Evaluation of reproduction performance of Gir cattle (*Bos indicus*) reared in Hot-Humid condition of Konkan region

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ABSTRACT

The study was conducted at Dr. B.S. Konkan Krishi Vidyapeeth Dapoli, Maharashtra to assess the reproductive efficiency of Gir cattle. A total of 226 Gir cows were selected and their information regarding reproductive parameters were collected from farm records (Bombay Gorakshak Mandali, Akurli Road, Kandivali (East) Mumbai, Maharashtra) for a period of 26 years (1981 to 2005). Data representing 226 Gir cows from 1090 total records of reproductive parameters for a period of 25 years (1981 to 2005) were analysed to determine Body weight (BW), age at puberty (AP), age at first calving (AFC), service period (SP), calving interval (CI), gestation period (GP), dry period (DP), weight at first calving, reproductive and breeding efficiency (%). The overall least squares means of age at puberty (979.08±12.77 days), age of first calving (1254.29±12.83 days), service period (107.93±0.64 days), calving interval (387.26±0.63 days), gestation period (279.86±0.20 days), dry period (87.74±0.95 days), weight at first calving (352.63±1.64 kg), with reproductive and breeding efficiency and persistency index, 40.70±0.11 per cent and 89.29±0.40 per cent, respectively. Therefore, it can be concluded that Gir cattle shows optimum reproductive performance under Konkan region of Maharashtra.

Key Words: Age of first calving, calving interval, dry period, Gir cattle, service period.
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INTRODUCTION

The reproductive performance of the breeding female is probably the single most important factor that is a prerequisite for sustainable dairy production system and influencing the productivity. The size of the calf crop is important for herd replacement and the production of milk depends on heavily on the cow reproductive activity (Kiwuwa et al., 1983).

Maharashtra second largest livestock population state in India. The 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 of 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 (Anonymous, 2015).

Reproductive performance of cattle is influenced by feed, genetic, disease and management practices (Perera, 1999).Number of services per conception, days opens and calving interval are important reproductive traits which are crucial for determining the profitability of dairy production (Alemayehu et al., 2014). The aim of the present study was therefore, to investigate the reproductive performance of Gir cattle in Konkan region of Maharashtra, India.

MATERIALS AND METHODS

The data of 226 cows for the reproduction performance observations viz. body weight (BW), age at puberty (AP), age at first calving (AFC), service

period (SP), calving interval (CI), gestation period (GP), dry period (DP), persistency index, reproductive efficiency (%) and breeding efficiency (%) of Gir cattle maintained at Bombay Gorakshak Mandali, Akurli Road, Kandivali (East) Mumbai, Maharashtra in jurisdiction of the Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra State in India for the period of 25 years (1981 to 2005) were utilized for the study. Breeding efficiency was estimated by formula given by Tomar (1965), reproduction efficiency by Banerjee, (2004) and persistency index by Rao and Sundaresan (1982) as follows.

Breeding efficiency

= (Number of calving interval x (365) + 1020)/(Age of cow) x 100

Reproduction efficiency

=12 x (Number of calves born)/(Age of cow (month) – age at first breeding) x 100+3

Persistency Index

=(Standard Lactation Milk Yield (l))/(Peak Yield (l))

The standard uniform feeding and management practices were provided throughout the experimental period to all the animals. All the animals were maintained under stall feeding system. The main aim of present study to know the reproduction performance of Gir cattle and data calculating least-squares mean and maximum by using the fixed models given by Harvey (1975). The differences between least squares mean were tested through Duncan's multiple range tests

RESULTS AND DISCUSSION

Calf birth weight (CBW)

The overall least square means of CBW in present study 23.82±0.20 kg (Table 1). Higher BW of calves as compared to the present study was reported by many researchers (Taj, 2001). These differences might be due to breed, environmental and managerial practices that had impact on BW.

Age at puberty and weight at puberty (AP and WP)

The overall least square means of AP and WP were 979.08±12.77 days and 288.48±1.44 kg, respectively (Table 1). The present finding observed higher as compared to Mostari et al. (2007) in Red Chittagong cattle for age of puberty (458.7 days). Sandhu et al. (2011) also observed lower age of puberty in crossbred cattle (625.40±14.65 days). However, higher AP was reported by Pandit et al. (1999) in Gir cows (1116±74.7 days).

Age of first calving (AFC) and Weight at first calving (WAFC)

The overall least square means of AFC and WAFC in present study was 1254.29±12.83 day and 352.63±1.64 Kg (Table 1). The present finding found higher as compared to Kumar et al. (2016) in Frieswal cattle (980.41±8.22 days), Manjusha et al. (2016) in crossbred cattle (924.34±61.9days) and indigenous cattle (1090±192 days), Pundir et al. (2015) in Manipuri cattle (1130 days), Gaikwad et al. (2011) in Gir cattle (1401 to 1600days). Higher AFC reported by Gaur et al. (2005) and Bhadoria et al.(2003) in Gir cows as 1533±56 days and 1719.09±8.11 days, respectively. However, lower AFC was reported by Sandhu et al. (2011) in crossbred cows (655.10±10.44 days). AFC depends on various factors like the breed of animal, feeding, heat detection, animal health, breeding method etc. two and half years are considered as ideal for a cross bred cow to calve for first time Manjusha et al.(2016).

Service period (SP)

The average SP in Gir cows was 107.93±0.64 days (Table 1). The present finding is found near to the estimates reported by Pandit et al. (1999) and Bhadoria et al. (2003), who reported that 122.45±2.01 days and 138.93±5.53 days in Gir cows, respectively. Higher values for SP was observed by Umrikar et al.(1990) and Barwe et al.(2003) in Gir cattle (273.7 days and 161.44±4.85 days) and Sandhu et al.(2011)in Crossbred cattle (29.95±2.14 days). The variation in SP reported by different workers may be due to variation in the managemental practices in estrus detection and timely breeding followed in different herds (Savaliya et al., 2016).

Number of services per conception (NSPC)

The overall least squares mean for NSPC was

Table 1: Least-squares means (LSM) for reproduction performance of Gir cattle

S. N.	Traits	n	LSM±SE
1.	Birth weight (kg)	226	23.82±0.20
2.	Age at puberty (days)	226	979.08±12.77
3.	Weight at puberty (kg)	226	288.48±1.44
4.	Age at first calving (days)	226	1254.29±12.83
5.	Growth rate up to puberty (kg/day)	226	0.30±0.0034
6.	Service period (days)	1090	107.93±0.64
7.	Number of services per conception	1090	1.83±0.03
8.	Calving interval (days)	1090	387.26±0.63
9.	Gestation period (days)	1090	279.86±0.20
10.	Dry period (days)	1090	87.74±0.95
11.	Reproductive efficiency (%)	226	40.70±0.11
12.	Breeding efficiency (%)	226	89.29±0.40
13.	Persistency index	1090	184.09±0.92

SE: standard error

1.83±0.03 (Table 1). Similar findings in Gir cattle (1.8±0.3) were reported by Belay et al. (2012). Number of services per conception higher than 2.0 should be considered as poor (Mukassa Mugerewa, 1989). Higher NSPC was reported by Alemayehu et al. (2014) in indigenous dairy cows (2.0±0.65). However, lower NSPC was observed by Yifat et al. (2009) as 1.67 and Haile-Mariam et al. (1993) as 1.61. In the study area number of service per conception may be affected by time of insemination, proper heat detection and quality of semen etc.

Calving interval (CI)

The average CI observed in present study was 387.26±0.63 days (Table 1) 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 estimated value was desirable for profitable milk production. The higher findings for calving interval was observed by Manjusha et al. (2016) in indigenous cattle (405.78±15 days), Kumar et al. (2015) in Frieswal cattle (423.05±12.24 days), Pundir et al. (2014) in Hill cattle (432 days), Dangi et al. (2013) in Rathi cattle (427±12.3 days), Pundir et al. (2013) in Uttara cattle (456 days).

Gestation period (GP)

The overall least squares mean for GP was 279.86±0.20days (Table 1). This average value of GP in the present study is near to the estimates of first GP reported by Singh et al. (2012) in Gir cattle (279.8±0.69 days). Similar value of first gestation period were also reported by Sharma et al. (1989), Babu Rao, (1990) and Norman et al. (2009) in Gir cattle and Raja, (2010) in Sahiwal cattle, whereas 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 of Bangladesh and Patel et al. (1999) in Gir cows (273.12±1.96 days) and greater value in Gir cattle reported by Gaikwad et al. (2011), Malik and Ghei, (1977)and Casian D'Souza et al. (1978)as 284 to 286 days, 286.60±12.80 and 283.8±0.9 days gestation period and Camargo et al. (2005) by in Zebu cattle (284.4±1.1), respectively. 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. Ages of dam, nutritional body condition of the dam are the maternal factors. On the other hand, foetal factor include the sex of the foetus, twining and hormonal functions of the foetus. Environmental factors such as season, temperature, feeding and management may also contribute to some extent Mostari et al. (2007).

Dry period (DP)

The overall least squares mean for DP was

87.74±0.95 days. Similar findings in Gir cattle were reported by Sandhu et al. (2011) in crossbred cattle (87.06±1.63 days). Higher DP was reported by Gaikwad et al. (2011) in Gir cattle (91-120 days), Bhutkar et al. (2014) in Deoni cows (211.93±26.23 days). Nanavati et al. (2004) and Younas et al. (2008) also reported DP as 145.32±3.46 days and 137.94±4.04 days, respectively in Gir cattle.

Reproductive efficiency, breeding efficiency (%) and persistency index

Breeding efficiency (BE) is an important reproductive parameter that reflects the regularity of calving and the adaptability of the breed to its environment. The overall mean for reproductive efficiency and breeding efficiency was 40.70±0.11 and 89.29 ± 0.40 per cent. The overall mean persistency index of Gir cattle was 184.09±0.92. The mean RE and BE reported in this study was comparable with those reported by Berhanu et al. (2011) as 81.90 per cent for BE in crossbred cattle. Lower breeding efficiency by Deshpande et al. (1984) in Gir cattle (87.14%), Shelke et al. (1992b) in Red Kandhari cattle (74.77±71.0%), Getinet et al. (2009) in crossbred cattle (69.6%).

CONCLUSION

From the investigation, it was revealed that Gir cow has lower values age at puberty (979.08±12.77 days) and age of first calving (1254.29±12.83 days) in present study. Other parameters also have large quite satisfactory values in case of dry period (87.74±0.95 days), weight at first calving (352.63±1.64 kg), service period (107.93±0.64 days), number of services per conception (1.83±0.03), calving interval (387.26±0.63 days), gestation period (279.86±0.20 days) with reproductive, breeding efficiency and persistency index, 40.70±0.11 per cent, 89.29±0.40 per cent and 184.09±0.92, respectively. Therefore, it may be concluded that Gir cattle give optimum reproductive performance under Konkan Region of Maharashtra.

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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.

Babu Rao K. 1990. Reproductive Performance of Ongole Cows. Paper submitted to National Seminar on "Ongole Cattle Revival and Reinvigoration" held at College of Vet. Sci., Rajendra Nagar, ANGRAU, Hyderabad on 28thJune, 1999.

Banerjee GC. 2004. A text book of Animal Husbandry. Oxford and IBH publishing Co. Pvt. Ltd., New Delhi. Eighth edition. pp. 282-283.

Barwe VK, Tomar SS and Qureshi MZ. 2003. Factors affecting service period and its genetic and phenotypic relationship with other reproductive traits in Gir cow. Indian Veterinary Journal 80(1): 15-18.

Belay D, Yisehak K and Janssens GPJ. 2012. Productive and reproductive performance of Zebu X Holstein-Friesian crossbred dairy cows in Jimma Town, Oromia, Ethiopia. Global Veterinaria 8(1): 67-72.

Berhanu Y,Fikre L and Gebeyehu G 2011. Calf survival and reproductive performance of Holstein-Friesian cows in central Ethiopia. Tropical Animal Health Production 43: 359-365.

Bhadoria HBS, Khan FH, Tomar SS and Yadav MC. 2003. Genetic study on some of the production traits in Gir cows. Indian Journal of Animal Science 73 (11): 1256-1259.

Bhutkar SS, Thombre BM and Bainwad DV. 2014. Effect of non-genetic factors on production traits

in Deoni cows. IOSR Journal of Agriculture and Veterinary Science 7 (12-3): 09-14

Camargo LS, Viana JHM, Sa WF, Ferreira AM and Vale VR. 2005. Developmental competence of oocytes from pre pubertal Bosindicuscrossbred cattle. Animal Reproduction Science 85 (1-2): 53-9.

Casian D'Souza, Bhat PN and Mukundan G. 1978. Studies on growth reproduction and production traits in Gir and its half-bred with Friesian. Indian Journal of Dairy Science 31:395-400.

Dangi PS, Singh R, Pundir RK, Singh A, Chaudhary V and Verma NK. 2013. Study of various performance traits in Rathi cattle. Indian Journal of Animal Research 47 (4): 321-326.

Deshpande KS and Sakahre PG. 1984. Milk producing ability and breeding efficiency in Red Kandhari cows its crosses. Cherion 13(5): 272-275.

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(2): 94-96.

Gaur GK, Kaushik SN and Garg RC 2005.The Gir cattle breed of India characteristics and present status. http:// www.fao.org//docrp /006/74924t/y4924107.htm.

Getinet M, Workneh A and Hegde PB. 2009. Growth and reproductive performance of Ogaden cattle at Haramaya University, Ethiopia. Ethiopian Journal of Animal Production 9(1), 13-38.

Haile-Mariam M, Banjaw K, Gebremeskel J and Ketema T. 1993. Productivity of Boran cattle and their Friesian crosses at Abernossa Ranch, Ethiopia. I. Reproductive performance and prevailing mortality. Tropical Animal Health and Production 25: 239-248.

Harvey WR. 1975. Least squar analysis of data with unequal sub class number. United States Department of agriculture, Agriculture Research service, Washington D. C., United States.

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 (2): 33-35

Kiwuwa GH, Trail JCM, Kurtu MY, Worku G, Anderson FM and Durkin J. 1983. Crossbred dairy cattle productivity in Arsi region, Ethiopia (Research report No. 11, ILCA, Addis Ababa Ethiopia), pp: 1-29.

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(8): 1032-1037.

Kumar N, Eshetie A, Tesfaye A and Yizengaw HA. 2016. Productive performance of indigenous and HF crossbred dairy cows in Gondar, Ethiopia. Veterinary World 7(3): 177-181.

Malik BS and Ghei GC. 1977. A note on some production characteristics of Gir cattle. Indian Journal Animal Science 47(9):587- 590.

Manjusha J, Roy R, Kumar V and Gupta J. 2016. Productive and reproductive performance of dairy animals in Karnal district of Haryana. Indian Veterinary Journal 93 (06): 38-40.

Moges N. 2012. Study on reproductive performance of crossbred dairy cows under Small holder conditions in and around Gondar, North Western Ethiopia. Journal of Reproduction and Infertility 3(3): 38-41.

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 Nutrition 4 (4): 222-225.

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

Mukassa-Mugerewa E. 1989. A review of reproductive performance of female Bos indicus (Zebu) cattle, ILCA Monograph 6: 57-67.

Nanavati S and Singh A. 2004. Non-genetic factors affecting production traits in Gir cattle. Indian Journal Dairy Science 57(5): 342-346.

Norman HD, Wright JR, Kuhn MT, Hubbard SM, Cole JB and Vanraden PM. 2009. Genetic and environmental factors that affect gestation length in dairy cattle. Journal Dairy Science.92:2259–2269.

Pandit RK, Agrawal RG, Shukla SP and Shrivastava OP. 1999. Reproductive and productive efficiency of crossbred Gir cow. Indian Journal Veterinary Research 8(1): 33-44.

Patel JA, Tajane KR, Murthy KS, Dalal PS and Dutta KS 1999. Reproductive performance of Gir cattle. Indian Journal Dairy Science. 52(2): 124-125.

Perera O. 1999. Management of reproduction In: Falvey L and Chantalakhana C (eds.), Smallholder dairying in the tropics. ILRI (International Livestock Research Institute), Nairobi, Kenya, pp: 241-264.

Pundir RK, Singh PK, Dangi PS, Kumar A, Singh NB, Singh PK And Sadana DK. 2015. Indigenous cattle of Manipur - Characterization and performance evaluation. Indian Journal of Animal Sciences 85(4): 382–385.

Pundir RK, Singh PK, Neelkant and Prakash B. 2013. Uttara-A new cattle germplasm from Uttarakhand hills. Indian Journal of Animal Sciences 83(1):51-58.

Pundir RK, Singh PK, Neelkant, Sharma D, Kumar S, Tiwari R, Singh CV and Prakash B. 2014. Characterization and evaluation of hill cattle of Garhwal region of Uttarakhand, India. Indian Journal Animal Research 48 (4): 322 – 328.

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

Rao MK and Sundaresan D (1982). Factors affecting the shape of lactation curve in Friesian x Sahiwal crossbred cows. Indian Journal of Dairy Science 35: 160-167

Sandhu ZS, Tariq MM, Baloch MH andQaimkhani MA. 2011. Performance analysis of Holstein-Friesian cattle in intensive management at dairy farm Quetta, Balochistan, Pakistan. Pakistan Journal Life Soc. Science 9(2): 128-133.

Savaliya BD, Parikh SS, Gamit PM and Gajbhiye PU. 2016. Environmental factors affecting economic traits in Gir cattle. International Journal Science Environment Technology 5(4):2467-2475.

Sharma RJ, PrasadT and Singh DV. 1989. The genetic management of morphometric traits in Gir cows. ArchivaZootechnica.13:1, 60-82.

Shelke BS, Sakhare PG and Deshpande KS. 1992. Effect of non-genetic factors on birth weight, gestation period and lactation yield of Red Kandhari and its crosses. Indian Journal Animal Science 62(3): 278-279.

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 Extension Education (Vol. II), 203-206.

Taj GR. 2001. Study on performance analysis of Holstein Friesian cattle under intensive management at Punjgoor cattle farm, Balochistan Pakistan. MSc thesis. Sindh Agriculture University Tandojam, Pakistan.

Tomar NS. 1965. A note on method of working out breeding efficiency in zebu cows and buffaloes. Indian Dairyman, 17: 389-393

Umrikar UD, Natarajan N, Thanguraju P and Rahamathulla PS. 1990. Factors influencing performance traits of Gir and Jersey x Gir crossbred cattle. Animal Breed Abstract 60: 5631.

Yifat D, Kelay B, Bekana M, Lobago F, Gustafsson H and Kindahl H. 2009. Study on reproductive performance of crossbred dairy cattle under smallholder conditions in and around Zeway, Ethiopia, pp: 55-56.

Younas M, Bilal M, Babar ME, Yaqoob M and Lqbal A. 2008. Re Journal productive profile of Holsteins kept in Balochistan province of Pakistan-II. Pakistan Journal of Agriculture Science 45: 280-287.