

Artificial Insemination in Goats: Facts and Procedures

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Optimal reproductive performance of livestock is essential for profitable farming. Artificial Insemination (AI) is a technique in which semen is collected from the male goat (buck) and is deposited by an AI worker in the female reproductive tract in right time and place. AI is simple, efficient, and most widely adapted technology in the livestock enterprise. AI is used as tool to disseminate superior genetic material to a wide geographical area among the population.

Semen is collected from the bucks by artificial vagina and the semen ejaculates are evaluated for *in vitro* sperm characters and quality parameters. Semen ejaculates with more than 0.5 ml volume, 3+ mass activity, 70% progressive forward motility and sperm concentration of more than 1500 million sperm cells per ml are used for semen preservation. Semen ejaculates are mixed with semen extender which provides nutrients to sperm cells, buffering capacity, protection from cold shock and cryo-injury and controls microbial growth during storage. The volume of semen extender added to each ejaculate is adjusted to maintain sufficient sperm concentration (50 to 100 million) in each semen doses used for insemination. Semen can be preserved either at refrigeration temperature (5°C) or at ultra-low temperature (-196 °C) in liquid nitrogen (LN₂). Semen stored in refrigeration temperature can be used for Insemination purpose up to 3 days of storage, while frozen semen can be stored for many years, if optimal LN₂ level is maintained.

Advantages of AI in goats

- Eliminates the cost of rearing a buck for breeding purpose in a small unit of goat
- Reduces the risk of sexually transmitted diseases
- Maximal use of genetically superior male germplasm
- Genetic purity of any particular breed can be maintained by avoiding indiscriminate breeding with non-descript males

Disadvantages of AI

- If AI is not carried properly conception rate will be very low

- Non-availability of quality buck semen and high cost of liquid nitrogen
- If buck selected for semen donation is not screened properly, it may lead to spread of genetic abnormalities and infectious diseases to vast population

Anatomy of female goat (doe) reproductive system

Vulva is the exterior part of reproductive tract. When the goat is in estrum (heat), vulva appears swollen and reddened. Vagina is the next part in front of vulva and male goat (buck) deposits semen during natural service. Cervix is located next to vagina and is the gate between vagina and uterus. Cervix remains closed except during estrus and at parturition (delivery). Uterus is the part where fetus nourished up to parturition. Uterus has a body and two horns. Ovaries are two in number and they produce oocyte and hormones essential for reproduction. Oviducts connect the ovaries with uterus and transport the sperm and oocyte for the fertilization.

Reproductive cycle

Young female goats attain puberty at about 6 to 8 months of age. They can be bred at 7 to 10 months of age once they attain 60% of adult body weight. If the goats are provided with good nutrition, they can be bred at earlier age and vice versa. If the females are bred with low body weight, it may lead miscarriage dystocia and birth of small sized kids with poor viability. After attainment of puberty, females come into heat (estrus) once in 20 days (18-22 days), regularly Cyclicity is interrupted during pregnancy and anoestrus conditions.

Signs of heat (estrus)

- Frequent bleating (vocalization)
- Frequent twitching of tail
- Restlessness
- Isolation from group and searching male
- Standing to be mounted by a buck/other female
- Vulva- swollen, reddened and moist
- Mucus discharge from vulva, matting of hair in perineal parts
- Duration of estrus 12 to 36 hours

Detection of heat (estrus)

Heat detection is one of the important factors greatly influences the outcome of AI. To get optimal conception rate with AI, goat has to be inseminated at right time. For proper estrus detection, sufficient time has to be spent and estrus detection should be done during morning and evening hours while the animals resting.

Procedure of Artificial insemination

- Confirm the goat presented is in heat by discussing with the farmer regarding the heat signs observed and duration of signs noticed.
- Timing of AI is important. If the goat is inseminated too early in the estrus or too late after end of estrus, the conception will be very low. The onset of estrus can be decided by the noting the appearance of first heat sign.
- Mucus is clear and thin in the early heat and it turns to cloudy at late heat. Pale yellow/

whitish thick cheesy mucus indicates completion of estrus.

- First Insemination has to be done 12 hours after onset of heat. If the animal remains in heat and continues to show heat signs, second insemination has to be done at 24 hours after the first AI to have optimal conception rate
- If only one AI has to be carried out, it has to be done towards the end of estrus, ie when the vaginal mucus turns to cloudy. With single insemination, the conception rate will be lower than the double insemination.
- It is not necessary to inseminate all the goats brought for AI. Only goats in good health, free from any disease condition, in good heat only to be inseminated.
- AI equipment's such as AI gun, sheath, speculum, scissors all should be kept in clean and sterile conditions.

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