BEEF CATTLE RESEARCH UPDATE

Britt Hicks, Ph.D., PAS
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March 2011

Effects of Body Condition on Performance of Beef Cows Grazing Different Forages

Recent University of Arkansas research determined the interactive effects of forage environment and body condition on the calving rate of beef cows.[1] In this study, 227 multiparous beef cows (1/4 to 3/8 Brahman) were managed to achieve marginal (4.7) or good (6.6) body condition scores (BCS) over approximately 5 months before the initiation of the breeding season. During this 5 month period, the cows grazed stockpiled and spring-growth, endophyte-infected tall fescue pastures (EI) at a stocking rate of either 1 cow/0.75 acres (marginal BCS) or 1 cow/2 acres (good BCS). At the start of the breeding season, cows within each BCS group were randomly assigned to graze common bermudagrass (CB) or EI (85% endophyte infected) during a 60-day breeding season. Body weight (BW) and BCS were recorded on days 0, 30, and 60 of the breeding season. In addition, cow intramuscular fat percentage (IMF) and rump fat (RF) were measured via ultrasonography at the start and end of the breeding season.

The effects of BCS and forage type on body weights, BCS, IMF, and RF are shown in Table 1. These researchers reported that during the breeding season that cows with marginal BCS grazing CB gained the most body weight (143 lb), whereas cows with good BCS grazing EI gained the least weight (24 lb). The other treatment groups were intermediate in overall BW gain (77 and 53 lb, respectively, for good-BCS CB and marginal-BCS EI cows). Cows with good-BCS and grazing either forage had greater BCS throughout the breeding season. Change in BCS was affected by a forage x BCS interaction. Marginal BCS cows grazing CB gained BCS (0.4 units), whereas all other cows lost BCS during the breeding season (-0.1 to -.06 units). As would be expected, intramuscular fat percentage was greater for good BCS cows than marginal BCS cows on both day 0 and 60 of the breeding season (~3.74 vs. 3.09% for good vs. marginal; $P < 0.0001$). Similar to IMF, rump fat was greater ($P < 0.0001$) in cows with good BCS compared with cows in marginal BCS. Rump fat tended to increase ($P = 0.07$) during the breeding season in marginal BCS cows compared with good BCS cows.

These researchers also reported that calving rates were similar ($P > 0.10$) among good- (82%) and marginal- (84%) BCS cows grazing CB, and good-BCS cows grazing EI (79%). However, marginal-BCS cows grazing EI had a reduced ($P = 0.04$) calving rate (61%). It is interesting to note that in this study that marginal BCS cows grazing CB had a calving rate similar to that of cows with good BCS. Possibly, this occurred because these cows actually gained condition during the breeding season (final BCS of 5.1, 0.4 unit gain), whereas cows with marginal BCS grazing EI lost condition during the breeding season (final BCS of 4.6, lost 0.1 units). In contrast, a number of published research studies have shown that cows in poor body condition at calving or breeding (below marginal BCS used in this study) generally have reduced reproductive performance even if they are managed to gain weight.[2,3] This earlier research clearly showed that cows should have a BCS of 5 or greater from calving through breeding in order to optimize reproductive performance.[2,3] In summary, the combination of marginal body condition and poor forage resulted in decreased reproductive performance in this Arkansas study.

Table 1. Body weight, BCS, IMF, and RF of beef cows in marginal (BCS = 4.7) or good (BCS = 6.6) body condition grazing common bermudagrass (CB) or toxic endophyte-infected tall fescue (EI) during a 60-day breeding season

	Forage Environment				P-value		
	CB		EI				
Item	Marginal BCS	Good BCS	Marginal BCS	Good BCS	Forage	BCS	Forage x BCS
# Cows	57	63	49	58	----	----	----
BW, lb							
day 0	1074	1323	1043	1283	0.21	0.0001	0.82
day 60	1217	1400	1096	1308	0.01	0.0001	0.46
change	143[a]	77[b]	53[b]	24[c]	0.001	0.0001	0.02
BCS							
day 0	4.7	6.6	4.7	6.6	0.96	0.0001	0.77
day 60	5.1[b]	6.1[a]	4.6[c]	6.0[a]	0.12	0.0001	0.04
change	0.4[b]	-0.5[a]	-0.1[c]	-0.6[a]	0.05	0.0001	0.06
IMF, %							
day 0	3.16	3.86	3.06	3.60	0.64	0.0001	0.51
day 30	3.11	3.85	3.02	3.66	0.68	0.0001	0.65
change	-0.04	-0.01	-0.04	0.06	0.96	0.46	1.72
RF, inches							
day 0	0.25	0.76	0.24	0.75	0.92	0.0001	0.99
day 30	0.34	0.79	0.33	0.76	0.69	0.0001	0.82
change	0.09	0.03	0.09	0.01	0.74	0.07	0.46

[a,b,c] Unlike superscripts within rows indicate difference ($P < 0.06$).
Adapted from Looper et al., 2010.

Is Feed Efficiency the Same While Growing and Finishing?

Feedlot cattle are often fed a backgrounding or grower diet before being fed a high energy finishing diet. However, it is not known whether animals that are efficient on a backgrounding diet or grazing pasture are also efficient on a high grain diet. Recent Canadian research determined whether feedlot steers changed their feed efficiency ranking when fed a grower diet, then a finisher diet.[4] These researchers used 490 crossbred steers (5 to 7 months of age with average initial weight of 578 lb) in a 3-year study to measure feed efficiency rankings. Within each year, there were two feeding periods. The first feeding period ran from November to January (averaged 84 days) and the second feeding period ran from February to May (averaged 80 days). In each year, the steers were divided into three groups: one group received a grower ration through both periods, a second group received a finisher ration through both periods, and a third group received a grower ration during period 1 and a finisher ration during period 2.

The grower ration on an as-fed basis contained 74% oats, 20% grass hay, and 6% supplement (NEm and NEg= 0.77 and 0.49 Mcal/lb, respectively or ~72% TDN), whereas the finisher ration contained 57% barley, 28% oats, 10% alfalfa, and 5% supplement (NEm and NEg= 0.88 and 0.59 Mcal/lb, respectively or ~80% TDN). All steers were fed ad libitum and individual feed intakes were measured using the GrowSafe feeding system. Feed efficiency was computed using three different methods at the end of each feeding period: gain to feed ratio (G:F), residual feed intake (RFI), and Kleiber ratio (KR). RFI is defined as the difference between an animal's actual feed intake and its expected intake based on body weight and growth rate. KR was calculated as the ratio of average daily gain to the

mean metabolic body weight ($BW^{0.75}$). For each measure of efficiency, the animals were classified as low, medium, or high based on 0.5 standard deviations (SD) from the mean.

These researchers reported that the majority of the steers did not maintain their previous feed efficiency rankings in period 2. Approximately 51, 51, and 58% of steers in the grower-fed group, the finisher-fed group, and feed-swap group, respectively, changed their RFI measure by 0.5 SD. The correlation estimates between the two feeding periods for all three feed efficiency measures for all three groups were low (Table 2) but were lowest for the feed swap group. These low correlation estimates may show that a majority of the steers performed differently on the different diet types and different periods. A low correlation estimate may indicate that efficient animals in period 1 may not be efficient in period 2 or vice versa. RFI had the greatest correlation between the 2 periods for the majority of the groups.

Table 2. Correlations for the three feed efficiency measures between feeding periods 1and 2 for all three feeding groups.

Feed Efficiency Measure	Feeding Group		
	Grower: Both Periods	Finisher: Both Periods	Feed Swap Group
G:F	0.38***	0.29**	0.20***
RFI	0.44***	0.42***	0.33***
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[2] Herd, D. B., and L. R. Sprott. 1996. Body condition, nutrition and reproduction of beef cows. Texas Agricultural AgriLife Extension Service B-1526. Available at: http://animalscience.tamu.edu/images/pdf/nutrition/nutrition-body-condition-nutrition.pdf

[3] Selk, G. 2008. Body condition scoring of cows. Pages 141-144 in Oklahoma Beef Cattle Manual Sixth Edition, Oklahoma Cooperative Extension Service.

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