

STANDARD OPERATING PROCEDURES FOR
ARTIFICIAL INSEMINATION
IN
GOAT AND SHEEP (draft)



1. Introduction

The main value of Artificial Insemination (AI) is in its judicious application to livestock improvement and to control venereal diseases that may occur in natural breeding. The practical possibility of being able to store frozen semen almost indefinitely gives scope for the maximum possible use of the best sires. The successful use of commercial (AI) requires a high standard of technical efficiency at the (AI) centre. The use of a very small number of rams/bucks on a very wide scale does give opportunity for widespread dissemination of harmful genes and spread of infectious agents should not be overlooked. Vigilant tracking of each consignment of imported frozen semen is required to ensure their freedom from reproductive and other infectious diseases.

2. Standard Operating Procedure for AI in Sheep/Goat

2.1 Objective

To deliver an effective dose of semen to the ewe's/doe's uterus, artificially.

2.2 Details of Procedure

The procedure requires

- synchronization of estrus within the mob of ewes/does
- identification of the ewes in estrus
- and followed by insemination of those ewes.

For the insemination of a group of ewes or does to take place on the same day, the estrus cycle of the group must be manipulated so that ovulation occurs at a set time.

2.3 Methods of Oestrus Synchronization

2.3.1 Standard procedures for Oestrus Synchronization by using sudden buck/ram introduction effect

- i) There shall be no buck/ram in the flock or within sight, smell or hearing of the does/ewes for at least three weeks to use this method of estrus synchronization.
- ii) Then a vasectomised/castrated buck/ram or an intact buck/ram with an apron shall be introduced in the flock, the does/ewes will exhibit oestrus because of the pheromones secreted by the buck/ram within the next 5 or 6 days and may be inseminated at this time.

2.1.2 Standard procedures for Oestrus Synchronization by Hormonal method

A. Progesterone based protocol:

- i) A sponge or CIDR (Controlled Internal Drug Release Dispenser) impregnated with the hormone progesterone or with synthetic derivatives of progesterone known as progestogens (melengestrol acetate (MGA), altrenogest or norgestomet) shall be introduced into the vagina of the doe/ewe.

These agents mimic the action of the corpus luteum (CL), a progesterone secreting structure located on the ovary. Elevated levels of progesterone released by the CIDR prevent the doe/ewe from coming into estrus until the device is removed.

- ii) After CIDR removal, the doe/ewe will come into heat about 36-72 h later and can be bred by AI. CIDRs can be administered for varying periods, typically ranging from 9 to 21 days.

B. Prostaglandin-based protocols :

Prostaglandin F2 alpha (PGF₂), a naturally occurring hormone is effective for estrous synchronization only if females are normally cycling and have a corpus luteum (CL) present on their ovaries. The CL is the ovarian structure that produces progesterone in the female, keeping her out of estrous.

This method typically involves administration of 2 PGF injections, the first given on Day 1 and the second on Day 10. Does/ewes will come into heat after either the first or second injection and can be bred by AI at either time. Most of the treated does/ewes will show estrus 36-96 h after the second PGF injection

C. Combined methods utilizing both progesterone- and prostaglandin-based treatments:

A CIDR-PGF protocol involves a short, 6-day CIDR treatment. A CIDR is inserted on Day 1 in the morning and six days later is removed. An injection of PGF must be given either at the time of CIDR removal. If PGF is given at the time of CIDR removal, does/ewes will come into estrus 36-72 h later and can be bred by AI.

D. Combined methods utilizing both progesterone- and PMSG:

- i) A sponge or CIDR impregnated with the hormone progesterone shall be introduced in to the vagina of the doe/ewe and shall be removed after 17 days.
- ii) An intramuscular injection of PMSG (Pregnant Mare Serum Gonadotropin) shall be given to the doe/ewe at the time of sponge/CIDR removal.
- iii) All the does/ewes will exhibit oestrus simultaneously around 30 hours after removal of the sponge/CIDR.

2.4 Selection of Ewes/Does

1. Ewes/Does must be individually identified by ear tag or other permanent marking prior to use for AI purpose. Only mature, in oestrus, Ewes/Does may be used. Animals under 15 months of age or undersized animals should not be used. They do not need to have had a lamb but should be sexually mature. Ewes/Does must be in good body condition and good general health as assessed by a competent Veterinarian.
2. Only non-pregnant Ewes/Does should be used. An accurate history of **NO** mixing with rams/bucks must be available, or Ewes/Does must be pregnancy tested prior to the commencement of insemination. Ewes/Does showing vaginal discharge (other than oestrus discharge) should not be used. The oestrus status of Ewes/Does used for insemination is significant. More successful penetration of the cervix is possible in oestrus Ewes/Does.
3. The Ewes/Does must be restrained properly, with hind legs over a rail of suitable height to prevent lateral or forward movement.

An indicative list of reproductive parameters of sheep and goat is annexed as annexure (1)

2.5 Standard Operating Procedures for (AI) Technicians

2.5.1 Semen Handling

1. Keep the liquid Nitrogen container with semen straws in a location that allows seeing into the neck tube of the container, and ease in withdrawing & replenishment of semen and liquid nitrogen. The surrounding should be well ventilated, dry and dust free.
2. Clean (AI) gun, scissors and other accessories whenever they get soiled or at least once a week with hot water and air dry them. Sanitize the (AI) gun and the scissor with Isopropyl alcohol after drying. The AI equipments should be kept always clean after each insemination. Surgical spirit and soaps are lethal to semen, hence should not be used to clean equipments.
3. Measure the liquid nitrogen level of the containers weekly with the help of measuring scale provided with liquid nitrogen container. Maintain the record of measurements to monitor its evaporation rate. Replenish the liquid nitrogen when needed.
4. Use small liquid nitrogen container to carry the semen straws to the field. Maintain the liquid nitrogen level above the straw level.
5. Carry the required semen doses in the liquid nitrogen container to farmer's / farm supervisor's door step. Never carry semen straws in pocket / thermos-flask / polythene bags filled with water/ ice etc.

6. Maintain an accurate semen inventory to lessen the risk of semen exposure.
7. Always attach the paper tag provided with each goblet to the requisite canister of the container to identify the type of semen in each canister.
8. A skilled operator will take less than 2-3 minutes to inseminate each animal. The professionalism and skill of the inseminator are vital components for success. The surgical approach, cleanliness, recognition of internal and uterine abnormalities, and risk assessment of infection and disease must be observed.

2.5.2 Procedure for Thawing

1. Thaw straws in a water bath at 37 °C for 30 seconds: Set the temperature of water in the receptacle to 37°C using a thermometer. Lift the required canister and remove the required straw with the help of forceps. Plunge the straw for 30 seconds in the water in the receptacle. Wipe the straw with tissue paper or a clean cloth.
2. May assess post-thaw motility under microscope
3. Load the straw in an AI gun, cut the sealed end of the straw and prepare the AI gun for insemination by placing a sheath over it and proceed to inseminate the does/ewes.

2.5.3 Procedure for Artificial Insemination in Goat & Sheep

1. Cervical AI or trans-cervical AI:
2. Laparoscopic intra-uterine AI (where semen is deposited directly into the uterus)

(An indicative list of things required for AI is annexed as annexure (11))

2.5.3.1 Standard Operating Procedure for Cervical/trans-cervical method

1. The doe/ewe in oestrus shall be separated from the flock. Does/ewes detected to be in oestrus in the morning shall be inseminated in the evening and those detected in the evening shall be inseminated the next morning.
2. Lift the hind legs of the doe/ewe in a 45° angle towards the direction of sunlight.
3. The inseminator should gently introduce a lubricated speculum into the vagina to determine the stage of oestrus. If a large quantity of vaginal mucus is preventing the correct location of the cervix, the assistant should tilt the animal down to allow the mucus to run out of the vagina with the aid of the speculum.
4. Locate the cervix using the speculum with the help of sunlight or AI light.
5. The inseminator shall try to pass the insemination gun as deep as possible into the cervix (Generally, 0.5 to 1cm) and deposit the semen. The assistant should hold the doe/ewe firmly. Ensure that no urine or faecal matter contaminates the tip of the AI gun.
6. The doe/ewe should then be gently lowered and returned to the flock while keeping it calm.
7. The speculum should be wiped with cotton between two inseminations.

2.5.3.2 Standard Operating Procedure for Laparoscopic method

1. The doe/ewe in oestrus shall be separated from the flock. Does/ewes detected to be in oestrus in the morning should be inseminated in the evening and those detected in the evening should be inseminated the next morning.
2. For 12- 24 hours prior to the scheduled procedure, the doe/ewe must be denied food and water.
3. The doe/ewe shall be anesthetized and placed on a surgical table and restrained by use of a cradle, with the head pointed down.
4. Portions of the abdominal area of her belly shall be scrubbed and sterilized.
5. Semen can be deposited directly into the uterus, via the technique of laparoscopy.
6. Following insemination, the incisions shall be stapled or sutured and dressed with an antibiotic ointment.
7. Following skin closure of the abdominal wounds, the female is promptly released from the cradle, and she can return to feed immediately.

2.5.4 Qualifications, experience or training necessary to perform this procedure

Operators should be familiar with the correct techniques and the anatomy and physiology of the ewe before attempting this procedure. Laparoscopic artificial insemination is a 'restricted act of veterinary science' and may only be carried out by a veterinarian, the owner of the animals or his/her employee.

2.5.4 Post Insemination Advice to Farmer/ Farm Supervisor

1. Ask farmer/ farm supervisor to keep the animal under observation for next 12-24 hrs.
2. Inform the farmer/ farm supervisor to save the animal from scrub bulls during the remaining part of present heat.
3. If signs of heat persist even after 18-24 hrs, repeat (AI), otherwise observe for heat symptoms after 18-21 days and also after 36-42 days.
4. If animal does not repeat heat at 18-21 days intervals for two consecutive times, check for pregnancy diagnosis after 2 months from the date of insemination.

2.5.5 Post Insemination follow-up by the Veterinary /AI Technician

1. Follow each and every animal inseminated after around 21 days to find out whether it has repeat heat.
2. Follow each and every animal inseminated for pregnancy diagnosis after 1 months and record the date and result of pregnancy diagnosis in the register.
3. Follow each and every pregnant animal and record kidding/lambing details of the animals inseminated in the register.

4. Maintain all records related to artificial insemination, pregnancy diagnosis, and kidding/lambing
5. Advise farmer/ farm supervisor on proper heat detection, feeding, management and healthcare of animals.

Reference

Miller, SJ (1995) 'Artificial breeding techniques - Sheep' in *Compendium of Approved Procedures*, CSIRO Division of Animal Health, Armidale pp. 58:71-58:83.

<https://www.msivetmanual.com/management-and-nutrition/management-of-reproduction-sheep/artificial-insemination-in-sheep>

Annexure (1) Reproductive parameters of sheep and goat

- Breeding age- 6-8 months
- Comes to heat after lambing – 21 days after
- Length of pregnancy - 147 days (ranges between 144 and 152 days)
- Male female ratio - 1:20
- Estrous period is repeated every 16-17 days on average in ewes (range 14-19 days).
- Estrous period is 19-21 days in does (range 17-24 days).
- The estrous period lasts for about 24-36 hours in ewes and 34-38 hours in does.

Annexure (11) List of things required for AI

1. Water receptacle
2. Thermometer
3. Scissor, razor blade or straw cutters
4. Artificial insemination (AI) gun: A goat/sheep length (usually 12 inch) device used for the depositing of semen via a 0.25 or 0.5 cc straw;
5. AI gun sheaths
6. AI light: A compact light source which should attach securely to the vaginal speculum.
7. Vaginal speculum
8. Speculum brush
9. Straw tweezers
10. Non-spermicidal, sterile lubricant
11. Fresh Cooled or Frozen Semen packaged in 0.25 or 0.5 cc straws
12. Vaginal Swabs
13. Microscope
14. Microscope Slides
15. Microscope Cover Slips
16. Liquid Nitrogen Storage Tank
17. Liquid Nitrogen Tank Measure Stick