

# Effect of field pea-flaxseed blends on calf weaning performance, immune response, feedlot performance carcass quality and economics

## Progress Report

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### Introduction

Developing management methods that demonstrate the use of field peas in livestock diets is essential to developing awareness of the crop's merit in livestock feeding.

Death loss among calves is greatest during calving and the 6 to 8 week period following weaning when stressed calves are being transitioned from grazing to a drylot environment. Bovine respiratory disease is estimated to cost the beef cattle industry \$800 million/year in direct death loss, treatment, and slowed performance.

Feeding field peas in combination with flaxseed appears to be a complementing relationship. However, there is no known research available evaluating the interaction between flaxseed (omega-3 linolenic acid source) and field peas on animal performance and immune response through slaughter. The purpose of this research is to evaluate the interrelationship between 42d postweaning field pea and flaxseed diet regimes on subsequent backgrounding and finishing performance and immune response.

### Procedure

#### *Experiment -*

The first complete cycle of data collection has been completed in the diet formulation evaluation of field peas and flaxseed. Sixty-four crossbred Angus X Hereford X Gelbvieh steers were randomly assigned to four pelleted dietary weaning transition treatments that included a 1) fiber-based control, 2) fiber-base + 10% flaxseed, 3) fiber-base + 20% field pea and 4) fiber-base + 20% field pea + 10% flaxseed. Four pen replicates of each dietary treatment were used. Steers were weaned the first week of November, offered long mixed hay for the first 2 days after weaning and then switched to chopped hay with the pelleted supplements top dressed over the hay. As daily supplement level was increased, chopped hay removed until the steers were consuming 8-9 pounds of supplement per day and

were fed a total of 42 days. When the 42d transition period was completed, the steers were transported to a commercial feed yard at Oberlin, Kansas, where they were fed to final harvest.

#### *Experiment 2-*

The immune response component of the study was initiated during the second year of the investigation. Two to four weeks prior to each weaning date, calves were vaccinated with One Shot Ultra 7® (blackleg, malignant edema, black disease, Clostridium sordellii infections, enterotoxemia types C and D and pneumonic pasteurellosis infection caused by Pasteurella haemolytica Type A1); Bovi-Shield 4®, a modified-live vaccine designed for respiratory disease protection (infectious bovine rhinotracheitis (IBR); bovine virus diarrhea types 1 and 2 (BVD); parainfluenza 3 (PI3); and bovine respiratory syncytial virus (BRSV). Calves were booster vaccinated with Bovi-Shield 4® and One Shot Ultra 7® at weaning. Blood samples were drawn from the steers at preweaning, weaning, 30, 60 and 90 days postweaning. Serum samples are being analyzed for humoral antibody level to develop an immune response profile that will be correlated to feed yard bovine respiratory disease incidence. Steers in the project are on feed at this report date and scheduled blood collections are in progress. Results will be reported in the 2006 annual report.

### Results

Composition of the pelleted experimental diets and nutrient analysis is shown in Table 1. Gain, average daily gain, average daily feed intake, and feed efficiency among steers receiving the experimental supplements during the 42d short backgrounding period varied numerically; however, differences observed were not significant.

Steers were moved from backgrounding lots in North Dakota to Decatur County Feed Yard, Oberlin, Kansas for finishing and final harvest. Receiving weight did not differ between treatments. Closeout results for final harvest weight, days on feed, average daily feed intake and average daily gain did not

differ. Feed efficiency was improved ( $P=0.08$ ) when a 20% field pea-10% flaxseed blend was fed during the 42d transitioning period after weaning. Carcass measurements for hot carcass weight, ribeye area, yield grade and quality grade did not differ between treatments, however, the number of carcasses grading Choice or better was greater ( $P=.049$ ) for steers that received a 20% pea supplement during the 42d weaning transition period after weaning. Treatments that included flaxseed, during the 42d weaning transition period, had a significantly reduced ( $P=.049$ ) number of steers grading Choice.

Economic analysis for weaning transition, finishing and retained ownership to final harvest is shown in Table 4. The number of steers grading Choice or better had a significant impact on monetary return to the cow calf enterprise. Feeding flaxseed depressed the number of carcasses grading Choice or better and return to retained ownership. Compared to the highest carcass return of \$419.49 per head recorded for steers receiving the 20% pea weaning transition diet, total carcass value reductions of -\$18.61, -\$59.53 and -\$99.91 were recorded for the control, 10% flaxseed and 20% Pea-10% flaxseed blended supplements, respectively. Depressed

carcass quality in this project, following inclusion of 10% flaxseed, does not agree with Drouillard (2001) who reported that a five to six week feeding of 10% flaxseed substantially improved carcass quality grade at slaughter without large changes in subcutaneous fat deposition. A second year of data collection in this study is in progress. The combined data for two years will be reported next year.

#### **Literature cited**

**Drouillard, J.S., E.J. Good, C.M. Gordon, T.J. Kessen, M.J. Sulpizio, S.P. Montgomery, and J.J. Sindt.** 2001. Flaxseed and flaxseed products for cattle: effects on health, growth performance, carcass quality, and sensory attributes. In Proceedings of the 59<sup>th</sup> Annual Flax Institute of the United States, North Dakota State University, Fargo, ND.

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Table 1. Complete pelleted weaning transition feed formulation and nutrient analysis (% As Fed).

	<b>Control</b>	<b>10% Flax</b>	<b>20% Pea</b>	<b>20%Pea/10%Flax</b>
Soyhulls	30.0	38.123	36.823	35.573
Peas	0.0	0.0	20.0	20.0
Flax	0.0	10.0	0.0	10.0
Wheat Midds	33.773	20.750	17.0	13.25
Barley Malt Sprouts	20.0	15.0	10.0	5.0
Corn	10.0	10.0	10.0	10.0
Molasses	5.0	5.0	5.0	5.0
Salt	0.5	0.5	0.5	0.5
Calcium	0.5	0.4	0.45	0.45
Dical	0.1	0.1	0.1	0.1
TM Premix	0.075	0.075	0.075	0.075
Decoquinat	0.027	0.027	0.027	0.027
Vit A & D	0.025	0.025	0.025	0.025
Total	100.0	100.0	100.0	100.0
<b>Cal. As Fed Anal.</b>				
CP, %	14.21	14.16	14.82	15.4
TDN, %	67.59	60.41	69.07	62.28
C. Fiber, %	15.43	17.56	16.85	16.27
Fat, %	2.6	5.58	2.06	5.3
Ne <sub>m</sub> , Mcal/lb	.73	.80	.80	.83
Nd <sub>g</sub> , Mcal/lb	.50	.55	.512	.56

Table 2. Pea and flaxseed replacement effect on weaning transition backgrounding performance.

	<b>Control</b>	<b>10% Flax</b>	<b>20% Pea</b>	<b>20%Pea/ 10%Flax</b>	<b>P-Value</b>
No. Calves	15*	15*	16	15*	
Ave. Days Fed	39.56	41.875	42	40.94	
St. Wt., lb.	651	649	651	656	.907
End Wt., lb.	781	786	779	796	.323
Gain, lb.	130	137	128	140	.499
ADG, lb.	3.29	3.27	2.86	3.42	.512
ADFI, lb. (As Fed)	17.972	16.815	15.789	17.736	.372
F:G, lb.	5.46	5.14	5.52	5.19	.706
Feed Cst/Hd, \$	\$31.46	\$29.92	\$26.92	\$27.91	.291
Feed Cst:Gain, \$	\$0.2420	\$0.2184	\$0.2243	\$0.1994	.175

\*One calf died of bloat.

Table 3. Pea and flaxseed replacement effect on finishing performance and carcass characteristics.

	<b>Control</b>	<b>10% Flax</b>	<b>20% Pea</b>	<b>20% Pea/ 10% Flax</b>	<b>P-Value</b>
<b>Growth Performance:</b>					
Receiving Wt., lb.	759	764	749	772	0.61
Harvest Wt., lb.	1234	1216	1242	1200	0.72
Days On Feed, da	130	126	131	117	0.55
Gain, lb.	475	452	493	428	0.70
ADFI, lb.	19.65	19.08	20.12	19.09	0.55
ADG, lb.	3.66	3.59	3.76	3.66	0.70
Feed:Gain <sup>a</sup> . lb.	5.38 <sup>b</sup>	5.31 <sup>ab</sup>	5.35 <sup>ab</sup>	5.21 <sup>a</sup>	0.08
<b>Carcass Measurements:</b>					
HCW, lb.	767	743	764	738	0.63
REA, sq. in.	12.55	12.07	12.57	12.85	0.36
Yield Grade	2.73	2.67	2.56	2.47	0.59
Quality Grade	2.53	2.73	2.88	2.67	0.78
Percent Choice, % <sup>b</sup>	60.0 <sup>x</sup>	26.7 <sup>y</sup>	68.8 <sup>x</sup>	33.3 <sup>y</sup>	0.049

<sup>a</sup>Means with unlike superscripts differ.

<sup>b</sup>Pr > ChiSq; means with unlike superscripts differ.

Table 4. Pea and flaxseed replacement effect on finishing economics and return to retained ownership in the cow-calf enterprise.

	<b>Control</b>	<b>10% Flax</b>	<b>20% Pea</b>	<b>20%Pea/ 10%Flax</b>	<b>P-Value</b>
<b>Feedlot Analysis:</b>					
<b>Income:</b>					
Carcass Value, \$	1077.07	992.85	1108.07	1003.27	0.0755
<b>Expenses:</b>					
Receiving Calf Cost, \$	663.51	665.42	658.96	671.70	0.6202
Feedlot Cost/Hd, \$	269.43	268.05	286.36	239.10	0.1775
Net Return to Finishing, \$	144.13	59.38	162.75	92.47	0.0296
<b>Cow-Calf enterprise Analysis:</b>					
<b>Income:</b>					
Carcass Value, \$	1077.07	992.85	1108.07	1003.27	0.0755
<b>Expenses:</b>					
Transition Feed Cost, \$	31.46	29.92	26.92	27.91	.2907
Transition Yardage Cost, \$	10.50	10.50	10.50	10.50	
Feedlot Cost/Hd, \$	269.43	268.05	286.36	239.10	0.1775
Annual Cow Cost	341.00	341.00	341.00	341.00	
Freight to Feedlot/Hd, \$	23.80	23.80	23.80	23.80	
Net Return to ND Cow/Calf Enterprise with Retained Ownership, \$	400.88	319.58	419.49	360.96	