FEEDING RAW SOYBEANS TO FINISHING CATTLE

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Summary

Two finishing trials were performed to determine if raw soybeans could be incorporated into diets to partially replace soybean meal and beef tallow. Our data indicated that no sacrifices in animal performance, feed efficiency, and carcass quality will occur if cattle feeders replace soybean meal and tallow with raw dry-rolled soybeans. The feeding value of raw soybeans is equal to .8 times the value of 44% CP soybean meal plus .2 times the value of fancy bleachable tallow. Raw soybeans contain the enzyme, urease, which converts urea to ammonia. Therefore, caution should be used in mixing raw soybeans with urea-containing diets.

(Key Words: Soybean, Protein, Fat, Finishing Cattle.)

Introduction

Studies have indicated that up to 10% raw soybeans can be included in diets for growing cattle and sheep without sacrificing animal performance. Raw soybeans contain about 40% crude protein and 20% oil, two of the more expensive nutrients in finishing cattle diets. Additional costs of feeding soybean-based products are transportation, storage, handling, and processing. If raw soybeans can be added to finishing cattle diets, part of those costs can be redistributed to soybean growers and cattle feeders, thereby increasing their profits. Our objectives were to determine if raw soybeans could be included successfully in finishing cattle diets and to derive the economic feeding value of raw soybeans in the diet.

Experimental Procedures

Two feeding trials were performed at the Southwest Research-Extension Center, Garden City, Kansas. Both had similar treatments but differed in basal diet composition and sex of animal fed. Diets were formulated to be equal in nitrogen and fat and included a minimum of 1.0% urea and 2% beef tallow (Table 1).

In trial 1, 220 crossbred steers (average starting weight 820 lb) were assigned to 22 pens, and pens were assigned randomly to treatments in a completely randomized experiment. The three treatments consisted of: negative control (NEG), 4% beef tallow and 1.6% urea; positive control (SBM), 6% soybean meal and 4% beef tallow; and raw soybeans (DRB), 7.5% dry-rolled soybeans and 2.5% beef tallow. The dry-rolled beans had a bulk density of 43 lb/bushel. Steers were stepped up to the final diets in 14 days. The steers were fed for 139 days starting on July 11, 1997. Traits measured were weight gains, feed intake, and carcass parameters that influence USDA quality and yield grades.

In trial 2, 242 crossbred heifers (average starting weight 692 lb) were fed for 164 days. Pen assignments and treatments were consistent with Trial 1. Heifers were placed on feed on December 20, 1997. Major differences between the trials were the sources

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of dietary roughage and grain. Diet compositions are listed in Table 1.

Results and Discussion

Table 2 lists the overall results of trial 1 with steers. Throughout the entire feeding period, average daily gains were similar between treatments (P<.23). For the type of steers in this trial, gains were disappointing, partially because of extreme weather conditions during the feeding period. Daily dry matter intakes were quite robust. Only small differences occurred between treatments. The NEG-fed cattle consumed less dry matter daily than the SBM- and DRB-fed cattle. No differences were noted in feed efficiency. Differences did occur between the treatments in those traits used to calculate USDA quality and yield grades.

Table 3 lists the results of trial 2 with heifers. SBM- and DRB-fed heifers tended to gain faster than their NEG contemporaries (P<.11). The NEG heifers typically gained .1 to .2 lb/day slower than the rest of the cattle, probably because of lower consumption (P<.06). Throughout the entire feeding period, NEG-fed heifers ate about .7 lb/day less than the others. Because NEG-fed heifers ate proportionally less feed and had slightly lower gains, no difference was observed in feed efficiency among the treatments. Carcass traits used to determine USDA yield grades were similar among all treatments. However, SBM- and DRB-fed heifers had significantly greater marbling scores than NEG-fed heifers. This translated into a greater percentage (4.7% more for the SBM and 13.8% more for the DRB heifers), grading USDA Choice or higher.

Raw soybeans managed properly and not exceeding 7.5% of the diet can be fed without losing animal performance. Interpreting our data in economic terms, the value ($/lb) of raw soybeans as a feed ingredient is equal to .8 times the cost of 44% soybean meal ($/lb) plus .2 times the cost of fancy bleachable tallow ($/lb).

Table 1. Final Diets for Trial 1, Steers, and Trial 2, Heifers[a]

	Treatments		
Ingredient	NEG	SBM	DRB
Trial 1, Steers	- - - - - - - - - - - - - - - % of DM - - - - - - - - - - - - - - -		
Steamed-flaked corn	86	81	81
Alfalfa hay	5	5	5
Soybean meal	0	6	0
Dry-rolled soybeans	0	0	7.5
Urea	2	1	1
Beef tallow	4	4	2.5
Supplement	3	3	3
Trial 2, Heifers			
High-moisture corn	41.65	40	10
Steamed-flaked milo	41.65	40	40
Corn silage	10	10	40
Soybean meal	0	4	0
Dry-rolled soybeans	0	0	5
Urea	1.7	0.7	0.7
Beef tallow	3	3	2
Supplement	2	2.3	2.3

[a]Balanced to contain 14% CP, .7% K, .6% Ca, .4% P, and .2% Mg. Vitamins A, D, and E were included at 2,000, 200, and 20 IU/lb of diet DM. Monensin and tylosin were fed at 30 and 10 g/ton of diet DM. Supplements provided 1% urea to all diets.

Table 2. Treatment Effects of Finishing Trial 1, Steers

Item	Treatments			P value
	NEG	SBM	DRB	
Feeding traits				
Average daily gain, lb	3.10	3.23	3.13	.23
Daily dry matter intake, lb	23.2	24.1	23.6	.10
Feed:gain	7.48	7.45	7.56	.84
Carcass traits				
Hot carcass weight, lb	774	788	779	.22
Back fat, in	.45	.46	.45	.77
KPH fat, %	2.1	2.2	2.2	.45
Marbling score[a]	4.5	4.5	4.6	.66

[a]Marbling score scaled 4.0 = slight0, 5.0 = small0, 6.0 = modest0, etc.

Table 3. Treatment Effects of Finishing Trial 2, Heifers

Item	Treatments			P value
	NEG	SBM	DRB	
Feeding traits				
Average daily gain, lb	2.84	3.07	3.01	.11
Daily dry matter intake, lb	17.0	17.7	17.8	.06
Feed:gain	6.00	5.78	5.94	.46
Carcass traits				
Hot carcass weight, lb	722	746	742	.12
Back fat, in	.53	.55	.54	.87
KPH fat, %	1.9	2.0	2.0	.07
Marbling score[a]	5.4 [b]	5.7 [c]	5.9 [c]	.01

[a]Marbling score scaled 4.0 = slight0, 5.0 = small0, 6.0 = modest0, etc.

[b,c]Means with differing superscripts in the same row differ (P<.05).