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The Effects of On-Farm Semen Storage Temperature on Stored Semen Quality

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Artificial insemination using extended boar semen has become commonplace in the North American swine industry. Both producers that use semen collected on-farm and producers that purchase semen from boar studs typically store the semen on-farm for a number of days prior to use. Boar semen is very temperature sensitive so maintaining proper storage temperatures on the farm is critical. The objectives of this study were to determine whether proper semen storage temperatures are being maintained on Ontario farms and also to determine what impact on-farm storage temperature has on the quality of stored boar semen.

Sixteen Ontario sow herds were visited on the day a fresh batch of semen was delivered to or collected on the farm. A sample of this fresh semen was collected and transported to the lab for evaluation using Spermvision™, a computer-assisted sperm analysis system. A temperature-logging device that recorded air temperature at one-minute intervals was left in the farm's semen storage unit. The producers were asked to record the date, time and reason for opening every time the unit was opened. Each herd was re-visited approximately 72 hours after the initial visit. A sample of stored semen from the same batch that was initially evaluated was collected. This second sample was transported to the lab and analyzed in the same manner as the first sample. The change in sperm motility and number of viable sperm/ml between the first and second sample taken from each farm was calculated. The temperature logger was removed from the storage unit and the data was downloaded onto a computer. The most consistently reported suitable temperature range for storing boar semen is 15-20^{0}C so storage unit temperatures that fell out of this range were considered unacceptable (1,2). Temperature fluctuations impact semen quality (3), therefore, fluctuations of 2^{0}C or greater that lasted for a period of at least 30 minutes were also considered unacceptable.

Unacceptable storage temperatures were recorded in 7/16 (44%) of the units examined. Of these, 5/7 (71%) had temperature readings below 15^{0}C, 2/7 (29%) had temperature readings above 20^{0}C and 5/7 (71%) had temperature fluctuations of at least 2^{0}C. In 57% of the problem storage units, the unacceptable temperatures were triggered by an event such as removing or replacing semen, rotating semen and, on one farm, failure of the storage unit. In 43% of the problem units, the reasons for the unacceptable temperatures could not be explained.

Over the 72-hour storage period, the average change in sperm motility for semen kept in storage units with acceptable temperatures was -3.87% while that for semen kept in storage units with unacceptable temperatures was -12.0%. This difference was not found to be statistically significant ($p= 0.172$). The average change in viable sperm concentration for semen held in storage units with acceptable temperatures was -2.4×10^6 sperm/ml while that for semen held in storage units with unacceptable temperatures was -16.3×10^6 sperm/ml. This difference was found to be statistically significant ($p=0.036$).

In conclusion, almost half of the on-farm semen storage units examined were found to produce unacceptable semen storage temperatures. These unacceptable temperatures did not appear to have a significant impact on the motility of sperm stored in coolers for 72 hours. However, after 72 hours, the unacceptable temperatures did have a significant negative effect on the concentration of viable sperm in stored semen. This reduction in the number of viable sperm available in a dose of semen may affect both litter size and farrowing rate in sows bred with semen stored for at least 72 hours in units with temperature problems. The results of this study emphasize the need for producers to closely monitor the temperature inside their semen storage units.

References

1. Paulenz et al. 2000: Effect of long-term storage at different temperatures on the quality of liquid boar semen. Reprod Dom Anim 35:83-87.
2. Johnson LA and Guthrie HD (eds) 2000: Boar Semen Preservation IV. Allen Press, Lawrence, Kansas.
3. Quality assurance of semen. 2003: Proceedings of the Allen Leman Conference, pp171-179.