Potential interactions between prior endophyte exposure and phytogenic supplementation for finishing steers with varying chute exit velocities

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Introduction

- All-natural phytogenic supplementation has gained momentum in the feeding industry in recent years.
- Mechanisms of such supplements likely differ from traditional antibiotic supplements, suggesting potential additive effects.
- Backgrounding cattle on endophyte infected pastures is common and could influence response to dietary treatment during finishing.
- Consistent effects of exit velocity on finishing ADG suggest that animals of differing exit velocities could respond differently to dietary manipulation.

Objective

Our objective was to determine the influence of Actifor® Energy (ActEN) when fed with monensin and tylosin on performance and carcass measurements of finishing cattle with varying chute exit velocities (EV) and differing prior endophyte exposure (E).

Materials and Methods

Steers and Treatments

- 118 crossbred steers were utilized in a 150 d finishing study.
- Previously grazed on either toxic or nontoxic endophyte-infected fescue for 112 d.
- Actifor® Energy supplemented at 6g·hd^{-1}·d^{-1}

Cattle Management

- Finished in 3 head pens.
- Weights and exit velocity were recorded on d0, d28, d56, d112, and at slaughter when cattle were shipped to a local abattoir, harvested and carcass measurements recorded.

Diet

- Pens fed on ad libitum basis once daily with weekly orts collection for DMI calculations.
- Balanced Ration: 27.5% cracked corn; 27.5% high moisture corn; 25% DDG; 10% corn silage; 10% supplement.
- Supplementation of Rumensin® at 411mg·hd^{-1}·d^{-1} and Tylan® at 80mg·hd^{-1}·d^{-1}

Statistical Analysis

- Split plot – whole plot = 2 x 2 factorial: prior endophyte status and Actifor® Energy supplement (EU = pen of 3 head), exit velocity (as covariate) in subplot (EU = animal).
- Data analyzed using Mixed Model platform in SAS JMP Pro (v 14.3) with weight block and associated interactions specified as random effects.

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Results

Table 1. Effect of prior exposure to toxic endophyte and supplementation with Actifor® Energy on dry matter intake (DMI) and feed efficiency (G:F) in finishing steers.

	Nontoxic Endophyte		Toxic Endophyte			P-value[a]		
Item[b]	ActEn-	ActEn+	ActEn-	ActEn+	SEM	ExActEn	E	ActEn
DMI, % BW								
d 0-28	2.12	2.20	2.07	2.06	0.051	0.24	0.12	0.34
d 29-56	2.42	2.45	2.37	2.38	0.053	0.88	0.33	0.57
d 57-112	2.36	2.37	2.40	2.40	0.034	0.90	0.41	0.90
d 113-End	2.00	1.99	2.06	2.06	0.031	0.93	0.11	0.81
d 0-End	2.23	2.27	2.20	2.21	0.030	0.36	0.26	0.29
G:F								
d 0-28	0.172	0.204	0.185	0.165	0.0150	0.15	0.30	0.72
d 29-56	0.220	0.221	0.227	0.219	0.0087	0.62	0.83	0.70
d 57-112	0.183	0.172	0.187	0.185	0.0052	0.45	0.11	0.28
d 113-End	0.155	0.162	0.157	0.155	0.0050	0.40	0.66	0.65
d 0-End	0.180	0.184	0.182	0.177	0.0028	0.09	0.55	0.81

[a] E x ActEn = Endophyte x Actifor® Energy interaction; E = endophyte main effect; ActEn = Actifor® Energy supplementation main effect

[b]End = last day of experiment, which varied from d132 to d176 for the four slaughter groups, which were each balanced across treatments. Slaughter dates for each group were determined based on target backfat estimate of 1.27 cm.

Figure 1. Effect of prior endophyte exposure on relationship between exit velocity and finishing ADG (Endophyte x Exit velocity P = 0.09)

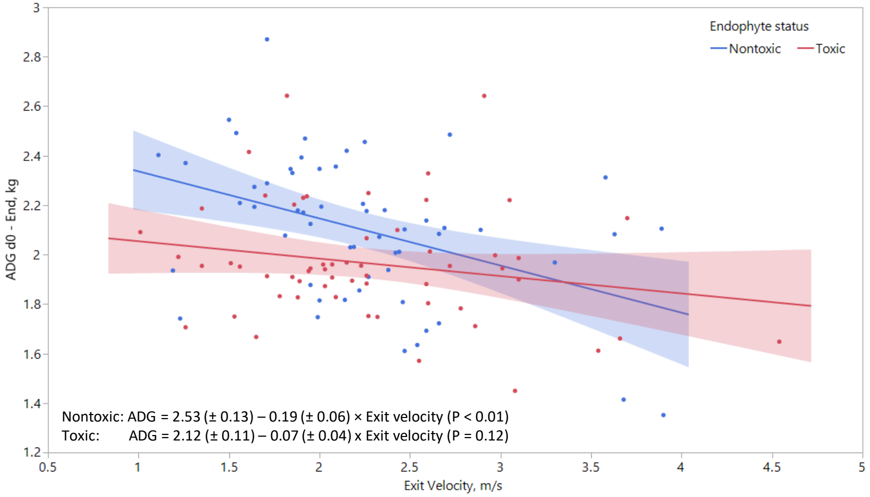

Table 2. Effect of prior exposure to toxic endophyte, supplementation with Actifor® Energy, and exit velocity on average daily gain (ADG) in finishing steers.

	Nontoxic Endophyte		Toxic Endophyte			P-value[a]						
Item[b]	ActEn -	ActEn +	ActEN -	ActEn +	SEM	EV x ActEn x E	E x ActEn	E	ActEn	E x EV	ActEn x EV	EV
Initial wt, kg	366	361	341	342	9.0	0.81	0.12	0.10	0.27	0.08	0.33	0.01
Final wt, kg	659	656	656	645	7.8	0.37	0.31	0.28	0.49	0.06	0.54	<0.01
ADG, kg/d												
d 0-28	1.41	1.73	1.38	1.25	0.128	0.36	0.14	0.03	0.51	0.49	0.09	0.02
d 29-56	2.34	2.41	2.20	2.11	0.098	0.73	0.35	0.06	0.87	0.78	0.22	0.01
d 57-112	2.31	2.23	2.27	2.22	0.067	0.26	0.73	0.67	0.34	0.10	0.72	0.35
d 113-End	1.97	2.04	2.01	1.93	0.092	0.90	0.35	0.74	0.94	0.69	0.48	0.01
d 0-End	2.06	2.12	2.00	1.93	0.055	0.39	0.12	0.07	0.86	0.09	0.27	0.00

[a] EV = exit velocity; ActEn = Actifor® Energy; E = endophyte status

[b]End = last day of experiment, which varied from d132 to d176 for the four slaughter groups, which were each balanced across treatments. Slaughter dates for each group were determined based on target backfat estimate of 1.27 cm.

Table 3. Effect of prior exposure to toxic endophyte, supplementation with Actifor® Energy and exit velocity on carcass traits in finishing steers.

	Nontoxic Endophyte		Toxic Endophyte			P-value[a]						
Item	ActEn -	ActEn +	ActEn -	ActEn +	SEM	EV x ActEn x E	E x ActEn	E	ActEn	E x EV	ActEn x EV	EV
HCW, kg	394	396	393	384	4.6	0.46	0.28	0.25	0.28	0.08	0.50	<0.01
DP, %	62.4	62.2	62.2	62.0	0.29	0.95	0.92	0.67	0.39	0.27	0.78	0.18
YG	3.38	3.36	3.45	3.39	0.119	0.22	0.97	0.76	0.56	0.12	0.83	0.02
REA, cm^2	88	87	88	86	1.4	0.39	0.69	0.75	0.28	0.72	0.98	0.49
Marbling	537	565	557	567	24.3	0.45	0.73	0.71	0.32	0.36	0.68	0.22
Backfat, cm	1.47	1.39	1.54	1.46	0.073	0.34	0.90	0.44	0.16	0.15	1.00	0.01
KPH, %	1.90	1.88	1.91	1.96	0.026	0.42	0.13	0.10	0.66	0.39	0.24	0.24

[a] EV = exit velocity; ActEn = Actifor® Energy; E = endophyte status

Conclusions

- Prior exit velocity and prior endophyte status were the primary factors influencing performance and carcass traits.
  - Finishing ADG increased with decreasing exit velocity in calves that had previously grazed on nontoxic fescue, whereas the effect of exit velocity on finishing gain was suppressed in cattle that had grazed on toxic fescue pastures.
- Indications of small effects of phytogenic supplementation when fed in combination with antibiotics, especially during the first 28 days of feeding, warrant further investigation.