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EFFECTS OF BODY CONDITION ON REPRODUCTIVE PERFORMANCE OF BEEF COWS

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Summary

Cows were fed differing nutritional levels before and after calving to create a wide range of cow body condition or fleshiness prior to calving and at the beginning of the breeding season. Cows that were fleshier prior to calving and when turned on pasture in early May (30 days prior to the beginning of the breeding season) had a higher cycling rate in early May, June and July. Cows maintaining or increasing slightly in body condition (precalving to early May) tended to have a higher cycling rate during the breeding season than cows which lost body condition regardless of precalving body condition. Cows that were fleshier prior to the breeding season calved earlier the following year. Body condition prior to calving and change in body condition (precalving to early May) did not affect calving date the following year.

(Key Words: Beef Cow, Body Condition, Reproduction, Nutrition.)

Introduction

Many researchers have shown that body condition of beef cows affects reproductive performance. Previous studies have linked higher cow body conditions with shorter postpartum intervals and increased percentage of cows diagnosed pregnant. However, it is not clear as to the minimum degree of body condition or the body condition changes that will lead to adequate reproductive performance.

The objectives of this study are to (1) establish the minimum cow body condition before calving and breeding necessary for adequate reproductive performance and analyze the effects of change in cow body condition (precalving to the breeding season) on reproductive performance and (2) evaluate objective measurements to describe body condition of beef cows. Preliminary data from the first 2 years of a 3-year study relating to the first objective are reported in this paper.

Experimental Procedure

One hundred twenty-five Simmental-Angus crossbred cows wintered at the SDSU Range and Livestock Research Station near Cottonwood and summer grazed near Sturgis, SD, were allotted each December by age, weight and condition score to one of two levels of early winter nutrition for 60 days. In December of 1984, high early winter treatment cows grazed native range and were supplemented with 2 lb per head per day of a 37% protein (primarly soybean meal) supplement. Low early winter treatment cows grazed native range without supplement. Pastures grazed are co-dominated by short and medium height grasses of which western wheatgrass (mid-grass), buffalograss (short-grass) and blue grama (short-grass)

comprise over 75% of total forage production. All cows were supplemented with 2 lb of the same supplement beginning in early February until calving. Within 1 week following calving, cows were allotted by calving date, calf sex, cow age and early winter treatment to one of two late winter treatments and fed until early May. High late winter treatment cows received alfalfa hay (crude protein 14.7%; ADF 46%) and grass hay (crude protein 5.6%; ADF 57%) to meet NRC requirements while grazing native range. Low late winter treatment cows were supplemented with 2 lb of a 37% protein supplement while grazing native range.

Due to heavy early winter snow cover and the desire to increase the differences in cow body condition at the end of treatment periods, diets were changed in 1985. For early winter, high treatment cows were full fed grass hay (mostly brome, crude protein 8.6%; ADF 46%) with access to native range. Low treatment cows received similar grass hay to meet 70% of their NRC requirements for metabolizable energy and remained in drylot. Beginning in early February, all cows were supplemented with 2 lb of a 41% protein supplement (mostly soybean meal) and received grass hay when snow cover prevented grazing. For late winter, high treatment cows received 2 lb of the same supplement while grazing native range. Low treatment cows received 2 lb of the 41% protein supplement and grass hay (crude protein 6%; ADF 42%) to meet 70% of their NRC requirements for metabolizable energy while in drylot.

Each year cow body condition scores (table 1), cow weights (after overnight withdrawal from feed and water), backfat needle probes (Cooks probe taken between 12th and 13th rib), weight:height ratios (weight ÷ height at top of the hook bones) and cow weight changes were monitored monthly from December through July. The calving season began the second week in March and cows were exposed to Charolais bulls for 60 days beginning June 5. Cows were bled in early May, June and July for detection of cyclic activity via serum progesterone as determined by radioimmunoassay. Only records from cows nursing calves were included in statistical analysis.

Results and Discussion

Cows supplemented in early winter, 1984, were higher ($P<.05$) in condition score, weight:height ratio and backfat just prior to calving had increased ($P<.05$) weight gains from December to early February (+1.0 lb/day vs -.5 lb/day), had a higher ($P<.05$) percentage cycling just prior to the breeding season (58% vs 34%) and had 8-day earlier ($P<.05$) mean calving dates in 1986 than nonsupplemented cows (table 2). Supplemented cows in late winter, 1984, had similar condition scores, weight:height ratios and backfat in early June, weight changes from March to early June and percentage cycling in early May, June and July as nonsupplemented cows. While pregnancy rates (Fall, 1985) were near 100% for all groups, cows receiving high level diets for both early and late winter treatments had 7- to 12-day earlier ($P<.05$) mean calving dates in 1986 than cows on either or both low level diets.

In 1985-86, greater differences in cow body condition prior to calving and breeding were established by nutritional treatments (table 3). Cows on high early winter treatment, 1985, had higher ($P<.05$) body condition just prior to calving ($P<.05$) and increased ($P<.05$) weight gains from December to February (+.5 lb/day vs -7 lb/day) than low early winter treatment cows. Percentages of cows cycling in early May, June and July were similar for both early winter nutritional groups. High late winter treatment cows had ($P<.05$) higher condition scores, weight:height ratios and backfat in early June, higher ($P<.05$) weight

gains from March to early June (+4 lb vs -51 lb) and higher (P<.05) percentage of cows cycling in early June and July. It appeared low early winter treatment cows fed NRC diets postpartum were able to regain prepartum weight losses and exhibit cycling rates prior to breeding similar to high-high treatment cows.

Mean calving date, 1986, was earlier (P=.09) for cows with higher condition scores in early May, 1985 (table 4). Cow condition score in early March, May or June had higher (P<.05) percentage cycling rates in May, June and July. Cows that maintained or slightly increased body condition score from early March until they were turned out to spring pasture in early May tended to have higher percentage cycling rates in early May, June and July than cows declining in condition score (P=.14, .16, .17 for May, June and July, respectively). This trend was similar regardless of cow condition score in early March.

These preliminary results indicate that March calving cows grazing native range under western South Dakota conditions should be of condition score 5 or greater prior to calving and in early May to have 60% cycling by early June and 90% cycling by early July. It is also suggested that cows maintaining body condition (March to May) tend to have higher cycling rates in early May, June and July than cows losing body condition during that same period. Including another 1 1/2 years information will allow us to determine more specific recommendations in regard to body condition and weight changes of beef cows for adequate reproductive performance.

TABLE 1. COW BODY CONDITION SCORE SCALE[a]

Cow body condition score	Description
1	Severely Emaciated. All ribs and bone structure easily visible. Animal is physically weak and exhibits difficulty with standing or walking. No external fat present by sight or touch.
2	Emaciated. Similar to 1, but not weakened.
3	Very Thin. No visible fat on ribs or brisket. Individual muscles in the hind quarter are easily visible and backbone is apparent.
4	Thin. Ribs and pin bones are easily visible and fat is not apparent on ribs or pin bones. Individual muscles in the hind quarter are apparent.
5	Moderate. Ribs are less apparent than in 4. Last 2-3 ribs can be seen. No fat in brisket. Individual muscles in hind quarter are not apparent.
6	Good. Smooth appearance throughout. Some fat deposition in brisket. Individual ribs are not visible.
7	Very Good. Brisket is full, tail head and pin bones have visible deposits of fat. Back appears square due to fat, when viewed from behind.
8	Obese. Back is very square. Brisket is distended with fat. Large protruding deposits of fat on tail head and pin bones.
9	Very Obese. Description of 8 taken to greater extremes.

[a] Adapted from Wagner et al., 1985.

TABLE 2. EFFECTS OF EARLY AND LATE WINTER TREATMENTS (1985)

Early winter treatment	High		Low	
Late winter treatment	High	Low	High	Low
No. cows	15	16	17	16
Cow wt, lb, 12/13/86	1023	992	1026	1051
Cow condition score				
3/12/85	6.0[a]	5.6[ab]	5.4[ab]	5.0[b]
5/7/85	5.3[a]	4.6[b]	4.5[b]	4.2[b]
6/5/85	4.9	4.8	4.6	4.9
Cow wt change, lb				
12/13/84-2/15/85	53[a]	48[a]	-8[b]	-40[c]
2/15/85-3/12/85	21[a]	15[a]	42[b]	51[b]
3/12/85-6/5/85	-143	-132	-145	-115
12/13/84-5/7/85	-112[a]	-127[a]	-143[ab]	-174[b]
12/13/84-6/5/85	-28[a]	-65[ab]	-111[c]	-110[b]
Cows cycling, %				
5/7/85	29	35	12	23
6/5/85	65[a]	52[ab]	38[ab]	29[b]
7/2/85	100	100	90	95
Cows pregnant, %				
Fall 1985	100	100	95	100
Mean calving date				
(following year)	Mar 27[a]	Apr 3[ab]	Apr 6[b]	Apr 8[b]

[a,b,c] Means without common superscripts differ (P<.05).

TABLE 3. EFFECTS OF EARLY AND LATE WINTER TREATMENTS (1986)

Early winter treatment	High		Low	
Late winter treatment	High	Low	High	Low
No. cows	25	22	22	23
Cow wt, lb, 12/9/85	1031	1046	1016	1013
Cow condition score				
3/7/86	5.5[a]	5.1[ab]	4.9[a]	4.6
5/7/86	4.3[a]	3.4[b]	4.0[a]	2.8[c]
6/5/86	5.3[a]	4.5[b]	5.1[a]	4.1[c]
Cow wt change, lb				
12/9/85-2/7/86	29[a]	33[a]	-41[b]	-40[b]
2/7/86-3/7/86	-22[a]	-17[a]	4[b]	5[b]
3/7/86-6/5/86	-9[a]	-55[c]	16[b]	-47[c]
12/9/86-5/9/86	-120[a]	-165[b]	-142[ab]	-194[c]
12/9/86-6/5/86	0[a]	-37[b]	-21[ab]	-80[c]
Cows cycling, %				
5/9/86	14	10	9	1
6/5/86	55[a]	44[ab]	51[a]	22[b]
7/2/86	80[a]	58[ab]	78[ab]	51[b]

[a,b,c] Means without common superscripts differ (P<.05).

TABLE 4. EFFECTS OF CONDITION SCORE AND CONDITION SCORE CHANGE ON REPRODUCTIVE PERFORFMANCE

	% cows cycling on			Average calving date, 1986
	5/9	6/5	7/2	
Condition score prior to calving				
4	0[a]	15[a]	58[a]	Apr 10
5	9[ab]	41[b]	84[b]	Apr 8
6	24[b]	66[c]	93[b]	Apr 2
7	63[c]	82[c]	98[b]	Mar 31
Condition score in early May				
3	0[a]	5[a]	33[a]	Apr 11[a]
4	5[a]	22[a]	76[b]	Apr 5[a]
5	26[b]	60[b]	90[b]	Apr 3[a]
6	25[b]	59[b]	99[b]	Mar 27[b]
Change in condition score (precalving to May)				
Decreased	17	47	88	Apr 6
No change or slight increase	30	55	78	Apr 3

[a,b,c] Means within column, without common superscripts differ (P<.05).