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Popular Article

Artificial Insemination in Goat: *An Insight*

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Abstract

Goat is an important component of agriculture system in India that contribute more than 27% of total livestock population. Goat is mostly maintained by landless, marginal and small farmers and supports livelihood of more than thirty-five million families. Despite this fact, majority of Indian goat are categorized as low producer. Poor growth rate, low fecundity and low milk yield are consistent feature of Indian goat sector. Further, high demand and good return from goat chevon has promoted indiscriminate breeding limiting the availability of superior quality breeding buck. With predominance of negative selection in India goat husbandry, the sector requires intervention to protect and disseminate the superior germplasm of goat breeds. Artificial Insemination in goats has come up as a new technique to overcome this limitation. But the techniques with full of flying colours has limitation for its use in goats. This article critically evaluated the various dimension of artificial insemination in goat, need and requirement for its efficient use as an effective tool to dress the problem breed improvement and productivity enhancement in goat.

Introduction

Goat contribute substantially in livelihood of small, marginal and landless farm families in India. Goat are generally kept as a backyard animal with herd size ranging from 5 to 50 goats. Although dispersed in small groups, the goat farming has impact on more than thirty-five million farm families. But still goats in India are maintained on traditional grazing system that follow unscientific breeding and managerial strategies. Cross breeding and negative selection have become a dominant feature of Indian goat husbandry which has not only affected the growth rate but fecundity

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and milk yield of goat as well. So, a little impetus to improve the genetic potential of goat can change the scenario of goat husbandry with improved farm economics that can be a great support to farmers.

Today, goat farming is coming up as an alternate to address the increasing demand of protein rich nutritive diet and seems to have a promising future (Rana, 2019). But this high demand and good return from goat chevon has led to indiscriminate slaughtering of male goats irrespective of their genetic merit. There has been a significant decline of the pure breed goat population and wash of superior germplasm. Today, we are left with limited population of breeding bucks especially of good genetic merit for breed improvement. Fact, can be well understood with the report of Karim et al., (2019) stating that more than 30% oestrus does remain without service in India. So, looking into the current scenario of goat husbandry, its impact on farm families and its future endeavors, it has now become essential to conserve and propagate the superior germplasm of goat in India.

Artificial insemination (AI) with use of cryopreserved semen is a well-accepted techniques to disseminate the superior germplasm. The technique is well established in large ruminants and is being utilized to improve the production potential of cattle. Although, AI in goats can be effective for breed improvement in India but it has limited application in field. Reason may be attributed to lack of structured plan to effectively implement AI in goat for breed improvement and conservation. But now looking into the need for AI in goat, the central and state government has come up with different programmes to supports and implement AI in goat. In recent years, the country as seem transformation of goat sector from unorganized setup to organized entrepreneurial programme. Farmers are coming up for breed improvement in their goat herd and also there has been an increased acceptance of AI technology.

Difference in Cattle and Goat Artificial Insemination

The size of cattle and goat together with the structure of cervix creates a difference in the insemination technique utilized to transfer the semen dose in female reproductive tract. In cattle, it's the palpation of the reproductive tract that is utilized to guide the gun up to the junction of cervix and uterus or mid cervix, while in goat it's the visual perception that we utilize to demarcate the opening of external os. Although the size of the AI gun also varies with the ruminant size which is small in goats, but same AI gun that is used for cattle can be used for insemination in goat. Other difference is the size of the reproductive tract with smaller diameter of cervix in goat compared to cattle. Hence, goat insemination requires more technical expertise with persisted movement of gun during its passage through the OS as compared to the cattle.



Advantages Artificial Insemination in Goat

- **Genetic up-gradation:** Breeding strategies followed in goat husbandry are solely based on principle of successful conception irrespective of buck characters for breed improvement in subsequent generation. As the result herd losses its vigour after few generations evident through poor growth rate and low productivity. AI give an opportunity in induce genetic variability and regain the vigour of herd (NAVS, 2020). Reason to it may be attributed to selection of high genetic merit buck as semen donor with an opportunity to include germplasm of multiple buck from different genetic lines in form of semen dose which otherwise would have not been possible.
- **Conservation of pure germplasm:** Because of high demand and early castration of the male goat, the farmers are facing the shortage of pure breed breeding buck (Khandoker *et al.*, 2011). They are forced to get their goat mated with available buck irrespective of breed, breeding efficiency and quality. This promotes cross breeding and diluting the purebred germplasm even in the native breeding tract of goat. AI with using frozen semen from the pure breed buck of specific breed helps to conserve the breed purity and limits breed dilution.
- **Prevent of Disease-** Generally one or two buck with phenotypic superiority are utilized by farmers to breed goats in their area. If in case the breeding bucks are infected with sexually transmitted disease, it can affect a large population of goat. Generally, this disease related to reproductive system remain unnoticed until expressed and cause a great loose to the reproductive and productive performance of goat (Rerkyusuke, et al., 2020). AI give an opportunity to reduce the changes of spreading of sexually transmitted disease, since the buck used as semen donor are well tested for different disease prior to be utilization for semen collection and cryopreservation for its use as insemination dose. Also ther is no direct connet of individual male with the female for semen transfer.
- **Increase fecundity in herd -**The selected buck maintained at semen station are pedigreed and well identified for desirable traits related to production. Use of semen from buck with high fecundity can be helpful in increasing the fecundity (multiple birth) of the goat herd that in real sense is income for a farmer.
- **Reduced Kid mortality-** AI in goat is also helpful in reducing the kid mortality. Mating the doe with an inferior quality buck predispose the goats to deliver kids with low birth weight which has high chances of mortality. Use of semen from genetically superior male improves



the birth weight of kid. Kid born through insemination with semen from pedigreed buck has been reported to have better immunity that support kid survival.

- **Increase in milk production potential of herd-** Milk production from goat is important in two aspects. High milk yielder goat in herd can nourish their kid better and also farmers get an opportunity to sell goat milk as a marketable product. Since the goat farming has focused itself on meat production, the milk character of goat has always been neglected. Today majority of goat have good body size but have low milk production potential that affect farm economics. Use of cryopreserved semen from buck with good milk character can improve the milk production of herd in upcoming generation.
- **Opportunity to utilize physically impaired elite buck as genetic resource-** Artificial insemination requires cryopreserved semen in French mini straws for its transfer in female. With use of electroejaculation or even artificial vagina as a technique for semen collection and cryopreservation we can make full use of physically impaired buck with high genetic potential in dissemination of germplasm.

Techniques of artificial insemination in goat

Various method used for artificial insemination in goats are as follows-

- **Vaginal (peri-cervical) insemination:** Vaginal insemination is effective in the does, where directly fresh semen or chilled buck semen is used. however, it gives poor conception rate with chilled or frozen buck semen.
- **Cervical (intracervical) insemination:** In field conditions, cervical or intracervical insemination technique is more popular and economical. The external OS-cervios-service is assessed by using an illumination device and the insemination gun is then passed directly into the cervix with the help of vaginal speculum
- **Laparoscopic intrauterine insemination:** In the case of laparoscopic insemination, the semen is introduced directly into the uterine horns at a location closer to the site of fertilization. Therefore, we can reduce the amount of semen used for insemination and surpass the cervical barrier. This approach allows for more sustainable use of semen because fewer sperm are needed for each insemination.
- **Transcervical intrauterine insemination:** In this technique, the animal must be positioned specifically, the cervical region must be retracted and fixed, and tools with unique shapes must be used to hold the animal and allow the insemination gun to pass through the cervix.



Conclusion

Genetic upgradation in goat is urgently required in country to improve the production potential of goat. With limited population of elite pedigreed buck, artificial insemination has come up as an important technical tool for easy, efficient and widespread disseminate the superior goat germplasm. In addition to it, this technology has other advantages over the natural breeding that can improve the farm economics. But, extensive use of this technology in goats requires uninterrupted availability of frozen semen dose, which is still a challenge with limited goat semen production stations. Trained human resource to perform successful AI in goats with higher conception is another constraint associated with optimum use of this technique. So, it can be concluded that AI with multiple advantages can be useful tool to improvement production potential of goat, but there still exist challenges that requires urgent addressal to achieve maximum benefit of this technology.

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