



IMPACT OF NON-GENETIC FACTORS ON FIRST LACTATION TRAITS IN PHULETRIVENI CATTLE

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Abstract: Records on 194 PhuleTriveni cattle were utilized to assess the impact of certain non-genetic factors on first lactation traits. Results revealed that estimated overall least squares means were 2712.67 ± 143.02 kg, 2498.34 ± 153.78 kg, 338.66 ± 486 days, 84.36 ± 5.57 days and 424.94 ± 8.02 days for first lactation milk yield (FLMY), 300 days milk yield (300DMY), lactation length (LL), dry period (DP) and calving interval (CI), respectively. The effects of period of calving, season of calving and age at first calving group were non-significant on all first lactation traits. The correlations among various first lactation traits were positively non-significant except correlation for dry period with lactation length, first lactation milk yield and 300 days milk yield.

Key words: Non-genetic factors, first lactation traits, Correlation, PhuleTriveni cattle.

Introduction

India being predominantly an agricultural country has an enormous cattle population. In India, crossbreeding programme in cattle was started initially at military dairy farms and afterwards systematic crossbreeding was planned at six centers as All India Coordinated Research Project (AICRP) on cattle since early seventies in different states including Maharashtra for enhancing milk production and thereby for evolution of new dairy strains. In Maharashtra, one of the project was started at Mahatma PhuleKrishiVidyapeeth, Rahuri in 1970's and has been continued as Research Cum Development Project (RCDP) on Cattle since year 1986. Under this project, PhuleTriveni triple crossbred cow is developed having genetic combination of 50 % Holstein Friesian + 25 % Jersey + 25 % Gir. The first lactation traits are the most important factors in determining the productive efficiency of the dairy cattle. In the present study, therefore, an attempt has been made to evaluate the first lactation performance and certain non-genetic factors affecting the performance in PhuleTriveni cattle.

Material and Methods

The data for the present investigation were recorded on 194 PhuleTriveni cattle (50 % HF + 25 % Jersey + 25 % Gir) maintained at Research Cum Development Project (RCDP) on Cattle, Mahatma PhuleKrishiVidyapeeth, Rahuri for the period of 24 years from 1989-2012. The animals were given optimum feeding and standard managerial practices were followed. The first lactation traits included in the study were first lactation milk yield (FLMY), 300 days milk yield (300 DMY), lactation length (LL), dry period (DP) and calving interval (CI). The data on first lactation traits were classified into 4 periods of six years each as P₁ (1989-94), P₂ (1995-2000), P₃ (2001-06) and P₄ (2007-12) to account for variation in managerial practices. On the basis of ambient temperature and relative humidity, each calendar year was divided into three seasons as; season 1 (Rainy) – June to September, Season 2 (Winter) - October to January and season 3 – (Summer) – February to May. The data was divided into three groups on the basis of age at first calving such as; A₁ – age at first calving up to 900 days, A₂ – age at first calving ranging between 901 to 1000 days and A₃ – age at first calving above 1000 days. The abnormal records due to abortion,

premature birth, still birth, incomplete lactation due to death and culling, and chronic illness were excluded from the study. The least-squares analysis procedure was adopted using LSMEMW programme (Harvey, 1990). The data was corrected for significant effects due to period of calving, season of calving and age at first calving as per formula suggested by Gacula *et al.* (1968). The correlations among various first lactation traits were also estimated as per method suggested by Snedecor and Cochran (1994).

Results and Discussion

The least squares means and analysis of variance for first lactation traits along with standard error are presented in Table 1 and Table 2. The correlations among first lactation traits are presented in Table 3.

First lactation traits

The overall least squares means for first lactation milk yield, 300 days milk yield, lactation length, dry period and calving interval were 2712.67 ± 143.02 kg, 2498.34 ± 153.78 kg, 338.66 ± 4.86 days, 84.36 ± 5.57 days, 424.94 ± 8.02 days, respectively. These findings are in close agreement with results reported by Saha *et al.* (2010) in Karan Fries for first lactation milk yield and 300 days milk yield. Similar results for lactation length, dry period and calving interval were reported by Khade (2001) in Friesian X Gir crossbreds, Kamble (2003) in Friesian X Gir crossbreds and Zol (2007) in PhuleTriveni cattle, respectively.

Effect of period of calving

The effect of period of calving on first lactation milk yield, 300 days milk yield, lactation length, dry period and calving interval were found non-significant. The highest and lowest values ranged from 2336.08 ± 284.0 kg and 3121.40 ± 287.17 kg, 2162.00 ± 316.28 and 2830.07 ± 373.55 kg, 345.89 ± 9.66 and 331.14 ± 5.14 days, 108.44 ± 12.09 and 66.64 ± 5.83 days, and 399.08 ± 8.42 and 444.92 ± 18.92 days for first lactation milk yield, 300 days milk yield, lactation length, dry period and calving interval, respectively. However, these differences were non-significant. Similar results were

reported by Patond (2009) in Jersey cattle for first lactation milk yield, 300 days milk yield and lactation length; and Kamble (2003) and Nagare and Patel (1997) in Gir crossbreds for dry period and calving interval.

Effect of season of calving

The analysis of variance revealed that the effect of season of calving on first lactation milk yield, 300 days milk yield, lactation length, dry period and calving interval were observed non-significant. The highest and lowest least squares means values ranged from 3034.31 ± 231.24 and 2484.24 ± 207.29 kg, 2242.12 ± 227.30 and 2710.33 ± 227.26 kg, 341.06 ± 7.05 and 343.88 ± 7.86 days, 91.83 ± 8.24 and 79.88 ± 8.80 days, and 422.23 ± 12.63 and 429.06 ± 11.29 days for first lactation milk yield, 300 days milk yield, lactation length, dry period and calving interval, respectively. The results revealed that the cows calved during rainy season had higher first lactation milk yield and 300 days milk yield than those calved during winter season and summer season. This may be due to availability of green fodder during rainy season. However, these differences were non-significant. This may be due to low magnitude of data. These results were in close agreement with Nagawade *et al.* (2008) in PhuleTriveni cattle for first lactation milk yield, Patond (2009) in Jersey cattle and Garudkar (2011) in PhuleTriveni cattle for 300 days milk yield, Patond (2009) in Jersey cattle, Nagawade *et al.* (2008) and Garudkar (2011) in PhuleTriveni cattle for lactation length, Khade (2001) in Friesian × Gir crossbreds for dry period and Zol (2007) in PhuleTriveni cattle for calving interval.

Effect of age at first calving

The age at first calving did not influence the first lactation milk yield, 300 days milk yield, lactation length, dry period and calving interval. The highest and lowest least squares means values ranged from 2894.39 ± 172.35 and 2592.58 ± 233.27 kg, 2188.32 ± 276.18 and 2923.93 ± 266.57 kg, 341.06 ± 7.05 and 343.88 ± 7.86 days, 88.81 ± 9.27 days and 78.41 ± 6.71 days, and 431.93 ± 14.12 and 420.24 ± 13.35 days for first lactation milk yield, 300 days milk yield,

lactation length, dry period and calving interval, respectively. The results indicates gradual decline in calving interval with increase in age at first calving. However, these differences were non-significant. Similar results were noticed by Gawari (1999) in triple crossbred cattle, Patond (2009) in Jersey cattle and Garudkar (2011) in PhuleTriveni cattle for first lactation milk yield, 300 days milk yield and lactation length, Khade (2001) in Friesian \times Gir crossbreds for dry period and Murdia and Tripathi (1991) in Jersey cattle for calving interval.

Correlation

The correlations among various first lactation traits were positively non-significant except correlation for calving interval with lactation length and dry period.

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Summary

The least squares means for first lactation milk yield, 300 days milk yield, lactation length, dry period and calving interval were 2712.67 ± 143.02 kg, 2498.34 ± 153.78 kg, 338.66 ± 4.86 days, 84.36 ± 5.57 days, 424.94 ± 8.02 days, respectively. The effect of period of calving, season of calving and age at first calving was non-significant on all first lactation traits. The calving interval had positive and significant correlation with lactation length and dry period.

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Table 1: Least squares means and standard errors of the factors affecting various first lactation traits in PhuleTriveni cattle

| Source | First lactation traits | | | | |
|-----------------------------------|----------------------------|----------------------------|-------------------------|-------------------------|-------------------------|
| | FLMY (kg) | 300 DMY (kg) | LL (days) | DP (days) | CI (days) |
| μ | 2712.67 \pm 143.02 (194) | 2498.34 \pm 153.78 (148) | 338.66 \pm 4.86 (194) | 84.36 \pm 5.57 (159) | 424.94 \pm 8.02 (159) |
| Period of calving | | | | | |
| P ₁ | 2510.52 \pm 151.21 (110) | 2739.77 \pm 176.46 (79) | 331.14 \pm 5.14 (110) | 66.64 \pm 5.83 (92) | 399.08 \pm 8.42 (92) |
| P ₂ | 2336.08 \pm 284.0 (33) | 2162.00 \pm 316.28 (25) | 345.89 \pm 9.66 (33) | 70.49 \pm 10.89 (28) | 415.53 \pm 15.70 (28) |
| P ₃ | 3121.40 \pm 287.17 (30) | 2261.51 \pm 295.45 (27) | 341.40 \pm 9.76 (30) | 108.44 \pm 12.09 (21) | 440.24 \pm 17.42 (21) |
| P ₄ | 2882.67 \pm 346.24 (21) | 2830.07 \pm 373.55 (17) | 336.23 \pm 11.77 (21) | 91.81 \pm 13.13 (18) | 444.92 \pm 18.92 (18) |
| Season of calving | | | | | |
| S ₁ | 3034.31 \pm 231.24 (56) | 2542.56 \pm 249.47 (46) | 343.88 \pm 7.86 (56) | 79.88 \pm 8.80 (50) | 422.23 \pm 12.63 (50) |
| S ₂ | 2619.46 \pm 202.37 (76) | 2710.33 \pm 227.26 (55) | 331.06 \pm 6.88 (76) | 91.83 \pm 8.24 (58) | 423.54 \pm 11.98 (57) |
| S ₃ | 2484.24 \pm 207.29 (62) | 2242.12 \pm 227.30 (47) | 341.06 \pm 7.05 (62) | 81.31 \pm 7.89 (51) | 429.06 \pm 11.29 (52) |
| Age at first calving group | | | | | |
| A ₁ | 2651.03 \pm 255.40 (55) | 2188.32 \pm 276.18 (44) | 347.33 \pm 8.68 (55) | 85.86 \pm 9.80 (47) | 431.93 \pm 14.12 (48) |
| A ₂ | 2894.39 \pm 172.35 (89) | 2382.76 \pm 189.21 (68) | 336.77 \pm 5.86 (89) | 78.41 \pm 6.71 (73) | 422.65 \pm 9.72 (72) |
| A ₃ | 2592.58 \pm 233.27 (50) | 2923.93 \pm 266.57 (36) | 331.89 \pm 7.93 (50) | 88.81 \pm 9.27 (39) | 420.24 \pm 13.35 (39) |

Figures in parenthesis are number of observation

Table 2: Least squares analysis of variance for first lactation traits in PhuleTriveni cattle

| Traits | Mean squares of different sources of variation | | | |
|--------|--|-----------------------|--------------------------------|------------------|
| | Period of calving (3) | Season of calving (2) | Age at first calving group (2) | Error |
| FLMY | 412627.33 | 1643601.08 | 2338519.17 | 2382547.15 (186) |
| 300DMY | 297223.23 | 2708494.07 | 4923598.09 | 2220374.45 (140) |
| LL | 1903.74 | 3028.02 | 2843.48 | 2705.94 (186) |
| DP | 10701.74 | 2303.76 | 1450.32 | 2882.03 (151) |
| CI | 21605.49 | 18665.30 | 20569.67 | 14393.37(164) |

Figures in parenthesis are the degrees of freedom

Table 3: Correlations among various first lactation traits

| | LL | DP | CI | 300DMY | FLMY |
|--------|----|--------|---------|--------|--------|
| LL | 1 | -0.053 | 0.460** | 0.100 | 0.170 |
| DP | - | 1 | 0.856** | -0.008 | -0.011 |
| CI | - | - | 1 | 0.044 | 0.075 |
| 300DMY | - | - | - | 1 | - |
| FLMY | - | - | - | - | 1 |

(* P < 0.05) (**P<0.01)