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## Production and reproduction traits of indigenous cattle of Arunachal Pradesh

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**Abstract**

A total of 810 lactation records pertaining to indigenous cattle of Arunachal Pradesh were utilized to study the effect of location and lactation order on production and reproduction characteristics. Lactation milk yield (LMY), lactation length (LL), peak yield (PY), days to attain peak yield (DAPY), dry period (DP) and inter calving period (ICP) were included in the present investigation. The data on production and reproduction characteristics were classified according to location, and parity of the animal. The means for lactation milk yield, lactation length, peak yield, days to attain peak yield, dry period and inter calving period were  $296.71 \pm 0.80$  kg,  $239.51 \pm 0.48$  days,  $1.82 \pm 0.01$  kg,  $35.97 \pm 0.07$  days,  $209.957 \pm 0.742$  days and  $447.085 \pm 0.702$  days respectively. Location and lactation order had significant effect on all the production and reproduction characters, while location exerted highly significant ( $P < 0.01$ ) influence on LMY, LL and ICP.

**Keywords:** Indigenous cattle, Lactation milk yield, lactation length, peak yield, days to attain peak yield, dry period and inter calving period, Arunachal Pradesh

**Introduction**

The cattle population of Arunachal Pradesh is purely non-descript. The state acknowledged for its rich biodiversity and forest cover has a varying climate due to its complex elevation above the mean sea level which varies from 100-1500 m in the low altitude to 3500-5500 m in high altitude areas and it receives an annual rainfall of 2,000 to 5,000 mm. According to the 19<sup>th</sup> livestock census, Arunachal Pradesh has 6.56 lakh indigenous and 0.30 lakh crossbred cattle which constitute one-third of the total livestock resource of the state. Indigenous cattle are the main source of milk production in the state and they are mostly distributed in the Lohit, Changlang, West Siang, East Siang and Lower Subansiri districts. During the year 2013-14 [2] total milk production in the state was 43.35 tonnes, 71.37 percent of which was contributed by the indigenous cattle.

Not much work has been done on the production and reproduction traits of indigenous cattle of Arunachal Pradesh. The present study was, therefore, undertaken to study these traits in the context of breed description and also to develop necessary breeding strategies for their improvement.

**Materials and Methods**

Data pertaining to production and reproduction characters from 810 lactation records of indigenous cattle belonging to Arunachal Pradesh were collected from 3 districts West Siang, Lohit and West Kameng following a stratified sampling design (3 districts x 2 block x 5 villages) covering altogether 30 villages. The geographical location of West Siang district is between  $28.1^\circ$  N latitude to  $94.8^\circ$  E longitude with an altitude of 619 m above the sea level. Whereas, Lohit and West Kameng districts lie between  $27.9^\circ$  N latitude to  $96.1^\circ$  E longitude and  $27.3^\circ$  N latitude to  $92.3^\circ$  E longitude respectively. The Lohit and West Kameng district, stands at an altitude of 185 m and 1496 m above the sea level. The data collected for production and reproduction traits were classified according to Location viz., West Siang (D<sub>1</sub>), Lohit (D<sub>2</sub>) and West Kameng (D<sub>3</sub>) and lactation order (L<sub>1</sub>, L<sub>2</sub>, L<sub>3</sub>, L<sub>4</sub> and L<sub>5</sub>). The effects of location, and lactation order were evaluated following least squares analysis of variance as suggested by Harvey (1990) [12]. Duncan's Multiple Range Test (DMRT) as modified by Kramer (1957) [13] was used to make all pair wise comparisons among the means wherever significant differences between levels of effect were obtained.

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## Results and Discussion

The overall least-squares means for lactation milk yield (LMY), lactation length (LL), peak yield (PY), days to attain peak yield (DAPY), dry period (DP) and inter calving period (ICP) based on 810 lactations in the present study were  $296.710 \pm 0.803$  kg,  $239.513 \pm 0.483$  days,  $1.820 \pm 0.005$  kg,  $35.97 \pm 0.07$  days,  $209.957 \pm 0.742$  days and  $447.085 \pm 0.702$  days respectively (Table 1). Corresponding values in Assam local cattle have been reported by Kayastha (2006) [15] as  $304.862$  kg,  $241.172 \pm 1.109$  days,  $1.928 \pm 0.021$  kg,  $25.234 \pm 0.225$  days,  $225.284 \pm 1.678$  days and  $465.442 \pm 1.423$  days respectively. Similar to present findings was also reported by Singh (2008) [28] in Manipur local cattle who recorded the LMY, LL, DP and ICP as  $312.49 \pm 3.68$  kg,  $238.19 \pm 2.90$  days,  $218.98 \pm 1.48$  days and  $463.82 \pm 2.09$  days respectively. Bhutkar *et al.* (2014) [4] obtained the mean PY and DAPY in Deoni cows as  $3.14 \pm 0.18$  kg and  $44.81 \pm 2.52$  days respectively. However, higher values of LMY in Gir [29], Gangatiri [10] and Malvi [26] cattle; Longer LL in Nagori [19], Tharparkar [21] and Vrindavani [30] cattle; higher PY in Sahiwal [16], deshi [27] and Hariana [30] cattle; and longer DAPY in Vrindavani [30] and Assam local cattle [6] than the present observation was reported. The average DP observed in the present finding was longer than the findings of Patel *et al.* (2000) [21] in Tharparkar ( $105.16 \pm 19.36$  days); Chakravarthi *et al.* (2002) [5] in Deoni ( $103.66 \pm 19.78$  days). Longer ICP than the present finding were reported by Thombre *et al.* (2002) [32] in Deoni ( $533.64 \pm 5.21$  days); Pundir *et al.* (2012) [22] in hill cattle of Uttarakhand (485 days) and Iype *et al.* (2016) [14] in Kasargod ( $466.6 \pm 13.5$  days). The lower production and longer DP and ICP in the indigenous cattle of Arunachal Pradesh might be due to non-application of scientific breeding and relatively poor managerial practices to these animals.

### Effect of location

The mean LMY of indigenous cattle in West Siang, Lohit and West Kameng districts were found to be  $298.500 \pm 1.599$ ,  $288.682 \pm 1.056$  and  $302.948 \pm 1.261$  kgs respectively. The

least-squares analysis of variance indicated highly significant ( $P < 0.01$ ) effect of location on LMY, LL and ICP.

The significant effect of location on LMY in crossbred cattle [23], HF X Deoni crossbred cattle [32], Assam local cattle [15], Manipur local cattle [28], Hariana [30] and Sahiwal cattle [24]; on LL in Sahiwal cattle [9, 24, 25], Vrindavani cattle [30], Arado cattle of Ethiopia [11] and Sheko cattle in Southwest Ethiopia [3]; and on ICP in Deoni and HF X Deoni halfbred cattle [32], Sahiwal cattle [25], Hariana cattle [31], Red Chittagong Cattle [1] and Sheko cattle in Southwest Ethiopia [3] were also reported which was in agreement with the present findings. Location wise differences in the traits under study might be due to variable environment and managerial practices. The differences associated with location on PY, DAPY and DP was non-significant in the present study. The finding of non significant effect of location on PY was in agreement with the reports in deshi cattle of West Bengal [27], indigenous X HF crossbred cattle [18] and Rathi breed of cattle [7]. Kayastha (2006) [15] in Assam local cattle and Singh (2008) [28] in Manipur local cattle also observed non significant effect of location on DAPY and DP.

### Effect of lactation order

Sequence of lactation influenced the LMY, LL, PY, number of DAPY, DP and ICP significantly ( $P < 0.01$ ) in the present study. The LMY reached its peak in the third lactation ( $396.598 \pm 1.552$  kg) with highest PY ( $2.316 \pm 0.009$  kg) and longest number of DAPY ( $38.483 \pm 0.146$  days). The longest LL was observed in the third ( $248.036 \pm 0.935$  days) and fourth lactation ( $248.070 \pm 1.042$  days). Similar findings were reported by Gahlot *et al.* (2000) [8] in Tharparkar cows, Khatri *et al.* (2004) [17] in Red Sindhi, Kayastha (2006) [15] in Assam local and Singh (2008) [28] in Manipur local cattle. The mean ICP was found to be significantly shorter in the first lactation ( $438.831 \pm 1.030$  days) with longest DP ( $216.580 \pm 1.137$  days) than the other lactations. In conformity to the present findings, Nahar *et al.* (1995) [20] in native cows and Vij *et al.* (1995) [33] in Nagori cows reported that DP and ICP were significantly influenced by parity.

**Table 1:** Least-Squares Means and Standard Errors for Lactation Milk Yield (LMY), Lactation Length (LL), Peak Yield (PY), Days To Attain Peak Yield (DAPY), Dry Period (DP) and Inter calving Period (ICP) of Indigenous Cattle of Arunachal Pradesh

Sub class description	LMY (kg)	LL (days)	PY (kg)	DAPY	DP(days)	ICP(days)
	LSM $\pm$ SE	LSM $\pm$ SE	LSM $\pm$ SE	LSM $\pm$ SE	LSM $\pm$ SE	LSM $\pm$ SE
$\mu$	296.71 $\pm$ 0.80 (810)	239.51 $\pm$ 0.48 (810)	1.82 $\pm$ 0.01 (810)	35.97 $\pm$ 0.07 (810)	209.95 $\pm$ 0.74 (439)	447.08 $\pm$ 0.70 (462)
Location						
D <sub>1</sub>	298.50 $\pm$ 1.59 <sup>a</sup> (162)	241.67 $\pm$ 0.96 <sup>a</sup> (162)	1.81 $\pm$ 0.00 (162)	35.82 $\pm$ 0.15 (162)	212.25 $\pm$ 1.49 (89)	449.77 $\pm$ 1.33 <sup>a</sup> (112)
D <sub>2</sub>	288.68 $\pm$ 1.05 <sup>b</sup> (385)	235.73 $\pm$ 0.63 <sup>b</sup> (385)	1.81 $\pm$ 0.00 (385)	36.10 $\pm$ 0.10 (385)	209.02 $\pm$ 0.97 (211)	442.32 $\pm$ 0.95 <sup>b</sup> (211)
D <sub>3</sub>	302.94 $\pm$ 1.26 <sup>c</sup> (263)	241.13 $\pm$ 0.75 <sup>a</sup> (263)	1.82 $\pm$ 0.00 (263)	35.99 $\pm$ 0.11 (263)	208.58 $\pm$ 1.20 (139)	449.15 $\pm$ 1.17 <sup>a</sup> (139)
Lactation Order						
L <sub>1</sub>	238.60 $\pm$ 1.33 <sup>a</sup> (231)	223.17 $\pm$ 0.80 <sup>a</sup> (231)	1.29 $\pm$ 0.01 <sup>a</sup> (231)	32.31 $\pm$ 0.12 <sup>a</sup> (231)	216.58 $\pm$ 1.13 <sup>a</sup> (156)	438.83 $\pm$ 1.03 <sup>a</sup> (176)
L <sub>2</sub>	298.04 $\pm$ 1.42 <sup>b</sup> (202)	238.22 $\pm$ 0.85 <sup>b</sup> (202)	2.13 $\pm$ 0.01 <sup>b</sup> (202)	36.76 $\pm$ 0.13 <sup>b</sup> (202)	209.73 $\pm$ 1.27 <sup>b</sup> (123)	446.98 $\pm$ 1.23 <sup>b</sup> (125)
L <sub>3</sub>	396.59 $\pm$ 1.55 <sup>c</sup> (169)	248.03 $\pm$ 0.93 <sup>c</sup> (169)	2.31 $\pm$ 0.01 <sup>c</sup> (169)	38.48 $\pm$ 0.14 <sup>c</sup> (169)	207.24 $\pm$ 1.45 <sup>b</sup> (95)	452.16 $\pm$ 1.40 <sup>c</sup> (96)
L <sub>4</sub>	291.68 $\pm$ 1.73 <sup>d</sup> (136)	248.07 $\pm$ 1.04 <sup>c</sup> (136)	1.66 $\pm$ 0.01 <sup>d</sup> (136)	35.80 $\pm$ 0.16 <sup>d</sup> (136)	206.26 $\pm$ 1.75 <sup>b</sup> (65)	450.35 $\pm$ 1.70 <sup>bc</sup> (65)
L <sub>5</sub>	258.61 $\pm$ 2.35 <sup>e</sup> (72)	240.06 $\pm$ 1.42 <sup>b</sup> (72)	1.68 $\pm$ 0.01 <sup>d</sup> (72)	36.50 $\pm$ 0.22 <sup>b</sup> (72)	-----	-----

LSM: Least-squares means; SE: Standard error; N: Number of observations.

Sub-class means with different superscripts differ significantly ( $P < 0.05$ ).

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