Occurrence of proximal droplets in performance-tested beef bulls

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The presence of spermatozoa proximal droplets in performance-tested bulls during breeding soundness examinations causes concern regarding future fertility. A retrospective analysis was performed to evaluate various parameters related to breeding soundness examination (BSE) classification and occurrence of proximal droplets in bulls. Results of BSE from 755 bulls (12 – 16 months of age) that represented 8 breeds collected over a 4-year period at two 84-day performance testing facilities were included in the following analysis regarding proximal droplets and fertility. Other facility-specific criteria for eligibility included average daily gain, adjusted 365-day weight, frame score (≥ 5.0), and minimum scrotal circumference (≥ 31 cm). Bulls were then either classified as satisfactory (successfully passed all aspects of the BSE as set forth by the Society for Theriogenology) or unsatisfactory (unsuccessfully completed the semen portion of the BSE). Data observations included body weight and scrotal circumference measurements collected at on- and off-test dates, along with evaluations of spermatozoa motility and morphology conducted during the first BSE. Descriptive statistics were performed using the frequency procedure of SAS 9.4 and pivot tables in Microsoft Excel. Separate linear mixed models were used to determine if morphological defect-deferral and proximal droplet deferral were associated with scrotal circumference on-test and off-test, age, on-test and off-test weight, average daily gain and scrotal circumference growth. Logistic regression models did not identify an impact of location, breeds, or year. The incidence of proximal droplets accounted for 80.95 % (170/210) of primary defects. On-test scrotal circumference was greater in bulls that passed than those that were deferred for overall sperm morphology (32.94 ± 0.20 cm vs. 31.98 ± 0.32 cm, respectively; $P = 0.01$) and the incidence of proximal droplets (32.9 ± 0.18 cm vs. 31.4 ± 0.44 cm, respectively; $P = 0.001$). However, off-test scrotal circumference did not differ between bulls that passed or were deferred (37.3 ± 0.12 cm vs. 37.3 ± 0.22 cm, respectively), and was not related to sperm morphology ($P = 0.89$) or the incidence of proximal droplets ($P = 0.31$). Scrotal circumference growth was greater for bulls that were unsatisfactory when compared to bulls that were satisfactory (0.070 ± 0.003 vs. 0.060 ± 0.002 cm/day, respectively; morphology ($P = 0.0009$), proximal droplets ($P = 0.002$)). Furthermore, age was inversely related to deferrals on morphology ($P = 0.0005$) and proximal droplets ($P < 0.0001$), with younger bulls exhibiting increased morphological issues. On-test body weight was increased in bulls with morphological failure ($P = 0.04$), but had no difference in relation to proximal droplet failure ($P = 0.35$). Off-test weight was not affected by classification status on either sperm morphology ($P = 0.10$) or occurrence of proximal droplets ($P = 0.54$). Average daily gain of the bulls during the 84-day test had no impact on BSE classification related to sperm morphology and occurrence of proximal droplets. In summary, bull age and scrotal circumference growth during the test period were important factors associated with unsatisfactory classification due to sperm morphology and occurrence of proximal droplets. Occurrence of proximal droplets has been previously associated with bull maturity; however, the cause of its relationship to rapid scrotal circumference growth in performance-tested bulls remains unclear.