Production and reproductive performance of crossbred cattle in Coastal Maharashtra

B G Desai[1]*, R S Yadav[2], Shalu Kumar[1], R G Burte[1]and A J Mayekar[1]
[1]*Dr. B.S. Konkan Krishi Vidyapeeth (Agricultural University) Dapoli – 415712, Dist. – Ratnagiri, Maharashtra*
[2]*Department of Livestock Production and Management, Haryana Agricultural University, Hisar - 125004, Haryana*

ABSTRACT

The study was conducted to assess the production and reproductive efficiency of crossbred cattle (Dangi × Red Sindhi × Jersey). A total of 270 crossbred cattle were selected and their information regarding production and reproduction performances were collected from farm records maintained at Cattle Breeding Farm, Nileli, Dist. Sindhudurg, Maharashtra for a period of 15 years (1980 to 1994). Data representing 270 crossbred cattle from 657 total records of productive and reproductive performances for a period of 15 years (1980 to 1996) were analyzed to determine, Persistency Index (PI), Standard Lactation Milk Yield (SLMY), Peak Yield (PY), Days to Attain Peak Yield (DAPY), Wet Average (WA), Lactation Length (LL), Dry Period (DP), Service Period (SP), Gestation Period (GP) and Calving Interval (CI). The overall least squares mean of persistency index (162.65±0.83), standard lactation milk yield (1394.97±10.50), peak yield (8.61±0.05), days to attain peak yield (42.35±0.43), wet average (4.75±0.03), lactation length (302.01±1.58), dry period (81.77±1.65), service period (107.55±2.09), gestation period (279.14±0.30) and calving interval (387.58±2.18), respectively. Therefore, it may be concluded that crossbred cattle (Dangi × Red Sindhi × Jersey) cattle give optimum production and reproductive performance under coastal zone of Maharashtra.

Keyword: Crossbred cattle, productive and reproductive traits.
***Corresponding author:** headahds@gmail.com
Manuscript received: 18.1.2017; Manuscript accepted: 09.5.2017

INTRODUCTION

Maharashtra is believed to have the second largest livestock population state in India. This livestock sector has been contributing considerable portion to the economy of the country and still promising to rally round the economic development of the country. The total cattle population for the state is estimated to be about 16.2 million. Out of this the indigenous cattle constitute about 13.1 million and the remaining 3.1 million are crossbred cattle and 80.86 per cent of the total cattle in the state are local breeds and remaining are crossbred and exotic breeds that accounted for about 19.13 per cent, respectively (Anonymous, 2015).

The native dairy cattle have low genetic potentials for milk production, mature late and have a delayed conception coupled with long calving intervals. But, have excellent qualities such as adaptability to hot climatic conditions, resistance to diseases and general thriftiness under inferior feeding and managemental conditions (Japheth *et al.,* 2015). Whereas, high producing specialised dairy breeds from temperate region when introduced to tropical and subtropical zones generally have a reduced performance in terms of productivity and reproduction which may be due to lack of adaptability to hot climatic conditions and susceptible to tropical diseases. Under such circumstances (Thomas *et al.,* 2012), the productivity of indigenous animals could be increased by crossbreeding the low yielding nondescript cows with high yielding suitable exotic breeds for high milk yield, early sexual maturity and with sufficient capacity to withstand the direct and adverse effects of tropical climatic conditions.

The reproductive performance of breeding female is probably the single most important factor that is a prerequisite for sustainable dairy production system

Table 1. Nutrients composition of concentrate mixture.

Sr. No.	Concentrate mixture	Dry matter (%)	Crude protein (%)	Total digestible nutrients (%)
1.	Milch animals (Milk ration)	90.00	20.00	72.00
2.	Dry stock (Dry stock ration)	90.00	15.00	70.00

and influencing the productivity. Number of services per conception, days opens till conception and calving interval are important reproductive traits which are crucial for determining the profitability of dairy production (Alemayehu *et al.,* 2014).

Age at 1st service (AFS), age at 1st calving (AFC), birth weight (BW), total milk yield (TMY), average milk yield per day (AMYD), calving to 1st service interval (CSI) and calving interval (CI) are the important parameters that determine cattle productive and reproductive efficiency and these are important factors in terms of economics of dairy management (Dematawawa and Beger, 1998). Therefore, the objectives of the present investigation were to evaluate the productive and reproductive performance of crossbred cattle in coastal zone of Maharashtra, India.

MATERIALS AND METHODS

The data of 657 production and reproduction performance observations viz.,Persistency Index (PI), Standard Lactation Milk Yield (SLMY), peak yield (PY), days to attain peak yield (DAPY), wet average (WA), lactation length (LL), dry period (DP), service period (SP), gestation period (GP) and calving interval (CI) of crossbred cattle (Dangi × Red Sindhi × Jersey) generated at Cattle Breeding Farm, Nileli, Dist. Sindhudurga, Maharashtra in jurisdiction of the Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra State in India for the period of 15 years (1980 to 1996).The standard uniform feeding and management practices were provided throughout the experimental period to all the animals. All the animals were maintained under semi-intensive feeding system. Cows were fed with green and dry fodder by *ad libitum*. Concentrate mixtures were provided as per body requirements at rate 2 kg per cow per day for maintenance ration and 0.5 kg concentrate for per kg of milk at milking time. The feeds along with their nutrient content provided to the herd during experimental period in different seasons are given in Table. 1 and 2. Seasonal proximate analysis for estimating nutrient content was done by methods of AOAC (1980). All 657 observations of productive and reproductive performance were divided into persistency index (PI), standard lactation milk yield (SLMY), peak yield (PY), days to attain peak yield (DAPY), wet average (WA), lactation length (LL), dry period (DP), service period (SP), gestation period (GP) and calving interval (CI).

RESULTS AND DISCUSSION

The overall performance of dairy cattle is judged by the production and reproduction traits and these

Table 2. Composition of different fodders offered during study period.

Sr. No.	Fodders	Dry matter (%)	Crude protein (%)	Total digestible nutrients (%)
A.	*Green fodders*			
1.	Elephant grass	28.20	6.80	54.76
2.	Para grass	26.35	9.40	56.20
3.	NB -21	27.58	9.81	58.30
4.	Maize	25.00	8.17	68.00
5.	Cow pea	19.34	17.32	58.95
6.	Stylo	32.00	16.53	53.75
7.	Subabhul	20.60	25.80	51.55
8.	Rice bean	20.40	18.37	54.90
9.	Local grass	26.93	3.92	42.72
B.	*Dry fodders*			
1.	Local dry grass	87.00	3.05	45.20
2.	Maize stover	85.00	4.10	48.00

Table 3. Overall mean for persistency, production and fertility performance of crossbred cattle.

Sr. No.	Traits	Least-squares Mean±SE	N
Production performance			
1.	Persistency index	162.65±0.83	657
2.	Standard lactation milk yield (kg)	1394.97±10.50	657
3.	Peak milk yield (kg)	8.61±0.05	657
4.	Days to attain peak yield	42.35±0.43	657
5.	Wet average (kg/day)	4.75±0.03	657
6.	Lactation length (days)	302.01±1.58	657
7.	Dry period (days)*	81.77±1.65	471
Reproductive performance			
1.	Service period (days)*	107.55±2.09	471
2.	Gestation period (days)	279.14±0.30	657
3.	Calving interval (days)	387.58±2.18	657

serve as the economic indicator in evaluation of milch animals. The overall persistency, production and fertility performance of crossbred (*Dangi × Red Sindhi × Jersey*) cattle are present in Table 3.

Standard lactation milk yield (SLMY)

The overall mean standard lactation milk yield was 1394.97±10.50 kg. Similar finding were reported by Jalatge (1986) as 1397.00 kg in Sindhi × Jersey and Sharma *et al.* (1994) as 1434.92±62.60 kg in Friesian × Jersey × Ongole cattle breeds, respectively. Lower values for lactation milk yield was observed by Buvanendra and Mahadeven (1975) in Red Sindhi × Jersey cattle (1209.00 kg) and Sharma *et al.* (1994) in Jersey ×Friesian × Ongole crossbred cattle (1206.71±61.22 kg).However, higher values for lactation milk yield was observed by Pyne *et al.* (1988) in Jersey × Haryana cattle (1932.39±39.84 kg), Kumar *et al.* (1991) in Jersey × Ongole cattle (1823.00 kg) and Shelkar *et al.* (1992a) in Jersey × Red Kandhari cattle (1573.93±32.10 kg).

Peak milk yield (PMY)

The overall mean peak milk yield was 8.61±0.05 kg per day. Similar results have been reported in Dhawan *et al.* (2015) in Sahiwal cattle (7.94 ± 0.12 kg). Higher values for peak milk yield has been reported by Gahlot *et al*. (2000) in Tharparker cattle (12.780.10 litres), Kebede (2015) in Holstein-Friesian cattle (11.39±0.58 litre) and Nanavati and Singh (2004) in Gir cattle (10.05±0.10 kg per day), whereas lower values for PMY observed by Bangar and Narayankhedkar (1999[b]) in Gir cattle (7.46 kg).

Days to attain peak yield (DAPY)

The overall mean Days to attain peak yield (DAPY) was 42.35±0.43 days. These findings are in agreement with Tomer *et al.* (1997) in HF × Sahiwal half breed (43.89 ± 3.81 days) and Nanavati and Singh (2004) in Gir cattle (43.37±0.84 days). The higher value for DAPY was reported by Dhawan *et al.* (2015) in Sahiwal cattle (68.62 ± 0.96 days).

Wet average per day (WAPD)

The overall mean wet average was 4.75±0.031 kg per day. These results are in consonant with that of Jadhav (1982) and Bangar and Narayankhedkar (1999[a]) who has reported 4.16±1.24 kg per day and 4.60 kg per day, respectively in Gir cattle. Lower estimates for average WAPD (4.00±0.10 kg/day) have been reported by Sharma *et al.* (1972) and Narain and Garg (1972) who found overall mean for WAPD as 4.17±0.01 kg/day in Tharparkar cattle.

Lactation length (LL)

The overall mean lactation length was 302.01±1.58 days. These findings are in agreement with Sharma *et al.* (1994) who have reported 299.24±12.92 days in crossbred cattle. Lower value for LL was recorded by Dhawan *et al.* (2015) in Sahiwal cattle (295.33 ± 4.36 days), Haque *et al.* (2011) in crossbred cattle (291.49±29.30 days), Kabir and Islam (2009) in Holstein crossbred (295.0±33.96 days), Gahlot *et al*. (2000) in Tharparkaer cattle (285.272.20 days). The higher estimates for lactation length has been reported by Sandhu *et al.* (2011) in Holstein-Friesian cattle (314.19±0.91 days).

Dry period (DP)

The overall means and their standard error for DP was 81.77±1.65 days. Similar finding have been reported by Sandhu *et al.* (2011) in Gir cattle (87.06±1.63 days). Lower average DP (60.26-65.06 days) in Tharparkar exotic crosses have been reported by Thakur and Singh (2000). However, higher estimates for dry period were reported by Gaikwad *et al.* (2011) in Gir cattle (91-120 days) and Bhutkar *et al.* (2014) in Deoni cows (211.93±26.23 days).

Service period (SP): The average SP in crossbred cows was 107.55±2.09 days (Table 3). The present finding is nearer to the estimates reported by Vij *et al.* (1992) in Tharparkar cows (107.98 days). However, higher values for SP were reported by Pandit *et al.* (1999) who reported that 122.45±2.01 days in Gir cows and Sandhu *et al.* (2011) in Holstein-Friesian cattle (29.95±2.14 days). The variation in SP reported by different workers may be due to variation in the managemental efficiency in estrus detection and timely breeding followed in different herds (Savaliya *et al.,* 2016).

Gestation period (GP): The overall least squares mean for GP was 279.86±0.30 days (Table 3). This average value of GP in the present study is near to the estimates of first GP reported by Singh *et al.* (2012) as 279.8±0.69 days in Gir cattle. Similar value of first gestation period were also reported by Raja, (2010) in Sahiwal cattle, whereas the lower value reported by Mondal *et al.* (2005) as 275±4.11, 276±4.26, 274±4.41, 275±3.95 and 277±3.31 days with overall average 275±4.11 days in Jersey cross, Sahiwal cross, Sindhi cross, Holstein cross and Red-Chittagong cattle, respectively and greater value in Gir cattle reported by Gaikwad *et al.* (2011) as 284 to 286 days gestation period. The gestation length is a species characteristic. The variation of gestation length is genetically determined. Variation may be due to maternal influence. A little variation in gestation length within the individual may be contributed mainly by maternal and foetal factors. Age of dam, nutritional body condition of the dam are the maternal factors. On the other hand, foetal factors like the sex of the foetus, formation of twin and hormonal functions of the foetus. Environmental factors such as season, temperature, feeding and managementel (Mostari *et al.,* 2007).

Calving interval (CI): The average CI observed in present study, was 387.58±2.18 days (Table 3) which is near to the estimates of Khirari *et al.* (2014) in non-descript cows (381.23±3.27 days) and Manjusha *et al*. (2016) in crossbred cow (389.46±13.49 days). The estimate value was desirable for profitable milk production. This is because animals are low producers and hence are in the field for grazing along with other cattle and bulls for longer period. The animals in heat are covered naturally by the bulls in the field itself. The mean value was lower than the findings of Kumar *et al.* (2015) in Frieswal cattle (423.05±12.24 days), Kunbhar *et al.* (2015) in Red Sindhi cattle (413.050±10.362 days) and crossbred (372.200±7.486 days), Sandhu *et al.* (2011) in crossbred cattle (408.09±2.10 days) and Dandapat *et al.* (2010) in crossbred cattle (500.13±35.35days) and Sahiwal (522.63±27.99 days).

CONCLUSION

From the investigation, it was revealed that crossbred cattle (*Dangi × Red Sindhi × Jersey*) have large quite satisfactory values in case of lactation milk yield (1394.97±10.50 kg), peak yield (8.61±0.05 kg/day), lactation length (302.01±1.58 days) dry period (81.77±1.65 days), service period (107.55±2.09 days), calving interval (387.58±2.15 days), gestation period (279.14±0.30 days) with persistency index (162.65±0.8%), respectively. Therefore, it may be concluded that crossbred cattle (*Dangi × Red Sindhi × Jersey*) cattle can perform better in coastal zone of Maharashtra.

ACKNOWLEDGEMENT

The authors would like to acknowledge Officer In-charge, Cattle Breeding Farm, Nileli, Dist. Sindhudurga, Maharashtra, India to provide data for research work. Also would like to acknowledge Head of Department, Livestock Production and Management, Haryana Agricultural University, Hisar - 125004, Haryana, India for providing guidance during the work.

REFERENCES

Alemayehu T and Moges N. 2014. Study on reproductive performance of indigenous dairy

cows at small holder farm conditions in and around Maksegnit Town. Global Veterinaria.13 (4): 450-454.

Anonymous. 2015. Dairying in Maharashtra – A statistical profile 2015. National dairy Development Board.

AOAC. 1980. Association of Official Agriculture Chemists, Official Methods of Analysis, 14th Edn., Washington, D. C.

Bangar NP and Narayankhedkar SG. 1999a. Effect of sire and various non-genetic factors on total lactation milk yield in Gir cows. Cheiron 28(5): 168-170.

Bangar NP and Narayankhedkar SG. 199b. Study on lactation curve in Gir and its crosses with HF and Jersey. Dairy Science Abstract 61(9): 659.

Bhutkar SS, Thombre BM and Bainwad DV. 2014. Effect of non-genetic factors on production traits in Deoni cows. IOSR Journal of Agricultural Veterinary Science 7 (12 III): PP 09-14

Buvanendra V and Mahadeven P. 1975. Crossbreeding for milk production in Sri Lanka. World Animal Review 15:7-13.

Dandapat A, Banerjee D and Chakraborty D. 2010. Genetic studies on various production and reproduction traits of Sahiwal and crossbred cattle (HF ×Jersey × Sahiwal) of an organised farm. Veterinary World 3: 167-168.

Dematawewa CMB and Beger PJ. 1998. Genetic and phenotypic parameters for 305- day Yield, Fertility, and Survival in Holsteins. Journal of Dairy Science 81: 2700-2709.

Dhawan S, Yadav AS, Dhakal SS and Chakraborty D. 2015. Genetic studies on production and production efficiency traits in Sahiwal cattle. Indian Veterinary Journal 92 (9): 35–38.

Gahlot GC, Pant KP and Kachawaha RN. 2000. Variation in production performance of Tharparker cows in north-western Rajasthan. Indian Journal of Animal Sciences 70 (7): 718-722.

Gaikwad JS, Jadhav RM, Torawane KB and Todmal SB. 2011. Productive and reproductive performance of Gir cow in Akola district. Asian Journal of Animal Science 6: 94-96.

Haque MN, Haque MR, Parvin A and Hussain MM. 2011. Productive and reproductive performance of different crossbred cattle at Sylhet Govt. Dairy farm. Progressive Agriculture. 22(1 & 2): 47 – 54.

Jadhav PD. 1982. Comparative studies on some of the economic traits in Gir crosses with HF and Jersey. M.V.Sc. Thesis, KKV, Dapoli.

Jalatge EFA. 1986. Crossbreeding of Cattle in Sri Lanka. In 3rd World Congress in genetics Applied to Livestock Production. IX. Pp. 119-124.

Japheth KP, Mehla, RK, Imtiwati and Bhat SA 2015. Effect of non-genetic factors on various economic traits in Karan Fries crossbred cattle. Indian J. Dairy Sci. 68(2): 163-169.

Khirari PB, Bhambure CV, Bharambe VY and Kedari VC. 2014. Physical characteristics, productive and reproductive performance of non-descript cattle in Ratnagiri district of Konkan region, India. Livestock Research International 2: 33-35

Kumar J, Singh YP, Kumar S, Singh R, Kumar R and Kumar P. 2015. Genetic analysis of reproductive performance of Frieswal cattle at military farm, Ambala, Veterinary World. 8: 1032-1037.

Kumar VP, Rao CH, Venkatramaiah A and Naidu KN. 1991. Effect of change in genetic constitution from generation to generation in Ongole × Exotic crossbred cattle. Indian Journal of Dairy Science 44:54-57.

Kunbhar HK, Lasi AB and Memon AA. 2015. Reproductive performance of crossbred cattle under intensive management condition. Advanced Animal and Veterinary Science 3(5s): 7-13.

Mondal SC, Alam MM, Rashid MM, Ali MY and Hossain MM. 2005. Comparative study on the productive and reproductive performance of different dairy genotypes reared in Bangladesh Agricultural University dairy farm. Pakistan Journal of Nutrition 4: 222-225.

Mostari MP, Huque KS, Hasanat MS and Gulshan Z. 2007. Productive and reproductive efficiency of Red Chittagong cattle under farm condition. Prog. Agric. 18(2): 109-114.

Narain P and Garg LK. 1972. Estimation of genetic

change in Indian herds of cattle. Indian Journal of Animal Production 3:143-153.

Pandit RK, Agrawal RG, Shukla SP and Shrivastava OP. 1999. Reproductive and productive efficiency of crossbred Gir cow. Indian Journal of Veterinary Research 8: 33-44.

Pyne AK, Misra SK, Maitra DN, Dattagupta R and Majumdar SC. 1988. Reproductive and productive performance of Jersey Hariana half breds in humid tropical conditions of West Bengal. Indian Journal of Animal Production and Management 4:37-39.

Raja TV 2010. Part lactation records for Sahiwal sire evaluation. Ph.D. Thesis, NDRI, Karnal, India.

Sandhu ZS, Tariq MM, Baloch MH and Qaimkhani MA. 2011. Performance analysis of Holstein-Friesian cattle in intensive management at dairy farm Quetta, Balochistan, Pakistan. Pakistan Journal of Life and Social Science 9: 128-133.

Savaliya BD, Parikh SS, Gamit PM and Gajbhiye PU. 2016. Environmental factors affecting economic traits in Gir cattle. International Journal of Science and Environmental Technology 5:2467-2475.

Sharma GP, Reddy CE, Krishnaiah N, Shivaprasad L and Sri Ramamurthy A. 1994. Studies on productive and reproductive traits of triple cross Ongole breed. Indian Journal of Animal Sciences 15(2):128-140.

Shelkar BS, Sakhare PG and Deshpande KS.1992a. Breeding efficiency and milk producing ability of Red Kandhari and Jersey × Red Kandhari half-bred cows Indian Journal of Animal Sciences 62:79-80.

Singh G, Dutt G, Sharma RB, Singh SK, Fatima A and Chauhan SVS. 2012. An analytical study of reproductive performance in Gir Cows. Indian Research Journal of Extension Education (3), 203-206.

Thakur YP and Singh BP. 2000. Performance evaluation of Jersey × Zebu crossbreds involving different indigenous breeds (C) performance of Jersey × Hariana crossbred. Indian Veterinary Journal 77:127-130.

Thomas CK, Sastry NSR and Ravikiran G 2012. Dairy bovine production. Second revised edition.P-430.

Tomer AKS, Prasad KB, Verma SK and Bhadula SK. 1997. First lactation performance comparison between Holstein Friesian purebred and Sahiwal half-breds in Tarai region of Uttar Pradesh. Indian Journal of Animal Research 31(1):54-56.

Vij PK, Nivsarkar AE, Balaine DS and Raj B. 1992. Influence of inbreeding on performance of Tharparkar cattle. Indian Journal of Animal Sciences 62:689-691.