Original Research Article

Studies on Productive Performance of Dangi Cattle in their Breeding Tract of Maharashtra

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A B S T R A C T

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In the present investigation the productive performance of Dangi cattle at various stages of growth were studied at different locations in the breeding tract. The idea behind the collection of data in breeding tract of Dangi cattle from the farmers and breeders herd of Dangi rather than on the organized farm to obtain the real picture of productive performance of breed in the breeding tract. The productive traits often help in judging the economic value of the animal. The improvement in productive characteristics of indigenous breeds has become essential to make the economically viable dairy animals.

Introduction

The livestock sector plays an important role in the socio-economic development of rural households. The cattle occupy central position and are basis of the Indian rural livelihood security. The cattle biodiversity in India constitutes 43 well defined breeds of cattle (Anonymous, 2017). The country population of cattle accounts for 17.00 per cent of the total world cattle population. The livestock sector alone contributes nearly 25.6% of value of output at current prices of total value of output in Agriculture, Fishing and Forestry sector. The overall contribution of livestock sector in total GDP is nearly 3.90 per cent at current prices during 2013-14. India has 190.9 million cattle, 108.7 million buffaloes, 135.2 million goats and 65.06 million sheep population. The total Bovine population is 299.9 million in 2012 which shows a decline of 1.57% over previous

census (Livestock Census, 2012). The Dangi animals are found near the hilly tract where forest is available in the ranges of Sahyadri where it is reared mainly for draught purpose. The Dangi cattle is a hardy and medium-slow draft animal, subsist mostly on grazing alone and they have visible characteristics like distinct white coat colour with red or black spots distributed unevenly over the body with slightly protruding forehead. Horns are short and thick with lateral pointing tips.

Animals with inward and also with downward pointing horn tips are also available in sizable numbers. Dangi Cows are low milk producers with an average lactation milk yield of 175-800 kg. The productive performances like Lactation milk yield (LMY), Peak milk yield (PMY), Days to reach peak milk yield (DRPMY), Lactation length (LL) and Dry period (DP) plays an important role for evaluation of animal.

Therefore, the present study has been conducted with following objectives:

1. To study the productive performances
2. To study the block effect on productive performances

Materials and Methods

Selection of cattle

The data on body measurements of 189 Dangi cattles was collected by taking actual measurements of each individual in different villages in Akole tehsil of Ahmadnagar district, Igatpuri and Sinner tehsils of Nashik district and Shahapur and Murbad tehsils of Thane district of Maharashtra. From each tehsils Dangi calves with different age group was chosen randomly for present study. From each tahsils, five villages i.e. total twenty five villages were taken as sample for study (Table-1).

In present study the data on productive performances i.e. lactation milk yield (LMY), Peak milk yield (PMY), days to reach peak milk yield (DRPMY), lactation length (LL), dry period (DP) was collected by actual interview with the livestock owners with the help of model questionnaire.

Productive performances

The analysis of data was done by method of Least Square Technique as outlined by Harvey (1990). The following mathematical model was employed to analyze the data.

$$Y_{ijk} = \mu + B_i + O_l + e_{ijk}$$

Where,
Y_{ijk} = is the record of kth Dangi individual in i^{th} block,
and j^{th} off-type.
μ = is the population mean common to all

the observations.
B_i = is the effect of ith block of individual.
O_j = is the effect of jth off-type of individual.

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

The significant effect will be further analyzed to have all pair wise comparison by Duncan's Multiple Range Test (DMRT) as modified by Kramar (1957).

Results and Discussions

Productive characteristics

Lactation milk yield (LMY)

It was observed from Table 2 that the overall least square means for lactation milk yield (LMY) of Dangi cattle was recorded as 511.07 ± 11.60 kg in the present study which is in accordance with Ahlawat *et al.,* (2014) as 430-600 kg with an average of 515 kg in Dangi cows. The higher lactation milk yield than the present finding has been reported by Jaiswal *et al.,* (1979) as 550.00 to 680.00 kg, Purbey and Sane (1982) as 486.3, 516.0, 587.0, 557.7, 584.4 and 534.7 kg, respectively for 1st to 6th lactation with an average of 544.35 kg, Nivsarkar *et al.,* (2000) as 529.5 ± 17.7 kg, Maske and Phule (2012) as 530 kg, Janmeda *et al.,* (2013) as 529.5 ± 17.7 kg and Sharma and Pundir (2014) as 550 kg, respectively, in Dangi cattle.

Block effect on lactation milk yield

The difference observed in the LSMs for LMY of Dangi cattle was significant due to block effect (Table 3). The LSM for LMY of Dangi cattle in block B_1, B_2, B_3, B_4 and B_5 were 598.22 ± 25.18, 531.64 ± 25.50, 506.05 ± 25.50, 475.76 ± 26.18 and 443.68 ± 27.31 kg, respectively. The LSM for LMY of Dangi

cattle recorded in B_1 was higher to that of recorded in B_2, B_3, B_4 and B_5 which also differed highly significant from each other.

The DMRT revealed that Dangi cattle maintained at B_1 block had highly significantly higher LMY over other blocks. This indicates that there is great potential for genetic improvement of the breed using selective breeding techniques.

Peak milk yield (PMY)

It was observed from Table 4 that the overall least square means for peak milk yield (PMY) of Dangi cattle was recorded as 2.65 $\pm$ 0.03 kg in the present study which is in agreement with Siddiqui *et al.,* (2000) as 2.27 $\pm$ 0.35 kg in Red Kandhari cattle, Salunkhe (2007) as 2.63 $\pm$ 0.05 kg in Deoni cattle, Bainwad *et al.,* (2018) as 2.63 $\pm$ 0.01 kg in Red Kandhari cattle and Jagdale (2018) as 2.77 $\pm$ 0.03 kg in Khillar cattle, respectively. The higher peak milk yield than the present finding has been reported by Auradkar and Sakhare (1984) as 3.01 $\pm$0.14 kg in Red Kandhari cattle, Bhutkar (2014) as 3.14$\pm$ 0.18 kg in Deoni cattle and Wagh (2018) as 3.10 $\pm$ 0.03 kg in Gaolao cattle, respectively.

Block effect on Peak milk yield

The difference observed in the LSMs for PMY of Dangi cattle was non-significant due to block effect (Table 5). The LSM for PMY of Red Kandhari cattle in block B_1, B_2, B_3, B_4 and B_5 were 3.04 $\pm$ 0.06, 2.60 $\pm$ 0.06, 2.60 $\pm$ 0.06, 2.57 $\pm$ 0.06 and 2.47 $\pm$ 0.06 kg, respectively. The LSM for PMY of Dangi cattle recorded in B_1 was higher to that of recorded in B_2, B_3, B_4 and B_5 which also differed highly significant from each other.

The DMRT revealed that Dangi cattle maintained at B_1 block had highly significantly higher PMY over other blocks.

Days to reach the peak milk yield (DRPMY)

It was observed from Table 6 the overall least square means for days to reach peak milk yield (DRPMY) in Dangi cattle was recorded as 37.78 $\pm$ 0.26 days which is in accordance with Salunkhe (2007) as 36.39 $\pm$ 0.48 days in Deoni cattle. The slightly higher days to reach the peak milk yield than the present finding has been reported by Bhutkar (2014) as 44.81$\pm$ 2.52 kg in Deoni cattle at CCBP, Parbhani, Bainwad *et al.,* (2018) as 39.48 $\pm$ 0.09 days in Red Kandhari cattle, Jagdale (2018) as 40.70 $\pm$ 0.36 days in Khillar cattle, whereas lower by Wagh (2018) as 34.49 $\pm$ 0.44 days in Gaolao cattle, respectively.

Block effect on Days to reach the peak milk yield

The difference observed in the LSMs for DRPMY of Dangi cattle was non-significant due to block effect (Table 7). The LSM for DRPMY of Dangi cattle in block B_1, B_2, B_3, B_4 and B_5 were 38.42 $\pm$ 0.56, 38.10 $\pm$ 0.57, 37.90 $\pm$ 0.57, 37.76 $\pm$ 0.58 and 36.73 $\pm$ 0.61 days, respectively. The LSM for DRPMY of Dangi cattle recorded in B_1 was higher to that of recorded in B_2, B_3, B_4 and B_5 which differed non-significant from each other.

The DMRT revealed that Dangi cattle maintained at B_1 block had highly significantly higher DRPMY over other blocks.

Lactation length (LL)

It was observed from Table 8 that the overall least square means for lactation length (LL) of Dangi cattle was recorded as 301.70 $\pm$ 3.74 days which is slightly higher than previously reported by Purbey and Sane (1982) as 272.4, 249.8, 290.0, 256.3, 280.0 and 271.2 days, respectively for 1st to 6th lactation with an

average of 269.95 days, Nivsarkar *et al.,* (2000) as 268.8± 3.5 days, Gokhale (2003) as 246 ± 1.61 days, Maske and Phule (2012) as 269 days ranging from 100- 396 days, Janmeda *et al.,* (2013) as 268.8 ± 3.5 days which was ranging from 100–396 days and Sharma and Pundir (2014) as 249 days, respectively, in Dangi cattle.

Block effect on Lactation length

The difference observed in the LSMs for lactation length (LL) of Dangi cattle was highly significant due to block effect (Table 9). The LSM for LL of Dangi cattle in block B_1, B_2, B_3, B_4 and B_5 were 331.15 ± 8.12, 329.49 ± 8.23, 317.46 ± 8.23, 279.16 ± 8.45 and 251.23 ± 8.81 days, respectively. The LSM for LL of Dangi cattle recorded in B_1 was higher to that of recorded in B_2, B_3, B_4 and B_5 which differed highly significant from each other.

The DMRT revealed that Dangi cattle maintained at B_1 block had highly significantly higher LL over other blocks.

Dry period (DP)

It was observed from Table 10 that the overall least square means for dry period (DP) of Dangi cattle was recorded as 204.30 ± 3.86 days which is slightly higher than previously reported by Purbey and Sane (1982) as 284.9, 216.9, 120.0, 196.8, 152.1 and 118.8 days, respectively for 1 to 6 lactations with an average of 193.25 days, Nivsarkar *et al.,* (2000) as 189.6 ± 3.5 days, Maske and Phule (2012) as 190 days, Janmeda *et al.,* (2013) as 189.6 ± 3.5 days, respectively, in Dangi cattle.

Table.1 List of villages randomly selected for collection of data

Sr.No.	Name of the District	Name of the Tahsil	Name of the villages
1.	Ahmadnagar	Akole	Khirwire, Rajur, Ekadare, Samsherpur, Mogras
2.	Nashik	Igatpuri	Devle, Ghoti, Dhamani, Igatpuri, Mauli (Khurd)
		Sinner	Duberewadi, Thangaon, Dubere, Belu, Padali
3.	Thane	Shahapur	Katbav, khardi, Khor, Umbarmali, Dondarpada
		Murbad	Bhoirwadi, Moroshi, Bhorande, Diwanpada, Aawlyachiwadi

Table.2 Least squares means for Lactation milk yield (LMY) as affected by block in Dangi cows

Sources	Code	N	Mean Lactation milk yield (Kg) ± SE
Population mean	μ	189	511.07 ± 11.60
Block			
Akole	B_1	40	598.22[a] ± 25.18
Igatpuri	B_2	39	531.64[a] ± 25.50
Sinner	B_3	39	506.05[b] ± 25.50
Shahapur	B_4	37	475.76[b] ± 26.18
Murbad	B_5	34	443.68[b] ± 27.31

Note: Means connected by same superscripts do not differ significantly.

Table.3 Least squares analysis of variance (ANOVA) for Lactation milk yield of Dangi cows

Sources of variation	d.f.	M.S.S.	F-value
Block	4	130100	5.130**
Error	184	25360	

**Significant at P<0.01

Table.4 Least squares means for Peak milk yield (PMY) as affected by block in Dangi cows

Sources	Code	N	Mean Peak milk yield (Kg) $\pm$ SE
Population mean	μ	189	2.65$\pm$ 0.03
Block			
Akole	B_1	40	3.04$^a\pm$ 0.06
Igatpuri	B_2	39	2.60$^b \pm$ 0.06
Sinner	B_3	39	2.60$^b \pm$ 0.06
Shahapur	B_4	37	2.57$^b \pm$ 0.06
Murbad	B_5	34	2.47$^b \pm$ 0.06

Note: Means connected by same superscripts do not differ significantly.

Table.5 Least squares analysis of variance (ANOVA) for Peak milk yield of Dangi cows

Sources	d.f.	M.S.S.	F-value
Block	4	1.881	12.683**
Error	184	0.1483	

**Significant at P<0.01

Table.6 Least squares means for Days to reach the peak milk yield (DRPMY) as affected by block in Dangi cows

Sources	Code	N	Mean Days to reach the peak milk yield (Days) $\pm$ SE
Population mean	μ	189	37.78 $\pm$ 0.26
Block			
Akole	B_1	40	38.42 $\pm$ 0.56
Igatpuri	B_2	39	38.10 $\pm$ 0.57
Sinner	B_3	39	37.90 $\pm$ 0.57
Shahapur	B_4	37	37.76 $\pm$ 0.58
Murbad	B_5	34	36.73 $\pm$ 0.61

Table.7 Least squares analysis of variance (ANOVA) for Days to reach the peak milk yield of Dangi cows

Sources	d.f.	M.S.S.	F-value
Block	4	14.53	1.162^{NS}
Error	184	12.50	

NS = Non significant

Table.8 Least squares means for Lactation length (LL) as affected by block in Dangi cows

Sources	Code	N	Mean Lactation period (Days) $\pm$ SE
Population mean	μ	597	301.70 ± 3.74
Block			
Akole	B_1	40	$331.15^{a} \pm 8.12$
Igatpuri	B_2	39	$329.49^{a} \pm 8.23$
Sinner	B_3	39	$317.46^{a} \pm 8.23$
Shahapur	B_4	37	$279.16^{b} \pm 8.45$
Murbad	B_5	34	$251.23^{bc} \pm 8.81$

Note: Means connected by same superscripts do not differ significantly.

Table.9 Least Squares Analysis of Variance (ANOVA) for Lactation length of Dangi cows

Sources	d.f.	M.S.S.	F-value
Block	4	44830	16.97**
Error	184	2641	

** Significant at P<0.01

Table.10 Least squares means for Dry period (DP) as affected by block in Dangi cows

Sources	Code	N	Mean Dry period(Days) $\pm$ SE
Population mean	μ	597	204.30 ± 3.86
Block			
Akole	B_1	40	$155.37^{a} \pm 8.38$
Igatpuri	B_2	39	$166.87^{a} \pm 8.48$
Sinner	B_3	39	$170.82^{a} \pm 8.48$
Shahapur	B_4	37	$232.35^{b} \pm 8.71$
Murbad	B_5	34	$296.09^{bc} \pm 9.09$

Note: Means connected by same superscripts do not differ significantly.

Table.11 Least squares analysis of variance (ANOVA) for Dry period of Dangi cows

Sources	d.f.	M.S.S.	F-value
Block	4	127000	45.227**
Error	184	2808	

** Significant at P<0.01

Block effect on dry period

The difference observed in the LSMs for DP of Dangi cattle was non- significant due to block effect (Table 11). The LSM for DP of Dangi cattle in block B_1, B_2, B_3, B_4 and B_5 were 155.37 ± 8.38, 166.87 ± 8.48, 170.82 ± 8.48, 232.35 ± 8.71 and 296.09 ± 9.09 days, respectively. The LSM for DP of Dangi cattle recorded in B_5 was higher to that of recorded in B_1, B_2, B_3 and B_4 which differed highly significant from each other.

The DMRT revealed that Dangi cattle maintained at B_5 block had highly significantly higher DP over other blocks. These long term dry period could be attributed to the short lactation length, which, in turn, could be attributed to the lower persistence in milk yield due to poor nutritional status of the of Dangi cows.

In conclusion, the effect of block was found highly significant on Lactation Milk Yield (LMY), Peak milk yield (PMY), Lactation length (LL) and Dry Period (DP), whereas non significant block effect on Days to reach peak milk yield (DRPMY). Hence it is concluded that the management practices, available water and feed resources and climatic condition followed there plays an important role on productive performance of Dangi cattle.

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