

Guidelines for Semen Storage and Handling

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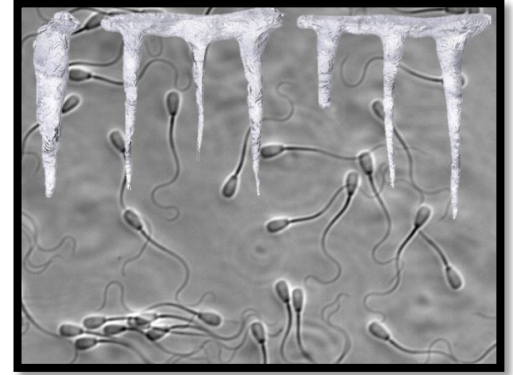
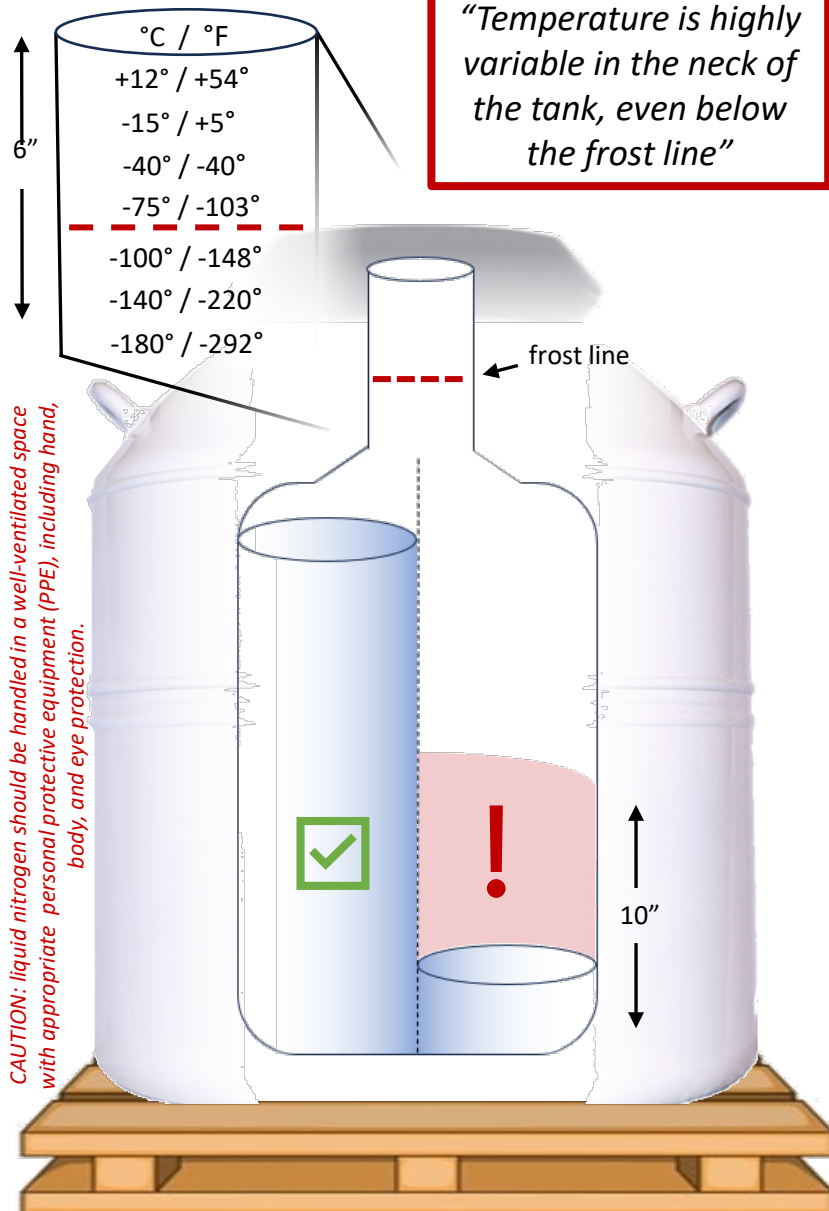
Proper semen handling is necessary to ensure maximum possible fertility when using artificial insemination (AI) for your herd. Damage to the sperm can occur before, during, or after the thawing process.

Semen Storage

A liquid nitrogen semen storage tank is a “tank within a tank”. The internal tank contains liquid nitrogen at approximately -320°F (-196°C). The external tank contains an insulated barrier with a vacuum seal to prevent the internal tank from exposure to ambient temperatures.

We recommend that you check liquid nitrogen levels regularly and never work out of a tank containing less than 10 inches (25 cm) of liquid nitrogen. The temperature gradient is largely dependent on the level of liquid nitrogen in the tank.

Adapted from Saacke, 1974



Sperm is frozen in a cryoprotective agent to prevent crystallization, but even slight thawing and refreezing can create damaging ice crystals.

Irreparable damage to sperm can occur in temperatures as low as -110°F (-80°C). Proper handling of semen can prevent this from occurring.

“Never handle semen above the frost line until it is ready to be thawed for use.”

Time to -320°F (-196°C) After Exposure



Adapted from Berndtson et al., 1976

In a full tank, a straw held below the frost line for 60s will return to -320°F (-196°C) in less than 1 minute. In a tank that is nearly empty, a straw held below the frost line will not return to -320°F (-196°C) for more than 2 minutes.

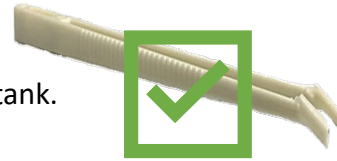
“Store your liquid nitrogen tank off the ground.”

The outer aluminum tank can react with alkalis in concrete that degrade the metal and ruin its ability to keep a vacuum.

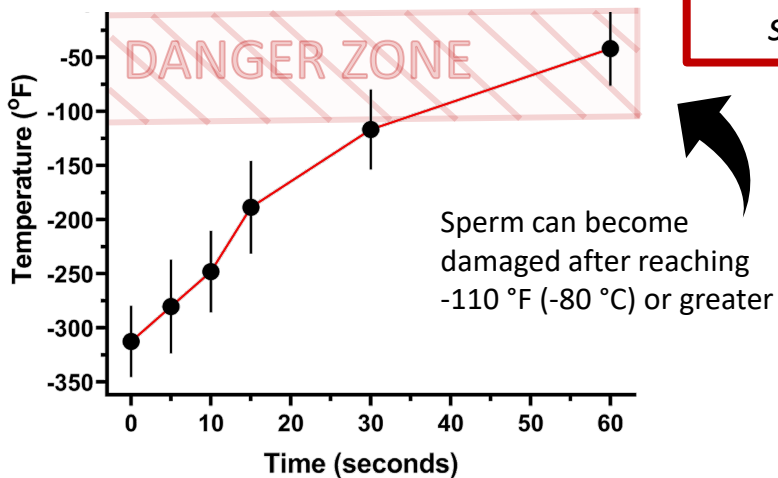
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Semen Handling

Tweezers allow you to work below the frost line of the tank. Additionally, the heat from your hands will increase the temperature of non-target straws.



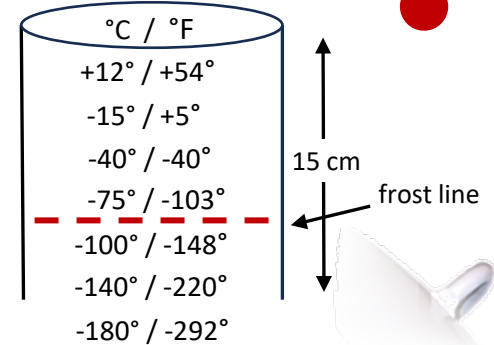
Internal straw temperature following exposure to room temperature



Adapted from Garcia Guerra et al., 2009

Exposing frozen semen to room temperature for just 30s can cause a straw to warm nearly 200 °F (120 °C). Likewise, exposure for more than 30s can cause a 50% or greater reduction in motility which may affect fertility.

"Use tweezers to move frozen straws."



Sperm motility following exposure to room temperature

Time (s)	N	Motile (%)	Progressive (%)
0	28	60 ± 13 ^a	35.8 ± 9 ^a
15	28	58.3 ± 16.5 ^a	35.8 ± 11 ^a
30	28	56.3 ± 13.4 ^a	34.4 ± 9 ^a
60	28	32.3 ± 16 ^b	19.7 ± 10 ^b
120	28	1 ± 2 ^c	0.7 ± 1.5 ^c

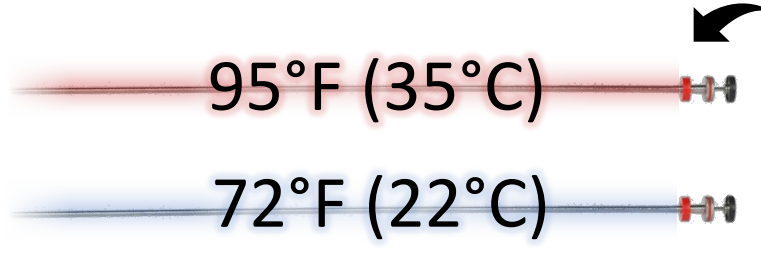
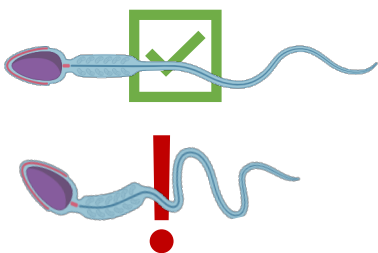
Dissimilar subscripts differ, $P > 0.05$ (a-c) Adapted from Garcia Guerra et al., 2009

Semen Thawing

Thaw frozen straws at 95 °F (35 °C) for at least 45 seconds, (unless otherwise instructed). Straws may remain in the bath for 10 to 15 minutes provided the temperature remains between 90-98 °F (32-37 °C).

The AI gun must be warmed prior to loading and remain warm until used. Friction using a clean paper towel, body heat, or a dedicated AI gun warmer are effective strategies.

"Never thaw more semen than can be inseminated within 15 minutes."



"Protect post-thaw semen from thermal stress."

Standard 0.5 cc straws held at 95 °F (35 °C) post-thaw showed no difference in motility at 20 minutes post-thaw. Conversely, straws held at 72 °F (22 °C) post-thaw experienced reduced motility.

