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## Semen storage and handling for A.I.

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Artificial insemination is an efficient and cost-effective strategy to improve the genetics and reproductive performance of a herd. Reputable commercial AI studs and custom semen collection businesses, through stringent collection, processing and quality control, provide a highly fertile product to their customers. When semen is purchased and transferred to the producer's or professional AI technician's liquid nitrogen refrigerator, the maintenance of male fertility is in the hands of the producer, farm employees, and AI technicians.

In order to realize the maximal potential fertility within straws of frozen semen, the liquid nitrogen refrigerator must be managed properly. The liquid nitrogen refrigerator consists of a "tank within a tank," with insulation under vacuum between the inner and outer tanks. Liquid nitrogen refrigerators should be stored in a clean, dry area, preferably on a wood stand to avoid possible corrosion (due to contact with wet or damp concrete).

Be sure to securely fasten the liquid nitrogen refrigerator during transportation to avoid tipping the tank over, and damaging the tank – both of which usually result in the premature loss of liquid nitrogen.

Regardless of whether the liquid nitrogen refrigerator is stored in an office or transported in a vehicle to a location closer to the cows to be serviced, a detailed inventory of semen should be easily accessible, so that straws may be located and removed from the tank quickly to avoid exposure of

semen to ambient temperature.

When removing a straw from a liquid nitrogen refrigerator, it is imperative that the technician keep the canister, cane and unused semen straws as low as possible in the neck of the tank. A best management practice is to keep all unused straws below the frost-line in the neck of the tank.

Keep in mind that although the temperature of liquid nitrogen is -320 degrees F, there is a temperature gradient in the neck of the tank. For example, a tank with a neck tube that measures six inches long may have a temperature of -103 degrees F in the middle of the neck (3 inches below the top), while the temperature at 1 inch below the top may be + 5 degrees F. Previous reports have shown that sperm injury (as judged by sperm motility) occurs at temperatures as low as - 110 degrees F. Furthermore, injury to sperm cannot be corrected by returning semen to the liquid nitrogen.

As would be expected, the temperature in the neck of the tank becomes warmer as the liquid nitrogen level in the tank decreases. Therefore, another best management practice is to monitor the liquid nitrogen level in your tank regularly, and never let the tank go dry.

As dairy producers manage larger herds, labor efficient management strategies such as once-daily AI and fixed-timed AI synchronization protocols are more common. Consequently, when numerous cows must be inseminated on a given day, AI technicians routinely thaw multiple straws of semen simultaneously to facilitate AI in a timely manner.

A recent field trial was conducted to de-



termine:

1. The effect of simultaneous thawing of multiple 0.5-mL straws of semen and sequence of insemination (1st, 2nd, 3rd or 4th) on conception rates.

2. Whether conception rates achieved following AI by professional AI technicians (PAI) and herdsman-inseminators (HI) differed.

3. The effect of elapsed time from initiation of thawing straws of semen to seminal deposition on conception rates.

Although the average conception rate differed between PAI and HI (45% vs. 27%,

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respectively), simultaneous thawing and sequence of insemination (1st, 2nd, 3rd or 4th) had no effect on conception rate within inseminator group. Lastly, elapsed time from initial thaw to completion of fourth AI had no effect on conception rate within inseminator group. Both PAI and HI finished the fourth insemination within 11 minutes after the initiation of thawing.

A general recommendation as to the number of straws that may be thawed simultaneously detracts from the overall importance of proper semen handling for successful AI. Conception rates are most likely to be maximized when AI personnel take the following precautions:

- Accurately identify and administer the appropriate treatments to all cows to synchronize estrus or ovulation.

- Accurately identify cows in estrus.

- Follow the AI stud's recommendations for thawing semen.

- Prevent direct straw-to-straw contact during thawing to avoid decreased post-thaw sperm viability as a result of straws freezing together in the thaw bath.

- Use appropriate hygienic procedures.

- Maintain thermal protection of straws during AI gun assembly and transport to the cow.

- Deposit semen in the uterus of the cow within approximately 10 to 15 minutes after thawing.

Reputable commercial AI stud and custom semen collection businesses provide a highly fertile product to their customers. Frozen semen must be stored, thawed and handled properly to maintain fertility and offer the greatest opportunity to obtain optimal conception rates. Contact your local University Extension faculty or AI stud representative for more information on proper semen storage and handling.

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