IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 7, Issue 12 Ver. III (Dec. 2014), PP 09-14
www.iosrjournals.org

Effect of Non – Genetic Factors on Production Traits in Deoni Cows

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Abstract: *The research was conducted to evaluate the effect of non - genetic factors on production traits in Deoni cattle. Data representing 114 Deoni cows from 211 total records of lactation over a 30 years period were analysed to determine the effect of age at first calving, season of calving and period of calving on production traits. The overall least squares means of lactation milk yield, peak milk yield, days to reach peak milk yield, lactation period and dry period were 358.31 ± 27.18, 3.14 ± 0.18, 44.81 ± 2.52, 213.90 ± 13.74 and 211.93 ± 26.23. The age at first calving were significant effect on lactation milk yield, peak milk yield and days to reach peak milk yield, whereas non significantly affected on lactation period and dry period. All sources of variation for season of calving on production traits were non significant. The period of calving had significant effect on lactation milk yield, peak milk yield and dry period, whereas non significantly affected on days to reach peak milk yield and lactation period.*

Keyword: *CCBP, Deoni, Genetic factors, Production, Traits,*

I. Introduction

In India, there are about 37 breeds of cattle among this cattle breeds Deoni and Red Kandhari cattle have gifted to Marathwada region. Deoni is one of the important dual purpose cattle breeds of Marathwada native to adjoining areas of Maharashtra, Andhra Pradesh and Karnataka state. The migration of Gir breed of cattle to Marathwada region and the consequent admixture with Dangi and local cattle . The home tract of Deoni breed is Udgir, Ahmedpur, Nilanga and Ausa tehsils of Latur district of Maharashtra and adjoining areas of Andhra Pradesh, Bidar and Gulbarga districts of Karnataka state. Deoni bullocks are suitable for heavy cultivation and carting works (Suryawamshi et al. 2000). The population of Deoni breed of cattle is dwindling and information on the productive traits of these cattle is scanty. Hence the present investigation was taken to study productive traits of Deoni cattle.

II. Materials And Methods

2.1 Study area

This study was conducted at Cattle Cross Breeding Project (CCBP) of Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. The CCBP is situated between 17^0 35' N and 20^0 40' N latitude and between 70^0 40' N and 78^0 15' E longitude. The mean daily maximum temperature varies from 29.1^0 C in December to 42.5^0 C in May. The mean daily minimum temperature varies from 6.9^0 C in December to 25.4^0 C in May. The relative humidity ranges from 11 to 90 per cent. Normally the summer becomes hot and general dryness persists though out the year except during south-west monsoon. The region is essentially a subtropical one and it comes under assured rainfall zones with an average rainfall of 900 mm spread in about 70 rainy days mostly received from June to September.

2.2 Management of animals

The management and feeding practices followed on CCBP research farm is uniform. Deoni receive their ration according to the feeding schedule. After commencement of rainy season within a month grazing is available and grazing practices are followed from mid of July to end of January in addition to grazing regular feeding of dry and green is practiced. At the time of morning and evening milking concentrates are allowed to each individual cow in accordance of their requirement for maintenance plus production. Dry roughages of sorghum and the green as per availability (Green maize, Lucerne, Green Jowar, Natural grasses) are fed to them. Good housing facilities exist at the farm. Enough health cover is provided to protect the animals from epidemics and causal incidences of ill- health and eventualities.

2.3 Sources and nature of data

Data representing 114 Deoni cows from CCBP with 211 total records of lactation over a 30 years period (1981 to 2010) were collected and organized to study the effect of age at first calving, season of calving and period of calving on production traits. The complete years was divided into 4 seasons and 6 periods having

5 years each. Five levels of age at first calving (AFC) were coded as A_1 < 1200 days to A_6 < 1600 days with class interval 150 days. The four seasons namely winter (December to February), summer (March to May), monsoon (June to September) and post monsoon (October to November) were codeded as S_1, S_2, S_3 and S_4. Each cow having at least theree offsprings was considered in this study.

2.4 Statistical analysis

Data were analysed by linear model (SAS, 2002). When the analysis of variance indicated the existance of significant within class, Duncan Multiple Range Test (DMRT) by Kramar (1957) were emplyoed to test and locate means that are significantly differed from the rest.

The following statistical model was employed to analyse the data.

$Y_{ijk} = \mu + S_i + P_j + e_{ijk}$

Where,

Y_{ijk} = is the record of a cow calved during j^{th} period in i^{th} season

μ = is the population mean common to all the observations

S_i = is the effect of i^{th} season of calving (1..4)

P_j = is the effect of j^{th} period of calving (1..6)

e_{ijk} = is the random error assumed to be NID (0, δ^2,e)

III. Results And Discussion

3.1 Lactation milk yield

Performance of dairy animal is judged from the milk it produces during a specified period of lactation. Variation observed in lactation milk yield from lactation to lactation in the same animal. The main reason of variation attributed to the physiology of lactation is the given set of genes and their reaction with non- genetic factors. The lactation performance of dairy cattle is usually measured by total milk yield per lactation.

The least squares means and ANOVA of lactation milk yield as affected by AFC, season and period of calving are presented in Table 1 and 2, respectively. The overall LSM of LMY of Deoni cow was 358.31 ± 27.18 kg. Similar results were reported by Thombre (1996), Salunkhe (2007), Mruttu (2013) in Deoni cattle.

3.1.1 Effect of age at first calving on lactation milk yield

The lactation milk yield was significantly (P < 0.01) influenced by AFC. The highest LMY was observed from the cows that had AFC groups A_1 followed by cows that had AFC group A_2 and the lowest of all from those cows, which had AFC group A_5. Similar results were reported by Yadav and Rathi (1992) in Hariana cattle, Thombre et al.(2001) in Deoni cattle, Monalisa et al.(2010) in Sahiwal cattle and Mruttu (2013) in Deoni cattle.

3.1.2 Effect of season of calving on lactation milk yield

The LMY was non significantly affected by season of calving. Maximum production was occurred during monsoon season. Milk production was depressed for cows calving in summer. The variation among LMY was non significant as Deoni cattle genotype are resourceful to tolerate the seasonal changes in Maharashtra state and can flourish comfortably at CCBP farm, Parbhani. These results were in agreement with Shelke et al.(1992) in Red Kandhari, Jagtap et al.(1994) in Red Sindhi, Thombre et al.(2002), Salunkhe (2007) and Mruttu (2013) in Deoni cattle.

3.1.3 Effect of period of calving on lactation milk yield

The lactation milk yield was affected by period of calving (P < 0.01). The variation in LMY observed in different periods indicates the level of management as well as environmental effects. Similar results showing significant effect of period of calving on LMY was reported by Nagadwali et al. (1996) in Sahiwal, Thombre (1996) in Deoni, Dhaware et al.(2008) in Khillar and Mruttu (2013) in Deoni cattle.

3.2 Peak milk yield

The least squares means and ANOVA of peak milk yield as affected by AFC, season and period of calving are presented in Table 1 and 2, respectively. The overall LSM of PMY of Deoni cow was 3.14 ± 0.18 kg. The results were similar to Ramesha (2001) in Khillar cattle, Joshi et al.(2005) in Bachaur, Vechur and Ongole cattle.

3.2.1 Effect of age at first calving on peak milk yield

The analysis of variance indicated that effect due to age at first calving groups on PMY in Deoni cow was significant (P < 0.01) (Table 2). A_1 had significantly higher PMY than cows born in A_5 , A_4 , A_2 and A_3

groups. This is indicated that high AFC will ultimately affects the peak milk yield. Similar results reported by Pathak (1980) in Tharparkar and Sahiwal cattle, Yadav and Rathi (1992) in Hariana, cattle.

3.2.2 Effect of season of calving on peak milk yield

The statistical analysis revealed that observed differences of PMY due to season of calving were non significant. The variation among PMY was non significant indicated that irrespective of any season of calving the cows their PMY remains unchanged and does not get significantly deviated. These results were in agreement with Chauhan et al.(1976) in Sahiwal, Tharparkar and Red Sindhi cattle, Gogoi et al.(1993) in Red Sindhi cattle, Patil (1997) in Sahiwal cattle, Salunkhe (2007) in Deoni cattle.

3.2.3 Effect of period of calving on peak milk yield

The analysis of variance indicated that effect due to period of calving on PMY in Deoni cow was significant ($P < 0.05$) (Table 2). The higher peak milk yield was observed in P_6 than other periods. Similar results showing significant effect of period of calving on PMY were reported by Joshi et al. (1989) in Rathi cattle, Nanavati and Qureshi (1996) in Gir cattle, Khadda et al.(2012) in Tharparkar cattle and Kumar et al.(2012) in Sahiwal cattle.

3.3 Days to reach peak milk yield

Days to reach peak yield is one of the major factor which determines the lactation yield, lactation length and shape of lactation curve. The least squares means and ANOVA of days to reach peak milk yield as affected by AFC, season and period of calving are presented in Table 1 and 2, respectively. The overall LSM of DRPMY of Deoni cow was 44.81 ± 2.52 days. The results were close to Nanavati and Qureshi (1996) in Gir cattle and Bhadoria et al.(2002) in Gir cattle.

3.3.1 Effect of age at first calving on days to reach peak milk yield

The days to reach peak milk yield was significantly ($P < 0.01$) influenced by AFC. The highest DRPMY was observed from the cows that had AFC groups A_1 followed by cows that had AFC group A_5 and the lowest of all from those cows, which had AFC group A_2. Similar results reported by Balaine et al.(1970) in Hariana cattle and D'Souza et al.(1979) in Red Sindhi cattle.

3.3.2 Effect of season of calving on days to reach peak milk yield

The analysis of variance indicated that effect due to season of calving on DRPMY in Deoni cow was non significant. Season S_4 had significantly higher DRPMY than cows calved than S_2, S_3 and lowest in S_1. This has indicated that irrespective of any season of calving the cows for their DRPMY remains unchanged and do not get significantly deviated. These results were in agreement with Raheja (1982) in Hariana cattle, Nanavati and Qureshi (1996) in Gir cattle, Salunkhe (2007) in Deoni cattle and Khadda et al.(2012) in Tharparkar cattle.

3.3.3 Effect of period of calving on days to reach peak milk yield

The days to reach peak milk yield was non significantly affected by period of calving (Table 2). Similar results showing non significant effect of period of calving on DRPMY was reported by Tomar and Pandey (1995) in Tharparkar cattle.

3.4 Lactation period

The least squares means and ANOVA of lactation period as affected by AFC, season and period of calving are presented in Table 1 and 3, respectively. The overall LSM of LP of Deoni cow was 213.90 ± 13.74 days. The results were agreement with Dhumal et al.(1989) in Red Kandhari cattle, Joshi et al.(2005) in Ongole cattle, Dhaware et al.(2008) in Khillar cattle, and Mruttu (2013) in Deoni cattle.

3.4.1 Effect of age at first calving on lactation period

The lactation period was non significantly affected by age at first calving. The LP (Days) was higher in cows born during A_2 followed by A_3 , A_4 , A_5 and lowest in A_1. This has revealed that AFC not interfering with LP and therefore it provides an scope for selection of animals with low AFC with comparatively optimum LP. Similar results were reported by Balaine et al.(1970) in Hariana cattle, Umrikar et al. (1990) in Gir cattle, Gaur and Raheja (1996) in Sahiwal cattle and Salunkhe (2007) in Deoni cattle.

3.4.2 Effect of season of calving on lactation period

The lactation period was non significantly affected by season of calving. This indicated that Deoni genotype are efficient tolerate the seasonal changes and get comfortable. These results were in agreement with

Latpate (1995) in Red Kandhari cattle, Patil (1997) in Sahiwal cattle, Vinoo et al.(2005) in Ongole cattle and Salunkhe (2007) in Deoni cattle.

3.4.3 Effect of period of calving on lactation period

The statistical analysis revealed that observed differences of LP due to period of calving were non significant. The variation among LP was non significant indicated that irrespective of any period of calving the cows their PMY remains unchanged and does not get significantly deviated. Similar results showing non significant effect of period of calving on LP was reported by Malhotra and Singh (1980) and Gupta and Tripathi (1994) in Red Sindhi cattle and Vinoo et al.(2005) in Ongole cattle.

3.5 Dry period

Dry period is important economic trait causing the variations in calving interval and thus indirectly affects production efficiency of cattle. The least squares means and ANOVA of dry period as affected by AFC, season and period of calving are presented in Table 1 and 3, respectively. The overall LSM of DP of Deoni cow was 211.93 ± 26.23 days.

3.5.1 Effect of age at first calving on dry period

The highest dry period was observed from cows that had AFC group A_1 followed by A_5 , A_4 , A_3 and lowest in A_2 . DMRT indicated that, observed differences for DP due to AFC effect were non – significant. Similar results were reported by Dubey and Singh (2005) in Sahiwal cattle, Vinoo et al.(2005) in Ongole cattle and Mruttu (2013) in Deoni cattle.

3.5.2 Effect of season of calving on dry period

The effect of season of calving on dry period was non significant. The LSM for DP (Days) was higher in cows calved during S_2 followed by S_1, S_3 and lowest in S_4. The present results revealed that season of calving were not significantly affected DP in the herd and capable with prevailing environmental conditions and weather changes. These results were in agreement with Chawala and Mishra (1982) and Patil (1997) in Sahiwal cattle, Vinoo et al.(2005) in Ongole cattle, Nanavati and Singh (2009) in Nimari cattle and Mruttu (2013) in Deoni cattle.

3.5.3 Effect of period of calving on dry period

The dry period was significantly ($P < 0.05$) affected by period of calving. Similar results showing significant effect of period of calving on DP was reported by Reddy and Nagarcenkar (1990) in Sahiwal cattle, Nanavati and Singh (2009) in Nimari cattle and Mruttu (2013) in Deoni cattle.The variaiton in DP in different periods indicates the level of management as well as enviornmental effect.

Table 1. Least square means and standard error for Lactation milk yield (LMY), Peak milk yield (PMY), Days to reach peak milk yield (DRPMY), Lactation period (LP) and Dry period (DP) as affected by AFC groups, season of calving and period of calving in Deoni cows

Source	Code	LMY(Kg)	PMY (Kg)	DRPMY (Days)	LP (Days)	DP (Days)
Overall mean	μ	358.31 ± 27.18	3.14 ± 0.18	4.81 ± 2.52	213.90 ± 13.74	211.93 ± 26.23
AFC groups	A_1	405.13^{a} ± 10.80	4.13^{a} ± 0.71	43.01^{ab} ± 10.02	168.74 ± 54.58	266.22 ± 10.42
	A_2	370.87^{a} ± 25.83	3.03^{b} ± 0.17	41.55^{b} ± 2.39	227.52 ± 13.05	199.09 ± 24.93
	A_3	359.50^{b} ± 23.16	2.97^{b} ± 0.15	42.41^{b} ± 2.14	218.87 ± 11.70	211.46 ± 22.35
	A_4	392.03^{a} ± 23.01	3.19^{b}± 0.15	43.99^{ab}± 2.13	215.70 ± 11.62	212.02 ± 22.21
	A_5	340.02^{b} ± 17.51	3.23^{b} ± 0.11	46.08^{a} ± 1.62	206.64 ± 8.85	213.84 ± 16.90
Season of calving	S_1	350.60 ± 29.64	3.06 ± 0.19	43.35 ± 2.75	211.34 ± 14.98	211.16 ± 28.60
	S_2	338.75 ± 32.42	3.14 ± 0.21	45.29 ± 3.00	216.90 ± 16.38	228.01 ± 31.29
	S_3	373.64 ± 29.46	3.20 ± 0.19	44.42 ± 2.73	218.00 ± 14.89	209.80 ± 28.43

	S_4	370.25 ± 29.91	3.18 ± 0.20	46.18 ± 2.78	209.33 ± 15.11	198.72 ± 28.87
Period of calving	P_1	350.02[a] ± 22.84	2.98[b] ± 0.15	42.42 ± 2.12	217.72 ± 11.54	208.91[b] ± 22.04
	P_2	410.46[a] ± 57.37	3.04[b] ± 0.38	42.10 ± 5.32	183.94 ± 28.99	187.32[b] ± 55.37
	P_3	304.16[a] ± 78.69	3.08[b] ± 0.52	41.24 ± 7.30	203.98 ± 39.76	212.75[b] ± 75.95
	P_4	334.05[b] ± 30.87	3.01[b] ± 0.20	42.62 ± 2.86	201.80 ± 15.60	224.15[ab] ± 29.79
	P_5	347.16[ab]± 26.34	3.34[ab] ± 0.17	47.93 ± 2.44	205.05 ± 13.31	226.02[a]± 25.41
	P_6	438.02[a] ± 30.91	3.40[a] ± 0.20	46.55 ± 2.87	234.87 ± 15.62	181.41[ab]± 29.83

Table 2. Analysis of variance for Lactation milk yield (LMY), Peak milk yield (PMY), Days to reach peak milk yield (DRPMY) on AFC groups, season of calving and period of calving in Deoni cows

Sources	**DF**	**LMY**		**PMY**		**DRPMY**	
		MSS ('000)	**F value calculated**	**MSS ('000)**	**F value calculated**	**MSS ('000)**	**F value calculated**
AFC	4	39210.00	3.55^{**}	2.07	4.32^{**}	389.40	4.19^{**}
Season	3	11540.00	1.05^{NS}	0.23	0.47^{NS}	70.21	0.74^{NS}
Period	5	83640.00	7.58^{**}	1.29	2.70^{*}	168.60	1.77^{NS}
Error	198	11040.00		0.48		95.11	
Total	211						

Table 3. Analysis of variance for Lactation period (LP) and Dry period (DP) on AFC groups, season of calving and period of calving in Deonicows

Sources	**DF**	**LP**		**DP**	
		MSS ('000)	**F value calculated**	**MSS ('000)**	**F value calculated**
AFC	4	1682.00	0.60^{NS}	8648.00	0.84^{NS}
Season	3	841.60	0.30^{NS}	5090.00	0.49^{NS}
Period	5	6074.00	2.15^{NS}	29740.00	2.89^{*}
Error	198	2820.00		10290.00	
Total	211				

IV. Conclusion

This study indicates that the performance of Deoni cows for lactation milk yield, peak milk yield and lactation period is comparatively low which needs an improvement in overall management of the dairy cows. Morever, for all productional traits concerns seasonal changes had not any affects.Therefore, additional production strategies like improving enviornmental factors and managemental factors needed to improve the production performance.

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