



Research Article

CORRELATION STUDY BETWEEN SCROTAL CIRCUMFERENCE AND SEMINAL TRAITS OF DECCANI RAMS

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Abstract- In the present study, seminal traits of Deccani rams were studied along with the inter-relationship study between the scrotal circumference and other seminal parameters in Deccani rams. Semen was collected from eight deccani rams (18 ejaculates/each ram). The scrotal circumference (cm), semen ejaculate volume (ml), sperm concentration (millions/ml) and mass activity (0-5 scale) of Eight Deccani rams were in a range of 24.00 to 28.50, 0.10 to 1.20, 2260 to 16000 and 3.00 to 5.00 respectively. Significant ($P<0.05$) variation was observed in semen volume and mass activity between the rams, but no significant ($P>0.05$) variation was found between the semen concentration of the rams. A significant ($P<0.05$) positive correlation ($r=0.298$) was observed between scrotal circumference (SC) and volume of semen, and between scrotal circumference and semen concentration ($r=0.836$). Significant positive correlation between physical and seminal traits of Deccani Ram semen indicate their role as selection criteria for improving the reproductive performance of the Deccani ram breed.

Keywords- Scrotal circumference, Correlation, Seminal Traits, Selection Criteria, Breeding rams.

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Introduction

India ranks second in sheep population contributing 6.8% (74 million) of world's sheep population [1]. Among the breeds of India, Deccani breed of sheep was known for its disease resistance and quality meat [2]. Semen characteristics of various sheep breeds has been studied but research on Deccani ram seminal traits is inadequate. Selection of the breeding rams is the primary tool for genetic improvement of the Native herd. The physical traits [Scrotal circumference (SC) and Body weight (BW)] play an important role in selection of breeding rams. SC measurement is a simple repeatable method which correlates with testicular weight, semen quality, and with fertility [3]. Scrotal circumference in rams indicates the fertilising ability because the sperm production is correlated with testicular measurements. The purpose of this investigation was to measure the scrotal circumference (SC), body weight (BW), semen characteristics, and to determine the relationship between these parameters in deccani ram population.

Materials and Methods

Ethical approval

The present study was conducted after approval by the Institutional Animal Ethics Committee.

Experimental animals

Eight Deccani rams (aged 3 years) stationed at Instructional Livestock Farm Complex (ILFC), college of Veterinary science (C.V.Sc), Rajendranagar, Hyderabad (longitude: 78.4018° E, latitude: 17.3203° N) were utilized to study the characteristics of semen (volume, colour, consistency, concentration and mass activity) along with physical traits (SC and BW). The rams were maintained under intensive management in loose housing system. All the animals were fed daily with concentrate feed at the rate of about 300 gm per day per head in addition to

adlibitum quantity of green fodders.

Semen collection

Semen was collected from eight rams twice in a week using Artificial Vagina (AV) [Fig-1] at a temperature of 45°C, during early morning before feeding throughout the period of study. A total of 144 ejaculates (18 ejaculates/each ram) were collected during the study period from January to May.



Fig-1 Semen collection from Deccani ram by using artificial vagina

Scrotal circumference (SC) and Body Weight (BW) measurement:

Scrotal circumference (SC) was measured by holding the testes down within the scrotum by placement of the fingers and thumb at the sides of the scrotal neck. A

looped tape measure was placed around the greatest diameter of the testes and pulled tightly so that the tape is firmly in contact with the entire circumference. Body weight (BW) of each ram was measured by using weighing balance.

Characteristics of semen

Immediately after semen collection, colour and consistency was noted directly by visual observation. The volume of ejaculate was recorded directly from the graduated semen collection tube in millilitres (ml). Mass motility was estimated by assessment of wave motion of fresh semen under light microscope (10X) with 0-5 score. Sperm concentration in semen was determined by using improved Neubauer counting chamber. semen was diluted with diluting fluid (1:200) (composition of diluting fluid -Water soluble Eosin-Y -0.05 gm; Sodium chloride - 1.00 gm; Formalin (qualigen chem, Mumbai, India) -1ml; Distilled water made upto 100ml)

Statistical analysis

Data were treated and statistically analyzed by using Statistical Package for Social Science (SPSS, version 16). The comparison of the means was done by Duncans test (ANOVA; Analysis of Variation) at a probability level of 5%. Coefficients of

correlation [Pearson (r)] were calculated between SC, BW, semen ejaculate volume, sperm concentration and mass activity.

Results

The scrotal circumference (cm), semen ejaculate volume (ml), sperm concentration (millions/ml) and mass activity (0-5 scale) of eight Deccani rams were in a range of 24.00 to 28.50, 0.10 to 1.20, 2260 to 16000 and 3.00 to 5.00 respectively. Out of the 8 rams, Ram No. 2 has lower average semen volume (0.35 ± 0.27 ml) per ejaculation. The average semen colour and consistency were creamy white and thick creamy in all semen ejaculates [Table-1]. There was significant difference between the mass activities of spermatozoa between the animals ($P \leq 0.05$). Significant positive correlation reported between SC and semen volume ($r = 0.298$) [Fig-2], SC and BW ($r = 0.532$) [Fig-3], SC and semen concentration ($r = 0.836$), SC and mass activity (0.272) [Fig-4], BW and Semen volume (0.538), BW and mass activity (0.374), semen volume and concentration (0.412). Moderate positive correlation was observed between semen volume and mass activity (0.219). Low positive correlation was observed between semen concentration and BW (0.134), semen concentration and mass activity (0.010) [Table-2].

Table-1 Body weight, scrotal circumference and seminal traits of Deccani rams.

Ram No	Body weight (Kg)	Scrotal circumference (cm)	Semen volume (ml) (n=18)	Semen concentration (millions/ml) (n=18)	Colour	consistency	Mass activity (0-5 score) (n=18)
1	29.00	27.00	0.88 ± 0.24^a	11640.00 ± 690	Creamy white	Thick creamy	4.25 ± 0.88^a
2	26.00	25.50	0.35 ± 0.27^d	9458.300 ± 1034	Creamy white	Thick creamy	3.41 ± 0.51^{bc}
3	26.50	26.50	0.64 ± 0.16^{bc}	11499.00 ± 757	Creamy white	Thick creamy	3.71 ± 0.61^{bc}
4	27.00	25.00	0.50 ± 0.20^{cd}	9275.700 ± 699	Creamy white	Thick creamy	3.64 ± 0.49^{bc}
5	26.50	25.00	0.56 ± 0.22^c	11335.00 ± 895	Creamy white	Thick creamy	3.23 ± 0.43^c
6	27.50	25.50	0.78 ± 0.21^{ab}	11445.00 ± 517	Creamy white	Thick creamy	3.66 ± 0.48^{bc}
7	28.00	28.50	0.85 ± 0.26^a	11052.00 ± 726	Creamy white	Thick creamy	3.83 ± 0.38^{ab}
8	27.00	24.00	0.54 ± 0.17^{cd}	11323.00 ± 595	Creamy white	Thick creamy	3.57 ± 0.53^{bc}

Values are mean \pm S.E and values in parenthesis are the no. of ejaculates collected from each ram; Means with different superscripts within column differ significantly ($p < 0.05$).

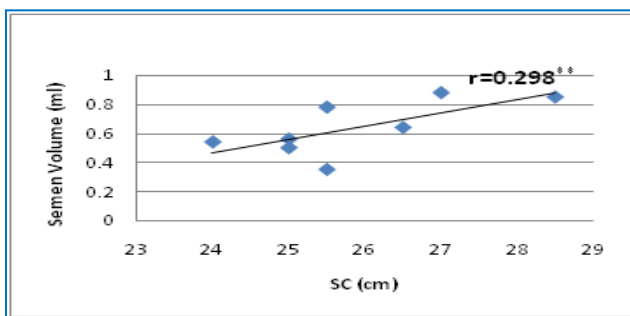


Fig-2 Representing the positive correlation between scrotal circumference (SC) and semen volume of the Deccani Rams

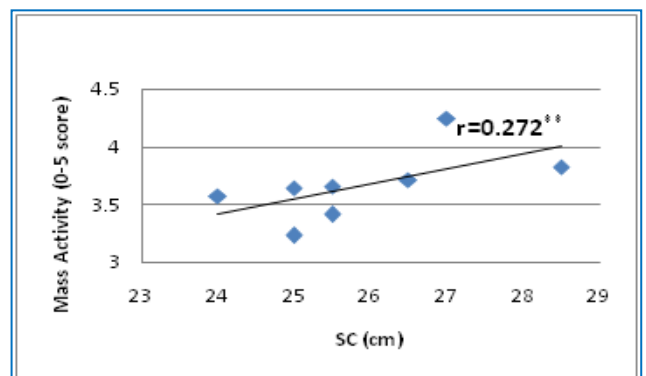


Fig-4 Representing the positive correlation between scrotal circumference (SC) and Mass activity of the Deccani Ram semen

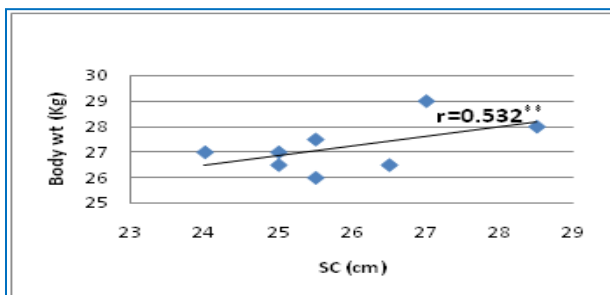


Fig-3 Representing positive correlation between scrotal circumference (SC) and Body Weight (BW) of the Deccani Rams

Table-2 Correlation of physical traits with seminal traits of Deccani Ram semen

	SC	BW	Volume	Concentration	Mass activity
SC					
BW	0.532**				
Volume	0.298**	0.538**			
Concentration	0.836**	0.134	0.412**		
Mass activity	0.272**	0.374**	0.219*	0.010	

** Correlation was significant at $P < 0.01$ level (2-tailed)

* Correlation was significant at $P < 0.05$ level (2-tailed)

Discussion

The overall mean SC of Eight Deccani rams was within a range of 24.00 to 28.50 cm which was comparable to that of Finn and Dorset rams (27 to 29 cm) [4]. The semen ejaculate volume (ml) of Deccani ram was comparable with the volume of Karradi and Arrabi rams [5], Chottanaguri rams [6] and Garut rams [7] while higher semen volume (0.99 to 1.6 ml) was recorded in Kivircik and Awassi rams [8], Sanjabi rams [9]. There was significant difference between the volume of semen obtained per ejaculation between the animals ($P \leq 0.05$) [Table-1]. These differences between various reports could be due to semen collection method [10], the season of the study, breed and age of rams, environmental factors [11].

In the present study, sperm concentration was much higher than the concentration of Santa Ines rams [12], Kivircik and Awassi rams [8], Sanjabi rams [9] which were varying from 1200 to 4900 million sperms/ml. The variation could be due to the "breed-related effect" upon sperm production in rams [13].

The average semen colour of Deccani ram was creamy white in the present study which was similar to that of Indigenous ram semen of Bangladesh [14], Ossimi, Barki, Rahmani, Awassi, Finnish ram semen [15], native ram semen of Bangladesh [16] while the semen colour of Ille-de-France and Schwarzkopf breeds was white [17].

The average semen consistency of Deccani ram was thick creamy in the present study while moderate consistency was reported for the semen of Garut ram semen [7]. The variation may be due to semen sperm concentration [18], breed and testosterone level.

The mass activity (0-5 scale) of Deccani semen was observed to vary from 3.00 to 5.00 which was similar to the mass activity of Kivircik and Awassi rams [8], Native ram semen of Bangladesh (3.88) [16] and lower compared to the mass activity of Sanjabi rams [9]. Such differences may be attributed by many factors that can affect the semen quality such as genetic and environmental changes [19], and seasonal variation [20].

In the present study, significant positive correlation was obtained between sperm concentration, scrotal circumference, body weight and semen volume, mass activity [Table-2] which was in accordance with the findings of other authors [21-23]. Estimated high positive correlations (0.532) between BW and SC indicated that testes measurements were strongly associated with body weight of the animals. Thus, these parameters could serve as the criteria for selection of valuable Rams.

A moderately positive correlation was found between semen volume and mass activity. Significant positive correlation (0.412) was found between semen volume and sperm concentration, which was in agreement to that of other study [24]. Low positive correlation (0.01) was obtained between mass activity and semen concentration. In contrast, few authors [25,26] reported strong positive correlation between sperm concentration and mass activity. The variation might be due to breed and seasonal variation. Moderate positive correlation was obtained between mass activity and semen volume (0.219) which was in agreement with that of the findings of recent study in bulls [22]. The positive correlation indicates that SC should be considered as important indicator of breeding potential of rams. So its consideration during selection process of breeding rams not only enhances semen quality but also the conception rates of the overall herd.

Conclusion

The present study indicates that the physical and seminal traits of Deccani ram semen were within the normal limit. The semen concentration of Deccani breed was higher compared to other breeds. There was significant correlation between body weight, scrotal circumference and other seminal traits indicating their role as important selection criteria for improving seminal performance of breeding rams.

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Competing Interests

There are no competing interests.

Conflict of Interest: None declared

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List of Abbreviations:

SC Scrotal circumference, BW Body Weight, ILFC Instructional Livestock Farm Complex

AV: Artificial Vagina, ml: millilitre, °C: degree centigrade

SPSS: Statistical Package for Social Science, cm: centimeter

ANOVA: Analysis of Variation, gm: grams