

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

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### Introduction

Reproductive performance in herds using AI is often not as good as herds that are using natural breeding. One reason for this reduced performance may be due to the improper storage and handling of the semen used for AI. Producers typically store semen on-farm for a number of days prior to use. Boar semen is highly temperature sensitive so maintaining proper storage temperature on the farm is critical in order to achieve good results using AI. The objectives of this research were to determine whether proper semen storage temperatures are being maintained on Ontario farms and to determine what impact on-farm storage temperature has on the quality of stored boar semen.

### Materials and Methods

Twenty-seven Ontario sow herds participated in this project. On a day that fresh semen was delivered to or collected on the farm, 1 dose of the fresh semen was obtained from the producers and transported directly to the lab for evaluation. Before leaving the farm, a temperature-logging device was placed inside the farm's semen storage unit. The logger was set to record the air temperature inside the unit at 1-minute intervals. The producers were asked to keep a log of their storage units' use by recording the date, time and reason each time the storage unit door was opened.

Approximately 72 hours after the first visit, the herds were re-visited. The temperature recorder was removed from the storage unit to be downloaded onto a computer for evaluation and the log sheets were also collected. Storage unit temperatures that fell out of the range of 15-20°C or that fluctuated by 2°C or more were considered unacceptable. The log sheets were used to determine if any temperature changes recorded by the logger corresponded with events recorded by the producer. A 2<sup>nd</sup> dose of semen from the same batch that was initially evaluated was obtained during the 2<sup>nd</sup> visit and transported to the lab for evaluation in the same manner as the 1<sup>st</sup> dose. The changes in semen quality from Day 1 (when fresh) to Day 4 (after 72 hours of on-farm storage) were examined for semen stored in both acceptable and unacceptable temperatures.

### Results

Unacceptable storage temperatures were recorded in 36% of the storage units examined. In 9 of the 10 storage units producing unacceptable temperatures, the temperature went out of the 15-20°C range: 3 units went above 20°C, 5 units went below 15°C and 1 unit went both above 20°C and below 15°C. In 1/10 of the problem storage units, the temperature fluctuated by >2°C within the 15-20°C range.

In 70% of the problem storage units, the unacceptable temperatures appeared to have been triggered by specific events that had been recorded by the producers. In 3 cases, unacceptably high temperature occurred when warm, fresh semen was put into the storage unit. Other causes of unacceptable storage temperatures included poor maintenance of the storage unit (2 cases), improper setting of the storage unit thermostat (1 case) and adding frozen ice packs to the storage unit (1 case).

Several producers had more than 1 batch of semen available on the day of their 1<sup>st</sup> herd visit. Because of this, 31 separate batches of semen were analyzed from the 27 participating herds. Twenty of the batches were stored in units with acceptable temperatures while 11 batches were stored in units with unacceptable temperatures. The semen analyses showed that on Day 1, there were no differences in any of the semen quality parameters between semen stored in acceptable versus unacceptable conditions (Table 1). However, by Day 4, semen stored in unacceptable temperatures had lower sperm/ml and lower viable sperm/dose than semen stored under acceptable conditions. In semen stored on-farm under unacceptable temperature conditions, there was a decrease in total motility from Day 1 to Day 4 (Table 1). There was also a tendency for progressive motility, sperm/ml and viable sperm/dose to decrease from Day 1 to Day 4 when stored in unacceptable temperatures. For semen stored under acceptable temperatures, there was an increase in total sperm abnormalities from Day 1 to Day 4 while no significant changes in any other quality parameters were observed (Table 1). The percent sperm found in clumps increased from Day 1 to Day 4 in samples stored in both acceptable and unacceptable temperature conditions.

**Table 1.** Means of semen quality parameters for semen doses stored on-farm under acceptable and unacceptable temperature conditions on Day 1 and Day 4 of storage.

Parameter	Acceptable Temperature (n=20)		Unacceptable Temperature (n=11)	
	Day 1	Day 4	Day 1	Day 4
Total Abnormalities	10.15%	12.10%*	10.37%	8.04%†
Total Motility	78.06%	76.89%	73.07%	64.21%*
Progressive Motility	63.31%	62.06%	57.39%	48.81%
Sperm/ml	42.47 x 10 <sup>6</sup>	38.82 x 10 <sup>6</sup>	31.46 x 10 <sup>6</sup>	26.34 x 10 <sup>6</sup> †
Sperm/Dose	3.32 x 10 <sup>9</sup>	3.11 x 10 <sup>9</sup>	2.43 x 10 <sup>9</sup>	2.03 x 10 <sup>9</sup> †
Clumped Sperm	9.59%	13.25%*	11.55%	21.59%*

\* p < 0.05 within row, within temperature category and between day

† p < 0.05 within row, between temperature category and within day

### Summary and Implications

- Unacceptable semen storage temperatures are common in Ontario swine herds
- Unacceptable on-farm storage temperatures have negative effects on sperm quality, particularly motility, sperm/ml and viable sperm/dose
- Producers should be aware that their actions can impact the temperatures inside their storage units and that proper semen storage unit maintenance and management are important
- Monitoring temperatures inside semen storage units should be a regular part of sow herd management

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