



Cattle Producer's Handbook

Genetics Section

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Genetics of Reproduction

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The reproductive efficiency of heifers, cows, and bulls is extremely important in determining net return to the cow-calf producer. Past research has shown that many of the measures of reproduction had low heritability and would respond slowly to selection. Several of these traits were gross measures made up of several component traits. These complex traits are affected greatly by environmental effects masking the expression of any underlying genetic differences among animals in their genetic potentials for efficient reproduction. Emphasis has been placed on improved management, nutrition, and the use of hybrid vigor resulting from crossing systems to improve reproductive efficiency.

Recent studies have looked at new measures or component parts of the more complex measures of reproductive efficiency. We may have some real breakthroughs in which selection can be used effectively to improve the genetic potential for improved reproduction. This publication reviews some of the more recent studies in this area although it is not a comprehensive review.

Reproductive Measures in Young Bulls

A breeding soundness exam (BSE) on yearling bulls at the completion of the performance test has been an integral part of data collection procedures at the San Juan Basin Research Center since the early 1950s. The early exams included the seminal traits of concentration, motility, percent live cells, percent primary abnormalities, percent secondary abnormalities, and percent normal sperm, along with physical soundness traits. Scrotal circumference (SC) was added to the list of measurements in 1969. The present BSE is that recommended by the Society of Theriogenology. The scoring system used for bulls 12 to 14 months of age is:

Classification	Very good	Good	Fair	Poor
Motility score	20	12	10	3
% motility	70%+	50-70%	30-50%	30%-
Abnormal sperm score	40	24	10	3
% abnormal	10%-	10-24%	24-35%	35%+
Scrotum circum. score	40	24	10	10
Scrotum circum. (cm)	34+	30-34	30-	30-
Total score	100	60	30	16

Seminal Traits

Estimates of heritability for several seminal traits along with estimates of genetic correlations among these traits are shown in Table 1. These estimates are from 534 linecross Hereford bulls produced at the Center from 1957 through 1970.

Heritability estimates for concentration, motility, primary abnormalities, and normal sperm ranged from 23 to 30 percent while the estimate for live cells was somewhat lower at 17 percent. Heritability of secondary abnormalities is essentially zero. The genetic correlations of percent primary abnormalities with other seminal traits were fairly high negative values, indicating that as percent primaries increase, other seminal traits also tend to become poorer.

In a separate study on 291 bulls, repeatability estimates between first and second ejaculates for concentration, volume, and motility were .53, .54, and .63, respectively.

Scrotal Circumference

Scrotal circumference measurements were first taken at the Center in 1969. These measurements were taken every 28 days during a 140-day performance test on 132 bulls of primarily Hereford breeding. The SC averages by 20-day intervals from 240 through 400 days of age were: