

EFFECT OF NON-GENETIC FACTORS ON MONTHLY TEST DAY MILK YIELD IN GIR CATTLE

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ABSTRACT

The present investigation was carried out on 365 records of Gir cows maintained at Cattle Breeding Farm during the period from 1986 to 2014 with an objective to assess the influence of various environmental factors on monthly test day milk yield in Gir animals. The overall least square means for individual monthly test day milk yields in Gir cows ranged from 2.74±2.0 to 6.35±0.26 litres. The effect of season of calving on first monthly test day was highly significant, The effect of age at first calving and period of calving was non-significant on all monthly test day milk yields.

Keywords: Gir cattle, Monthly test day milk yields, Non-genetic factors

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India possesses fifty registered indigenous cattle breeds and Gir cattle is one of the best milch breed in the country. Gir originated from Gir forest with native breeding tract spreading across districts like Junagadh, Amreli, Bhavnagar, Gir-Somanth and Rajkot, Porbandar and some parts of

Jamnagar, Morbi and Surendranagar districts of saurashtra region of Gujarat. Gir cattle breed is also famous for their tolerance to stress conditions and resistance to various tropical diseases (Kumar and Singhal, 2006). The important task of an animal breeder is to develop a strategy which leads to higher milk yield per day of life in dairy cattle. For establishing any selection or breeding programme, the knowledge of genetic and non-genetic factors influencing productive traits is of prime importance (Chaudhari *et al.*, 2013). Knowledge of the various climatic factors affecting the production performance of the breed shall go a long way in improving

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the overall productivity. Hence, the present investigation was carried out to investigate the influence of various non-genetic factors on monthly test day milk yield (MTDMY) records in Gir cattle.

The data was collected from pedigree cum history sheets/registers of Gir cows maintained at Cattle Breeding Farm, Junagadh Agricultural University, Junagadh, during the period of 29 years from 1986 to 2014. All the animals were stall fed with good quality green fodder, dry fodder, mineral mixture and concentrates. The animals were housed in loose housing system and all animals in herd were vaccinated. For the present investigation, the lactation milk yield of less than 100 days lactation lengths were considered short lactations and therefore, were ignored. Lactation affected by abortion, mastitis, sickness or disposal were excluded from the study. All the milk records with minimum 101 lactation days were considered for the study. Those lactation records with more than 305 lactation days were also considered however, maximum of 11 test day records were taken. The guidelines of International committee on Animal Recording ICAR Test day milk recording procedure had been adopted (ICAR, 2004). The monthly test day records with an interval of 30 days (i.e. 4th day, 34th day, 64th day, 204th and 304th day of lactation) were recorded. All the experimental data was classified according to period of calving, season of calving and age at first calving. The years were classified in four periods of five year duration except first period which was of five years duration (1986-1990, 1991-1998,

1999-2006 and 2007-2014). Based upon the seasonal variation, the year was divided into five seasons viz. Summer (April - June), Rainy (July - September), Autumn (October-November), Winter (December - January), Spring (February - March). The age at first calving was classified in seven groups i.e. less than 1200 days, 1201-1400, 1401- 1600, 1601- 1800, 1801-2000 and more than 2200 days. The data were analysed to study the effect of non-genetic factors (season, period and age at first calving) on all monthly test day milk records using fixed effect linear model by least squares and maximum likelihood analysis method for non-orthogonal data (Harvey, 1987).

Where,

$$Y_{ijkl} = \mu + s_i + a_j + b_k + e_{ijkl}$$

Y_{ijkl} = Observation on the l^{th} individual in i^{th} season, j^{th} period and k^{th} age group.

μ = Overall population mean

s_i = Effect of i^{th} Season of calving ($i = 1$ to 5)

a_j = Effect of j^{th} period of calving ($j = 1$ to 4)

b_k = Effect of k^{th} age group ($k = 1$ to 7)

e_{ijkl} = Random error, NID (0)

Duncan's multiple range test as modified by Kramer (1957) was used for testing differences among least squares means.

Overall least squares means for different individual test day milk yields in Gir cow ranged from 2.74±2.0 litre (MTDMY11) to 6.35±0.26 litre (MTDMY3). Least squares means for individual test day milk yield has been given in Table I. The effect of season of calving on MTDMY1 was found to be

Table I : Least squares means along with their standard errors for factors affecting monthly test day milk yields and first lactation 305-day milk yield in Gir cows

Traits	TD1	TD2	TD3	TD4	TD5	TD6	TD7	TD8	TD9	TD10	TD11	SLY
Overall	4.65± 0.19	6.21± 0.20	6.35± 0.26	6.06± 0.26	5.64± 0.25	5.25± 0.24	4.85±0.25	4.41± 0.24	3.90± 0.26	3.54± 0.20	2.74± 0.2	1517.31± 65.14
Season												
1	4.16± 0.31 ^a	5.72± 0.35	5.94± 0.39	5.54± 0.39	4.91± 0.37	4.76± 0.35	4.39±0.36	3.97± 0.37	3.69± 0.37	3.40± 0.34	2.31± 0.35	1417.92± 97.02
2	4.58± 0.30 ^b	5.83± 0.35	5.63± 0.39	5.85± 0.39	5.53± 0.37	5.22± 0.35	4.78±0.36	4.21± 0.36	3.90± 0.37	3.49± 0.34	3.01± 0.35	1496.54± 96.63
3	4.71± 0.37 ^b	6.33± 0.43	6.88± 0.47	6.68± 0.46	6.27± 0.43	5.83± 0.42	5.49±0.43	5.01± 0.44	4.23± 0.44	3.98± 0.42	2.99± 0.43	1660.07± 115.59
4	4.38± 0.31 ^{ab}	6.54± 0.36	6.56± 0.40	6.13± 0.39	5.66± 0.37	5.08± 0.36	4.70±0.36	4.28± 0.37	3.78± 0.38	3.23± 0.34	2.61± 0.35	1491.98± 97.72
5	5.41± 0.27 ^c	6.62± 0.31	6.72± 0.35	6.10± 0.35	5.83± 0.33	5.36± 0.32	4.91±0.33	4.57± 0.33	3.93± 0.34	3.60± 0.30	2.78± 0.31	1520.03± 87.58

Period	4.21 ± 0.52	5.39 ± 0.61	5.77 ± 0.65	5.11 ± 0.63	4.59 ± 0.59	4.37 ± 0.58	4.34 ± 0.58	4.06 ± 0.60	3.88 ± 0.60	3.53 ± 0.59	2.93 ± 0.60	1378.99 ± 157.76
1	4.21 ± 0.52	5.39 ± 0.61	5.77 ± 0.65	5.11 ± 0.63	4.59 ± 0.59	4.37 ± 0.58	4.34 ± 0.58	4.06 ± 0.60	3.88 ± 0.60	3.53 ± 0.59	2.93 ± 0.60	1378.99 ± 157.76
2	5.66 ± 0.54	6.88 ± 0.64	6.67 ± 0.68	6.80 ± 0.65	6.13 ± 0.61	5.07 ± 0.60	4.26 ± 0.60	3.95 ± 0.63	2.95 ± 0.62	2.02 ± 0.61	1.76 ± 0.63	1568.08 ± 163.84
3	5.26 ± 0.61	6.12 ± 0.72	6.40 ± 0.76	6.02 ± 0.73	5.87 ± 0.69	5.19 ± 0.67	4.86 ± 0.67	4.13 ± 0.71	4.06 ± 0.70	3.47 ± 0.69	2.53 ± 0.71	1455.31 ± 183.74
4	3.46 ± 0.57	6.44 ± 0.68	6.54 ± 0.72	6.31 ± 0.70	5.98 ± 0.65	6.38 ± 0.64	5.94 ± 0.64	5.47 ± 0.67	4.71 ± 0.66	4.35 ± 0.65	3.76 ± 0.67	1666.85 ± 174.57

AFC	
1	4.30 ± 0.51 5.69 ± 0.61 6.62 ± 0.65 6.11 ± 0.63 5.96 ± 0.59 5.43 ± 0.57 4.45 ± 0.57 4.07 ± 0.60 3.36 ± 0.60 2.86 ± 0.58 2.20 ± 0.60 1495.88 ± 156.89 ^b
2	4.52 ± 0.32 5.72 ± 0.37 5.54 ± 0.41 5.35 ± 0.40 4.90 ± 0.38 4.64 ± 0.36 4.35 ± 0.37 3.85 ± 0.38 3.31 ± 0.38 2.60 ± 0.35 2.38 ± 0.36 1286.55 ± 99.98 ^a
3	4.76 ± 0.26 6.21 ± 0.30 6.22 ± 0.34 5.97 ± 0.34 5.61 ± 0.32 5.17 ± 0.31 4.81 ± 0.32 4.23 ± 0.32 3.87 ± 0.33 2.26 ± 0.29 2.82 ± 0.29 1529.98 ± 84.51 ^b
4	4.94 ± 0.29 6.70 ± 0.33 6.73 ± 0.37 6.34 ± 0.37 5.79 ± 0.35 5.37 ± 0.34 5.05 ± 0.34 4.98 ± 0.35 4.47 ± 0.35 3.86 ± 0.32 3.01 ± 0.33 1692.17 ± 92.16 ^c
5	4.76 ± 0.37 6.76 ± 0.44 6.86 ± 0.47 6.26 ± 0.46 6.20 ± 0.44 5.25 ± 0.42 5.05 ± 0.43 4.89 ± 0.44 4.33 ± 0.44 3.62 ± 0.42 3.07 ± 0.43 1657.25 ± 116.30 ^c
6	4.31 ± 0.48 6.59 ± 0.57 6.49 ± 0.61 6.51 ± 0.59 5.80 ± 0.55 5.71 ± 0.54 5.44 ± 0.54 4.58 ± 0.57 4.61 ± 0.56 4.54 ± 0.55 3.03 ± 0.56 1670.88 ± 148.06 ^c
7	4.95 ± 0.78 5.79 ± 0.93 5.97 ± 0.97 5.88 ± 0.93 5.22 ± 0.87 5.19 ± 0.85 4.82 ± 0.85 4.25 ± 0.90 3.38 ± 0.88 4.05 ± 0.88 2.68 ± 0.91 1288.43 ± 233.42 ^a

(TD = test day)

highly significant ($P < 0.01$). However, on other test day records it was found to be non-significant. Animals that had calved in summer were found to have the lowest (4.16 litre) first MTDY. The seasonal stress of summer months might be a probable reason for the decreased test day milk yield. Similar findings were also reported by Monalisa *et al.* (2010) in Sahiwal cows, Japheth *et al.* (2015) and Singh *et al.* (2016) in Karan Fries cattle. However, Bhadouria *et al.* (1986) have reported the significant effect of season of calving on all the monthly milk yields except the 5th and 6th months in Jersey cows. Similarly, Machado *et al.* (1997) reported that the season of calving had significant effect on MTDY2 and MTDY8 in Holstein cows. The probable reason for significant effect of season on first test day milk records might be that post parturient stress recovery is influenced seasonal weather condition. Effect of Period of calving on all monthly test day milk yields was found to be non-significant in the present study. Similar observation has been made by Monalisa *et al.* (2010) and Japheth *et al.* (2015) in Sahiwal cows and Karan Fries cattle, respectively. Dongre *et al.* (2013) reported highly significant ($p < 0.01$) effect of period of calving on all weekly test-day milk yields in Sahiwal cows. Effect of age at first calving on test-day milk yield was found to be non-significant on all MTDYs in present study. The present results are in agreement with Rose (2008) who reported that the age at first calving had no significant effect on any of the monthly test day milk yields in the first lactation of Karan Fries cows. However,

the results of Dangar and Vataliya (2015) and Singh *et al.* (2016) are in disagreement with the present findings. Observation of non-significant effect of season, period and age on second and subsequent test day records might be due to scientific managerial practices adopted in the farm since its inception.

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