

STUDIES ON CERTAIN FRESH SEMEN CHARACTERISTICS IN RAMS OF INDIANTWINNIG BREED -THE NARI SUVARNA DURING WINTER MONTHS (SHORT PHOTOPERIOD)

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Abstract: The present study was conducted to determine certain physical parameters in neat semen, in NariSuvarnarams. A total of six healthy NariSuvarna rams with good body condition, good libido and adaptability to artificial vagina semen collection technique were selected. Semen was collected twice a week. A total of 96 ejaculates (16 ejaculates from each ram) were collected for a period of two months for the study of semen characteristics immediately after collection. Physical parameters such as semen volume, color, pH, per cent of motility, per cent of live and dead sperm were estimated in fresh semen. No significant variations motility were noticed among rams. Color of the semen observed in the present study was creamy white which could be due to high spermatozoa concentration in the ram ejaculates which can be used for artificial insemination of wide spread utilization and conception of more number of ewes. NariSuvarna ewes can produce more than one lamb per lambing and attain more adult body weight compared to normal Indian breeds. By rearing this sheep which are able to give twins, with smaller flock, the shepherd can get more income by increased mutton production.

Key words: Fresh semen, NariSuvarna, Short Photoperiod.

1. Introduction

The NariSuvarna breed was developed at Nimbkar Agricultural Research Institute (NARI) in 1990 by introducing the Fec B gene from the Garole breed of Sunderban, West Bengal. NariSuvarna ewes have about 90% Deccani breed proportion or 60% Deccani and 30% Madgyal (and only 10% Garole breed) proportion and are capable of producing and raising twin lambs. More than 60% of the ewes of this breed are known to produce twins. Though much of the work on semen composition is carried out in various sheep breeds, work with regard to the semen constituents of Indian sheep breeds is scanty and such a work in NariSuvarna breed is lacking.

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Due to socio-economic reasons most of the Indian shepherds are selling out almost all of their male lambs at an early age. Consequently, there are several shortfalls in the availability of superior breeding rams all over the country. To substantiate this shortage, Artificial Insemination (AI) is one of the important management tools for optimizing the production performance and maximizing the use of high value rams even by small farmers who doesn't have breeding rams (Kumar *et al.*, 2010). Thus information on normal seminal composition in animals is very essential for semen preservation and artificial insemination.

2. Materials and methods:

The study on physical and biochemical parameters was conducted in Narisuvarna rams maintained in the Sheep breeding farm. The farm is located at an altitude of 920 meters above the mean sea level (12.97°N latitude and 77.56°E longitude). The mean temperature of the area ranges from 15.4°C to 36°C. The average rainfall is 859 mm (Report by Karnataka Agriculture Policy, 2006). The study was conducted for a period of 2 months from January 2015 to February 2015 which were the late winter months, when the average temperature and relative humidity were 28°C and 65 % respectively.

Six healthy and sexually matured NariSuvarna rams having good body configuration, well-developed testes and good vigor within the age group of 2 to 3 years which were having good libido and adaptability to artificial vagina semen collection technique were selected. The experimental males were trained to mount on dummies (oestrus/anestrous ewes) for collection of semen by artificial vagina (AV) in the early morning at 6.30 to 7.00 A.M.

Semen was collected from three rams twice in a week using ewe as dummy with the help of standard artificial vagina (AV) during early morning hours before feeding throughout the period of study.

A total of 96 ejaculates (16 ejaculates from each ram) were collected during the study period from January to February for studying the semen characteristics immediately after collection, after dilution (0 h) and after chilling the semen for interval of 24 hrs.

Procedure:

All the equipments used for semen collection were maintained under sterile and dry conditions till use. The artificial vagina (AV) was prepared by assembling sterile soft rubber outer cylinder (20 cm long and 5 cm wide in diameter or 8''), a smooth latex liner (12''), a latex cone (6''), graduated collection tube, insulation bag, warm water at 45°C (Vishal, 2014) The volume of ejaculate was recorded directly from the eppendorf tube graduated up to the mark of 0.1 ml and the sperm concentration was expressed as the total number of

spermatozoa in millions (1×10^6) per ml of neat semen and was determined by using improved Neubauer counting chamber after a dilution of semen with 1:200 with a diluting fluid.

Live sperm percentage was estimated by supra vital staining using eosin nigrosin stain method and also the motility of spermatozoa was assessed as per the method described by Vishal (2014). The color of the semen was graded as Creamy white: 1, between opaque and creamy white: 2, Opaque: 3. (peters, *et al.*, 2008). The pH was obtained using pH strips and the colour change in the paper was compared with the standard strip.

Data were analyzed to know the difference between the seminal plasma characteristics of individual rams of NariSuvarna, with the aid of statistical software, Graph Pad Prism version 5.01, by application of paired t-test. All values were expressed as mean \pm SE. Significance or non-significance of differences between the mean values was determined.

3. Results:

The results of semen physical characteristics of NariSuvarna rams during the study period of eight weeks are presented here under.

The semen characteristics, *viz*, ejaculate volume, color, pH, sperm motility, total sperm count, per cent of live and dead spermatozoa were evaluated in six NariSuvarna rams. The mean, standard error (SE values of semen volume, colour, pH, spermatozoa motility, total sperm count and per cent of live and dead spermatozoa are presented (Table 1).

3.1.1 Volume

The semen volume ranged from 0.6 to 0.8ml. Mean \pm SE value for volume of semen was 0.71 ± 0.15 . The mean ejaculate volume between animals did not differ significantly ($P > 0.05$).

3.1.2 Colour

The colour grades of semen of NariSuvarna rams ranged from 1 to 2. The results showed non-significant difference ($P > 0.05$) between rams under study.

3.1.3. p^H of semen:

The pH of semen sample ranging from 6.5 to 7.0 indicating non-significant difference ($P > 0.05$) between animals.

3.1.4 Sperm motility (%)

The motility of spermatozoa ranged from 70 to 90 per cent. The average motility of sperm was 85.63 ± 0.98 per cent. There was non-significant difference ($P > 0.05$) between the animals with respect to motility.

3.1.5 Per cent of live spermatozoa (%)

The per cent of live spermatozoa did not differ significantly ($P>0.05$) between the animals and varied from 61 to 91. The average Mean \pm SE value of per cent of live spermatozoa was 78.13 ± 1.04 per cent.

3.1.6 Total sperm count (million/ml)

The results showed non-significant difference ($P>0.05$) between individual animals with respect to concentrations of sperm, with the average mean \pm SE value as 5080.13 ± 179 and ranged between 4298 to 5967 (million/ml).

4. DISCUSSION

4.1. Volume

The overall mean ejaculate volume of semen in NariSuvarna rams was 0.71 ± 0.15 ml which was within the physiological range for rams as stated by Nasrin *et al.* (2012)

The volume of semen in NariSuvarna ram was comparable with the volume of adult exotic rams (Mathur *et al.*, 1990), crossbred rams of United Arab Emirates (Ibrahim, 1997), Merino rams (Menchaca *et al.*, 2005), Garole \times Malpura rams (Kumar *et al.*, 2007), Karradi and Arrabi rams (Al-Samarrae, 2009), native sheep of Bangladesh (Pervage *et al.*, 2009), Boujaad rams (Talbi *et al.*, 2010) and Ghezel-Merinoise rams (Soltanpour *et al.*, 2014).

However, the volume recorded in present was not in agreement with the findings of Jennings and McWeeny (1976) and Olah *et al.* (2013) in Suffolk rams and (Nikolov *et al.*, 1983) in adult exotic rams. These variations in the semen volume among findings of different authors could be due to differences in genotype differences, season of the study in a year (Olah, 2013), nutritional status, health status, breed (Donavan *et al.*, 2001 and Alfaris *et al.*, 2012) and number of semen collections per day (Jennings and McWeeny, 1976).

RAM NO.	Volume (ml)	Colour	pH	Percent motility (%)	Percent live spermatozoa(%)	Sperm count (million/ml)
1	0.69±0.03	1.13±0.12	6.69 ±0.09	80.00 ± 3.27	80.13±2.39	5004.75±188.9
2	0.74±0.02	1.13±0.14	6.81±0.70	81.25 ± 2.95	78.13±1.71	5049.88±169.63
3	0.72±0.03	1.13±0.14	6.75±0.90	80.00 ± 3.27	74.75±3.62	5247.75±158.84
4	0.70±0.03	1.13±0.00	6.63±0.70	80.00 ±3.27	76.75±2.68	5035.25±179.60
5	0.73±0.01	1.13±0.00	6.88±0.90	82.50 ± 2.50	79.13±0.93	4991.63±182.84
6	0.70±0.02	1.81±0.9	6.81±0.90	81.25 ± 2.95	79.88±3.23	5163.50±196.06
Average	0.71±0.15	1.13±0.05	6.76 ±0.04	80.83 ± 1.18	78.13 ± 1.04	5080.13±179.00

None of the mean ± SE values among rams differed significantly (P>0.05)

4.2 Color and pH

Color ranged from creamy white to opaque and pH of semen sample was 6.5 to 7.0 and the recorded observations in the present study were within the physiological range for rams as compiled by Nasrin *et al.* (2012). There was non-significant difference between animals with respect to color and pH, which could be attributed to the same age group and similar environmental conditions provided to rams under study.

The results of color and pH were in agreement with the observations of Moghaddam *et al.* (2012) in Arkhar Merino × Moghani (AM × MG) and Baluchi × Moghani (BL× MG) rams and Malejane *et al.* (2014) in Dorper rams.

4.3. Sperm Motility

The overall mean percentage of sperm motility was 80.83 ± 1.18 . The individual motility percentages recorded in this study were corroborated with the findings of Saxena and Tripathi (1986) in Nali rams, Nel-Themaat *et al.* (2006) in Gulf Coast native rams, Kumar *et al.* (2010) in Bharat Merino rams and Malpura rams and Talbi *et al.* (2010) in Boujaad rams and Vishal (2014) in Nellore Jodephi rams.

4.4. Percentage of live sperms

The overall mean percentage of live sperms was 78.13 ± 1.04 per cent. The mean live sperms percentage observed in fresh semen was in agreement with the observations in Nali rams (Saxena and Tripathi, 1984), Finnish Landrace rams (Robertson *et al.*, 1989), Awassi rams (Bhosrekar *et al.*, 1994), Patanwadi rams (Dabas *et al.*, 1997), Dorper rams (Bester *et al.*, 2004), Karradi and Arrabi rams (Al-Samarrae, 2009), Suffolk, Sumaka and Walachian rams (Hegedusova *et al.*, 2012) and Ghezel-Merino ram (Soltanpour *et al.*, 2014).

The better live sperms percentage arrived in the present study could be due to the breeding season as opined by Saxena and Tripathi (1986) and Dabas *et al.* (1997) and body weight and genetic makeup as attributed by Chetri (2003).

4.5 Sperm concentration

The overall mean sperm concentration in the fresh semen of NariSuvarna ram was 5082.13 ± 179.31 million/ml with non-significant ($P>0.05$) difference between individual animals.

The findings of the present study were within the physiological range for rams as reviewed by Nasrin *et al.* (2012). Similar concentrations were also reported in Awassi rams by Bhosrekar *et al.* (1994) and Azawi and Ismaeel (2012).

But, lesser concentration of sperms compared to the concentration of sperms in the present finding was recorded in local and cross bred rams of United Arab Emirates (Ibrahim, 1997)

and Ghezel-Merinoise rams (Soltanpour *et al.*, 2014). The concentration of sperm in ejaculates could be influenced by several factors such as frequency of collection, nutrition and health status, genetic variation (Mann, 1964 and Verma, 1999) and breeding season (Dabas *et al.*, 1997).

5. Conclusion

In conclusion the present study was conducted to determine certain physical parameters in neat semen in NariSuvarna rams. Color of the semen observed in the present study was creamy white which could be due to high spermatozoa concentration in the ram ejaculates which can be used for wide spread utilization of semen for more number of ewes by artificial insemination. NariSuvarna ewes can produce more than one lamb per lambing and attain more adult body weight compared to normal Indian breeds. By rearing this sheep which are able to give twins, with smaller flock, the shepherd can get more income by increased mutton production

Hence study on normal physical characteristics of narisuvarna ram semen is of immense help in assessing fertility, useful for the formulation of better diluents and diagnosing male reproductive disorders besides preservation and artificial insemination.

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