

Artificial Insemination technology for sustainable goat production in coastal region



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(An ISO 9001:2015 Certified Institute)



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cervix. Ideal volume of semen and the number of progressively motile sperms per dose are 0.5-1 ml and 300 million, respectively.

When to inseminate the animal? Goats have ovulations either in late estrus or soon after end of estrus. It is important that females be inseminated well before ovulation so that sperms undergo maturation and increases the chance of healthy sperm fertilizing a healthy ovum. Depending upon AI method and estrus duration, optimal timing of liquid semen AI can range from 12 to 36 hours after the estrus onset. Towards the end of estrus (18-30 hours after onset of estrus), cervical mucus becomes cloudier, which is good time for AI. In case of vaginal AI, ideal time is 12-18 hours after estrus onset and in cervical AI, time is 15-20 hours after the onset of estrus. One can also breed the doe using the schedule shown below:

Estrus length	Optimal time for AI
24 hours	As soon as animal shows estrus
36 hours	20 hours after estrus onset
40-48 hours	30-36 hours after estrus onset

AI is a powerful tool that can allow goat farmers the flexibility to improve farm productivity and profitability. Its success depends on semen collection, semen quality, proper semen storage and technique of insemination. With good heat detection, record keeping, proper semen handling and AI method, one can achieve satisfactory results in AI and there by enhance productivity and profitability in goat farming.

Insemination process: AI in goats is comparatively easy to perform unlike in other animals like cattle and buffaloes. Insemination can be performed using different methods like vaginal AI, intra-cervical AI, trans-cervical AI and laparoscopic AI. Vaginal AI method involves depositing semen deep in the anterior end of vagina without any attempt to locate the cervix. It is the simplest and quickest method but requires a large semen dose. This method is effective when inseminated directly with fresh semen, but gives poor results with extended (chilled) or frozen semen.



Procedure of AI in Goat

Other preferred method is intra-cervical AI and procedure involves raising the rear quarters of the female, and with the help of a speculum and light source, locating the external cervical opening. External genitalia should be cleaned using a dry paper towel and speculum should be lubricated with a non-spermicidal lubricant. AI catheter is passed through the speculum into cervix to a depth of 5-12 mm and semen is deposited at the anterior part of

What is AI technology? Artificial insemination (AI) is one of the most important, practical and valuable livestock technologies that has been used for genetic improvement in farm animals. It is the process of collection of semen from a proven male goat (buck) and depositing it into the reproductive tract of the receptive or estrus female goat (doe). Both semen collection and insemination are accomplished through artificial means. It is possible to inseminate artificially 15 to 20 numbers of goats from a single semen ejaculate. Females can be inseminated with either chilled liquid semen or with frozen semen. This technology provides unique opportunity for the faster genetic gain in farm animals like goats.

What are the benefits of A.I technology in goats?

Some of the important advantages of AI technology are given below:

1. Rapid genetic gain through extensive use of semen from genetically superior goat
2. Eliminates the cost of maintenance of a breeding buck and breeding cost
3. Upgrading and crossbreeding can be achieved for genetic improvement
4. Minimizes the spread of sexually transmitted diseases
5. Inbreeding depression can be eliminated by selective breeding with high genetic potential
6. Breeding of incompatible sized animals is possible through A.I.
7. Allows use of semen from proven buck at a very distant place on a large scale

Scope of Goat AI in coastal region: Goat farming is an important component of livestock sector in the coastal region and majority of the goat farmers are

small, marginal and landless farmers. One important constraint in goat rearing is the shortage of superior quality male breeding goat. Also, indiscriminate mating using non-descript and genetically inferior male is resulting in inbreeding problems and loss of valuable goat germplasm. It is economically not feasible to keep a breeding buck for small and marginal farmers who maintain small flock size of goats.



Konkan Kanyal Male Goat

Adoption of AI technology can help in manifold increase in mating from valuable and proven buck and also reduce charges on rearing male goat and breeding cost especially for small and marginal farmers. AI can play a significant role in goat farming as this cost-effective technique also allows extensive and efficient use of available superior male goat germplasm for faster genetic improvement. AI also enables selective breeding of indigenous goats in the region which brings optimum economic benefits both in small-holder and commercial goat farming. Technique takes full advantage of estrus synchronization and induction methods and thus can aid in controlled reproduction, enabling breeding of more females, kidding in a desired time or season and allowing out of season breeding. The technology has been recently

promoted by government and extension agencies but its adoption is limited in the region. ICAR-CCARI, Old Goa has standardized the technique of AI in native goats and efforts are underway to develop more efficient and cost-effective indigenous semen diluents for optimal success rate in AI.

Semen collection, processing and storage:

Semen can be collected from a trained adult male goat (10-12 months of age) using an artificial vagina or by using an electro-ejaculator. The collected semen must be handled carefully to avoid heat shock, cold shock, contamination with water, disinfectants, and sunlight etc. that may decrease sperm viability. Collected semen ejaculates are evaluated for various parameters like sperm concentration (3.5-6.0 billion), progressive motility (80-90%) and morphology (70-80%). More elaborate tests include acrosomal integrity, hypo-osmotic swelling test, Computer Assisted Semen Analysis (CASA). Good quality ejaculates will be diluted using an extender or diluent with the required volume and concentration. Semen extender is medium that allows increasing the volume of ejaculate, contributes to reduce



Accessories for AI in Goat

sperm metabolism, preserves sperm function and fertility. The diluted semen can be preserved under refrigerated condition (ranging from 2 to 15°C and mostly at 5°C) or frozen state. Glucose-citrate-egg yolk, skim milk and soya lecithin-based diluents are commonly used but preservation is difficult because of toxic interactions between seminal plasma and milk or yolk-based extenders. Using liquid-stored semen, large numbers of females can be inseminated with relatively low doses of sperms, storage is inexpensive and the semen can easily be used in the field.

Estrous cycle and estrus detection in goats: In temperate regions, goats are seasonal breeders but in tropical countries like India, they tend to show sexual activity throughout the year. Female goats may be mated when they attain 8-12 months of age. Estrous cycle is the period wherein physiological changes occur in ovaries and genital tract leading to estrus (phase of receptivity towards males) expression and ova or egg release (ovulation), preparation for mating and fertilization. Average estrous cycle length is 21 days whereas duration of estrus or heat is typically 24 to 36 hours, with ovulation occurring near the end of estrus. Knowing when a doe comes into estrus lets the farmer plan AI time so as to nearly coincide with ovulation for better fertilization. Does that are to be inseminated should be observed twice daily. Farmer can detect the estrus in does by observing following signs:

- Swollen vulva with pinkish red colour, clear fluid discharge often found lodging from vulva
- Females may stand to be mounted by buck or other females
- Frequent urination, flagging of tail, decreased appetite and milk production
- Females will become unusually aggressive, noisy, or active