Drought Stressed Soybean Supplementation for Gestating Beef Cows Grazing Native Tall Grass Prairie

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Story in Brief

Ninety-one mature spring calving Angus and Angus x Hereford cows were used to determine the effects of feeding whole or rolled drought stressed soybeans as a winter supplement during late gestation while grazing dormant stockpiled native grass. Cows were blocked by weight and age, and allotted to one of four supplement treatments. Treatments were: (1) whole soybeans , (2) rolled soybeans, (3) a soybean meal and soybean hull supplement, formulated to be equivalent in protein and energy with the whole and rolled soybean treatments, and (4) no supplement. The supplementation period (88 d) was November 11 through February 2, 2001, and supplemented cows were individually fed in covered stalls on an every other day basis. Measurements were taken to monitor cow weight and body condition score change, calf birth and weaning weight, milk production, percent cows cycling at the onset of breeding, and overall pregnancy rates. We conclude that drought stressed soybeans are a viable and economical supplementation source for gestating beef cows. Processing soybeans does slightly improve winter cow performance, although this advantage would not be expected to offset the processing cost.

Key Words: Soybeans, Beef Cows, Winter Supplementation

Introduction

The high oil content and the presence of trypsin inhibitor has limited the use of raw soybean seeds in livestock feeding. However, high quality soybeans have proven to be a good source of energy and protein in beef cattle rations and supplements (Albro et al., 1993). Loesche et al. (1988) concluded that frost damaged soybeans were an effective protein and energy source in corn silage diets when included at no more than 15% of diet dry matter. Little research has been done with drought stressed soybeans (DSSB). When compared to high quality soybeans, drought-damaged grain is altered in terms of size, color, weight, and nutrient content; and depending on degree of damage can be relatively difficult to market. Alternative uses should be considered if the grain is subject to significant market discounts. Drought damaged soybeans have a decreased level of protein and fat when compared to high quality soybeans (Lalman and Gill, 2000). The objectives of this research were to determine the viability of DSSB as a winter supplement for beef cows during late gestation; as well as the benefit of processing these soybeans.

Materials and Methods

This trial was conducted at the Range Cow Research Center, located west of Stillwater, Oklahoma. Ninety-one spring calving mature Angus and Angus x Hereford cows (age 3-12) were allotted by weight and age to one of four treatments. The four treatments were: 2 lb/d of whole soybeans (WSB), 2 lb/d of rolled soybeans (RSB), 2.77 lb/d of a soybean meal and soybean hull supplement, formulated to be equivalent in protein and energy with WSB and RSB

(PCON), and no supplement (NCON). Supplement compositions are presented in Table 1. Cow weights and body condition scores (1-9 scale) were taken after overnight withdrawal from feed and water at approximately 28-d intervals during the supplementation period, at the onset of breeding, and at weaning. Initial cow weight and body condition score was 1225 $\pm$ 66 lbs. and 5.25 $\pm$ .14, respectively.

Table 1. Composition of supplements (DM basis)

	Supplements[a]		
Ingredients, %	PCON	WSB	RSB
Soybean Meal	45.4	-	-
Soybean Hulls	54.2	-	-
Dical P	.4	-	-
Soybeans	-	100	100
CP, %	28	38	38
Feeding rate, lbs per day	2.75	2	2
CP, lbs per day	.78	.77	.77
TDN, lbs per day	2.0	2.0	2.0

[a] PCON = Positive Control, WSB = Whole Soybeans, RSB = Rolled Soybeans

The 88d supplementation period began November 11 and continued through the onset of calving (February 2, 2001). Cows grazed abundant dormant native pasture and were rotated among four pastures to ensure forage availability was not limiting. Due to inclement weather in December, native prairie grass hay (5% CP) harvested from an adjacent meadow was provided for 20 days when snow or ice covered the ground. Cows were gathered from pasture every-other-day, and individually fed twice their daily supplement rate in a covered stall barn. The DSSB used for this study were purchased from a neighboring farmer, and were harvested in October, just prior to the initiation of trial. The soybeans were 3502 ASGRO variety, weighed 56 lb/bu., 93% dry matter, 38% protein, and 16% fat. The soybeans graded US #4, and the overall appearance was small, with a portion of the beans being green and/or shriveled. One-half of the soybeans were processed through an eighteen inch corrugated roller at the OSU feed mill. The roller was adjusted to a width capable of splitting the soybeans. Following the supplementation period all cows were managed as a contemporary group throughout the remainder of the winter. From February 2nd through April, cows were fed 3 lbs./day of a 38% range cube to meet their protein requirements until pasture green up. Post-supplementation cow and calf performance was evaluated to determine residual effects.

Blood samples were collected on May 2nd and 9th to determine plasma progesterone concentration and the number of cows cycling at the onset of the breeding season (May 10th). Estimates of milk production were obtained on April 11, June 2, and July 24 using the weigh suckle weigh technique. On each date, cows and calves were separated for three consecutive 8-hour periods. At each interval calves were weighed, allowed to nurse until satisfied, then reweighed to determine pounds of milk produced per 8-hour period. The sum of these three periods was considered to be their 24-hr milk production. Cows were exposed to Angus bulls from May 10 to July 15, 2001 (66 d). Calves were weaned on September 18, 2001; and pregnancy was determined by rectal palpation at this time.

Data were analyzed using least squares analysis of variance (SAS, 1985). Cow served as the experimental unit, and the statistical model included treatment with cow age as a covariat.

Results and Discussion

Cow performance is summarized in Table 2. Treatment influenced (P<.05) weight change during the supplementation period. The three supplemented groups combined were an average of 153 lbs heavier and 1.16 condition score higher than the NCON cows (P<.05). Results of this experiment confirm other studies demonstrating the importance of winter protein supplementation. Calf birth weight and weaning weight followed a similar pattern, being greater for the three supplemented groups in comparison to NCON (P<.05).

When describing cow maintenance (least weight and BCS loss) during the supplementation period treatments can be ranked: PCON, RSB, WSB, and NCON. Cows that received the traditional supplement (PCON) weighed 40 lbs more at the beginning of the calving season compared to the RSB treatment. There were no other differences in measurements between these two groups. The RSB cows were 41 lbs heavier than the WSB treatment after the supplementation period, and had a 43% increase in cows cycling at the onset of the breeding season (P<.05). All other measurements were similar between RSB and WSB treatments. When comparing WSB to NCON we found significant differences in weight and BCS change during supplementation; as well as decreased birth weight, milk production, and weaning weight for the NCON treatment (P<.05). Percent cows cycling and pregnancy rates were not different between WSB and NCON treatments. Milk production estimates and pregnancy rates for the two soybean groups were numerically higher, although this difference was not statistically different (P>.16) likely due to number of cows per treatment.

Table 2. Weight and BCS changes, calf birth and weaning weights, milk production, percent cycling and pregnancy rates

	Treatment[a]				
	WSB	RSB	PCON	NCON	SE
Final number, cows per treatment	22	25	23	21	
Cow weight change, supp. Period	-58[b]	-17[c]	23[d]	-153[e]	16.2
Cow BCS change, supp. Period	-.57[b]	-.46[b]	-.33[b]	-1.61[c]	.67
Calf birth weight	84.8[b]	84.6[b]	88.5[b]	77.5[c]	4.32
Calf weaning weight	493[b]	494[b]	484[b]	448[c]	10.49
Average milk production, lbs/day	18.6[b]	16.3[bc]	15[cd]	14[d]	2.54
% Cows cycling, onset of breeding	21.5[b]	64.5[c]	62.5[c]	24.7[b]	9.45
Pregnancy rate, %	96	95	84	82	8.26

[a] WSB = Whole Soybeans, RSB = Rolled Soybeans, PCON = Positive Control, NCON = Negative Control

[bcd,] Means in a row with different superscripts differ P<.05

Implications

Drought stressed soybeans can be a cost effective winter supplement for beef cows. There appears to be somewhat of an advantage to processing the soybeans, in terms of cow weight change during winter. However, the difference in cow winter weight change did not significantly affect economically important factors enough to offset processing costs.

Literature Cited

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[**2002 Animal Science Research Reports** | **Animal Science Research Reports** | **Department of Animal Science**]