

Reproductive wastage rate of crossbred dairy bulls with reference to level of exotic inheritance and number of breed components

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ABSTRACT

Studies conducted on crossbred bulls to observe the impact of various levels of Holstein-Friesian inheritance and numbers of indigenous breeds components (Sahiwal, Red Sindhi, Tharparkar, Hariana) on the reproductive wastage rate of bulls, used in artificial insemination programme revealed that on over all basis, 8.36% bulls were culled due to non-donation of semen in artificial vagina, and only 41.11% bulls (out of those donated semen) produced freezable quality semen. As the number of indigenous breeds component increased, the number of crossbred bulls producing freezable quality semen decreased. Similarly, with the increase in exotic inheritance beyond 62.5%, the proportion of crossbred bulls producing freezable quality semen also decreased.

Key words: Reproductive wastage, crossbred bull, exotic inheritance

Evaluation of bulls for breeding soundness is an important aspect of reproductive management. It is based on combined information obtained through physical examination of bulls, health status of reproductive organs, sexual behavior and quality of semen. All the above mentioned characteristics varies with species, breeds, individuals and in crossbreds bulls it depends upon number of breeds involved in cross breeding level of inheritance thus selection/rejection of bulls in artificial insemination programme varies widely.

To keep pace with the enormous increase in crossbred cattle population in India, a sizeable number of bulls producing good quality semen is required to meet out the germ plasm need of breedable crossbred female population. Practically all the young bull calves reared as future breeding bull based on the pedigree or production performance, did not turn out to be the potential bulls with freezable quality semen producer. Scientific information under Indian condition is scanty (Rao and Rao 1991; Mathew *et al.*, 1982; Sagdeo *et al.*, 1992). In this paper a retrospective study has been conducted on Holstein-Friesian crossbred bulls to observe the effects

of various levels of exotic inheritance and numbers of breed components on the reproductive wastage rate of breeding bulls used in artificial insemination programme.

MATERIALS AND METHODS

The present investigation was carried out on the breeding bulls maintained from the year 1988 to 2000 at Bull Rearing Unit of this Directorate. The bulls were obtained in different years from the crossbred base population of various Military Farms as a part of 'Frieswal Project', started in the year 1987. Crossbreeding had started at Military farms since long and during the inception of 'Frieswal Project' majority of crossbred population had Holstein-Friesian as exotic and Sahiwal as indigenous inheritance. However, a very small population had the genetic mosaic of other indigenous inheritance viz. Tharparkar, Red Sindhi and Hariana along with Holstein Friesian X Sahiwal gene combinations. Accordingly, in this study crossbred bulls depending upon their genetic architecture were classified into 3 groups having 2, 3, and 4 or more breed components. Further more, within the various breed components 3 sub classifications were done depending upon the levels of exotic (Holstein-Friesian) inheritance viz. (i) less or equal

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to 62.5%, (ii) more than 62.5% but less than 70%, and (iii) more or equal to 70%. In these categories of bulls (a total of 335) multistage selection of animals in their different phases of reproductive life and reasons for their culling from semen freezing programme were investigated. The data were analysed using chi-square (χ^2) test (Amble, 1975).

RESULTS AND DISCUSSION

Only 118 out of 335 bulls produced satisfactory quality semen (initial motility = 60% with post thaw motility = 50%) and their semen doses were frozen, stored and utilized. A total of 28 bulls (8.36%) were culled between 6 to 24 months of age either due to death or transfer to other Military farms and poor health status. Hence, about 92% bulls were maintained over 2 years of age at Bull Rearing Unit and were trained to ejaculate semen in artificial vagina (AV) by giving prior stimulus to bulls. Culling rate between 6 to 24 months of age varied from 90.07 to 95.00% in various groups depending upon the number of breed components (Table 1). A reasonable number of crossbred bulls (6.5%, overall) did not donate semen in AV. The rate of non-donation of semen in AV was less (3.85%) in two breeds (HF X Sahiwal) components; however, it was on higher side (8.47 to 12.12%) in 3, 4 or more breeds component. Like present study, Rao and Rao (1991) reported that about 8.33% crossbred bulls did not respond to AV and hence their semen could not be collected. In the present investigation, 58.88% of bulls (out of those donated semen in AV) produced either unsatisfactory quality semen (initial motility <60%) not suitable for cryo-preservation or satisfactory quality semen that was subjected to cryo-preservation but the post-thaw motility was less than 50%. Such types of bulls were 54, 64 and 65.5% in 2, 3 and 4 or more breed components groups, respectively. The proportion of freezable quality semen producer bulls was highest in 2 breeds component (46%), followed by 3 (36%) and 4 or more (34.5%) breeds component groups, respectively, however, the differences were statistically non-significant ($\chi^2_{2df} = 3.12, P > 0.05$).

Information as well as plausible explanation on the influence on various breed components on the production of freezable quality semen in crossbred bulls

with multiple indigenous genetic mosaic is limited. Our earlier studies on crossbreeding experiments through AICRP indicated that in lactating crossbred cows the indigenous breeds component did not make any serious differences on the production performance, and involvement of more numbers of breeds did not show any additional advantage (Acharya, 1989) on increasing the production performance. The incidence of decrease in proportion of freezable quality semen producer crossbred bulls with increased involvement of more numbers of Indigenous breeds need to be substantiated through the evidence and experience from other crossbred bulls semen production stations.

When the impact of levels of exotic inheritance on the percentage of bulls producing freezable quality semen (i.e. whose semen doses were finally frozen) was studied, it was observed (Table 2) that the highest proportion of bulls (53.94%) were under the category having 62.5% or less HF inheritance, followed by >62.5 to <70% HF inheritance (42.46%) and 70% inheritance level (36.11%), respectively. The differences were statistically significant ($\chi^2_{2df} = 6.07, P < 0.05$). The obtained results indicated that with the increase in exotic inheritance beyond 62.5%, the percentage of bulls turned out to be the potential freezable quality semen producer decreased almost linearly. Our earlier studies in lactating dairy animals through AICRP also indicated that the ideal exotic inheritance is between 1/2 and 3/4, more close to 1/2 (Acharya, 1989). Crossbred animals having exotic inheritance beyond the ideal (1/2 - 3/4) level showed greater problems of adaptation and disease susceptibility. The same reason can also be imbibed as a reasonably good explanation for reduction in proportion of freezable quality semen producers bulls with increase in exotic inheritance. Like present study, in other crossbred bulls having 50 and 75% exotic inheritance, maintained at Lam Farm, Guntur about 47.92% bulls only produced satisfactory quality semen, however, the trends of freezability with increase in exotic inheritance was not reported in details (Rao and Rao, 1991). However, contrary to the present results, Mathew *et al.* (1982) reported that semen production and freezability reduced as the percentage of exotic blood (Brown Swiss) decreases in Indian crossbred bulls.

Table 1: Effect of Breed Components on reproductive wastage rate of crossbred bulls (Bulls born up to December, 1998 and completed 2 Years of age up to December, 2000)

Number of breed components	Number of animals	Died/transferred before 2 years of age	Maintained over 2 years of age	Not donated semen	Donated semen	Produced non freezable quality semen	Produced freezable quality semen	% Bulls produced freezable quality semen (out of donated)
2	169	13 (7.69%)	156 (92.31%)	6 (3.85%)	150(96.15%)	81 (54.00%)	69	46
3	131	13 (10.08%)	118 (90.07%)	10 (8.47%)	108 (91.53%)	69 (63.88%)	39	36.11
4 or more and unclassified	35	2 (5.71%)	33 (94.28%)	4 (12.12%)	29 (87.88%)	19 (65.52%)	10	34.48
Total	335	28 (8.36%)	307 (91.64%)	20 (6.51%)	287(83.49%)	169 (58.88%)	118	41.11

Table 2: Effect of various levels of Holstein-Friesian inheritance on reproductive wastage rate of crossbred bulls (Bulls born up to December, 1998 and completed 2 years of age up to December, 2000)

Holstein Friesian inheritance (%)	Number of breed components	Number of animals	Died/Transferred before 2 years of age	Maintained over 2 years of age	Not donated semen	Donated semen	Producing non freezable quality semen	Producing freezable quality semen	% Bull producing freezable quality semen (out of donated)
	2	9	1	8	0	8	4	4	50
< 62.5%	3	5	1	4	0	4	2	2	50
	4	5	0	5	0	5	2	3	60
	Total	19	2 (10.53%)	17 (89.47%)	0 (0%)	17 (100%)	8	9	52.94
	2	137	10	127	5	122	64	58	47.54
>62.5 to <70%	3	111	11	100	10	90	59	31	34.44
	4	9	1	8	1	7	3	4	57.14
	Total	257	22 (8.56%)	235 (91.44%)	16 (6.81%)	219 (93.81%)	126 (57.53%)	93	42.46
	2	23	2	21	1	20	13	7	35
70%	3	15	1	14	0	14	8	6	42.85
	4 or more	2	0	2	0	2	2	0	0
	Total	40	3 (7.50%)	37 (92.50%)	1 (2.70%)	36 (97.30%)	23 (63.89%)	13	36.11
Unclassified		19	1	18	3	15	12	3	20
	Grand Total	335	28 (8.36%)	307 (91.64%)	20 (6.51%)	287 (93.49%)	169 (58.88%)	118	41.11

The rejection rate due to semen characteristics and sexual performance was lowest (28.3%) in Brown Swiss, but it increased to 63.9, 73.8 and 76.9% with the decrease in Brown Swiss inheritance to 75%, 62.5% and 50% in crossbred bulls, respectively. Sagadeo *et al.* (1992) reported that 42.11% Indian crossbred bulls produced freezable quality semen with only one exotic component (Jersey) and 18.18% bulls only with more than one (Jersey, Holstein Friesian or Brown Swiss) exotic components. The above study (Sagadeo *et al.*, 1992) inferred that with increase in number of exotic breed components, numbers of bulls producing freezable quality semen decreased.

The crossbred bulls in the above study (Sagadeo *et al.*, 1992) had the genetic mosaic of various indigenous inheritance (12-37.5%) of Gaolao, Haryana, Gir and Khillar which was however, ignored and considered to be as a pool, where as, in the present study the crossbred bulls had one or more than one indigenous inheritance (Sahiwal, Tharparkar, Red Sindhi, Haryana) with a single exotic component (Holstein-Friesian). Interestingly, the present study also revealed that more the number of breed component, lesser the number of crossbred bulls producing freezable quality semen. Thus, from the present study it was concluded that with the increase in Holstein-Friesian inheritance beyond 62.5%, the proportion of crossbred

bulls producing freezable quality semen decreases. Inter mixing of more number of indigenous inheritance with a single exotic component was also a predisposing factor for high reproductive wastage rate of Indian crossbred bulls.

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REFERENCES

- Acharya, R. M. (1989). Crossbreeding cattle as an instrument to increase milk production in rural areas. *Indian J. Anim. Sci.*, **59**: 264-287.
- Amble, V. N. (1975). *Statistical methods in Animal Sciences*. Indian Society of Agricultural Statistics, New Delhi.
- Mathew, A., Joseph, P. J. and Jose, T. K., (1982). Semen characteristics of pure breed and crossbred bull. *Indian Vety. J.*, **59**: 364-367.
- Rao, K. Babu and Rao, A. R.. (1991). Evaluation of crossbred bulls for breeding soundness. *Indian J. Anim. Reprod.*, **12**: 111-113.
- Sagdeo, L.R., Chitnis, A. B. and Kaikii, A. S. (1992). Semen freezability in relation to single or multiple exotic genetic component in crossbred bull. *Indian J. Anim. Reprod.*, **13**: 131-133.