

Effects of Testicular and Seminal Changes on Fertility of Yearling Beef Bulls

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Testicular and seminal evaluations were performed on yearling beef bulls as part of Breeding Soundness Evaluations prior to (BSE -1) and immediately following (BSE -2) a multi-sire, natural mating period. The objective was to evaluate changes in testicular mass, seminal quality, and the potential impact on fertility. Crossbred (*Bos taurus*) beef bulls (n = 60) were subjected to BSE -1 at 14 to 15 months of age and assigned into one of six groups of 9 or 10 bulls and to one of three groups of 2 and 3 year old cows at a bull to female ratio of 1:20 $\pm$ 2. Bull groups were rotated every two weeks during the 63-day breeding season (mid-June to mid-August). BSE -1 classified 59 of the 60 bulls as satisfactory (98.3%). Scrotal circumference (SC) was 36.5 $\pm$ 0.5 cm (range 32 to 45cm), percentage of progressive motile spermatozoa (MOT) was 59 $\pm$ 2% (range 30 to 80%) and morphologically normal spermatozoa (MRPH) was 82 $\pm$ 1% (range 28 to 96%). Percentage of primary abnormal spermatozoa was 13.5 $\pm$ 1% (range 2 to 54%). Beginning body weight (BW) was 549 $\pm$ 6 kg (range 445 to 643 kg) with a body condition score (BCS) of 6.11 $\pm$ 0.4 units (range 5.5 to 7.0 units). SC had weak correlation with MOT (0.26, p <0.05) and no significant correlation with MRPH. BSE -2 was conducted 61 to 87 days post BSE -1 (mean 73d) on 57 of the 60 bulls. Only 36 bulls (63%) attained satisfactory BSE classification; 23 bulls (35%) less than the 59 bulls (98.3%) at BSE -1, p <0.001. During this period, there were declines in BW by -73 $\pm$ 3 kg (range -25 to -103 kg), BCS by -1.5 $\pm$ 0.1 units (range -1.0 to -2.5 units), and SC by -1.4 $\pm$ 0.2 cm (range -0.5 to -4.0 cm). Twelve bulls (21%) had SC the same or increased from BSE -1 and 45 bulls (79%) had decreased testicular mass (p<0.05). There were no significant differences in SC changes between satisfactory BSE bulls and unsatisfactory BSE bulls. SC change was positively correlated (0.30, p <0.05) to BW loss during breeding. MOT decreased insignificantly to 54.5 $\pm$ 2.5% (range 0 to 80%). Overall, 32 bulls (56%) had improved MOT in comparison to 25 bulls (44%) with reduced MOT. MOT changes were moderately associated with SC change (0.43, p<0.001). MRPH changes were significant (p <0.05) as the percentage of normal spermatozoa decreased from 82 $\pm$ 1% down to 66 $\pm$ 3% (range 0 to 93%), with 38 bulls (67%) having decreased normal spermatozoa. Percent primary abnormal spermatozoa increased to 25 $\pm$ 2% (range 3 to 87%). Proportionally, sperm head abnormalities (shape, size, nuclear defects including diadem craters, and acrosomal defects) accounted for 57% of the increased total abnormalities. Changes in percentage of normal spermatozoa were not significantly associated with SC changes. Although marked reductions in testicular mass and seminal quality occurred in many of the yearling bulls, overall pregnancy rates of 92 - 95% were attained. Losses of SC, MOT, and MRPH had no discernable impact on yearling beef bull fertility within a multi-sire, natural mating study. More comprehensive information will be attained upon the fertility of individual bulls as calving data and paternal parentage is determined.

Keywords: beef bulls, fertility, testes, semen