

Ejaculate Characteristics of Angus and Hereford Bulls Finishing Gain Test

M. E. Wells, Suzanne Smith, D. J. Breuer and Barbara Ann Stotts

Story in Brief

Two groups of bulls, 37 Hereford and 33 Angus, finishing gain test at Oklahoma Beef, Inc. were used to study their ejaculate characteristics. One ejaculate was collected from each bull by electroejaculator. Percentage of normal cells, their rate of motility, concentration of cells per ml and extent of acrosomal aging indicated that the reproductive state of bulls finishing feedlot gain test is typical of bulls in early sexual function.

Introduction

The ability of dairy and beef bulls to produce sperm cells and the characteristics of their sperm cell populations produced has been studied at various points in the reproductive life of the animals. Most of the studies have been conducted on animals post-puberty and the progress of these animals to full sexual maturity has been well documented.

Placing young bulls on a 140 day gain test has been utilized for several years to gather desired genetic information on the bull population. The effects of such gain tests on subsequent reproductive performance have not been studied extensively. This study was initiated to characterize the reproductive status of bull populations as they finish gain tests.

Experimental Procedure

Two groups of bulls, 33 Angus and 37 Hereford bulls completing gain test at Oklahoma Beef, Inc., were utilized in this study. Semen was collected via electroejaculation upon completion of the gain test. One ejaculate was collected from each bull and the following determinations were made: volume, percent motile cells, rate of cell motility using a 0 to 4 scale, concentration of sperm per ml, percent normal and abnormal cells, and aging of the acrosome on normal and abnormal cells.

Results and Discussion

The average age of both groups of bulls was 12 to 14 months. This is perhaps earlier than most people would attempt to use bulls for

breeding purposes. However, there was only 2 bulls in each breed from whom extremely dilute samples or no sperm cells could be secured. This indicates that bulls on such a nutritional regime can routinely be expected to be sexually functional at a relatively early age. Extensive research elsewhere documents the effect of nutrition on the age at puberty.

Table 1 presents the means and range for several measures of ejaculate characteristics on these animals. Breeds were quite similar in all characteristics, with several characteristics means closely resembling the conditions usually observed for bulls of any age in sexual rest. The percent motile cells was low, approximately 40% live cells with a somewhat depressed rate of motility. By contrast, bulls on a 4 ejaculate per week schedule would likely approach 75 to 80% live cells with a rate of 3.5. Similarly, the percentage of normal cells was lower for these feedlot bulls, averaging 70-75%, than would be the case if they were in more extensive use. Most bulls in a reasonable use pattern will range from 10 to 20% abnormal cells in their ejaculates.

Hereford bulls averaged higher in volume of ejaculate, 4.9 ml than did Angus bulls, 3.3 ml. This should not be interpreted as a real difference since electroejaculation was the collection technique employed and the volume secured is usually related to length and level of electrical stimulus.

Concentration of cells per ml was low as was expected. These young bulls are just beginning their sperm producing function and will typically produce dilute ejaculates for several months. Both volume and concentration will gradually increase as the bulls progress toward a mature

Table 1. Average Ejaculate Characteristics of Feedlot Bulls.

Ejaculate Item	Breed			
	Hereford		Angus	
	Mean	Range	Mean	Range
Motile cells (%)	40	1-75	38	1-80
Rate of Motility (Scale of 0 to 4)	2.7	1.0-4.0	2.6	1.0-4.0
Volume (ml)	4.9	.5-9.5	3.3	2.0-9.4
Concentration (Sperm/ml, in millions)	301.2	23.4-1,110	287.1	18.1-656.8
Normal cells (%)	73.5	0-90.0	70.7	0-95
Normal cells with non-age acrosome (%)	43.2	23-63	55.9	22-77
Normal cells with aged acrosome (%)	32.3	15-54	19.3	10-42
Abnormal cells with non-aged acrosome (%)	4.9	0-16	7.7	0-22.5
Abnormal cells with aged acrosome (%)	19.4	8.0-57.0	17.0	2.5-45.5
Aged acrosomes (%)	50.4	0-72.0	34.2	0-58.0

status. Concentration of cells per ml is usually reduced on electroejaculator samples by at least one-third. Therefore, our best estimate of the state of these feedlot bulls is that they are typical of bulls in early sexual function with approximately 30-50% of the number of cells per ml. that will be typical at a later age.

Acrosome characteristics were determined on all ejaculates by use of special differential staining techniques. Table 1 indicates that a high level of aging of the acrosome was apparent in both breeds. The percentage of normal cells with no aging of the acrosome was 43% in Hereford bulls and 56% in Angus bulls. The degree of acrosomal aging in ejaculates is usually an indication of ejaculation frequency or, conversely, sperm cell storage time in the epididymis of the male. Bulls on routine ejaculation frequencies of 2X to 4X per week will usually have 80 to 90% normal cells with no apparent aging of the acrosome.

In summary, the reproductive state of bulls finishing their feedlot performance trials is very similar to that of bulls reared on a high nutrient intake regime. They likely reach sexual function somewhat ahead of animals on a lesser nutrient intake. Their ejaculate characteristics are typical of young bulls in sexual rest. There is a need now to instigate research to compare the effects of early nutritional regimes on lifetime reproductive functions. It would appear from these preliminary data that bulls coming off gain tests are reproductively normal. The long-range effects need to be investigated.
