

CORN VS SOYBEAN HULL SUPPLEMENTS FOR FALL-CALVING BEEF COWS IN WINTER

C.A. Hibberd¹, C.C. Chase², and C. Worthington³

Story in Brief

Eighty seven Hereford X Angus fall-calving beef cows were supplemented with 1.3 lb cottonseed meal (Negative control), 3.3 lb cottonseed meal (Positive control), 6.2 lb corn-cottonseed meal blend (Corn) or 7.8 lb soybean hulls (Soyhulls) per day. The Positive, Corn and Soyhull supplements supplied 1.34 lb crude protein per day while the Corn and Soyhull supplements provided twice as much TDN (4.8 lb/d) as the Positive control (2.4 lb/d). Cows fed the high energy supplements (Corn or Soyhulls) lost less weight and body condition than the Positive control cattle by the end of the 117-day study. Cows supplemented with Soyhulls, however, lost 31 lb less weight and .3 units less body condition than cows supplemented with Corn. In addition, calves from cows supplemented with either Corn or Soyhulls gained 22 lb more than the Positive control calves by day 117. This study suggests that soybean hull supplements may be a more efficient method of supplying energy to wintering beef cows than traditional corn-based supplements. When the additional 22 lb of calf weight are considered under the current price structure, the use of soybean hulls offers an economic incentive as well.

(Key Words: Fall-Calving Cows, Supplementation, Corn, Soybean Hulls)

Introduction

Nutritional management of fall-calving beef cows in winter presents a major challenge to cow-calf producers. High nutrient requirements, especially with high milking cows, coupled with low forage quality (forage crude protein 2-4%) and extreme environmental factors present a situation where adequate nutrition is necessary to maintain optimal calf growth and cow performance. Frequently, fall-calving cows can be properly maintained through the winter with 3 to 4 lb of a high protein (40% crude protein) supplement. When forage quality or quantity is poor, cows are milking well or environmental factors become severe, cows will require additional energy. Traditional high energy supplements containing large quantities of corn or other high-starch cereal grains may seriously hinder forage utilization. The starch component of cereal grains appears to decrease forage digestibility and intake to the extent that the overall energy status of cows may not be improved. Alternative feed sources composed of highly digestible fiber such as soybean hulls, a byproduct of the soybean milling industry, may truly supplement forage with no detrimental effects on forage utilization. Consequently, the objective of this study was to compare the effectiveness of high energy supplements composed of corn or soybean hulls with a traditional, high protein, cottonseed meal supplement.

¹Assistant Professor ²Former Graduate Assistant ³Herdsmen

Materials and Methods

Eighty seven fall-calving Hereford X Angus cows (average calving date November 2, 1984) were allotted to four supplementation treatments on December 7, 1984 and maintained on dormant native grass range composed primarily of Little Bluestem (*Andropogon scroporius*) at the Southwest Forage and Livestock Laboratory located near El Reno, Oklahoma. Forage samples collected throughout the study with esophageally cannulated heifers averaged 3.72% crude protein. Cows received only supplement except on days when snow or ice cover necessitated hay feeding (11 days). Calves received no supplemental feed throughout the study.

Four supplements were formulated to test soybean hulls as a digestible fiber feed for wintering, fall-calving beef cows (Table 1). The Positive control, Corn and Soyhull supplements supplied 1.34 lb of crude protein per day. The Corn and Soyhull supplements, however, were designed to provide twice as much TDN (4.8 lb/d) as the Positive control (2.4 lb/d). The Negative control cows were fed 1.3 lb of cottonseed meal per day until March 7, 1985 when they were switched to the Positive control due to extremely poor body condition. The weekly allowance for each supplement was individually fed on six consecutive days, Monday through Saturday. Cow weights, cow body condition score (1=very thin, 9=very fat) and calf weights were recorded every two weeks. Cows were weighed following an 18-hour shrink, calves were weighed full. Data were analyzed by least squares with treatment, sex, pasture and calf age (covariate) included in the model. Data from the Negative control were

Table 1. Supplement composition and daily nutrient supply (As-Is basis).

	Supplement			
	Negative	Positive	Corn	Soyhulls
Ingredient (lb/d)				
Cottonseed meal	1.1	3.2	2.5	---
Corn	---	---	3.6	---
Soybean hulls	---	---	---	7.6
Mineral ^a	.2	.1	.07	.2
Total	1.3	3.3	6.2	7.8
Nutrient supply (lb/d)				
Crude protein	.45	1.34	1.34	1.34
TDN	.8	2.4	4.8	4.8

^aSupplements were formulated to provide a minimum of 30 g/d calcium, 24 g/d phosphorus, 54 g/d potassium and enough sulfur to maintain a 15:1 nitrogen to sulfur ratio.

excluded from the analysis. Differences between least square treatment means were detected by LSD.

Results and Discussion

Changes in cow weight during the course of the study are illustrated in Figure 1. As would be expected, Negative control cows receiving only 1.3 lb cottonseed meal per day rapidly lost a substantial amount of weight. Once switched to the Positive control on April 7, Negative control cows gained almost 70 lb in only 28 days. Cows on the other three supplements performed similarly until February 14, 1985, when cows fed the Soyhull supplement continued to minimize weight loss while the Corn and Positive control cows lost additional weight. By the end of the 117-day study, Positive control cows had lost 154 lb of body weight and 1.06 units of body condition (Table 2). Cows on the high energy supplements (Corn and Soyhull) lost less ($P < .05$) weight and body condition than cows on the Positive control. Comparing the high energy supplements, cattle fed Soyhulls lost 31 lb less weight ($P < .05$) and .3 unit less body condition ($P < .05$) than Corn-supplemented cows.

The Corn and Soyhull supplements were formulated to provide the same amount of supplemental TDN based on N.R.C. estimates of 64% TDN for soybean hulls and 91% TDN for corn. The Soyhulls performed better than the Corn indicating that either the N.R.C. underestimates the energy value of soybean hulls or that the corn supplement had a detrimental effect on forage utilization. Previous work suggests that supplements containing large quantities of cereal grains can decrease forage

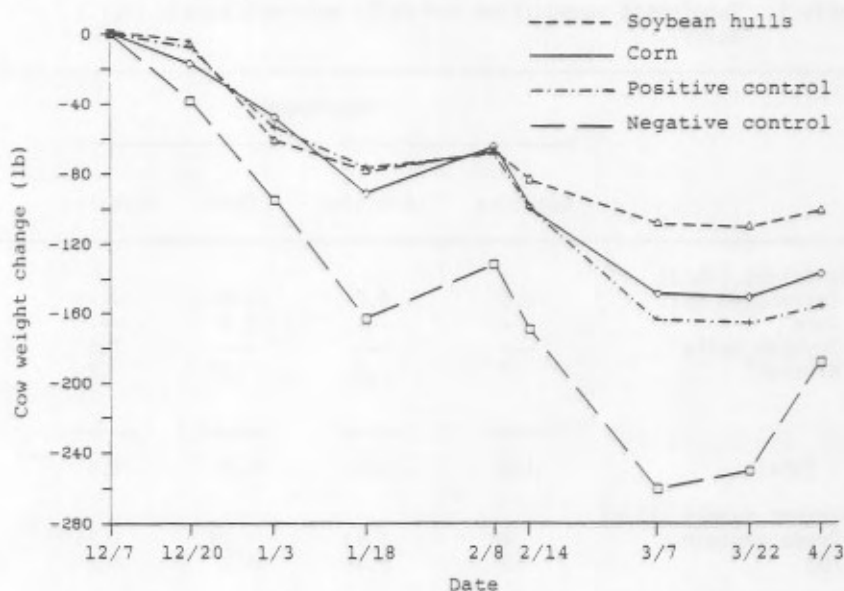


Figure 1. Winter weight change of cows supplemented with 1.3 lb cottonseed meal (Negative), 3.3 lb cottonseed meal (Positive), 6.2 lb corn-cottonseed meal (Corn) or 7.8 lb soybean hulls per day.

Table 2. Productivity of fall-calving cows supplemented with cottonseed meal, corn or soybean hulls.

	Supplement		
	Positive	Corn	Soyhulls
Cows/treatment	27	27	27
Cow weight, lb			
12/7/84	1055	1022	1059 ^b
4/3/85	900 ^a	890 ^a	958 ^b
Change	-154 ^a	-132 ^b	-101 ^c
Cow condition			
12/7/84	6.0	5.8 ^{ab}	5.8 ^b
4/3/85	4.9 ^a	5.2 ^{ab}	5.5 ^b
Change	-1.1 ^a	-.6 ^b	-.3 ^c
Calf weight, lb			
12/7/84	136	133	128
4/3/85	258 ^a	281 ^b	275 ^{ab}
Change	125 ^a	147 ^b	147 ^b

^{a,b,c}Means in a row with different superscripts differ ($P < .05$).

digestibility and intake to the extent that little or no improvement in cow performance may be observed. Although cows fed the Corn supplement responded slightly better than the Positive control in this study, their performance did not equal those fed the Soyhulls. Perhaps the low starch and high digestible fiber content of the soybean hulls truly supplemented consumed forage with no detrimental effects on forage digestibility.

Calves nursing cows fed high energy supplements (either Corn or Soyhulls) gained 22 lb more weight ($P < .05$) than the Positive control calves during the trial (Table 2). Additional energy supplied by the Corn and Soyhull supplements apparently stimulated milk production. Energy from the Soyhulls further stimulated cow weight and body condition gain over and above the Corn. Cows fed the high energy supplements appeared to satisfy energy demands for lactation first; additional energy above lactation requirements was apparently diverted to body stores.

Soybean hulls offer an alternative to traditional supplementation programs. They are relatively easy to handle and are currently economically feasible. The use of soybean hulls or other digestible fiber feeds may allow cow-calf producers to efficiently supplement energy to their cows with little or no detrimental effects on forage utilization.