Handling of semen straws and tips for successful Artificial Insemination

Dr. Anchal Rana
Khalsa College of Veterinary & Animal Sciences

Successful artificial insemination (AI) in cattle is a cornerstone of modern herd management, offering genetic improvement, disease control, and enhanced reproductive efficiency. However, the success of this powerful tool hinges on meticulous attention to detail, particularly in the handling of frozen semen and the insemination technique itself. This chapter provide a step-by-step guide to the proper procedures for handling semen straws and offer key tips to maximize the success rate in artificial insemination.

Handling of Semen Straws

Retrieving the Straw

- Minimize Exposure: Work swiftly and efficiently when retrieving a straw. Keep the canister, which holds the straws, as low as possible in the neck of the tank to minimize liquid nitrogen loss. A good rule of thumb is to not raise the canister above the frost line for more than 5-8 seconds.
- Use forceps, Not Fingers: Never handle a frozen straw with bare hands. The semen straw should be taken with pre-cooled forceps.
- Know Your Inventory**:** Before opening the tank, know which canister is need to access, for this labelling of canister is required so as to minimize the time in which tank is open and the straws are exposed to warmer temperatures.

The Thawing Process

- Thawing procedure: After removal of semen straw, immediately transfer the straw in water bath.Thawing is done by immersing the straw in a water bath having temperature of 40°C for 14-15 seconds or at 37°C for 30 seconds
- Avoid Shortcuts: Never thaw a straw in pocket, in the air, or by holding it in your hand. These methods result in slow, uneven thawing, which significantly reduces sperm viability.
- One at a Time: It is best practice to thaw only one straw at a time. Once thawed, the semen has a limited lifespan and should be used within 15 minutes.

Loading the AI Gun

Once thawed, the straw must be carefully loaded into the AI gun.

- After removing the straw from the water bath, wipe it thoroughly to remove all water. Water is spermicidal and any moisture on the straw can compromise the semen.
- Use a sharp, clean straw cutter to make a single, straight cut at the laboratory end of the straw. A clean cut ensures a proper seal with the sheath.
- AI gun should be loaded correctly after pulling the plunger down. Secure the plastic sheath over the gun and straw, ensuring a firm connection. Keep the loaded gun protected from extreme temperatures and sunlight until insemination.

NOTE: While transferring the frozen semen from one cryocan to the other, it should be done in goblet full of liquid nitrogen. One straw should never be transferred without putting in goblet full of liquid nitrogen. Each canister as well as goblet should have an easy to read information about the bull and semen. The goblet containing straws should be transferred very quickly. This is to be done in a place away from sunlight or hot air blast, preferably in an air conditioned room.

Tips for a Successful Artificial Insemination

Successful AI culminates with the proper placement of high quality semen in the female reproductive tract. Successful AI mainly depends upon high quality semen, proper technique of thawing, and insemination of cow in sound breeding condition and AI at proper time of the estrous cycle.

Timing of AI:

The AM-PM Rule**:** A long-standing guideline is the "AM-PM rule." Cows observed in standing heat in the morning (AM) should be inseminated in the evening (PM), and those observed in heat in the evening should be inseminated the following morning. This generally targets insemination about 12 hours after the onset of standing heat. However, in case of a problematic animal duration of the estrus phase of that should be assessed and AI should be performed midway to before the end of estrus.

Accurate Observation**:** Diligent and frequent observation for signs of heat is crucial. Look for primary signs like standing to be mounted by other cows, as well as secondary signs such as restlessness, bellowing, clear mucus discharge from the vulva, and a swollen, reddened vulva.

The Insemination Procedure:

- Always use a new, disposable glove for each cow. Thoroughly clean the cow's vulva to prevent introducing contaminants into the reproductive tract.
- Lubricate the gloved hand and arm and gently enter the cow's rectum, locate and grasps the cervix.
- Insert the AI gun into the vagina at a slight upward angle (about 30 degrees) to avoid entering the urethral opening on the vaginal floor.
- AI equipment should always be kept clean, properly covered, away from dust. Being living cells, sperms are sensitive to damage by foreign materials and temperature variations.
- Insemination gun should neither be too hot nor too cold
- Carefully guide the AI gun through the blind pockets of the vagina to the opening of the cervix. Use your hand in the rectum to manipulate the cervix over the tip of the AI gun. Never force the gun.
- The semen should be placed in the body of uterus just in front of the cervix. The site is easily recognized by change in consistency of tissue from hard and firm (cervix) to soft structure (uterus). Once the tip of the gun is in the correct location, slowly and gently depress the plunger over about 5 seconds to deposit the semen.Gently withdraw the AI gun.
- Always record the date, time, cow identification, and the bull used for the insemination.

Check Points before Artificial Insemination

- Animal should be in proper estrus. Check for proper history and signs. In per rectal examination uterus should be toned
- Always check the vulvar discharge (transparent, copious and hanging). There should be not be any abnormal discharge.
- Pregnancy diagnosis should be done prior to A.I
- There should be a gap of 60-85 days after calving.

Cow and Technician Factors

- Cow Health and Nutrition**:** A cow's fertility is directly linked to her overall health and nutritional status. Ensure animal is on a balanced nutrition plan and is free from diseases that can impact reproduction.
- Stress-Free Environment**:** Handle cattle calmly and quietly. Long distance transportation andhitting/ frightening of estrus animal should be avoided at the time of the AI. Stress can negatively impact conception rates.
- Technician Proficiency**:** The skill of the inseminator is a major factor in AI success. Continuous training and practice are essential to maintain and improve technique.