SEMEN PROFILE AND MORPHOLOGY OF FRIESIAN X BUNAJI BULL

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ABSTRACT

A study was conducted at the Artificial Insemination unit of National Animal Production Research Institute, Ahmadu Bello University, Shika-Zaria to determine the semen characteristics and morphology of Friesian x Bunaji bull. Three Friesian x Bunaji bulls between 2-3 years of age were used for the experiment and were intensively managed. Semen was collected from the three bulls with the aid of an artificial vagina. Parameters considered included; volume (pooled together), gross motility, semen pH, sperm concentration, viability, normal sperm, free tail, mid piece droplet, detached head, coiled tail and bent tail. Data collected was analysed using ANOVA of SAS. Significant means were compared using DMRT. The result showed that pooled semen volume was between 2.4 to 14.5 ml, gross motility was between 90 and 95 %, semen pH was between 6 to 7, sperm concentration ranged between 314 and 649 $\times 10^6$ and viability between 60 and 95 %. Sperm morphology was as follows mid piece droplet; 0 and 1, detached head; 4 and 13, free tail; 0 and 7, coiled tail; 2 and 7, bent tail; 0 and 15 and normal sperm; 64 and 88 respectively. In conclusion the semen profile from this study depicted good quality which can be used to service a female cow on heat with high chances conception.

Keywords: Semen, Morphology, Friesian x Bunaji, Fertility.

INTRODUCTION

Main objective of the dairy farm in a cow-calf operation is to produce one calf from each cow annually. Meeting this goal influences net income of the farm. A crucial component of efficient calf production is high quality bull semen for successful fertilization and improved herd health (Swanson and Herman 1940). Herd fertility is a combination of genetic and environmental factors. Physical and chemical properties of bull semen particularly ejaculate volume, density, pH and motility may influence herd fertility and play important role in successful dairy operation. Wide variations exist in properties of semen among different bulls as well as different ejaculates of the same bull. The fertilizing capacity of semen also depends on the quantity and quality of semen. There are many factors associated with the quantity and quality of semen output of which normal sperm morphology is one of the most important considerations. The quality of semen in relation to fertility is determined by the morphological features of spermatozoa, percentage of live spermatozoa concentration and motility of spermatozoa and the ejaculated volume. The length and breadth of sperm cell add to the quality in respect of fertilizing capacity.

MATERIALS AND METHODS

The study was conducted at the Artificial Insemination unit of National Animal Production Research Institute, Ahmadu Bello University, Shika-Zaria to determine the semen characteristics of Friesian x Bunaji bull. Three Friesian x Bunaji bulls between 2-3 years of age were used for the experiment. The bulls were kept under intensive management system. The bulls were fed a concentrate diet at 1.5% and hay at 2.5% body weight per head per day. Water and

mineral salt were provided *ad-* libitum. The bulls were sprayed weekly with acaricides against ectoparasites. Semen was collected from the three bulls with the aid of an artificial vagina weekly for five weeks. Parameters considered included; volume (pooled together), gross motility, semen pH, sperm concentration, viability, normal sperm, free tail, mid piece droplet, detached head, coiled tail and bent tail. Data collected was analysed using ANOVA of SAS. Significant means were compared using DMRT.

RESULTS AND DISCUSSION

Table 1 shows the semen characteristics of Friesian x Bunaji bull. The result showed that pooled semen volume was between 2.4 to 14.5 ml, gross motility was between 90 and 95 %, semen pH was between 6 to 7, sperm concentration ranged between 314 and 649 $\times 10^6$ and viability between 60 and 95 %. Sperm morphology was as follows mid piece droplet; 0 and 1, detached head; 4 and 13, free tail; 0 and 7, coiled tail; 2 and 7, bent tail; 0 and 15 and normal sperm; 64 and 88 respectively. The overall mean value of pooled semen volume was 7.8±1.6. Lower volume of semen observed by Dhami *et al.* (2001), reported that the ejaculate volume of Jersey and Holstein-Friesian was 5.28±0.21, 6.75±0.44 respectively. This variation could be attributed to breed, feed, environment and frequency of ejaculation. The overall mean of gross motility (%) was 92±0.5. The motility of sperm (%) in this study was higher than the study of Dhami *et al.* (2001) reported that the sperm motility of Jersey, Holstein-Friesian was 65.83±7.96% and 64.50±4.12% respectively. The high gross motility recorded in this study could be attributed to age, improved genetic potential due to crossbreeding, good nutrition and management. The overall mean pH value was 6.2. The semen pH of the present study was lower than that of Dhami *et al.* (2001). They described that semen pH of Jersey and Holstein Friesian was 6.77±0.04 and 6.61±0.04 respectively. The value for pH obtained in this study corroborates the fact that semen is slightly acidic in nature ranging between 6 and 7. It has been shown that pH of 6 – 7 are suitable for liquid storage of bovine semen with good motility scores (Foote *et al.*, 2002). The overall mean concentration of semen was 462.3±30.6. This is a parameter used to evaluate the quality and fertility of semen of animals as the higher the concentration of sperm cells in the semen the higher the chances of fertilization (Singh *et al.*, 2012). Sperm production on any day is also dependent on the collection frequency and the intensity of the sexual stimulation employed (Karolina, 2012). The overall mean viability (%) was 81±2.7. The viability of sperm cells in a semen sample is a strong parameter used to determine the quality as well as fertility of the semen (Singh *et al.*, 2012). Semen samples are expected to have not less than 70% viable sperm by vital stain assay (Saacke *et al.*, 1994). Sperm morphology is very important to ascertain the abnormalities. It is known that abnormalities in the sperm cell can bring about decreased ability to reach the site of fertilization, inability to fertilize oocytes, or inability to sustain embryonic development (Gordon, 2004). However, the morphological abnormalities of spermatozoa could be primary, secondary or tertiary. Primary abnormalities are due to the failure of spermatogenesis whereas secondary abnormalities occur during the passage of spermatozoa through epididymis (Bishop, 1972)

CONCLUSION

It can be concluded from the present study that the semen characteristic and morphology of Friesian x Bunaji bull were of good quality as they had high values depicting good quality semen which can be used for artificial insemination with probable high chances of conception.

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Table 1: Summary of Friesian x Bunaji bull semen characteristics.

Characteristics	Mean±SE	Coefficient of Variation (%)	Minimum	Maximum
Pooled semen volume (ml)	7.8±1.6	38.9	2.4	14.5
Gross motility (%)	92±0.5	2.7	90	95
Semen pH	6.2	6.58	6	7
Sperm Concentration ($\times 10^6$)	462.3±30.6	33.3	314	649
Viability (%)	81±2.7	16.6	60	95
Sperm Morphology (%)				
MPD	0±0.1	223.6	0	1
DH	9±0.7	36.9	4	13
FT	3±0.6	120.4	0	7
CT	4±0.4	53.0	2	7
BT	6±1.1	92.1	0	15
NS	78±1.8	11.6	64	88

Standard Error = SE, Normal Sperm =NS, Free Tail=FT, Mid Piece Droplet =MPD, Detached Head=DH, Coiled Tail=CT and Bent Tail=BT.