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Correlation coefficients between semen production traits of Murrah buffalo bulls

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Abstract

Frozen semen of Murrah bull is extensively used for augmenting milk production among the local buffaloes in our country. The present study was undertaken to find out the correlation between various semen production traits in Murrah buffalo bulls. The data on semen production traits like semen volume, initial motility and sperm concentration were collected for first and second normal ejaculates. The first and second ejaculates were pooled for the preparation of total doses of frozen semen per collection. The records of 4563 collections each for first ejaculate and second ejaculate from 53 Murrah bulls, spread over a period of five years from 1996 to 2000 were studied. Correlation co-efficient between various semen production traits were calculated by standard procedure. The correlation coefficients between semen production traits were generally high and positive except between volume and sperm concentration for first ejaculate (-0.609) and second ejaculate (-0.294).

Keywords: Buffalo, bull, murrah, semen, correlation

1. Introduction

The economic, social and cultural life of people in Asia largely depends on buffalo husbandry. The reproduction and productivity of buffaloes have a major influence on, and in some cases determine the standard of living of the small farmers and their families particularly in India. India possesses about 109.85 million buffaloes (BAHS, 2019) ^[1] and more than 50 per cent of the total milk production in our country is contributed by the buffaloes. There is a steady increase in the buffalo population in India which indicates its adaptability and suitability to the native environment. However majority of the buffaloes in our country are non-descript with an average milk yield of only 541 kg (272 days) per lactation compared to the average milk yield of 1597 kg from the recognized buffalo breeds (Murrah) of our country (Pundir and Sahai, 1997) ^[8]. Average yield per in milk animal from buffaloes during 2018-19 was 5.62 kg/day.

To augment the milk production, up-grading of non-descript buffaloes is of paramount importance for which the semen from the best breed of buffalo bulls should be made available to the buffalo breeders. Artificial insemination is now accepted as an essential tool for extensive use of best germplasm of selected males. In buffaloes, it has been observed that the Murrah buffaloes have been well adapted and performed well in various agro-climatic conditions of our country. Hence, the frozen semen of Murrah bull is extensively used for augmenting milk production among the local buffaloes in our country (Banerjee, 1991) ^[2]. The present study was undertaken to find out the correlation between various semen production traits in Murrah buffalo bulls.

2. Materials and Methods

The data on semen production traits like semen volume, initial motility and sperm concentration were collected for first and second normal ejaculates. The first and second ejaculates were pooled for the preparation of total doses of frozen semen per collection. The records of 4563 collections each for first ejaculate and second ejaculate from 53 Murrah bulls, spread over a period of five years from 1996 to 2000 were studied. The physical characteristics of semen i.e., semen volume, initial motility, sperm concentration, pre-freeze motility, post-thaw motility and total doses of frozen semen per collection were taken as semen production traits.

The statistical analysis was carried out by using least-squares procedure (Harvey, 1975) ^[6] wherever unequal and disproportionate numbers were encountered. Correlation co-efficient between various semen production traits were calculated following standard procedure of Snedecor and Cochran (1994) ^[11].

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3. Results and Discussion

3.1. First ejaculate

The first ejaculate volume, had a non-significant positive (0.417) correlation with motility (Table 1 above diagonal). Similar observations were noted by Saxena and Tripathi (1980) [9] and Dhama *et al.* (1995) [3]. However, the first ejaculate volume had a high negative (-0.609) correlation with sperm concentration. These findings were akin to the reports of Gopalakrishna and Rao (1979) [4], Porwal and Karandikar (1981) [7].

The correlation between motility and sperm concentration was positive (0.417) and significant for the first ejaculate. Similar positive significant correlation of motility with sperm concentration was also by Gupta *et al.* (1990) [5].

3.2. Second ejaculate

The correlation found between second ejaculate volume and motility were positive (0.627) and significant (Table 1 below diagonal). Similar observation was also obtained by Singh and Gangwar (1977) [10]. However, the second ejaculate

volume had a non-significant negative (-0.294) correlation with sperm concentration. But Saxena and Tripathi (1980) [9] and Gupta *et al.* (1990) [5] obtained significant and negative correlation between volume and sperm concentration.

The second ejaculate initial motility had very high positive (0.655) significant correlation with sperm concentration. A positive significant correlation of motility with sperm concentration was also noticed by Saxena and Tripathi (1980) [9] and Gupta *et al.* (1990) [5].

3.3. Correlation coefficients among frozen semen production traits

The correlation coefficients among frozen semen production traits are presented in Table 2. The correlation between pre-freeze motility and post-thaw motility was positive (0.354) and low but non-significant. Pre-freeze motility and total doses of frozen semen (TDFS) had a positive (0.701) and significant correlation. Post-thaw motility had a low and positive (0.326) significant correlation with total doses of frozen semen per collection.

Table 1: Correlation coefficients (\pm S.E) among semen production traits of Murrah bulls

Semen production traits (n=4563)	Volume	Motility	Sperm concentration
Volume	-	0.417 ^{NS} (0.01)	-0.609 ^{**} (0.01)
Motility	0.627 ^{**} (0.01)	-	0.612 ^{**} (0.01)
Sperm concentration	-0.294 ^{NS} (0.01)	0.655 ^{**} (0.01)	-

First ejaculate above diagonal and second ejaculate below diagonal, Figures in parentheses indicate S.E.

^{**} Highly significant ($P \leq 0.01$); ^{NS} Not significant ($P \geq 0.05$)

Table 2: Correlation coefficients (\pm S.E) among frozen semen production traits of Murrah bulls

Frozen semen production traits (n=4563)	Volume	Motility	Sperm concentration
Pre-freeze motility	-	0.354 ^{NS} (0.01)	0.701 ^{**} (0.23)
Post-thaw motility	-	-	0.326 ^{**} (0.01)
Total doses of frozen semen per collection	-	-	-

Figures in parentheses indicate S.E. ^{**} Highly significant ($P \leq 0.01$) ^{NS} Not significant ($P \geq 0.05$)

4. Conclusions

In the first ejaculate, correlation between volume and motility was positive and non-significant where as volume and sperm concentration had negative and highly significant correlation. Positive and significant correlation between motility and volume, and negative and non-significant correlation between sperm concentration and volume were observed in the second ejaculate. The correlation between motility and sperm concentration was positive and highly significant in both the ejaculates. Among frozen semen production traits pre-freeze and post-thaw motility had positive and non-significant correlation. But both pre-freeze and post-thaw motility had positive and significant correlation with total doses of frozen semen per collection.

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