

## WHEAT MIDLINGS VS SOYBEAN MEAL AND CORN/SOYBEAN MEAL SUPPLEMENTS AT TWO PROTEIN LEVELS FOR WINTERING SPRING CALVING BEEF COWS

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### Story in Brief

Eighty four spring calving Hereford and Hereford x Angus cows and heifers wintered on native range were fed supplements consisting of two levels of daily crude protein from soybean meal, wheat middlings or a corn/soybean meal mixture. Each supplement was fed to provide a low level of crude protein (.4 lb in November and .8 lb thereafter) or a moderate level (.8 lb in November and 1.2 lb thereafter). Feeding additional energy in the form of wheat middlings or corn/soybean meal supplements did not improve winter weight losses of cows at the low level of protein supplementation over soybean meal alone. However, when the moderate level of protein was fed, spring calving cows had significantly less winter weight loss than cows fed the same level of protein from soybean meal. Cow weight and condition changes were similar for wheat middlings and 16 percent crude protein corn/soybean supplements at both levels of protein. Pregnancy rates tended to be higher for groups fed wheat middlings or corn/soy supplements at both the low and moderate levels of protein. Calf weaning weights tended to be increased by feeding the higher level of protein and by feeding increased energy particularly at the low level of protein.

(Key Words: Beef cows, Energy, Protein, Wheat middlings, Native range)

### Introduction

Wheat middlings are the offal of the wheat kernel after the milling process for removal of flour. Over 140,000 tons per year are available for use in livestock feeds in Oklahoma. Wheat middlings contain about 16 percent crude protein but are discounted for their relatively high (8 percent) crude fiber content. In spite of the large amount of middlings fed annually to cattle in Oklahoma, little research has been conducted to establish the nutritional value of the protein and energy in wheat middlings for beef cattle. The objective of this study was to compare winter performance of spring calving beef cows and their calves when supplemented with soybean meal, wheat middlings or corn/soybean meal supplements fed at two levels of daily protein.

### Materials and Methods

Eighty four spring calving Hereford and Hereford x Angus cows and heifers wintered on dormant native tallgrass range were fed supplements consisting of two levels of daily crude protein (CP) from soybean meal (40% CP), wheat middlings (16% CP) or a corn/soybean meal mixture (16% CP). Each supplement was fed to provide a low level of crude protein (.4 lb in November and .8 lb thereafter) or a moderate level (.8 lb in

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Table 1. Composition (as fed) of supplements and daily amounts fed.

	Low protein			Mod. protein		
	SBM	Midds	Corn/soy	SBM	Midds	Corn/soy
Ingredients, %						
Soybean meal	88.8		23.1	96.3		21.9
Wheat midds		94.4			98.2	
Corn			69.3			76.3
Dicalcium phosphate	9.4	2.8	5.4	3.7		1.8
Limestone		.9			1.8	
Potassium chloride	1.8	1.9	2.2			
Crude Protein, 90% DM basis, %	37.4	15.3	13.5	40.0	15.6	14.9
Feeding rates per day:						
11/04 to 12/03	.8	2.0	2.0	2.0	5.0	5.0
12/03 to 4/21	1.25	3.0	3.3	3.0	7.6	7.9

November and 1.2 lb thereafter). Supplements were formulated to provide approximately equal daily amounts of calcium, phosphorus and potassium. About half the cows were two-year old heifers having their first calves with the remainder being primarily three-year-old heifers calving for the second time. Composition of supplements and daily amounts fed are shown in Table 1.

All cows grazed in a single pasture and were gathered 6 mornings each week for supplement feeding in individual covered stalls. Cows were weighed and body condition was determined (scale of 1 = very thin, 5 = moderate, 9 = very fat) at 28-day intervals after overnight withdrawal from feed and water. Supplement feeding began on November 4, 1986 and ended on April 21, 1987. Prairie hay was fed only on a few days in January when snow covered the forage. Cows were exposed by natural service to Hereford bulls from May 1 to July 15, 1987. Pregnancy was determined by rectal palpation on October 8 when calves were weaned.

### Results and Discussion

Weight and body condition score changes (Table 2) are calculated from the start of the trial through the end of January which represents the period up to the beginning of calving. Changes are also given from start of the trial to the last cow weight before calving as well as through the end of the supplementation period in late April and through the following summer.

Cows and heifers fed soybean meal at the moderate level of protein gained significantly more weight from November to calving (+34 vs -22 lbs). Feeding the moderate level of soybean meal also reduced ( $P < .05$ ) weight losses through the entire winter supplementation period (-113 vs -159 lbs). Responses to increased energy from wheat middlings or corn/soy supplements depended on the level of protein fed. When the low level of protein was fed, additional energy in the form of wheat middlings or corn/soybean supplements did not decrease winter weight losses over soybean meal alone. However, when the moderate level of

Table 2. Effects of soybean meal, wheat middlings and corn/soybean meal supplements of performance of cows and calves

	Low protein			High protein		
	SBM	Midds	Corn/soy	SBM	Midds	Corn/soy
No. of cows	14	14	14	14	14	14
Initial wt. Nov 4, lb.	897	891	900	897	894	894
Precalving weight changes, lb.						
Nov 4-Dec 3	-30 <sup>a</sup>	-28 <sup>a</sup>	-23 <sup>a</sup>	-7 <sup>b</sup>	0 <sup>b</sup>	-14 <sup>ab</sup>
Dec 3-Dec 31	-37 <sup>a</sup>	-23 <sup>a</sup>	-26 <sup>a</sup>	-18 <sup>a</sup>	15 <sup>bc</sup>	-2 <sup>b</sup>
Dec 31-Jan 27	50 <sup>b</sup>	36 <sup>bc</sup>	29 <sup>c</sup>	40 <sup>bc</sup>	35 <sup>bc</sup>	67 <sup>a</sup>
Nov 4-Jan 27,	-18 <sup>c</sup>	-15 <sup>c</sup>	-20 <sup>c</sup>	15 <sup>b</sup>	50 <sup>a</sup>	50 <sup>a</sup>
Nov 4 to calving	-22 <sup>a</sup>	-25 <sup>a</sup>	-8 <sup>a</sup>	34 <sup>b</sup>	69 <sup>c</sup>	52 <sup>bc</sup>
Initial condition score <sup>f</sup>	5.5	5.4	5.5	5.7	5.6	5.4
condition change,						
Nov 4-Jan 27	-1.1 <sup>a</sup>	-.7 <sup>bc</sup>	-.9 <sup>bc</sup>	-.4 <sup>cd</sup>	-.2 <sup>d</sup>	.3 <sup>d</sup>
Weight changes through						
end of calving <sup>g</sup>						
Nov 4-Apr 21	-159 <sup>a</sup>	-158 <sup>a</sup>	-140 <sup>ab</sup>	-113 <sup>b</sup>	-55 <sup>c</sup>	-57 <sup>c</sup>
Condition change, <sup>g</sup>						
Nov 4-Apr 21	-1.2 <sup>a</sup>	-1.3 <sup>a</sup>	-1.2 <sup>a</sup>	-.6 <sup>b</sup>	-.3 <sup>bc</sup>	.1 <sup>c</sup>
Calf birth weight	73 <sup>a</sup>	73 <sup>a</sup>	72 <sup>a</sup>	78 <sup>b</sup>	76 <sup>ab</sup>	74 <sup>a</sup>
Percent pregnant <sup>g</sup>	63	79	100	83	94	92
Weaning weight	372 <sup>a</sup>	410 <sup>b</sup>	402 <sup>ab</sup>	421 <sup>b</sup>	412 <sup>b</sup>	420 <sup>b</sup>

<sup>abcde</sup>Means on a line with different superscript letters differ P<.05).

<sup>f</sup>Condition score scale: 1 = very thin, 5 = moderate, 9 = very obese.

<sup>g</sup>Included data only from cows weaning a calf.

protein was fed, feeding energy in the form of wheat middlings or corn/soybean meal supplements significantly improved cow and heifer weight gains from the start of supplementation to the beginning of calving and through the entire winter supplementation period.

Cow weight changes before calving and over the wintering period were very similar at both low and moderate levels of protein for groups fed corn/soybean meal and wheat middlings supplements. These results suggest that wheat middlings are approximately equal in value to isonitrogenous mixtures of corn and soybean meal when used as a protein and energy supplements for cows grazing low quality forage. The greater fiber content and lower energy content of wheat middlings compared to mixtures of corn and soybean meal is apparently offset by more favorable effects on forage intake and/or digestibility.

Calf birth weights were significantly higher for calves of cows fed supplements at the moderate level of protein (76 vs 73 lbs.). Feeding additional energy at either low or moderate levels of protein did not increase birth weight.

Pregnancy rates tended to be higher (P<.15) for groups fed wheat middlings or corn/soy supplements at both levels of protein. Lowest rebreeding rates were seen with cows and heifers fed soybean meal at the low level of protein. However, pregnancy data from this study should be interpreted with caution because of small numbers of cows per group.

Calf weaning weights in October tended ( $P < .06$ ) to be increased by feeding the higher level of protein. Weaning weights were higher ( $P < .05$ ) for groups fed wheat middlings or corn/soy supplements at the low protein level although cow weight change was not affected, suggesting that the additional energy was used to promote greater milk production rather than to improve cow weight or body condition.

Further research is planned to more clearly determine how much of the response to energy or protein level occurred before versus after calving. A similar study with SBM and wheat middlings fed to fall calving cows that were lactating throughout the winter feeding period (Lusby and Wettemann, 1988) showed that additional energy was probably being used to support increased milk production because cow weight changes were not affected but calf gains were improved with the energy supplement. If this trend were to hold true for spring calving cows, the best use of increased supplemental energy might be obtained prior to calving.

In conclusion, beneficial effects of additional energy on cow weight and condition changes appeared to occur only if total needs for protein were met. Wheat middlings were shown to be about equal to blends of corn and soybean meal having the same percent protein when used as a supplement to winter range forage. The lower energy content of wheat middlings compared to corn is apparently offset by beneficial changes in forage intake and/or digestibility that result in similar total intake of digestible energy.

#### Literature Cited

- Lusby, K.S. and R.P. Wettemann. 1988. Value of wheat middlings as a winter supplement for fall calving cows. OSU MP-125:69.