EFFECTS OF FEEDING DIFFERENT AMOUNTS OF ENERGY AND PROTEIN SUPPLEMENTS TO FALL-CALVING BEEF COWS

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Story in Brief

Forty-eight fall-calving Hereford and Hereford x Angus cows were fed three different supplements to determine the effect of additional energy and protein levels on cow performance. Cows were individually fed 3 or 6 lb/day of a 40% crude protein soybean meal-based supplement or 6 lb/day of a 20% crude protein soybean hull-based supplement. Cows fed both levels of 40% crude protein supplement lost less weight during early lactation than cows fed the 20% crude protein supplement. Supplements did not affect reproductive efficiency or milk production (estimated near the end of the supplementation period). Feeding cows the high amount of 40% crude protein supplement reduced weight loss during early lactation but did not increase milk production. These data indicate that fall-calving cows in good body condition do not utilize excess supplemental energy and protein to improve reproductive efficiency or milk production.

(Key Words: Cows, Supplementation, Energy, Protein, Milk, Reproduction.)

Introduction

Supplementation programs for fall-calving beef cows grazing dormant native grass should enhance forage utilization. Dry winter grass without supplementation cannot provide adequate protein or energy for lactating cows to perform at optimum production levels. Research has shown that feeding supplements high in natural protein (CP = 40%) or high in ruminal digestible fiber (typically formulated to CP levels $\geq$ 20%) can increase low-quality forage intake and improve forage digestibility above non supplemented levels. General recommendations are to feed 3 lb/d of an all natural 40% CP supplement or its equivalent to cows with moderate body condition scores. Even with this level of supplementation, calculations of total diet (supplement and forage) suggest that protein and energy intake is inadequate.

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The objective of this study was to compare production traits of fall-calving beef cows fed equal amounts of supplemental protein but at different supplemental energy levels and to compare the effect of feeding a very large amount of supplemental protein at a similar supplemental energy intake.

Material and Methods

Forty-eight fall-calving Hereford and Hereford x Angus cows were randomly allotted to treatments by weight, breed, and age. The average calving date of these cows was September 22 and cows were from 3 to 11 years old. Beginning on October 24, cows were individually fed either 3.0 lb/day of a 40% CP soybean meal-based supplement (LOW-40), 6.0 lb/day of a 20% CP soybean hull-based supplement (TWENTIES), or 6 lb/day of a 40% CP soybean meal-based supplement (HI-40). Composition of the supplements are shown in Table 1. During the supplementation period cows grazed common dormant native

Table 1. Composition and nutrient value of supplements (DM basis) and daily feeding amounts (as is basis).

	Supplements[a]		
	LOW-40	TWENTIES	HI-40
Ingredients, %			
Soybean meal	90.86	15.49	91.72
Soybean hulls	3.28	79.93	3.36
Molasses	3.99	4.02	4.03
Dicalcium phosphate	1.80	0.51	0.91
Vitamin A	0.05	0.05	0.03
Copper sulfate	0.01		0.01
Nutrient content, %			
Crude protein[b]	44.08	19.14	43.74
Phosphorus[c]	1.09	0.40	0.93
Calcium[c]	0.59	0.57	0.39
Potassium[c]	2.48	1.56	2.51
TDN[c]	81.73	77.46	82.50
Amount fed, lb/day	3.0	6.0	6.0

[a] Abbreviations for supplement types correspond to those in text.
[b] Actual analysis.
[c] Estimated from NRC. 1984. Nutrient Requirements of Beef Cattle (6th Ed.).

grass pastures. Cow weight and body condition scores (1 = emaciated; 9 = extremely obese) were recorded following overnight removal from feed and water at monthly intervals. Milk production was measured at the beginning and end of the trial by the weigh-suckle-weigh technique. From November 25 until February 1, cows were exposed to bulls which had passed breeding soundness examinations. Calves were early weaned for use in another study on January 9. Pregnancy was determined by rectal palpation following the breeding season. The difference between a cow's calving dates was used to calculate calving interval.

Data were analyzed using the General Linear Model procedure in SAS. Production traits were analyzed using treatment, breed type, calving date and starting weight as the independent variables. Comparison of least square means were used to determine differences between treatments. Open cows (n = 4) and one pregnant cow were culled prior to calving, therefore, their calving intervals were not included in the analysis.

Results and Discussion

Cows fed TWENTIES supplement (Table 2) had the greatest weight loss (86 lb, $P < .05$) despite being fed the same amount of supplemental energy as HI-40 or the same amount of supplemental protein as LOW-40 (48 and 68 lb weight loss, respectively). These data indicate that the soybean hull-based supplement could be depressing dormant native grass intake and/or digestibility when compared to the soybean meal-based supplements. The additional weight loss was not reflected in a difference of body condition score. Average daily milk production for cows fed TWENTIES was 1 to 2 lb/day greater than for cows fed LO-40 and HI-40. At the end of supplementation, milk production was similar for all treatments.

Calf gains were not significantly affected by the dam's supplementation, even though calves of HI-40 cows gained about 6 lb more ($P > .14$) than calves nursing other cows. Calf gains were highly correlated ($r = .84$; $P < .01$) to dam's milk production. These results agree with other research concerning calves without access to creep feed, that graze low-quality forages.

By feeding additional supplemental energy and/or protein, cattlemen might expect to increase reproductive efficiency, milk production, or both. Pregnancy rates and calving intervals were not improved by feeding high levels of supplemental energy or protein. Feeding a much higher than normal level of protein (HI-40) did reduce cow weight loss during early lactation. This reduction in weight loss was not accompanied by an expected increase in milk production and only a slight improvement in calf weight gains. Calves were weaned at the end of the supplementation period, and it is doubtful that the early weaning of calves could have negated the effect of the supplements on the reproductive traits measured as pregnancy rate and calving interval. These

Table 2. Response to feeding different supplements.

	Supplement		
	LOW-40	TWENTIES	HI-40
Beginning data, 10/24/91			
Weight, lb	1115	1116	1121
Condition score[a]	5.4	5.5	5.6
Milk production, lb/day	13.5	16.0	15.4
Average calving date	9/29	9/25	9/12
Cow weight gains, lb			
10/24 to 11/19	-5[cd]	-18[d]	2[c]
11/19 to 12/16	23[cd]	16[d]	35[c]
12/16 to 1/09	-86	-83	-85
Total gains	-68[cd]	-84[d]	-48[c]
Changes in condition score			
10/24 to 1/09	-0.1	-0.1	0.0
Milk production, lb/day			
Average[b]	11.1[c]	13.2[d]	12.1[c]
End of trial, 1/09	9.6	10.8	10.6
Pregnancy rate, %	92	94	86
Calving interval, days	367	365	366
Calf weight gains, lb			
10/24 to 1/09	82	81	88

[a] Condition score based on scale: 1 = emaciated, 9 = extremely obese.
[b] Milk production is the average of weigh-suckle-weigh values taken on October 24 and January 9.
[c,d] Means in the same row with different superscripts differ ($P < .05$).

data indicate fall-calving cows with adequate body condition do not utilize excess amounts of supplemental energy or protein to increase economically important production traits, such as rebreeding postpartum interval or increased milk production.