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Using Arsoy™ as a protein supplement in growing cattle diets

Abstract

Arsoy™ Soybean Feed is a by-product from the manufacture of soy protein isolate. It contains nearly 30% crude protein, but there is little documentation about its feeding value. Therefore, we fed basal growing diets of corn silage and stover to 196 crossbred heifers and supplemented those diets with soybean meal, Arsoy, or a combination of soybean meal and high moisture corn to determine the feeding value of Arsoy. Our results suggest that Arsoy can be substituted for soybean meal in growing cattle diets, without any negative impact on animal performance, dry matter intake, or feed efficiency.

Keywords

Cattlemen's Day, 1999; Kansas Agricultural Experiment Station contribution; no. 99-339-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 831; Beef; Protein supplementation; Soybean by-products; Arsoy; Heifers

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USING ARSOY™ AS A PROTEIN SUPPLEMENT IN GROWING CATTLE DIETS¹

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Summary

Arsoy™ Soybean Feed is a by-product from the manufacture of soy protein isolate. It contains nearly 30% crude protein, but there is little documentation about its feeding value. Therefore, we fed basal growing diets of corn silage and stover to 196 crossbred heifers and supplemented those diets with soybean meal, Arsoy, or a combination of soybean meal and high moisture corn to determine the feeding value of Arsoy. Our results suggest that Arsoy can be substituted for soybean meal in growing cattle diets, without any negative impact on animal performance, dry matter intake, or feed efficiency.

(Key Words: Protein Supplementation, Soybean By-Products, Arsoy, Heifers.)

Introduction

Cattle producers constantly are offered by- and co-products from grain and oil seed processors. The economic value of these feeds depends on animal performance; feed efficiency; palatability; and transportation, handling, and storage costs.

Arsoy Soybean Feed is the main by-product from processing dehulled, defatted soybeans to make soy protein isolate. Typical analyses show about 27% crude protein (35% UIP), very little fat, .4% calcium, .5% phosphorus, and 1.35% potassium. No energy values or nonprotein nitrogen values have been reported.

These analyses indicate that Arsoy should be an excellent protein supplement for growing cattle, especially when diets contain a high percentage of low- and medium-quality forages. Our objective was to determine the feeding value of Arsoy as a protein supplement for growing cattle.

Experimental Procedures

One hundred ninety-six crossbred heifers (491 lb average starting weight) were used in a completely randomized experiment. Heifers were allotted randomly into 21 pens, and pens were allotted randomly to one of three treatments. Basal diets of corn silage and corn stover (Table 1) were supplemented with 1) control (CON), soybean meal at 6.8% of the diet dry matter; 2) Arsoy (ARSOY) at 13% of the diet dry matter; or 3) soybean meal and high moisture corn (HMC) at 6.8% and 6.2% of the diet dry matter, respectively. Diets were formulated to contain similar concentrations of crude protein. Comparing CON and ARSOY allowed for evaluating ARSOY as a protein source, and comparing ARSOY and HMC allowed us to evaluate ARSOY as an energy source. The heifers started treatments on February 3, 1998 and were fed for 98 days. Weights were recorded on consecutive days and averaged for the starting and ending weights. Body weight also was measured on day 49. Daily feed deliveries and refusals were recorded, so that daily feed intakes and feed efficiency could be calculated.

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Results and Discussion

Table 2 shows the results of this trial. Only small differences occurred between treatments in daily gain, feed intake, and feed efficiency.

No difference in average daily gain was noted between CON- and ARSOY-fed heifers ($P > .20$). Heifers fed the HMC diets tended ($P < .12$) to gain more weight than the CON-fed heifers during the first half of the experiment, which gave them a slight overall advantage in weight gain for the total 98 days.

Heifers eating CON and ARSOY diets consumed less feed than did the HMC-fed heifers ($P < .02$). All groups consumed more than 2.5% of their body weights daily. Therefore, ARSOY's palatability does not appear to be a concern.

Feed efficiencies for the entire 98 days were similar ($P < .19$) for all treatments. However, feed:gain was higher for days 49-98 than for 0-49. Maintenance requirements may have increased and gut filling may have been higher at the mid-experiment weighing.

Using the net energy values shown in Table 1 and actual dry matter intakes, we predicted the average daily gains to be 2.0 to 2.5 lb/day. Thus, the assumed energy values for ARSOY shown in Table 1 are good approximations.

These growing diets were formulated to minimal recommended levels of crude protein. Our intent was to determine if the protein in ARSOY was readily available. Animal performance confirmed that it was. We conclude that Arsoy can be used to replace traditional sources of protein in growing cattle diets.

Table 1. Diet Composition (Dry Matter Basis)

Item	Treatments		
	Soybean Meal (CON)	Arsoy (ARSOY)	Soybean Meal + High Moisture Corn (HMC)
Ingredient, %			
Corn stalks	33	33	33
Corn silage	58.2	52.1	52.1
Mineral supplement	2	2	2
Soybean meal	6.78	--	6.7
Arsoy	--	12.9	--
High moisture corn	--	--	6.2
Nutrient ^a			
Crude protein, %	10.42	10.39	10.4
NEm, Mcal/cwt	61.5	64.3	60.6
NEg, Mcal/cwt	35.7	37.7	34.9

^aNRC protein and energy values used on all ingredients except Arsoy. Assumed Arsoy nutrient values were 30% crude protein, 74 Mcal/cwt NEm, and 47 Mcal/cwt Neg.

Table 2. Effects of Supplementing Growing Heifer Diets with Soybean Meal (CON), Arsoy (ARSOY), and Soybean Meal & High Moisture Corn (HMC)

Item	Treatments			SEM
	CON	ARSOY	HMC	
Body weight, lb				
Initial wt	499	480	491	7.3
Mid wt	616	604	625	8.9
Ending wt	734	714	727	8.6
Average daily gain, lb				
Day 0 - 49	2.37	2.51	2.73	.12
Day 49 - 98	2.27	2.25	2.23	.10
Day 0 - 98	2.33	2.39	2.48	.07
Daily dry matter intake, lb				
Day 0 - 49	15.2	14.5	15.6	.39
Day 49 - 98	18.7	18.3	20.3	.49
Day 0 - 98	17.0	16.4	18.0	.38
Daily dry matter intake, %body weight				
Day 0 - 49	2.73	2.67	2.81	.06
Day 49 - 98	2.79	2.78	2.99	.05
Day 0 - 98	2.77	2.75	2.93	.05
Feed:gain				
Day 0 - 49	6.4	5.8	5.8	.22
Day 49 - 98	8.3	8.2	9.2	.40
Day 0 - 98	7.3	6.9	7.3	.19