



Seasonal Influence on Seminal Characteristics and Sexual Behaviour: A Comparative Study in Ganjam Bucks

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ABSTRACT

Background: Bucks raised for breeding purposes receive no special attention and are raised at random without following the correct selection process. Besides, the basic data on the fertility of the male Ganjam bucks is never addressed. Goat breeders have noted a sharp decline in the reproductive efficiency of Ganjam goats, associated with a lengthened kidding interval, fewer successful pregnancies and decreased twinning frequency. The measurement of male fertility parameters is crucial for estimating the breeding performance of any species since males contribute 50% of the reproductive efficiency.

Methods: A total of 120 Ganjam bucks of different age groups reared by the local farmers of Rambha, Khalikote and Chhatrapur areas of Ganjam district were used for the present study. A total of six healthier bucks of age 1.5(B1), 2(B2), 2.5(B3), 3.5(B4), 4(B5) and 4.5(B6) years were procured from the Farmers for the experimental purpose. For study on effect of season on the semen qualities, twelve ejaculates from each buck were collected, six ejaculates between the month of July to August (season 1) and six ejaculates during October to November (Season 2).

Result: The mean value of reaction time, Frequency of Flehmen's Reaction, libido, volume of semen, concentration of sperm and value of MBRT of each of the six bucks were significantly higher ($p < 0.01$) in the season 2. The mean of each of the six bucks did not show any significant difference between two seasons with respect to pH and live % of sperm. Buck B6 recorded a significantly higher ($p < 0.01$) individual motility of sperm in season 2 than of season 1, whereas buck B1, B2, B3, B4 and B5 did not show any significant difference between two seasons with respect to individual motility of sperm. Buck B5 and B6 recorded a significantly higher ($p < 0.01$) mass activity of sperm in season 2 than of season 1, whereas buck B1, B2, B3 and B4 did not show any significant difference between two seasons with respect to mass activity of sperm. We are found to be have non-significant difference with that of season 1 with respect to sperm abnormalities of sperm. Buck B2 and B4 recorded a significantly higher ($p < 0.05$) acrosomal integrity in season 2 than season 1, whereas buck B1, B3, B5 and B6 did not show any significant difference between two seasons with respect to acrosomal integrity of sperm. Buck B5 evaluated a significantly higher ($p < 0.05$) HOST in season 2 than season 1, whereas buck B1, B2, B3, B4 and B6 did not show any significant difference between two seasons with respect to HOST.

Key words: Ganjam buck, Season, Seminal characteristic, Sexual behavior, Spermatozoa integrity.

INTRODUCTION

Goat farming is a reliable source of revenue for farmers and serves as an auxiliary to agriculture (Banerjee, 2000; Arrebola and Abecia, 2017). Goats make up 26.40% of the livestock population in India. According to the 20th livestock census, there are 148.88 million indigenous goats in India, of which 26.97% are pure breed, 11.77% are graded breed and the remainder 61.26% is non-descript breeds (Chaurasia *et al.*, 2023a). Goat farming provides the sole source of income for 25% of the rural population in the state of Odisha. The Ganjam goat, also known as the lanka, golla, or dalua, is a medium-sized animal that is mostly reared for meat. The medium-sized animal, pendulous ears are drooping and the coat colour is predominantly brown or black (Chaurasia *et al.*, 2023b). The measurement of male fertility parameters is crucial for estimating the breeding performance of any species since males contribute 50% of the reproductive efficiency (Ramachandran and Singh, 2017; Revathy *et al.*, 2022 and Chaurasia *et al.*, 2024). So, the present study was undertaken on the seasonal variation of scrotal parameters, seminal characteristics, spermatozoa integrity and sexual behavior in Ganjam buck that could be correlated with the

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breeding efficiency of this breed to develop suitable breeding programmes.

MATERIALS AND METHODS

A total of 120 Ganjam bucks of different age groups reared by the local farmers of Rambha, Khalikote and Chhatrapur areas of Ganjam district were used for the present study. A total of six healthier bucks of age 1.5(B1), 2(B2), 2.5(B3), 3.5(B4), 4(B5) and 4.5(B6) years were procured from the Farmers for the experimental purpose. The seminal characteristics and sexual behavior parameters such as reaction time, Flehmen's response and libido were studied in the month of July to August (season 1) and October to November (season 2). For study on effect of season on the semen qualities, twelve ejaculates from each buck were collected, six ejaculates between the month of July to August (season 1) and six ejaculates during October to November (Season 2). The total of 72 ejaculates were evaluated for the study of seminal and biochemical characteristics.

All the data generated in the above experiments were statistically analyzed using Statistical Package for the Social Sciences (SPSS)-1996 version software computer package.

RESULTS AND DISCUSSION

Comparative analysis of seasonal variation in sexual behavior of ganjam bucks

The mean value of reaction time (in sec) of each bucks recorded in season 1 at the time of commencement of the research were 12.05 ± 0.26 , 12.02 ± 0.31 , 11.92 ± 0.37 , 12.43 ± 0.19 , 11.50 ± 0.26 and 12.28 ± 0.34 sec, respectively and the corresponding values in season 2 were 9.65 ± 0.31 , 9.80 ± 0.19 , 9.68 ± 0.25 , 10.08 ± 0.29 , 9.98 ± 0.22 , 9.83 ± 0.21 sec, respectively. The frequency of Flehmen's Reaction was recorded after 10 exposures to estrus female. The mean score evaluated for the different bucks were 3.50 ± 0.11 , 4.32 ± 0.13 , 3.55 ± 0.12 , 4.62 ± 0.16 , 4.23 ± 0.15 and 3.61 ± 0.14 , respectively in season 1 and 6.92 ± 0.16 , 7.21 ± 0.17 , 6.83 ± 0.15 , 6.94 ± 0.18 , 7.31 ± 0.18 and 6.91 ± 0.19 , respectively in season 2. The libido of the Ganjam bucks were recorded as per the score card, out of 10. Average score of sex libido of the six Ganjam bucks during season 1 were 2.86 ± 0.13 , 3.12 ± 0.11 , 2.94 ± 0.16 , 4.23 ± 0.12 , 3.45 ± 0.14 and 2.45 ± 0.17 , respectively and the corresponding values in season 2 were 7.94 ± 0.14 , 8.12 ± 0.15 , 7.56 ± 0.18 , 7.99 ± 0.16 , 8.45 ± 0.17 and 7.67 ± 0.19 , respectively. The present findings were in agreement to the observations of Kerketta *et al.* (2013).

Comparative analysis of seasonal variation in macroscopic semen parameters of ganjam bucks

In the present experiment, average volume of semen of the different bucks were 0.42 ± 0.01 , 0.44 ± 0.12 , 0.42 ± 0.02 , 0.43 ± 0.01 , 0.43 ± 0.02 and 0.42 ± 0.01 ml, respectively in season 1 and 0.78 ± 0.04 , 0.76 ± 0.01 , 0.80 ± 0.04 , 0.79 ± 0.02 , 0.74 ± 0.01 and 0.76 ± 0.01 ml, respectively in season 2. The mean value of pH of semen as 6.35 ± 0.03 , 6.35 ± 0.03 , 6.35 ± 0.03 , 6.27 ± 0.05 and

6.32 ± 0.06 were recorded for bucks B1 to B6, respectively in season 1. The corresponding values in season 2 were 6.28 ± 0.04 , 6.35 ± 0.03 , 6.32 ± 0.04 , 6.35 ± 0.03 , 6.38 ± 0.03 and 6.33 ± 0.03 , respectively in season 2. The present findings were similar to the reports given by Chemineau (1987) and Pattanaik *et al.* (1991).

Comparative analysis of seasonal variation in microscopic semen parameters of ganjam bucks

The average value of individual motility (%) of sperm of each bucks estimated in season 1 at the time of commencement of the research were 81.33 ± 0.62 , 81.00 ± 0.97 , 79.00 ± 2.00 , 79.83 ± 1.64 , 78.50 ± 1.65 and 76.50 ± 1.47 , respectively and the corresponding values in season 2 were 80.67 ± 1.02 , 80.00 ± 1.07 , 80.33 ± 1.02 , 81.17 ± 0.91 , 79.83 ± 1.92 and 83.17 ± 1.19 , respectively. In the present experiment, average value of concentration ($\times 10^9/\text{ml}$) of sperm of the different bucks were 2.44 ± 11.87 , 2.48 ± 25.18 , 2.56 ± 15.63 , 2.59 ± 22.75 , 2.62 ± 34.13 and 2.70 ± 33.53 , respectively in season 1 and 3.48 ± 37.27 , 3.59 ± 21.13 , 3.73 ± 23.77 , 3.80 ± 20.03 , 3.88 ± 4.19 and 3.95 ± 10.02 , respectively in season 2. The mean value of live % of sperm as 83.83 ± 1.40 , 83.67 ± 0.76 , 85.00 ± 0.93 , 85.00 ± 0.73 , 84.67 ± 0.72 and 84.0 ± 1.29 were estimated for bucks B1 to B6, respectively in season 1 and 85.83 ± 1.35 , 86.00 ± 0.73 , 87.17 ± 0.79 , 86.83 ± 0.79 , 86.17 ± 0.70 and 86.50 ± 1.23 , respectively in season 2. Average values of mass activity of sperm for the different bucks were 3.82 ± 0.14 , 3.75 ± 0.12 , 3.78 ± 0.12 , 3.75 ± 0.16 , 3.57 ± 0.09 and 3.18 ± 0.05 , respectively in season 1 and corresponding values of 3.72 ± 0.13 , 3.93 ± 0.04 , 3.75 ± 0.16 , 3.82 ± 0.12 , 3.98 ± 0.02 and 3.87 ± 0.08 , respectively in season 2. The present findings were in agreement to the observations of Biswas *et al.* (2002).

Comparative analysis of seasonal variation in abnormalities and acrosome integrity of ganjam buck semen

The mean value of sperm abnormalities of each bucks recorded in season 1 at the time of commencement of the research were 5.58 ± 0.65 , 5.61 ± 0.47 , 5.60 ± 0.46 , 6.90 ± 0.48 , 7.30 ± 0.19 and 7.10 ± 0.24 , respectively. The corresponding values in season 2 were 5.28 ± 0.54 , 6.38 ± 0.55 , 6.03 ± 0.61 , 6.07 ± 0.57 , 6.45 ± 0.35 and 6.30 ± 0.27 , respectively. The average value of acrosomal integrity (%) of sperm as 71.50 ± 0.62 , 71.50 ± 0.62 , 72.00 ± 0.58 , 73.17 ± 0.48 , 72.00 ± 0.58 and 73.33 ± 0.67 were recorded for bucks B1 to B6, respectively in season 1 and 73.00 ± 0.36 , 73.67 ± 0.56 , 73.50 ± 0.50 , 74.83 ± 0.31 , 72.83 ± 0.31 and 74.67 ± 0.76 , respectively in season 2. The present findings were similar to the observations of Kaymakci *et al.* (1988); Khalili *et al.* (2009) and Sundararaman *et al.* (2016).

Comparative seasonal variation in mbrt and host of ganjam buck semen

In the present experiment, mean value of MBRT of each Ganjam buck semen as 5.03 ± 0.13 , 4.78 ± 0.23 , 4.33 ± 0.09 ,

4.30±0.15, 4.22±0.11 and 4.55±0.09 min were recorded, respectively in season 1 and the corresponding values in season 2 were 4.05±0.16, 3.65±0.15, 3.53±0.50, 3.45±0.17, 3.47±0.08 and 3.67±0.13, respectively. The mean value of HOST of each bucks recorded in season 1 at the time of commencement of the research were 54.83±0.95, 53.67±0.76, 55.83±0.7, 54.00±0.93 55.50±1.06 and 55.50±0.96 sec, respectively and 57.33±0.96, 55.67±0.50, 58.17±0.95, 56.00±1.61, 59.17±1.17 and 58.50±1.23 sec, respectively in season 2. The present findings were in agreement to the observations of Kaymakci *et al.* (1988); Khalili *et al.* (2009) and Sundararaman *et al.* (2016).

CONCLUSION

The mean value of reaction time, frequency of Flehmen's Reaction, libido, volume of semen, concentration of sperm and value of MBRT of each of the six bucks were significantly higher ($p<0.01$) in the season 2. The mean of each of the six bucks did not show any significant difference between two seasons with respect to pH and live % of sperm. Buck B6 recorded a significantly higher ($p<0.01$) individual motility of sperm in season 2 than of season 1. Buck B5 and B6 recorded a significantly higher ($p<0.01$) mass activity of sperm in season 2 than of season 1, whereas buck B1, B2, B3 and B4 did not show any significant difference between the two seasons with respect to mass activity of sperm. Buck B2 and B4 recorded a significantly higher ($p<0.05$) acrosomal integrity in season 2 than season 1. Buck B5 evaluated a significantly higher ($p<0.05$) HOST in season 2 than season 1.

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Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Informed consent

All animal procedures for experiments were approved by the Committee of Experimental Animal care and handling techniques were approved by the University of Animal Care Committee.

Conflict of interest

Authors declare no conflict of interests for this article.

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