



Factors affecting semen quality of Indigenous bulls

PA Deshmukh¹, Divya P², SH Sontakke³, JR Khadase⁴

¹⁻⁴ Research Officer, Department of Frozen Semen Laboratory, CRS-BAIF, Urulikanchan, Pune, Maharashtra, India

Abstract

The presented study was conducted at BAIF CRS, Uruli kanchan. Good quality semen is a primary requirement in breed improvement and conservation programme. In India there is an acute shortage of frozen semen doses of Indigenous cattle. BAIF Development Research Foundation is an NGO dedicated in rural development and cattle improvement programme in India. The semen station of BAIF maintains pure indigenous bulls and the semen doses are distributed in the field. Semen is being collected from 13 indigenous breeds. This study aimed to evaluate the different factors that affect the semen quality of the indigenous bulls. Information on 12139 ejaculates of 65 bulls over a period of 6 years was used for the study. The effects of factors viz., such as season of collection, year of collection, breed, ages of the bulls, ejaculation number and Collector on semen volume, semen concentration and approved number of straws were done using general linear model analysis. The analysis revealed a high significant ($P \leq 0.01$) effect of year of collection, breed, ages of the bulls, ejaculation number and Collector on semen volume and semen concentration. Season had no significant effect on semen concentration. The volume was higher during summer season (5.29 ± 0.53 ml) compared to the other two seasons. Same was reflected in case of approved straws with higher number of approved straws of 186 ± 54.56 . There was an increasing trend in semen concentration over the year but reverse was found in case of volume where the values were found to be decreasing. The concentration was highest during 2014 (1361.71 ± 133.23 millions /ml) and volume was highest during 2011 (5.67 ± 0.53 ml). Approved straws were highest during 2011. Among the 13 breeds highest concentration was found to be of Hallikar (1547.84 ± 128.33 million sperms/ ml) and lowest was for Gaolao (721.18 ± 463.96 million sperms/ml). The volume was highest for Ongole (6.20 ± 0.519 ml) and lowest in Hallikar (4.2 ± 0.51 ml). The number of approved straws was highest in case of Ongole and lowest for Amritmahal. The concentration and volume were the maximum for bulls of five and seven years of age respectively. First ejaculation was found to be better than second ejaculation with respect to all the three traits studied.

Keywords: Indigenous, BAIF, CRS, bulls, Factors

1. Introduction

Indigenous bulls are the most important breed which are used for dual purpose (milk/semen) in India. There are thirty seven recognized breeds of cattle in India, in addition to large number of non-descript cattle. They are well adapted to harsh environmental conditions and highly resistant to many tropical diseases with good heat tolerance ability. They are better disease resistance than exotic breeds, more suitable for low input management system and suitable for draught work. In India there is an acute shortage of frozen semen doses of Indigenous cattle. Good quality semen is a primary requirement in breed improvement and conservation programme. Studies related to seminal attributes and freezability in this species is meager and preliminary. However, the most important and cheapest way of increasing production is crossing the indigenous cattle with exotic type. Concerning the breeding techniques artificial insemination is the best solution from several points of view. Good quality of semen is critically important for successful artificial insemination. So this particular study we have given emphasis for different factors affecting semen quality in indigenous bulls. Several different factors we had studied in this work. Variations in bull semen quality under varying conditions such as season, Age of the bull, semen collector and year of collection. The effects of factors viz., season of collection, year of collection, breed, and ages of the bulls, ejaculation number and

Collector on semen volume, semen concentration and approved number of straws were done using general linear model analysis. The analysis revealed a high significant ($P \leq 0.01$) effect of year of collection, breed, ages of the bulls, ejaculation number and collector on semen volume and semen concentration. The studied animals are collected from different origin places.

Table 1: Studied animal and their origin places

Sr no	Breeds	Origin Place
1	Amritmahal	Karnataka
2	Dangi	Western Maharashtra
3	Hallikar	Karnataka
4	Khillar	Maharashtra
5	Krishna valley	Southern Maharashtra & Andhra Pradesh
6	Nimari	Madhya Pradesh & Maharashtra
7	Ongole	Andhra Pradesh
8	Red kandhari	Maharashtra & Karnataka
9	Sahiwal	Undivided India
10	Tharparkar	Rajasthan & Pakistan
11	Gir	Gujarat & Maharashtra

2. Materials and Method

The data was collected from CRS-BAIF developmental research foundation. All studied indigenous breed are maintained in CRS-

BAIF. A total 12139 ejaculates of 65 bulls over a period of 6 years was used for the study. The bulls were healthy, free from diseases, sexually mature, good libido and clinically normal. All the bulls were vaccinated against FMD, HS & BQ annually.

2.1 Statistical analysis

The recorded data were subjected to statistical analysis using general linear model (SPSS15.0).

2.3 Factors of analysis- In this study total five factors & three traits were studied viz., Season -Classification of season- June-September (Rainy Season), October-January (winter), February-May (summer)

Year of collection- (2010-2016)

Breed-Total 11 breeds were studied Amritmahal, Dangi, Gir, Hallikar, Khillar, Krishna Valley, Nimari, Ongole, Red Kandhari, Sahiwal, Thaparkar

Age of the bull, Semen collector. & Concentration, Volume, approved straw respectively.

Table 1: Means ± S.E. for effect of season, year of collection, breed, age of bulls and collector on semen quality parameters

Factors	Trait	Sperm Concentration (million cells/ ml)	Semen Volume (ml)	Approved Straws
	Over all	1435.6 ± 5.1	5.8 ± 0.0	392.0 ± 2.2
Season	Rainy	1504.9 ± 40.0	5.8 ± 0.2 ^a	387.8 ± 16.9 ^a
	Summer	1493.0 ± 40.7	6.1 ± 0.2 ^b	400.1 ± 17.2 ^b
	Winter	1481.6 ± 40.3	5.9 ± 0.2 ^{ab}	388.6 ± 17.0 ^{ab}
	Sig	NS	S*	S** (1% significant)
Year of Collection	2010	1421.0 ± 44.2 ^a	7.0 ± 0.2 ^c	457.5 ± 18.7 ^c
	2011	1429.2 ± 41.2 ^a	7.3 ± 0.2 ^d	471.4 ± 17.4 ^c
	2012	1434.8 ± 41.8 ^a	5.7 ± 0.2 ^c	354.2 ± 17.7 ^a
	2013	1536.1 ± 42.3 ^b	5.4 ± 0.2 ^b	357.0 ± 17.9 ^a
	2014	1602.4 ± 43.5 ^c	5.8 ± 0.2 ^c	410.5 ± 18.4 ^b
	2015	1470.2 ± 42.3 ^a	5.1 ± 0.2 ^a	352.5 ± 17.9 ^a
	2016	1456.4 ± 40.3 ^a	5.1 ± 0.2 ^a	348.6 ± 17.0 ^a
	Sig	S**	S**	S**
Breed	Amritmahal	1174.3 ± 42.2 ^a	5.4 ± 0.2 ^b	286.8 ± 17.8 ^a
	Dangi	1632.9 ± 64.1 ^{ef}	6.9 ± 0.3 ^{de}	442.5 ± 27.1 ^c
	Gir	1315.2 ± 41.7 ^{bc}	7.0 ± 0.2 ^f	430.6 ± 17.6 ^d
	Hallikar	1659.4 ± 41.9 ^f	4.7 ± 0.2 ^a	347.5 ± 17.7 ^{ab}
	Khillar	1510.5 ± 39.7 ^{de}	5.9 ± 0.2 ^{bc}	386.7 ± 16.8 ^{bc}
	Krishna Valley	1612.5 ± 50.4 ^{ef}	4.2 ± 0.2 ^a	308.9 ± 21.3 ^b
	Nimari	1487.9 ± 54.1 ^{cd}	5.1 ± 0.2 ^b	333.5 ± 22.9 ^b
	Ongole	1545.1 ± 47.4 ^{cd}	7.2 ± 0.2 ^{cd}	500.2 ± 20.0 ^c
	Red Kandhari	1375.8 ± 55.1 ^b	6.6 ± 0.2 ^e	387.0 ± 23.3 ^{ab}
	Sahiwal	1550.6 ± 40.6 ^{def}	6.9 ± 0.2 ^c	498.8 ± 17.2 ^d
	Tharparkar	1574.1 ± 50.9 ^{def}	5.0 ± 0.2 ^b	371.2 ± 21.5 ^c
Sig	S**	S**	S**	
Age of the Bull	3 yrs	1469.9 ± 41.3 ^b	5.6 ± 0.2 ^b	347.5 ± 17.5 ^a
	4 yrs	1484.8 ± 41.0 ^b	5.8 ± 0.2 ^{bc}	389.6 ± 17.3 ^b
	5 yrs	1547.4 ± 41.8 ^c	5.3 ± 0.2 ^a	356.2 ± 17.6 ^a
	6 yrs	1478.24 ± 41.9 ^b	5.9 ± 0.2 ^c	388.3 ± 17.7 ^b
	7 yrs	1452.1 ± 41.9 ^{ab}	6.1 ± 0.2 ^d	416.3 ± 17.7 ^{cd}
	8 yrs	1401.2 ± 42.6 ^a	6.6 ± 0.2 ^c	436.4 ± 18.0 ^d
	9 yrs	1453.8 ± 42.9 ^{ab}	6.2 ± 0.2 ^d	413.16 ± 18.1 ^c
	Sig	S**	S**	S**
Collector	1	1494.5 ± 11.5 ^b	6.3 ± 0.0 ^d	428.9 ± 4.9 ^d
	2	1471.9 ± 11.2 ^{ab}	5.8 ± 0.0 ^c	387.9 ± 4.7 ^{cd}
	3	1427.02 ± 29.3 ^{ab}	5.6 ± 0.1 ^{bc}	331.1 ± 12.4 ^{ab}
	4	1379.6 ± 20.2 ^a	5.7 ± 0.1 ^{bc}	378.2 ± 8.5 ^c
	5	1468.87 ± 14.6 ^{ab}	5.4 ± 0.1 ^b	349.6 ± 6.2 ^{abc}
	6	1497.9 ± 43.9 ^b	4.9 ± 0.2 ^a	318.6 ± 18.5 ^a
	7	1407.2 ± 40.3 ^{ab}	6.0 ± 0.2 ^{cd}	365.9 ± 17.0 ^{bc}
	Sig	S**	S**	S**

4. Result and Discussion

Mean of all factors viz., Season, Year of collection, Breed, Age of the bull & Collector. The Present study revealed a high significant (P≤0.01) effect of year of collection, breed, ages of the bulls, ejaculation number and Collector on semen volume and semen concentration.

4.1. Season

In table season is showing significance in semen volume as well as approved straw. In rainy season concentration quite high (1504.9 ± 40.0) compare to other two season. The Influence of season on semen volume and mass activity was significantly higher (P<0.05) during monsoon Mukesh *et al* (2009).

Ravimurugan *et al.* (2003) reported significant ($P < 0.01$) seasonal influence on ejaculate volume, motility and sperm concentration.

4.2. Year of collection

This factor is showing significance in semen concentration, Semen volume, approved straws of semen. In the year 2013-2014 the concentration of semen is quite high compare to others. In the year 2010-2011 volume of semen is more than other year production hence it will show higher significance in approved straw production.

Same was reflected in case of approved straws with higher number of approved straws of 186 ± 54.56 . There was an increasing trend in semen concentration over the year but reverse was found in case of volume where the values were found to be decreasing. The concentration was highest during 2014 (1361.71 ± 133.23 millions /ml) and volume was highest during 2011 (5.67 ± 0.53 ml). Approved straws were highest during 2011. Among the 13 breeds highest concentration was found to be of Hallikar (1547.84 ± 128.33 million sperms/ ml) and lowest was for Gaolao (721.18 ± 463.96 million sperms/ml). The volume was highest for Ongole (6.20 ± 0.519 ml) and lowest in Hallikar (4.2 ± 0.51 ml). Mathur *et al.* (2002) observed that there was no significant seasonal difference in mass motility,

5. Conclusion

The number of approved straws was highest in case of Ongole and lowest for Amritmahal. The concentration and volume were the maximum for bulls of five and seven years of age respectively. First ejaculation was found to be better than second ejaculation with respect to all the three traits studied. There is significant effect of the factors viz., breed, age of the bulls, year of collection and collector on semen concentration, volume and approved number of straws for freezing. Seasonal effect was significant on volume and approved straws but not on concentration. Within the breed, except in Sahiwal, the seasonal effect on concentration was non-significant within the drought breed, except in Hallikar, seasonal effect was non-significant indicating adaptation of these breeds to the extreme tropical climatic conditions.

The Present study revealed a high significant ($P \leq 0.01$) effect of year of collection, breed, ages of the bulls, ejaculation number and Collector on semen volume and semen concentration.

Season - Season had no significant effect on semen concentration. The volume was higher during summer season (5.29 ± 0.53 ml) compared to the other two seasons.

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