STUDIES ON SCROTAL BIOMETRY, EJACULATE CHARACTERISTICS AND FERTILITY IN ONGOLE BULLS

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ABSTRACT

Scrotal biometry and ejaculate characteristics were studied in 25 Ongole breed bulls stationed in a Livestock Research Station and correlated them with fertility. The scrotal and testicular measurements revealed mature size by 5 years of age. A significant difference was observed between bulls in relation to various ejaculate characteristics like mass activity, initial motility, live sperm count and sperm abnormalities. The mean fertility rate to first insemination was found to be 71.63%. It was further observed that scrotal biometry, sperm concentration, progressive motility and live sperm count were positively correlated to first AI conception rate in cows.

Key words: Ongole bulls, Testicular measurement, Ejaculate characteristics, Fertility.

INTRODUCTION

Selection of best ejaculates is an essential prerequisite for successful freezing of semen. Studies on scrotal biometry, ejaculate characteristics as well as fertility will help in selection and ranking of bulls in a planned breeding programme. Comprehensive data on scrotal biometry, semen characteristics and their relationship on fertility was found to be scanty in Ongole bulls. The present study was therefore conducted to assess the scrotal and testicular biometry, ejaculate characteristics and fertility in Ongole (*Bos indicus*) bulls.

MATERIALS AND METHODS

The study was conducted during the period between March and August 2005 at Livestock Research Station, Lam, Guntur, Andhra Pradesh. Twenty five Ongole breed bulls of 3-10 years age (average age 84.56 ±5.36 months and body weight 715.76 ± 24.77 kg), 250 ejaculates (10 from each bull) and 12 insemination doses from each bull were utilized to evaluate scrotal biometry, various ejaculate parameters and fertility. The scrotal circumference (cm) was measured at its maximum horizontal level using a measuring tape after pressing the testicles to the lower part of the scrotum with left hand. The length and width of testes were measured in cms with the help of vernier caliper (Hahn *et al.*, 1969) taking care to exclude the epididymis while measuring the length. All the bulls were maintained under uniform conditions of housing, feeding and management through out the experimental period. They were fed 20-25 kg chopped green fodder (*Sorghum bicolor or Pennisetum purpereum)*, 5-6 kg paddy straw and 2kg concentrate ration daily. Water was available at libidum. Bulls were housed in individual pens. Semen was collected from each bull once a week in artificial vagina using a bull of same species as dummy. Each time two ejaculates were collected at a gap of 15-20 minutes after allowing one/two false mounts. Soon after collection the semen tubes were transferred to a water bath at 37° C. The pooled semen of both the ejaculates was then evaluated for the routine physio-morphological traits. The per cent live sperm and abnormal sperm were determined by Eosin-Nigrosin and Williams method of staining, respectively. After initial evaluation, the semen samples were diluted in Tris fructose egg yolk citrate glycerol extender so as to provide 40 million sperms per dose of 0.5 ml straw. The straws were filled and sealed manually, equilibrated at 4° C for 6 h in a cold handling cabinet and then freezing was done manually by exposing the straws to liquid nitrogen vapours (rapid horizontal freezing) in a wide mouthed cryo container. Finally the straws were transferred into pre cooled goblets to be plunged into liquid nitrogen. Thawing of straws was done at 37° C for 30 seconds. The progressive motility was estimated before freezing and post - thawing. Twelve frozen-thawed semen doses from each bull were inseminated to normal fertile cows and

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heifers over a period of one year taking due care that semen of all the bulls was used in each season and conception rate to first insemination after 45-60 days was determined by per rectal palpation. The data collected was analyzed as per the procedure described by Snedecor and Cochran (1989).

RESULTS AND DISCUSSION

The average body weight and biometry of scrotum and testes in relation to age in Ongole bulls is shown in Table. A significant (P<0.01) positive correlation was observed between age and body weight (r=0.86). In the present study, the body weight increased linearly from 468.80 ± 30.07 kgs in bulls of 3-5 years age group to 831.00 ± 1.00 kgs in bulls of above 9 years age. In line with our observation, Rao *et al.* (1992) reported that the body weight in Ongole bulls increased with age, then slow down as mature body weight is reached and finally decreased at later stages. The mean scrotal circumference and testicular measurements did not vary significantly (P>0.05) between age groups which might be because many bulls had already reached the mature age at the time of experiment. In keeping with our results Rao *et al.* (1992) observed that the scrotal circumference reached maximum level by 5.5 years after which it decreased with advancing age. Our results further suggest positive but non–significant (P>0.05) correlation of scrotal circumference with age (r =0.34) and body weight (r=0.31) as has been reported by Matharoo *et al.* (1994). The mean testicular measurements (length and width) in this study were found to be lesser than the values reported by Rao *et al.* (1992) in Ongole bulls and their crosses. Variations in the age, nutrition, management, selection intensity and genetics might contribute to differences in the testicular and scrotal biometry between various reports.

The overall mean ejaculate volume, mass activity, initial motility, sperm concentration, live sperm count and total sperm abnormalities were 5.78 ± 0.29 ml, 2.95 ± 0.05, 75.0 ± 0.35%, 1337.8 ± 12.39 millions/ml, 80.03 ± 2.89% and 8.08 ± 0.10%, respectively. There was a significant difference (P<0.01) between bulls but not between collections in relation to mass activity, initial motility, live sperm count and sperm abnormalities.

The ejaculate volume observed in this study was found to be higher than that reported by Rao *et al.* (2000), but was similar to the report of Raju and Rao (1982). Lagerlof (1934) reported that the mean ejaculate volume vary with breed, age, body weight, level of nutrition and method of semen collection. The mean ejaculate volume (range 2.12 ± 0.20 to 7.85 ± 1.04) in this study neither differed (P>0.05) between bulls nor between collections, presumably due the fact that 80% of bulls (20/25) had crossed mature age. The mass activity (range 2.03 to 3.60) and the initial motility (range 61.00 ±1.00 to 83.3 ± 0.83%) were found to be in agreement with the reports of Veeraiah *et al.* (1999) in the Ongole bulls. Initial motility is an important quality parameter to further process the semen samples for freezing and this characteristic has been reported to be positively correlated with keeping quality, freezability and fertility (Shelke and Dhami, 2001). The sperm concentration (range 973 to 1625 millions /ml), which is another important indicator of semen quality, was in accordance with the report of Veeraiah *et al.* (1999) but much higher than the observation of Rao and Rao (1980) in the same breed. The reasons for contradictory reports might be due to differences in age, season and interval between collections.

Of the total sperm abnormalities, the mean percentage of head, mid piece and tail abnormalities included 2.50 ±0.04, 1.04 ± 0.03 and 3.54 ± 0.05, respectively. These results were in accordance with the observations of Rao and Rao (1980) and Veeraiah *et al.* (1999) in Ongole bulls.

The mean percentage of pre-freeze and post - thaw motility was found to be 68.32 ± 1.73 and 58.24 ± 1.92. The post-thaw motility was found to be significantly lower (P<0.05) than pre-freeze motility. Veeraiah *et al.* (1999) reported similar pre-freeze motility but less than 50% post - thaw motility in Ongole bulls. Similarly, Surya Prakash and Rao (1993) observed less than 50% post-thaw motility in various exotic breeds and their crosses. The variations in reported post-thaw motility might be due to various freezing techniques and differences in the concentration of glycerol and egg yolk.

The mean fertility rate to first insemination was found to be 71.63 % (range 52.00 to 85.00%) with a significant positive (P<0.01) correlation to scrotal circumference (r=0.67), sperm concentration (r=0.47), progressive motility (r=0.46) and % live sperm count (r=0.52). Our results on fertility are similar to those of Selvaraju and Veerapandian (2004) in HF and cross bred bulls. However, Rao *et al.* (2000) observed less than 50% fertility in Ongole bulls.

From the results of the present study it may be concluded that under uniform conditions of management the body weight in Ongole bulls increased linearly with advancing age and the scrotal measurements reach

mature size by 5 years. It was further observed that ejaculate characteristics like sperm concentration, progressive motility and live sperm count are the important determinants of bull fertility.

Table : Body weight and biometry of scrotum and testes in relation to age in Ongole bulls.

S. No.	Parameter	Age group (No. of bulls)				Overall Mean ± SE
		3-5 years (5)	5-7 years (8)	7-9 years (10)	>9 years (2)	
1	Body weight (Kg)	468.80 ± 30.07^{a}	721.50 ±13.05^{b}	795.40 ± 11.20^{c}	831.00 ± 10.10^{c}	715.76 ± 24.77
2	Scrotal circumference (cm)	38.00 ± 0.63^{a}	36.62 ± 1.07^{a}	35.70 ± 0.47^{a}	37.5 ± 3.5^{a}	36.68 ± 0.49
3	Testes length (cm)	15.82 ± 0.32^{a}	12.86 ± 0.35^{a}	13.53 ± 0.26^{a}	16.00 ± 0.82^{a}	13.77 ± 0.24
4	Testes width (cm)	9.97 ± 0.19^{a}	8.46 ± 0.35^{a}	9.89 ± 1.25^{a}	11.01 ± 0.47^{a}	9.83 ± 0.56

Means bearing different superscripts with in a row vary significantly (P<0.05)
Figures in parenchesis indicate no. of bulls

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