

Original Research Article

<https://doi.org/10.20546/ijcmas.2021.1003.195>

## Studies on Milk Constituent of Indigenous Cattle of Arunachal Pradesh

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### ABSTRACT

#### Keywords

Milk constituent,  
Indigenous cattle,  
Arunachal Pradesh

#### Article Info

##### Accepted:

12 February 2021

##### Available Online:

10 March 2021

Milk samples of 146 indigenous cattle from three districts of Arunachal Pradesh were analysed to study the effect of location, lactation order and stage of lactation on various milk constituents. The means for Fat (%), SNF (%), Protein (%) and TS (%) were found to be  $5.895 \pm 0.032$ ,  $8.582 \pm 0.027$ ,  $2.790 \pm 0.017$  and  $14.483 \pm 0.048$  respectively. Stage of lactation significantly affected the fat (%) and total solids (%) in the milk of native cattle of Arunachal Pradesh. Solids not fat and Protein content of milk was not affected by the stage of lactation. Location and lactation order had non significant effect on all the milk constituents under study. Milk samples of the third stage of lactation showed significantly higher mean fat (%) ( $6.840 \pm 0.051$ ) and total solids (%) ( $15.474 \pm 0.080$ ).

### Introduction

The cattle population of Arunachal Pradesh is purely non-descript. The state is acknowledged for its rich biodiversity and 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. During the year 2013-14 (BAHS, 2015) total milk production in the state was 43.35 tonnes, 71.37 per cent of which was contributed by the indigenous cattle. In spite of being an enormous contributor to the economy of the state, these indigenous cattle of Arunachal Pradesh have not yet received any attention from the scientists or the policy planners. Thus, it appears that there is an urgent need to assess the qualitative attributes of their milk. Such

studies are inevitable to characterize and evaluate these cattle for breed description and also to develop necessary breeding strategies for their improvement.

## Materials and Methods

Milk samples of 146 indigenous cattle from 3 districts viz., West Siang, Lohit and West Kameng of Arunachal Pradesh were collected aseptically during morning milking hours. Analysis for milk constituents were performed with the help of Milk Analyzer, LAKTAN 1-4 (Model: 220). The geographical location of the area covered lies between 92°3' to 96°1' East longitude and 27°3' to 28°1' North latitude at an altitude ranging from 185m to 1496 m above the sea level. The data obtained for various milk constituent 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>), lactation order (L<sub>1</sub>, L<sub>2</sub>, L<sub>3</sub>, L<sub>4</sub> and L<sub>5</sub>) and stage of lactation (S<sub>1</sub>, S<sub>2</sub> and S<sub>3</sub>). The least squares analysis of variance technique (Harvey, 1990) was carried out to study the effect of location, lactation order and stage of lactation on the traits under study. Duncan's Multiple Range Test (DMRT) as modified by Kramer (1957) was used to make all pair wise comparisons among the means wherever significant differences between levels of effect were obtained.

## Results and Discussion

The overall least-squares mean fat, SNF, protein and TS percentage in milk derived from 146 samples of indigenous cattle of Arunachal Pradesh were found to be 5.895 ± 0.032, 8.582 ± 0.027, 2.790 ± 0.017 and 14.483 ± 0.048 per cent respectively (Table 1).

The present value of fat and SNF were in accordance with the finding of Venkatachalapathy *et al.*, (1998) in Vechur (6.13 ± 0.12 and 8.89 ± 0.13 per cent);

Kayastha *et al.*, (2008) in Assam native cattle (5.34 ± 0.06 and 8.54 ± 0.03 per cent) and Singh (2008) in Manipur indigenous cattle (5.42 ± 0.03 and 8.47 ± 0.02 per cent). Values higher than the present findings of protein percentage have been reported by Kayastha *et al.*, (2008) in Assam native cows (3.04 ± 0.03 per cent), Iype *et al.*, (2016) in Kasargod (3.79 ± 0.06 per cent) and Singh *et al.*, (2017) in Konkan cattle (3.39 ± 0.05 per cent). Present findings of Total solids was comparable to the findings of Venkatachalapathy *et al.*, (1998) in Vechur (15.02 ± 0.14 per cent) Sarkar *et al.*, (2006) in Tharparkar (14.22±0.25 per cent). Lower values of fat per cent than the present finding were reported by Sarkhel *et al.*, (2001) in Nimari (3.81 ± 0.08 per cent); Singh *et al.*, (2007) in Gangatiri (4.33 per cent); Dash *et al.*, (2013) in Binjharpuri (4.4 per cent); Kuralkar *et al.*, (2014) in Deoni (4.20 ± 0.15 per cent); Iype *et al.*, (2016) in Kasargod (3.9 ± 0.3 per cent) and Chakravarthi *et al.*, (2017) in Sahiwal (3.98 ± 0.16 per cent). Higher values than that of the present finding of SNF have been reported by Joshi *et al.*, (1996) in Haryana (9.1±0.23 per cent); Venkatachalapathy *et al.*, (1998) in Vechur (8.89 ± 0.13 per cent); Sarkar *et al.*, (2006) in Tharparkar (10.13±0.12 per cent). However, comparatively lower values of TS have been reported by Joshi *et al.*, (1996) in Haryana (13.61±0.38 per cent); Sarkhel *et al.*, (2001) in Nimari (11.76 ± 0.13 per cent); Srivastava *et al.*, (2002) in Malvi (13.05 ± 0.08 per cent); Krovvidi *et al.*, (2013) in Ongole (12.65±0.30per cent) and Iype *et al.*, (2016) in Kasargod (12.36 ± 0.18 per cent).

## Effect of location

Location did not show significant effect on fat (%), SNF (%), protein (%) and TS (%) as revealed by the least-squares analysis of variance. Singh (2008) in Manipur local cattle also reported non-significant effect of location on fat, SNF and TS content of milk.

**Table.1** Least-squares means and standard errors for various factors affecting milk constituents in indigenous cattle of Arunachal Pradesh

Sub class description	N	Fat (%)	SNF (%)	Protein (%)	TS (%)
		LSM ± SE	LSM ± SE	LSM ± SE	LSM ± SE
<b>μ</b>	146	5.895 ± 0.032	8.582 ± 0.027	2.790 ± 0.017	14.483 ± 0.048
<b>Location</b>					
<b>D<sub>1</sub></b>	34	5.865 ± 0.061	8.588 ± 0.054	2.817 ± 0.034	14.459 ± 0.096
<b>D<sub>2</sub></b>	57	5.901 ± 0.047	8.577 ± 0.042	2.799 ± 0.026	14.485 ± 0.074
<b>D<sub>3</sub></b>	55	5.919 ± 0.048	8.580 ± 0.043	2.754 ± 0.027	14.504 ± 0.075
<b>Lactation Order</b>					
<b>L<sub>1</sub></b>	28	5.877 ± 0.067	8.662 ± 0.060	2.868 ± 0.037	14.533 ± 0.106
<b>L<sub>2</sub></b>	33	5.827 ± 0.061	8.546 ± 0.055	2.776 ± 0.034	14.380 ± 0.097
<b>L<sub>3</sub></b>	31	5.942 ± 0.637	8.604 ± 0.057	2.847 ± 0.035	14.558 ± 0.101
<b>L<sub>4</sub></b>	27	5.878 ± 0.068	8.483 ± 0.061	2.675 ± 0.038	14.362 ± 0.108
<b>L<sub>5</sub></b>	27	5.950 ± 0.068	8.613 ± 0.061	2.786 ± 0.038	14.580 ± 0.108
<b>Stage of Lactation</b>					
<b>S<sub>1</sub></b>	43	4.718 ± 0.054 <sup>a</sup>	8.646 ± 0.048	2.764 ± 0.030	13.378 ± 0.086 <sup>a</sup>
<b>S<sub>2</sub></b>	53	6.127 ± 0.049 <sup>b</sup>	8.459 ± 0.044	2.759 ± 0.027	14.596 ± 0.077 <sup>b</sup>
<b>S<sub>3</sub></b>	50	6.840 ± 0.051 <sup>c</sup>	8.639 ± 0.045	2.849 ± 0.029	15.474 ± 0.080 <sup>c</sup>

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

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

On the contrary, Kayastha *et al.*, (2008) in indigenous cattle of Assam and Sudhakar *et al.*, (2013) in Jersey and Holstein crossbreds found significant effect of location on fat, SNF, protein and TS content of milk.

### Effect of lactation order

Least-squares analysis of variance revealed that fat (%), SNF(%), Protein(%) and TS(%) did not differ significantly among the lactations. Kayastha *et al.*, (2008) in indigenous cattle of Assam, Singh (2008) in Manipur local cattle and Jadhav *et al.*, (2009) in Phule Triveni also observed non significant effect of lactation order on fat, SNF and TS

content of milk. Present findings of non significant effect of order of lactation on protein percent was in conformity with the findings of Kayastha *et al.*, (2008). However, Lal *et al.*, (1984) in Sahiwal; Sudhakar *et al.*, (2013) in Jersey and Holstein crossbreds and Shuipep *et al.*, (2016) in local and crossbred cows in Sudan) reported significant effect of sequence of lactation on these traits.

### Effect of stage of lactation

Stage of lactation showed highly significant (P<0.01) effect on fat and TS per cent in the milk of native cattle of Arunachal Pradesh. Similar findings were reported by

Venkatachalapathy *et al.*, (1998) in Vechur cows; Kayastha *et al.*, (2008) in indigenous cattle of Assam and Jadhav *et al.*, (2009) in Phule Triveni. On the contrary, Sarkar *et al.*, (2006) in Tharparkar and Singh (2008) in Manipur local cattle observed non-significant effect of stage of lactation on fat per cent and TS per cent. In the present study DMRT result revealed that mean fat (%) ( $6.840 \pm 0.051$  and TS (%) ( $15.474 \pm 0.080$ ) for the late stage (>180 days) of lactation was significantly higher than the means in the early (5-90 days) as well as in the mid stage (91-180 days) of lactation. Kayastha *et al.*, (2008) in Assam native cattle reported mean fat (%) and TS (%) during later stage to be significantly higher than the early and mid stages of lactation. Least-squares analysis of variance also revealed that the SNF and protein per cent in the present investigation did not differ significantly among the lactations. Similar to this findings, Venkatachalapathy *et al.*, (1998) in Vechur; Singh (2008) in Manipur indigenous cattle and Sudhakar *et al.*, (2013) in Jersey and Holstein crossbred observed non significant effect.

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**How to cite this article:**

Marpi Kakki, G. Zaman, A. Aziz and Akhtar, F. 2021. Studies on Milk Constituent of Indigenous Cattle of Arunachal Pradesh. *Int.J.Curr.Microbiol.App.Sci.* 10(03): 1566-1570. doi: <https://doi.org/10.20546/ijcmas.2021.1003.195>