

A 20 percent decrease in body condition score from November to calving in the spring (a cow changing from a 6.0 to a 4.8) would be associated with an additional 15 days to first estrus after calving compared to a cow that maintained body condition. Similarly, a 20 percent decrease in body condition score would be associated with an additional 16 days to conception.

This study reemphasized the relationship between weight loss during pregnancy and rebreeding performance. Either body weight loss or change in body condition are good indicators of potential reproductive performance of range cows.

A Comparison of Different Breeds for Growth Rates, Performance Traits and Scrotal Circumference in Young Beef Bulls

J. H. Baker, J. R. Kropp,
E. J. Turman and D. S. Buchanan

Story in Brief

Performance data and testicular measurements from 497 Hereford, Polled Hereford, Angus, Brangus and Charolais bulls were collected from December 19, 1979, through April 2, 1981, at Oklahoma Beef, Incorporated, a performance bull test station. The on-test age of these bulls was approximately 7 months, and they remained on-test for 140 days.

Charolais bulls were taller, heavier, faster gaining and trimmer, and they possessed larger rib eye areas than the other breeds. Hereford, Polled Hereford and Angus bull on-test and off-test hip heights were similar (43.2 in.), while Brangus (44.5 in.) and Charolais (45.8 in.) were taller, representing differences in breed frame and mature size. However, skeletal growth as measured by hip height growth rate per day was similar for all breeds, averaging .0328 in. per day or 1 in. per month. Average daily gains on test were very similar for Charolais, Polled Hereford, Angus and Brangus bulls, ranging from 3.37 to 3.58 lb per day, while Hereford bulls gained slightly less (3.18 lb per day).

Angus bulls had the largest on-test scrotal circumference measurement (27.7 cm) while the Hereford and Polled Hereford bulls had the smallest (25.6 cm). Brangus, Angus and Charolais were similar in their off-test scrotal circumference

(35.2 cm) with Hereford and Polled Hereford bulls being smaller (33.3 cm). Scrotal size tended to increase at the rate of 1.7 cm per month while on test.

Brangus, Angus and Polled Hereford bulls tended to be fatter off-test (.44 in.) than Hereford (.38 in.) and Charolais bulls (.21 in.). Rib eye area measurements of 15.1, 13.5, 13.0, 12.6 and 12.5 were recorded for Charolais, Angus, Hereford, Brangus and Polled Hereford bulls, respectively.

Introduction

In beef cattle herds, the level of reproductive performance of both cows and bulls is probably the single most important factor contributing to gross returns. Therefore, it is especially important to understand all the factors influencing the reproductive performance of the bull. One such factor is testicular size, with scrotal circumference being the most common measurement of size.

With the influence of many breeds of beef cattle in this country, there has been some concern about whether these breeds are similar in their skeletal growth, performance and testicular growth. Most cattlemen would agree that there are definitely size differences in many breeds, but their growth rates are not clearly defined.

The purpose of this study was to evaluate the breed differences between scrotal circumference in young beef bulls and their respective growth traits as measured by linear hip height, body weight and average daily gain on a performance test program.

Materials and Methods

This study utilized performance data and testicular measurements from Hereford, Polled Hereford, Angus, Brangus and Charolais bulls on test at Oklahoma Beef, Incorporated, a performance bull test station, located 8 miles west of Stillwater. A total of 497 bulls in 20 different groups were placed on test, and 485 bulls completed the 140-day test period. Twelve bulls were removed because of health or unsoundness.

All bulls were approximately 7 months of age when placed on test. The bulls were acclimated to the feed and surroundings for a 14-day warm-up period prior to beginning the official 140-day gain test. Therefore, all bulls completed test at approximately 12-13 months of age. Different breeds were fed different rations (Table 1); therefore, breed and ration effects could not be separated. The Hereford and Polled Hereford bulls were fed the same ration; however, the

Table 1. Oklahoma Beef, Inc. bull test rations

Ingredient	Angus, Brangus, Charolais	Hereford, Polled Hereford
	%	%
Crimped corn	36	33
Crimped oats	30	30
Molasses	7	5
Dehydrated alfalfa	5	3
Cottonseed hulls	10	17
Soybean oil meal	10	5
Mineral mix	2	2
Cottonseed oil meal	—	5

Hereford bulls were bunk-line fed while the Polled Herefords were self-fed. The Angus, Brangus and Charolais were also fed the same ration; but the Angus were self-fed with 10 bulls per pen, Charolais were self-fed with 25 bulls per pen and Brangus were bunkline fed twice per day.

Measurements of weight, hip height and scrotal circumference were obtained prior to the start and upon completion of the official 140-day test. In addition, fat thickness and rib-eye area were estimated with a scanogram upon completion of the test. Average daily gain, weight per day of age, hip height growth rate and scrotal circumference growth rate were calculated.

Results and Discussion

Table 2 presents means for all on-test and off-test performance and testicular traits.

Table 2. Breed least squares means for performance traits of tested bulls

	Breed				
	Hereford	Polled Hereford	Angus	Brangus	Charolais
	119	On-test performance data		90	27
		120	141		
Number	119	120	141	90	27
HH (in)	43.5 ± .13 ^c	43.2 ± .15 ^{cd}	43.1 ± .13 ^d	44.5 ± .1 ^b	45.8 ± .25 ^a
SC (cm)	25.7 ± .25 ^c	25.6 ± .30 ^c	27.7 ± .25 ^a	26.6 ± .38 ^b	26.0 ± .51 ^{bc}
Wt (lb)	605 ± 7 ^b	562 ± 9 ^c	620 ± 7 ^b	602 ± 11 ^b	722 ± 14 ^a
Wt/day (lb)	2.51 ± .03 ^{bc}	2.31 ± .03 ^d	2.58 ± .03 ^b	2.45 ± .04 ^c	3.11 ± .06 ^a
		Off-test performance data			
	116	118	135	90	26
Number	116	118	135	90	26
HH (in)	48.2 ± .13 ^c	47.6 ± .15 ^d	48.0 ± .13 ^c	49.2 ± .19 ^b	50.8 ± .26 ^a
HGR (in/day)	.0322 ± .0006 ^a	.0318 ± .0007 ^a	.0339 ± .0006 ^a	.0332 ± .0009 ^a	.0335 ± .0012 ^a
SC (cm)	33.6 ± .21 ^b	33.1 ± .26 ^b	35.2 ± .21 ^a	35.6 ± .31 ^a	34.9 ± .43 ^a
SCGR (cm/day)	.054 ± .002 ^{bc}	.054 ± .002 ^{bc}	.052 ± .002 ^c	.062 ± .003 ^a	.059 ± .003 ^{ab}
Wt (lb)	1073 ± 9 ^{cd}	1047 ± 11 ^d	1118 ± 9 ^b	1082 ± 13 ^c	1251 ± 18 ^a
ADG (lb/day)	3.18 ± .04 ^c	3.47 ± .04 ^{ab}	3.45 ± .04 ^{ab}	3.37 ± .06 ^b	3.58 ± .09 ^a
Wt/day (lb)	2.77 ± .02 ^c	2.72 ± .03 ^c	2.89 ± .02 ^b	2.79 ± .03 ^c	3.27 ± .05 ^a
Fat (in)	.38 ± .01 ^b	.44 ± .01 ^a	.45 ± .01 ^a	.42 ± .02 ^{ab}	.21 ± .02 ^c
REA (sq in)	13.0 ± .09 ^c	12.5 ± .01 ^d	13.5 ± .09 ^b	12.6 ± .13 ^d	15.1 ± .18 ^a

a,b,c,d Means in the same row that do not share at least one superscript are significantly different by LSD test ($P < .05$).

Body weight

Charolais bulls were heavier on-test, heavier off-test, gained more and had more weight per day of age than the other breed groups. Since different rations were fed to different breed groups (Table 1), interpretation of off-test weight and average daily gain differences among breeds is difficult. Average daily gains were similar for Charolais, Polled Hereford, Angus and Brangus, ranging from 3.58 lb per day for Charolais to 3.37 lb per day for Brangus. Although Polled Hereford bulls gained well (3.47 lb per day), they were lowest in off-test weight and weight per day of age due to a low on-test weight. Hereford bulls had the lowest average daily gain on test (3.18 lb per day) but were bunk-line fed the lowest energy diet.

Hip height

Breed rankings for on-test and off-test hip height were very similar. Charolais bulls were tallest, followed by Brangus. Polled Hereford, Hereford and Angus bulls were smaller framed. Differences in skeletal height both on and off-test represent differences in mature size of the breeds. Hip height growth rate from on-test to off-test were similar regardless of the mature size of the breed, ranging from .0318 to .0339 in. per day or approximately 1 in. per month.

Scrotal circumference

The on-test scrotal circumference was larger for Angus bulls than the other breed groups. Off-test scrotal circumference measurements were similar for Brangus, Angus and Charolais bulls, while Hereford and Polled Hereford bulls were smaller in their average circumference by approximately 2 cm or .8 in. However, all breed averages for yearling scrotal circumference were in the acceptable range.

The scrotal circumference growth rate between the on-test measurement and off-test measurement, representing basically a weaning to yearling period, was greatest for the Brangus bulls (9 cm), followed by the Charolais (8.9 cm), Hereford (7.9 cm), Angus (7.5 cm) and Polled Hereford (7.5 cm). Differences in scrotal growth rate between breeds may be due to: first, Brangus and Charolais are larger, later-maturing breeds that mature sexually later in their growth curve, and secondly, Hereford, Polled Hereford and Angus bulls are smaller, earlier-maturing breeds that possibly reach sexual maturity sooner.

Fat thickness

Upon completion of the 140-day test, Charolais bulls were leaner than the other breed groups. This advantage in leanness is associated with a later physiological maturity pattern and a larger mature size. Cattle sired by Charolais bulls should be leaner and have higher cutability than cattle sired by the other breed groups. Hereford bulls tended to be leaner than Polled Hereford, Angus and Brangus bulls. However, energy density of the ration is confounded with breed; therefore, interpretation of the differences are difficult.

Rib eye area

Rib eye area, as measured between the 12th and 13th rib by scanogram procedures, was used as an indicator of muscle. Charolais bulls were more heavily muscled, followed by Angus, Hereford, Brangus and Polled Herefords, respectively. Cattle sired by Charolais bulls should have higher muscle-to-bone ratios than cattle sired by the other breed groups.

Conclusions

Definite breed differences exist among Charolais, Brangus, Hereford, Polled Hereford and Angus bulls for on-test weight, off-test weight, hip height, scrotal circumference, average daily gain on test, fat thickness and muscling. Differences among breeds tended to parallel differences in breed physiological and sexual maturity patterns. Charolais bulls were taller, heavier, faster gaining and trimmer and possessed larger rib eye areas than the other breeds.

All breeds tended to grow in height at the same rate during the test period or from weaning to yearling; however, Charolais and Brangus were generally taller at the completion of test due to their large mature size.