

# JOB ROLE – ANIMAL HEALTH WORKER

Sector – Agriculture

(Qualification Pack Code: Ref.Id.AGR/Q4804)

Class X



PSS Central Institute of Vocational Education  
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# **UNIT 4: Implementation of Animal Breeding Services in Dairy Animals**

## **Session 6: Artificial Insemination**

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# Session Objectives

The student will be able to understand the different aspects of the important technique of Artificial Insemination applied widely in dairy farms. The different aspects would include

- Advantages of AI
- Requirements of AI
- Thumb Rule of AI and the
- Rectovaginal Technique of AI in Cattle and Buffalo which would include techniques like
  - Thawing of semen
  - Loading of AI gun

# Introduction

- The union of sperm with ovum is essential for conception. Ovum is released from the ovary 8–12 hours after the end of oestrus.
- Ovum travels through the fallopian tube and remains viable up to 12–24 hours after release from the ovary.
- The lifespan of a sperm in the female genital tract is 12–24 hours.

# Artificial Insemination

Artificial Insemination (AI) is a technique of depositing semen into the female uterus or cervix artificially, with the use of instruments.

# Advantages of AI

- (i) Normally one bull can serve 25 cows by natural service. A single ejaculation of semen, after processing of the same can be used for approximately 500 artificial inseminations.
- (ii) The expenditure in rearing the breeding bull by the farmer can also be avoided.
- (iii) AI reduces the chances of spreading sexually transmitted diseases like vibriosis, trichomoniasis, etc., in the animals.

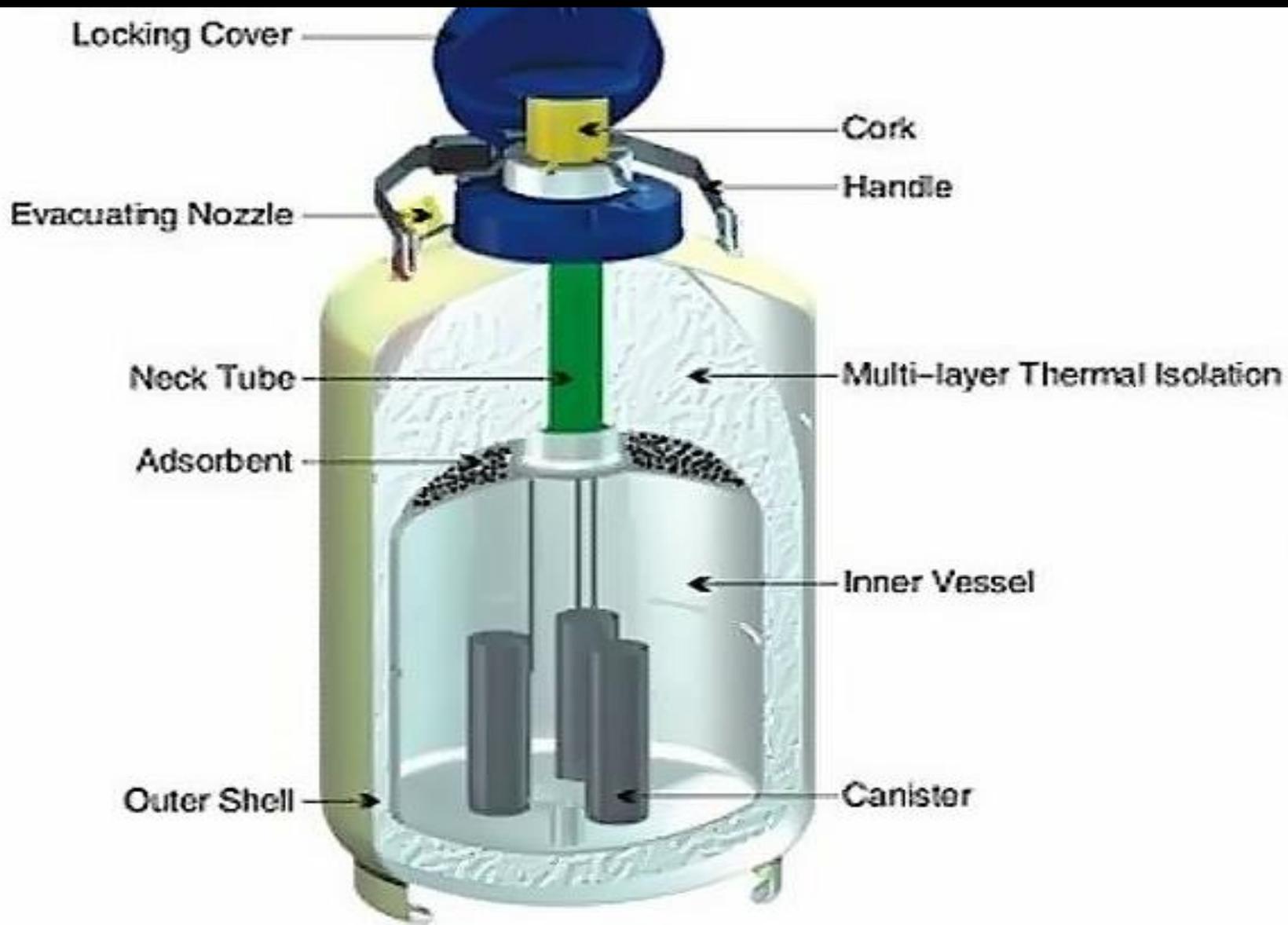
- (iv) AI reduces the risk of inbreeding if proper records are maintained.
- (v) Superior quality germplasm can be transported to different places economically.
- (vi) Good quality bulls, which are unable to serve naturally due to injury or certain disease, can be used for semen collection for AI.

# Requirements of AI

- (i) Proper and accurate heat detection is essential for good results.
- (ii) Proper hygiene and sanitation is maintained during the entire process of AI.
- (iii) AI requires a skilled technician with proper knowledge of palpation of the female genital tract and handling of semen and liquid nitrogen.

# Thumb Rule of AI

- The best time for AI is mid-oestrus which increases the chances of conception. AM-PM is a thumb rule followed for AI in cattle.
- AM-PM rule means that an animal, which comes in heat in the morning, is inseminated the same evening and an animal which comes in heat in the evening, is inseminated the next morning.
- The frozen semen used for AI is stored in a liquid nitrogen container (LN2 container).



Storage Type

# Rectovaginal Technique of AI in Cattle and Buffalo

Out of the many techniques of AI, rectovaginal technique is the most widely used in cattle and buffalo. The important steps of rectovaginal technique of artificial insemination are

- (i) Thawing of semen
- (ii) Loading of AI gun
- (iii) Deposition of semen in female genital tract

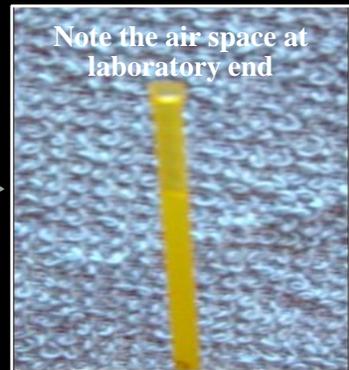
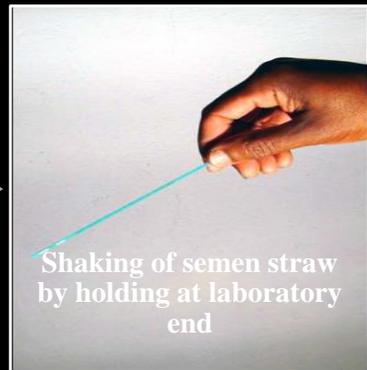
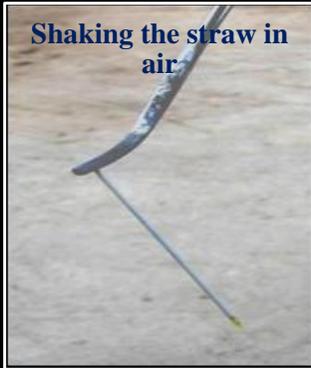
# Thawing of Semen

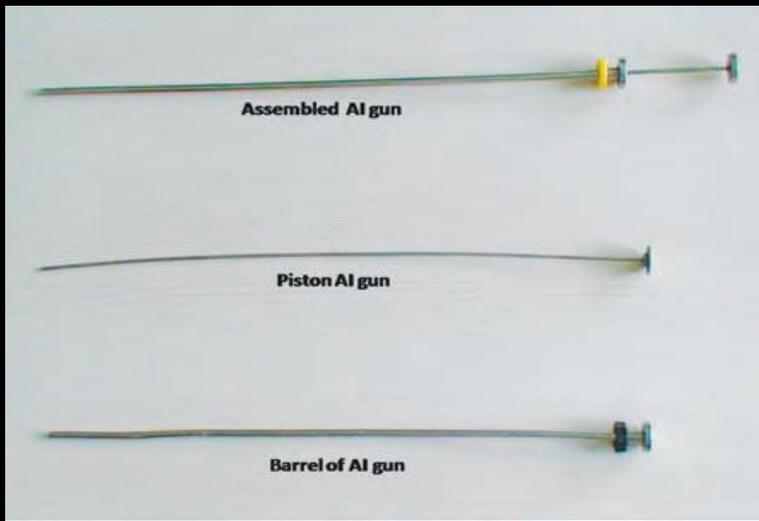
Before using the frozen semen, it is brought to a liquid state without compromising its quality. This is called thawing. Thawing of frozen semen is done at 37°C for 30 seconds. The following steps are involved in thawing of frozen semen.

- (i) Identifying the canister from which semen straw is to be taken out.
- (ii) Removing the lid of the liquid nitrogen (LN<sub>2</sub>) container.

- (iii) Lifting the canister slightly below the frost line.
- (iv) Cooling the tip of the tweezer forceps (used for picking the semen straw) in LN2 vapour for five seconds.
- (v) Grasping the individual straw securely to be removed and lowering the canister back to its actual place.
- (vi) If the semen straw is not removed within 10 seconds from the canister, it is again dipped in LN2 and brought up to the frost line.
- (vii) Placing the lid of the container immediately after the removal of straw.

- (viii) Shaking the straw in the air to remove LN<sub>2</sub> trapped at factory sealing end of the semen straw.
- (ix) Dipping the semen straw in clean warm water (37°C) for 30 seconds so that the straw is completely submerged in water (the straw is usually placed horizontally in water).
- (x) Removing the straw after 30 seconds, wiping it with a paper napkin and noting the details mentioned on the straw such as bull no. and date of filling, name of the semen lab, etc.





Different parts of an AI gun



An AI sheath



Material/instruments required for AI



Loading of a straw  
in an AI gun



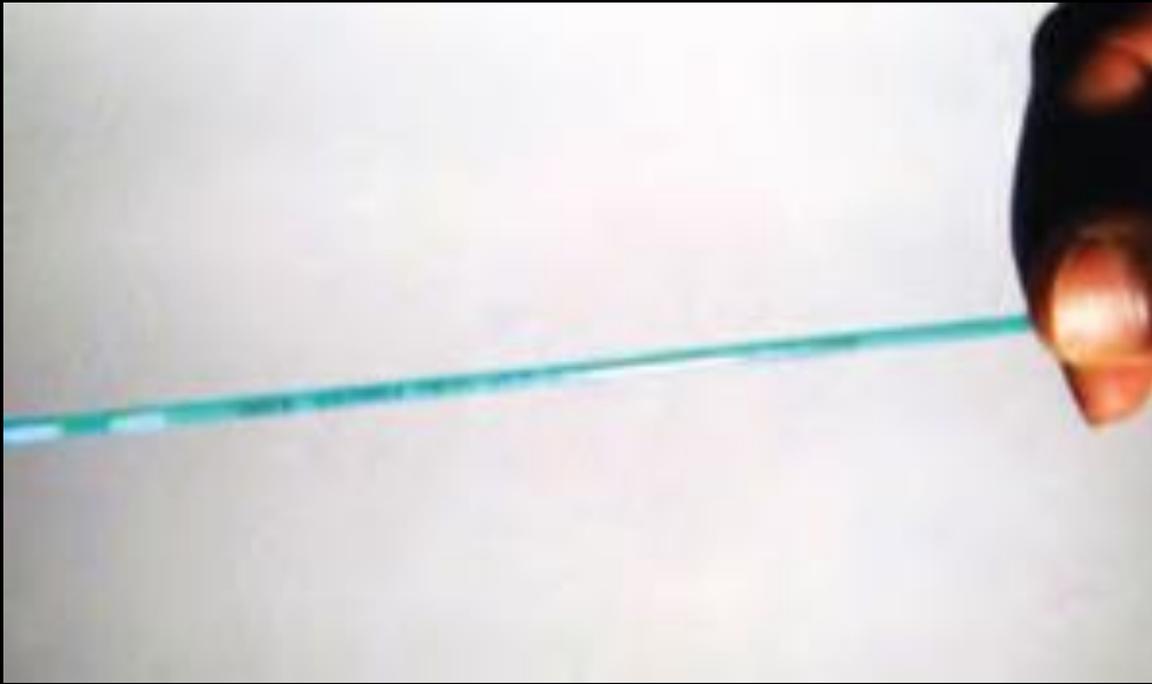
Note the laboratory  
end on the upper side

# Loading of AI Gun

The AI gun is loaded in the following manner

- (i) The straw is held vertically with the laboratory end on the upper side and shaken in the air to shift the air space to the laboratory end.
- (ii) Before loading, the AI gun should be maintained at  $37^{\circ}\text{C}$  to avoid cold shock to the sperms.
- (iii) While loading, the factory sealed end will go inside the AI gun while the laboratory sealed end will be towards the outer end of the gun and.

Cont...



The factory end of a semen straw



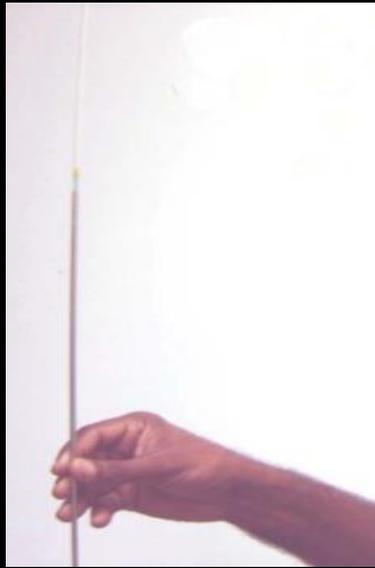
The laboratory end of a semen straw

- (iv) Cut the straw at a right angle on the laboratory sealed end with a clean scissors.
- (v) Fix the AI sheath over the AI gun.
- (vi) Lock the sheath with the plastic 'O' lock provided in the AI gun.
- (vii) Check if the gun is loaded properly by keeping the gun at eye level and simultaneously moving the piston slowly upwards.

- (viii) If the gun is properly loaded then the semen will move slightly upwards.
- (ix) If the piston is blocked or it does not move, the gun may be locked.
- (x) If movement of meniscus of semen is proper, then cover the AI sheath with a protective sheath.
- (xi) Now the AI gun is ready for use.



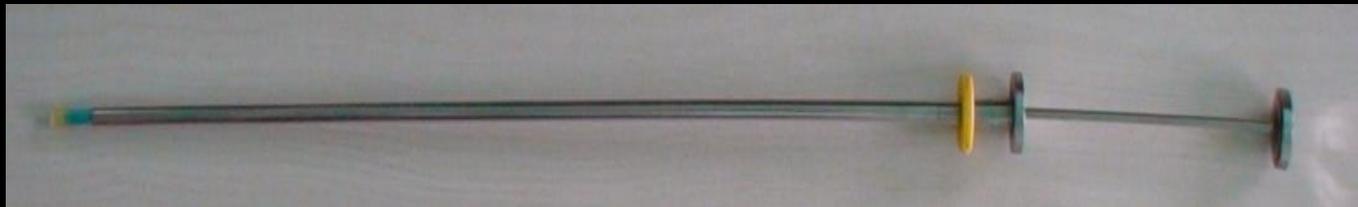
Cutting of the straw at the laboratory end



Placing an AI sheath over the AI gun



Locking the AI sheath on the AI gun



A loaded AI gun

# Deposition of Semen in Female Genital Tract

The steps for the deposition of semen in the female genital tract are

1. The animal is properly restrained in the trevis.
2. The dung is removed from the rectum.
3. Hold the cervix on the floor of the rectum.
4. Once the cervix is held, the external os is located.
5. Once the animal is confirmed to be in heat, the inseminator should thaw the semen as per standard procedure.

Cont...

6. The inseminator now holds the AI gun in the right hand, with 2–3 fingers to prevent excessive application of pressure while inseminating.
7. The AI gun is passed horizontally forward along the dorsal side of the vaginal wall to avoid its entry into the urethra. It is pushed up to the external os and guided in to the cervix with fingers and the thumb.
8. Once the tip of the gun is in the uterus, the semen is slowly deposited in the uterus by pushing the piston of the AI gun with the help of the thumb.
9. The AI gun is then slowly and carefully withdrawn from the genitalia.



Images showing step by  
step process of AI by  
recto-vaginal technique

# Summary

In this session you have learnt about different aspects of Artificial Insemination technique including

- Advantages of AI
- Requirements of AI
- Thumb Rule of AI and the
- Rectovaginal Technique of AI in Cattle and Buffalo which would include techniques like
  - Thawing of semen
  - Loading of AI gun

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