

Effect of Field Pea Replacement and *Yucca schidigera* extract on weaning transition growth and feedlot performance

Interim Report

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Summary

The addition of *Yucca schidigera* (*Yucca s.*) extract to field pea/fiber-based weaning transition diets was conducted to determine the potential effect on weaning growth, feedlot performance, and carcass characteristics. Steroidal saponins found in *Yucca s.* extract has been shown to alter rumen function creating a potential for improved ammonia utilization leading to a subsequent improvement in microbial protein flow to the small intestine. Steer calves, early weaned in mid-September and averaging 450 pounds, were used in the investigation.

Weaning growth and efficiencies have been completed at this writing and steers are on feed at the Decatur County Feed Yard, Oberlin, KS. Weaning performance across all treatments evaluated was excellent and no statistical differences were measured for the criteria evaluated. Non-significant ADG was 3.08, 3.16, 3.25, and 3.0 lbs./head for the 42-day transition period, respectively. Feed to gain efficiency was 3.92, 3.87, 3.78, and 4.20 pounds/pound of gain, respectively. On average, steers in the investigation gained 131.2 pounds in the 42-day conditioning period at a feed cost of \$16.58/cwt.

Introduction

Previous research with weaning transition diets at this center, in which field peas were used to replace a portion of fiber-based ingredients, has shown a trend toward improved carcass quality grade when transition diets included 20% field pea (Landblom et al. 2003).

Yucca s., like many plants, contains steroidal saponins which have surface active properties and ammonia binding capability. In the recent past, researchers have been interested in the use of *Yucca s.* extract in livestock production applications. Application of *Yucca s.* extract in high grain diets has improved rate of gain (Goodall et al., 1982). In other studies, *Yucca s.* extract has been shown to decrease ruminal ammonia concentration, increase propionate concentration, improve organic matter digestibility, and in some instances improve animal performance (Grobner et al., 1982; Goetsch and Owens, 1985;

Hristov et al., 1999; Hussain and Cheeke, 1995; Valdez et al., 1986; Wu et al., 1994). Hristov et al., (1999) was able to demonstrate that the antiprotozoal activity of yucca saponins could serve as an effective defaunating agent without compromising dry matter digestibility. Their work suggested that the inclusion of *Yucca s.* extract in higher protein diets may improve ammonia utilization in the rumen and by reducing protozoan populations in the rumen microbial protein flow to the small intestine may also improve.

Other research has shown early application of dietary energy in short term, 6 week, weaning transition and receiving calf diets has resulted in effective improvement in beef carcass quality (Drouillard et al., 2002; Farran et al., 2002).

The purpose of the present preliminary investigation is to determine whether the addition of *Yucca s.* extract will improve weaning and subsequent finishing performance over that already observed in previous field pea replacement research.

Procedures

Seventy-two crossbred steers were allotted to one of four treatments, with three pen replicates per treatment, in a completely randomized design. Diet formulation for each of the test supplements is shown in Table 1. In the formulation, field peas replaced either 0 or 15% of fiber-based ingredients. *Yucca s.* extract was added to half of the diets to provide for 35mg/lb of finished feed.

Diets fed were complete pelleted formulations that replaced chopped hay on a daily basis until 50% or more of the calves' intake was from the test diets. Steers and residual feed in bunks were weighed weekly during the 6 week postweaning transition period. Weighback residual feed was removed and not refed. At the end of the 42-day transitioning period (Oct. 31), the steers were shipped to Decatur County Feed Yard, Oberlin, Kansas, where an electronic cattle management (ECM) system is utilized to determine final harvest end point.

Results and Discussion

Steer growth performance across treatments, among the early weaned 450 lb. calves used in this study, was excellent tending to favor the inclusion of *Yucca s.* extract without peas in the 0% Pea + *Yucca s.* treatment. Numerical, non significant, differences for average daily gain (P=.12) were 3.08, 3.16, 3.25, and 3.0 pounds per day for 0% Pea, 15% Pea, 0% Pea + *Yucca s.* and 15% Pea + *Yucca s.*, respectively. No differences were measured for feed intake (P=.50) or feed efficiency (P=.50). Feed cost per head (P=.70) and feed cost per pound of gain (P=.70) did not differ and were nearly identical across treatments for each criteria.

Finishing performance and carcass characteristics were not available at the time this report was written. The impact of *Yucca s.* inclusion on carcass quality will be reported in the next issue of this annual report.

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Table 1. Experimental diet analysis.

	0% Pea	0% Pea + Yucca	15% Pea	15% Pea + Yucca
Corn	10.0	10.0	10.0	10.0
Peas	0.0	0.0	15.0	15.0
Soyhulls	39.421	39.421	37.656	37.656
Wheat Midds	24.56	24.56	18.818	18.818
Barley Malt Sprouts	20.0	20.0	12.5	12.5
Molasses	5.0	5.0	5.0	5.0
Limestone	0.30	0.30	0.30	0.30
Dical	0.1	0.1	0.1	0.1
Salt	0.5	0.5	0.5	0.5
<i>Yucca schidigera</i> Extract	0.0	^a	0.0	^a
TM Premix	0.075	0.075	0.075	0.075
Vitamin A & D Premix	0.025	0.025	0.025	0.025
Decoquinatate	0.0269	0.0269	0.0269	0.0269
Total	100.0	100.0	100.0	100.0
Analysis, %				
Crude Protein	16.5	16.5	16.2	16.2
TDN	69.3	69.3	69.9	69.9
C. Fiber	18.0	18.0	17.9	17.9
Fat	2.4	2.4	2.4	2.4
Degradable Protein	71.4	71.4	72.0	72.0
Nem, Mcal/lb.	.73	.73	.74	.74
Neg, Mcal/lb.	.46	.46	.47	.47

^a *Yucca schidigera* extracted inclusion was 35mg/lb of finished feed.

Table 2. Field pea weaning transition diets with and without *Yucca schidigera* extract.

	0% Pea	15% Pea	0% Pea+ <i>Yucca s.</i>	15% Pea+ <i>Yucca s.</i>	P-Value
Growth:					
No. Steers	18	17 ^a	18	18	
Days Fed	42	42	42	42	
Start Wt., lb.	453.4	461.9	445.8	443.2	
End Wt., lb.	583.8	594.8	582.2	569.2	
Gain, lb.	129.7	132.9	136.43	126.0	0.12
ADG, lb.	3.08	3.16	3.25	3.0	0.12
Intake, Effic., & Cost:					
Fd/Hd, lb.	507.3	514.0	515.0	528.6	0.50
Fd/Hd/Da, lb.	12.07	12.25	12.30	12.60	0.50
Feed:Gain	3.92	3.87	3.78	4.20	0.50
Fd Cost/Hd, \$	21.67	22.01	22.08	21.24	
Fd Cost/Cwt Gain, \$	16.70	16.56	16.18	16.86	

^a One steer died.