THE VALUE OF WHEAT MIDDLINGS AS A SUPPLEMENT FOR WINTERING SPRING CALVING BEEF COWS GRAZING NATIVE RANGE

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Story in Brief

Ninety-six spring calving, two-to-four year old Hereford and Hereford x Angus cows were used to determine the amount of wheat middlings needed to replace 3 pounds of soybean meal as a supplement for cows wintered on dormant native tallgrass range. Supplements were soybean meal (3 pounds/day) and wheat middlings fed at 5.0, 6.25 and 7.5 pounds per day. Soybean meal and the 7.5 pound level of wheat middlings provided 1.2 pounds of daily crude protein. Cow weight changes from November 1, 1988 to calving were 76, 45, 62 and 102 pounds for soybean meal, 5.0, 6.25 and 7.5 pounds of wheat middlings, respectively. Cow weight changes from just prior to calving to the end of supplementation (April 18) were -179, -186, -168 and -194 lb for the same treatments. From November 1, 1988 to October 11, 1989 cow weight changes were 90, 74, 110 and 103 pounds. Weaning weights and rebreeding rates were not significantly affected by treatment although weaning weights tended to be highest for calves of cows fed 7.5 pounds of wheat middlings and rebreeding rates were lowest for soybean meal-supplemented cows. A linear increase in precalving cow weight change indicated that the protein and/or energy in wheat middlings is well utilized. However, after parturition, cow weight change was not affected by increasing amounts of wheat middlings. Wheat middlings may be fed at less than isonitrogenous levels to soybean meal to produce equal performance from spring calving beef cows when forage supplies are adequate.

(Key Words: Beef Cows, Wheat Middlings, Soybean Meal, Energy, Protein.)

Introduction

Wheat middlings (WM), a by-product of the flour milling industry, comprise the layer of the wheat kernel just inside the outer bran covering.

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They contain granular particles containing different proportions of endosperm, bran, ground weed seeds and other nonwheat materials. Wheat middlings have approximately 16% CP and a maximum of 9.5% crude fiber (AAFCO, 1987). Fiber from bran type feeds has been shown to be highly digestible and to be an excellent source of supplemental energy for beef cattle. Lusby and Wettemann (1988b) and Cox et al. (1989) found that spring calving cows fed WM at isonitrogenous levels to cows fed 3 lb of soybean meal had improved precalving weight changes, increased weaning weight of calves and improved rebreeding rates. The objective of this study was to determine the daily amount of WM needed to produce equivalent winter weight change and reproductive performance to SBM, fed to provide 1.2 lb of daily CP in spring calving beef cows.

Materials and Methods

Ninety-six, two-to-four year old, spring calving Hereford and Hereford x Angus cows wintered on dormant native tallgrass range (3.4% CP) were fed supplements to provide increasing amounts of daily CP and equal daily amounts of calcium, phosphorus, potassium and vitamin A. Treatments were SBM (3.0 lb/day) or WM fed at 5.0, 6.25 or 7.5 lb/day. SBM at 3.0 lb/day and WM at 7.5 lb/day each provided 1.2 lb of CP. Composition of supplements and daily amounts fed are summarized in Table 1. Supplementation began on November 1, 1988. Feeding rates were increased on November 29, 1988. All cows grazed in a single pasture and were gathered 6 days per week and individually fed supplements in covered stalls. Supplements were prorated for a 6-day-per-week feeding schedule. Grass hay (6% CP) was fed during March and early April when snow or ice covered the ground, extreme cold was encountered or when available forage was inadequate to maintain the cow herd.

Cow weights and body condition scores (score of 1 = very thin to 9 = very fat) were taken after overnight withdrawal from feed and water at 28-day intervals until calving, at which time measurements were taken every 14 days. The 14-day weight nearest to calving was used as the final pregnant weight. Supplement feeding was terminated on April 18, 1989. From April to weaning in October, cow weights and body condition scores were taken at 28-day intervals.

Calf birth date and weight, sex, monthly weight changes and weaning weight were recorded. Calves were weaned on October 11, 1989. Calf birth and weaning weights were adjusted for age of dam and calf sex.

Cows were bred by natural service to Hereford x Angus bulls from May 8, 1989 to July 17, 1989 (70 days). Pregnancy was determined by rectal palpation at weaning.

Table 1. **Composition of supplements and daily feeding rates (DM basis).**

	Soybean Meal, lb/d	Wheat middlings, lb/d		
	3.0	5.0	6.25	7.5
Ingredients, %				
Soybean meal	90.8			
Wheat middlings		95.2	97.2	98.24
Dicalcium phosphate	7.7	2.7	.98	
Potassium chloride	1.45	1.09	.38	
Limestone		.98	1.41	1.74
Vitamin A[a]	.05	.03	.03	.02
Crude protein, %	44.45	16.80	17.16	17.34
Feeding rates per day, lb[b]				
11/01/88 to 11/28/88	2.0	3.3	4.2	5.0
11/29/88 to 4/18/89	3.0	5.0	6.25	7.5
Daily CP supplied, lb	1.21	.75	.96	1.16

[a] 30,000 IU/g
[b] Expressed as-is.

Data were analyzed by the least squares analysis of variance procedure and the protected least significant difference technique was used to separate means for characteristics in which differences were significant ($P<.05$).

Results and Discussion

Cow weight and condition changes are summarized in Table 2. Cows fed 7.5 lb WM gained more ($P<.01$) weight from November 1 to calving than cows on all other treatments, although differences were smaller than in previous studies with these levels of SBM and WM at this location. Unusually mild weather during the December-January period probably explains the small differences. Lower weight gain was noted ($P<.01$) for cows fed 5.0 lb WM than cows fed 3 lb SBM. Precalving cow weight gains increased linearly ($P<.001$) with increasing amounts of WM in the diet. Condition change for this period was not significant but reflected weight change.

Table 2. Weight and body condition changes and pregnancy rates of cows fed soybean meal and wheat middling supplements (least squares means).

	Soybean meal, lb/d	Wheat middlings, lb/d		
	3.0	5.0	6.25	7.5
No. of cows	24	22	26	24
Initial weight				
11/01/88	1001	1001	1008	999
Initial condition score[a]	6.1	6.0	6.0	6.0
<u>Precalving</u>				
Weight change, lb				
11/01/88 to calving	76[c]	45[b]	61[bc]	103[d]
Condition change				
11/01/88 to calving	-.07	-.15	-.14	.03
<u>Postcalving</u>				
Weight change, lb				
Calving - 4/18/89	-179	-186	-168	-194
4/18/89 - 10/11/89	193	218	216	194
Condition changes				
Calving - 4/18/89	-.80[b]	-.93[c]	-.61[b]	-.57[b]
4/18/89 - 10/11/89	.34[b]	.63[c]	.43[bc]	.19[b]
<u>Total trial period</u>				
Weight change, lb				
11/01/88 - 10/11/89	90	74	110	103
Condition changes				
11/01/88 - 10/11/89	-.57	-.42	-.31	-.38
Pregnancy rates, %[e]	86	98	97	100

[a] Body condition scale: 1 = very thin, 9 = very fat.
[b,c,d] Means in a row with different superscripts differ (P<.05).
[c] Includes data only from cows weaning a calf.

Cow weight changes were similar for all treatments from calving to the end of supplementation in April. During this period, cows fed 5.0 lb WM lost more ($P<.05$) body condition than cows from other groups. From April to weaning cows previously fed either 5.0 or 6.25 lb of WM tended ($P<.10$) to gain more weight than cows fed 3 lb SBM or 7.5 lb WM. Cows fed 5.0 lb WM regained more condition ($P<.05$) during the summer than cows on other diets. Previous studies have reported that cows fed low levels of nutrition during the winter tend to compensate for winter weight losses during the summer. Neither weight nor condition changes were different among supplements for the total trial period (November 1, 1988 to October 11, 1989) but cows fed the two highest levels of WM tended ($P<.12$) to gain more weight than cows fed 5 lb WM or 3 lb SBM per day.

While feeding increased amounts of WM significantly increased cow weight before calving, weight changes from calving to the end of the supplementation period and from the end of supplementation to weaning were similar for all treatments. This is supported by results of previous studies by Lusby and Wettemann (1988b) and Cox et al. (1989). In both studies, precalving cow weight changes were greater for cows fed 7.5 lb WM compared to 3 lb SBM, but after calving no differences were noted between treatments. In companion studies by Lusby and Wettemann (1988a) and Ovenell et al. (1989) lactating, fall calving cows fed the same diets as the spring calving cows had similar performance when fed 3 lb SBM or 7.5 lb WM. This suggests that weight and condition change responses of cows to supplements may depend on lactational status.

Calf birth weights (Table 3) increased linearly ($P<.001$) with increasing amounts of WM in the diet. Calves of cows fed 7.5 lb WM tended to gain faster from birth to the end of supplementation (April), as well as from April to weaning. This advantage was also observed for weaning weights (572 vs 544, 555 and 545 for 7.5 lb WM vs SBM, 5.0 lb WM and 6.25 lb WM, respectively). This suggests that milk production was greater for cows fed higher levels of energy.

Pregnancy rates (Table 2) were high and similar among treatments, indicating that cows in all supplemental groups had adequate body condition and overall nutrition for good rebreeding performance.

In conclusion, it does not appear necessary to feed WM at isonitrogenous levels to 3 lb of SBM in order to achieve equal pregnancy rates, cow weight changes and calf weaning weights. When adequate forage is supplied over the winter, 5.0 lb WM may be fed to spring calving beef cows to achieve similar postcalving weight change, calf weight and pregnancy rate. However, if there are adverse weather conditions and/or forage shortages 5.0 lb WM may not be adequate to maintain cow and calf performance due to negative cumulative effects. When SBM costs \$240/ton and WM is \$120/ton, cost/day for 3.0 lb SBM is \$.36 compared to \$.30 for 5 lb of WM, \$.38 for 6.25 lb WM and \$.45 for 7.5 lb WM.

Table 3. **Calf birth weight, weight gain and weaning weight (least squares means).**

	Soybean meal, lb/d	Wheat middlings, lb/d		
	3.0	5.0	6.25	7.5
Calf birth weights, lb	80^a	78^a	83^{ab}	89^b
Calf gain, lb				
Birth - 4/18/89	87	88	86	93
4/19/89 - 10/11/89	377	384	377	390
Weaning weight, lb	544	555	545	572

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

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