminosilicate in rumen fluid incubations amended with zearalenone and vomitoxin would be additional relevant future research