SHORT COMMUNICATION

Fertility Evaluation of Cryopreserved Osmanabadi Buck Semen at Field Level by Artificial Insemination of Estrus Synchronized Does

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Abstract

Reproductive technologies like estrus synchronization and artificial insemination play an important role in enhancing goats' reproductive efficiency and productivity. The present study was carried out to evaluate the fertility of cryopreserved Osmanabadi buck (5) semen through AI on 100 multiparous synchronized does. Does were selected after thorough clinico-gynecological examination and ultrasonographic evaluation for their reproductive status. From each of the selected bucks, five cryopreserved semen straws each from four ejaculates were prepared and used for inseminating the estrus synchronized does. The does were subjected to estrus synchronization protocol using an intra-vaginal sponge impregnated with 350 mg of natural progestagen for 7 days (Avikesil-S), followed by intramuscular injection of 125 µg, Cloprostenol sodium (Estrumate) on the day of sponge withdrawal. Fixed time insemination was performed 48-55 hours following sponge removal with simultaneous administration of 4 µg Buserelin acetate (Receptal). Pregnancy was confirmed using ultrasonography at 30-35 days of insemination. The conception rate varied non-significantly from 35.00 ± 9.57 to 45.00 ± 5.77 % among five bucks, with an average of 40.00 ± 3.40 %.

Keywords: Artificial insemination, Conception rate, Estrus synchronization, Fertility, Ultrasonography.

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Introduction

Artificial insemination (AI) with cryopreserved semen is an important technique in the reproduction of domestic animals (Batista *et al*., 2009). The reproductive efficiency of goats in India is relatively poor as the flocks are reared under unfavorable management and environmental conditions (Arora and Garg, 1998). Reproductive technologies like estrus synchronization and artificial insemination play an important role in enhancing the reproductive efficiency and productivity of animals. Artificial insemination (AI) in goats is gaining popularity in recent years as it reduces the cost of hiring the breeding bucks to the farmers who maintain the small-sized flocks (3-5 goats) and do not own the breeding bucks. Further, there is a shortage of breeding bucks in villages due to the early castration and slaughter of male goats for meat purposes. AI offers opportunities to utilize the superior male to its fullest extent widely. Fixed-time artificial insemination following estrus synchronization ensures breeding activity throughout the year. AI aims to maximize reproductive efficiency and genetic improvement, which depends mainly on the health and nutrition status of the herd or flock (Nunes and Salguerio, 2011). Osmanabadi goat is a dual-purpose breed with great demand in the market for their meat and also has good prolificacy, *i.e.,* 30 % twinning and 2 % triplets/quadruplets. The present study was conducted to ascertain the fertility rate of cryopreserved Osmanabadi buck semen using estrus synchronization protocol and fixed time artificial insemination in goats.

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Materials and Methods

Five adult Osmanabadi bucks were selected for the present study. From each of these bucks, five cryopreserved semen straws were prepared from four ejaculates each and were used for inseminating the estrus synchronized does. Hundred non-pregnant multiparous does were selected after thorough clinico-gynecological examinations and

Table 1: Sponge retention rate, conception rate and litter size in the synchronized does (N = 100)

Sl. No.	*Parameters*	*Percentage of Animals*
1.	Number of does that were inserted with sponge	100
2.	Number of does that retained the sponge	100
3.	Number of goats became pregnant	40
4.	Number of goats gave birth to singlet	37
5.	Number of goats gave birth to twins	2
6.	Number of goats gave birth to triplets	1

Table 2: Mean percentages of conception rates (CRs) achieved in different bucks

Sl. No.	*Buck Numbers*	*No. of AI*	*No. of does conceived*	*Overall CRs (%)**
1.	Buck-I	20	9	45.00 ± 5.77
2.	Buck-II	20	8	40.00 ± 8.16
3.	Buck-III	20	8	40.00 ± 8.16
4.	Buck-IV	20	8	40.00 ± 8.16
5.	Buck-V	20	7	35.00 ± 9.57
Overall Mean		100	40	40.00 ± 3.40

*None of the values within the column differ significantly ($p > 0.05$).

ultrasonographic evaluations. The estrus was induced in the selected does use short term progesterone protocol with an intra-vaginal sponge impregnated with 350 mg of natural progestagen (Avikesil-S, CSWRI, Avikanagar, Rajasthan, India). The intra-vaginal sponge was left *in situ* for seven days, followed by intramuscular injection of 125 µg, Cloprostenol sodium (Estrumate®, MSD Animal health, Pune, India) on the day of sponge withdrawal. Fixed time inseminations were performed 48–55 hours following sponge removal, and simultaneously 4 µg Buserelin acetate (Receptal® Vet, MSD Animal health) was administered. Animals were subjected to ultrasonographic evaluation for the diagnosis of pregnancy after 30-35 days of insemination and the conception rate was recorded. The data were analyzed statistically by one-way ANOVA using SPSS 16.0 software at the significance level of $p < 0.05$.

Results and Discussion

Following cervical insemination in estrus synchronized does, the pregnancy diagnosis was done around 30-35 days in non-returned does using trans-vaginal or trans-rectal ultrasound scanner with a linear probe with a frequency of 5–7.5 MHz (EASI-SCANTM, BCF Technology Limited, UK). The number of pregnancies obtained from 100 does inseminate 40, of which two twins and one triplet were born (Table 1). The mean conception rates for the bucks in the study ranged between 35.00 ± 9.57 and 45.00 ± 5.77 %. The highest percent conception rate (45.00 ± 5.77) was recorded in Buck - I followed by Buck –II (40.00 ± 8.16), III (40.00 ± 8.16), IV (40.00 ± 8.16), and V (35.00 ± 9.57). The overall mean conception rate obtained was 40.00 ± 3.40 % (Table 2). There was no significant difference in the conception rate achieved by using the frozen semen straws of five bucks.

Cryopreservation is reported to compromise fertility after AI using goat spermatozoa (Gacitua and Arav, 2005; Purdy, 2006). The conception rates in the present study were in accordance with the values recorded by several authors by cervical insemination using frozen semen of different breeds of buck. The conception rate of 39.10% for Cashmere buck semen (Ritar *et al.,* 1990) and of 38.50 to 43.60% in Majorera goats (Batista *et al*., 2009) have been reported earlier. Further, higher conception rates of 50.53 and 47.62 % were recorded by Singh *et al.* (1995) and Dorado *et al*. (2007) using Bengal buck and Florida buck semen, respectively. The variation in the conception rate might be attributed to, season, breed and age of goats used in the respective studies (Meza and Ross, 2000; Arrebola *et al*., 2010), method of insemination (Paulenz *et al*., 2005), estrus synchronization protocols employed, depth of cervical penetration of AI gun, the expertise of inseminator (Martemucci and D" alessandro, 2011), extender composition and hormone treatment (Nunes and Salgueiro, 2011), a dose of spermatozoa used (Ankkul *et al*., 2014), time and number of AI and body condition of female animals used (Gibbons *et al*., 2019). Leethongdee and Ponglowhapan (2014) suggested that deep deposition of frozen semen in the female reproductive tract can increase the pregnancy rate.

Conclusion

The study was conducted to ascertain the fertility rate of cryopreserved semen of five Osmanabadi bucks by deep cervical insemination of 100 estruses synchronized does. It gave an overall 40.00 ± 3.40 % conception rate. In order to obtain a better conception rate using AI at the field level, it is recommended to perform the insemination at detected estrus after choosing healthy does with better body condition score. Reducing the stress to does by proper restraining

during insemination and improved depth of the penetration can further improve the rate of conception in these does.

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References

Arora, C. L. and Garg, R. C. (1998). *Sheep Production and Breeding*. International Book Distribution Company, Lucknow, India.

Arrebola, F., Perez-Marin, C. C. and Santiago-Moreno, J. (2010). Limitation of seasonality in reproductive parameters of Mediterranean bucks using photoperiod treatment. *Small Ruminant Research, 89*(1), 31-35.

Ankkul, N., Suwimonteerabutr, J., Tharasanit, T., Khunmanee, S., Diloksumpan, P., Berg, D. K. and Techakumphu, M. (2014). Sperm distribution and fertilization after unilateral and bilateral laparoscopic artificial insemination with frozen-thawed goat semen. *Theriogenology, 82*(8), 1137-1144.

Batista, M., Nino, T., Alamo, D., Castro, N., Santana, M., Gonzalez, F., Cabrera, F. and Gracia, A. (2009). Successful artificial insemination using semen frozen and stored by an ultrafreezer in the Majorera goat breed. *Theriogenology, 71,* 1307-1315.

Dorado, J., Rodriguez, I. and Hidalgo, M. (2007). Cryopreservation of goat spermatozoa: Comparison of two freezing extenders based on post-thaw sperm quality and fertility rates after artificial insemination. *Theriogenology, 68*, 168-177.

Gibbons, A. E., Fernandez, J., Bruno-Galarraga, M. M., Spinelli, M. V. and Cueto, M. I. (2019). Technical recommendations for artificial insemination in sheep. *Animal Reproduction, 16*(4), 803-809.

Gacitua, H. and Arav, A. (2005). Successful pregnancies with directional freezing of large volume buck semen. *Theriogenology, 63*, 931-938.

Leethongdee, S. and Ponglowhapan, S. (2014). Artificial insemination in goats: An update. *Thai Journal of Veterinary Medicine, .44*(1), 73-77.

Martemucci, G. and Alessandro, A. G. (2011). Induction/ synchronization of oestrus and ovulation in dairy goats with different short term treatments and fixed time intrauterine or exo-cervical insemination system. *Animal Reproduction Science, 126*(3-4), 187-194.

Meza, C. A. and Ross, T.T. (2000). Factors affecting fertility and prolificacy of dairy goats inseminated with frozen-thawed semen. In: *Proceedings of the 7th International Conference on Goats. Edt*. Dubeuf, J. P., Institute de l' Elevage (Idele): Tours, France., pp. 476-478.

Nunes, J. F. and Salgueiro, C. C. M. (2011). Strategies to improve the reproductive efficiency of goats in Brazil. *Small Ruminant Research, 98*(1-3), 176-184.

Paulenz, H., Soderquist, L., Adnoy, T., Soltun, K., Saether, P.A., Fjellsoy, K.R. and Berg, K.A. (2005). Effect of cervical and vaginal insemination with liquid semen stored at room temperature on fertility of goats. *Animal Reproduction Science, 86*(1-2), 109-117.

Purdy, P. H. (2006). A review on goat sperm cryopreservation. *Small Ruminant Research, 63*, 215-225.

Ritar, A. J., Ball, P. D. and O'may, P. J. (1990). Artificial insemination of Cashmere goats: effects on fertility and fecundity of intra-vaginal treatment, method and time of insemination, semen freezing process, number of motile spermatozoa and age of females. *Reproduction Fertility and Development, 2*(4), 377-384.

Singh, M.P., Sinha, A.K. and Singh, B.K. (1995). Effect of cryoprotectants on certain seminal attributes and on the fertility of buck spermatozoa. *Theriogenology, 43,* 1047-1053.