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JOURNAL ARTICLE

Effects of cryopreservation on bull sperm head morphometry

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Artificial insemination using cryopreserved semen is a common management tool of the contemporary livestock producer. However, cryopreservation is detrimental to sperm function and fertility, killing some 50% of the spermatozoa during the process. Prediction of cryopreservation damage from prefreeze samples remains elusive.

Computer-automated sperm head morphometry was used in this study to determine the effects of cryopreservation on bovine sperm head morphometry.

Semen was collected from 18 bulls and was divided. One portion was extended to 200 x 10⁶ sperm/ml and a microscope slide was prepared, while the remaining portion was cryopreserved in a Triscitrate-yolk extender. After thawing, the cryopreserved samples were prepared on microscope slides. All slides were air dried and were stained with hematoxylin and rose bengal. The morphometric dimensions for length, width, width/length, area, and perimeter for a minimum of 200 sperm heads were analyzed from each slide by computer-aided sperm head morphometry analysis, and the mean measurements were recorded. Bull sperm heads were significantly ($P < 0.01$) smaller in cryopreserved spermatozoa than in the companion extended samples for length (8.56+/-0.07 vs. 8.63+/-0.08 microm), width (4.39+/-0.05 vs. 4.48+/-0.05 microm), area (28.42+/-0.07 vs. 29.14+/-0.08 microm), and perimeter (23.33+/-0.21 vs. 23.70+/-0.23 microm) for all bulls. Width/length was also different (0.513 vs. 0.519). In addition, differences ($P < 0.05$) were found within 14 of 18 bulls for at least four of the morphometric parameters. The percent change in measures after cryopreservation were correlated ($P < \text{or} = 0.05$) to the variability of the extended sample. Variations in sperm head measurements were lower ($P < \text{or} = 0.05$) in extended samples of the four bulls in which no changes occurred than in extended samples of the remaining 14 bulls. These data suggest that the variability in sperm head measurements of individual bulls, or ejaculates, may be an indicator of sperm cryosurvivability.

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