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## Study on factors affecting milk composition in Deoni cattle

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#### Abstract

The present study was conducted on 123 lactating Deoni cows in 13 villages of Bidar district. A baseline survey was carried out to identify Deoni animals being reared by farmers in the breeding tract of Deoni cattle in the state of Karnataka under the project "Field Performance Recording of Deoni cattle in Bidar District a part of Rashtriya Gokul Mission sponsored by Karnataka Livestock Development Agency. The performance records from August 2017 to October 2018 were compiled and analysed using least squares analysis. Season of calving was recorded as summer (March to June), rainy (July to October) and winter (November to February) based on agro-climatic conditions of the region. Cows were divided based on age group, parity and season of calving to study the effect of each on lactation performance. The overall mean for milk fat, SNF protein, lactose and salt in Deoni cattle were observed to be  $4.492 \pm 0.0233$ ,  $8.181 \pm 0.0117$ ,  $3.156 \pm 0.0073$ ,  $4.410 \pm 0.0112$  and  $0.6374 \pm 0.00176$  %, respectively. The non-significant differences in milk composition, in general, indicate that milk production function was not affected by season of calving or parity.

**Keywords:** Deoni, milk composition, factors affecting

#### Introduction

Deoni is an important dual-purpose cattle breed of India. It has a medium heavy built body. Male are good draft animals whereas the females are average milk producers. It is found in three colour variations viz. Wannera, Balankya and Shevera. The body is moderately developed and symmetrical with distinct muscles. Males are more developed than females. Body colour is clear white in Wannera and Balankya strain. Irregular black spots are found on the body in Shevera. The head is partially white in Wannera. Head is masculine, alert, broad and slightly convex. The colour of the head is black and white in Wannera and Shevera and completely white in the Balankya strain. The forehead is prominent, broad, slightly bulged and white in all the strains; ears are long and drooping with slightly curved tips; horns are medium, thick, apart and emerge from the sides of the poles; tips of the horns are blunt; and eyes are prominent, bright and alert with black eyebrows.

The chemical make-up of milk and its physical and chemical behaviour provide scientific basis for processing of milk and manufacturing of milk products. In India, milk from buffalo and cow (indigenous and cross-bred) is commercially important. Depending on its characteristics, each type of milk is eminently suitable for certain types of region-specific indigenous milk products. The process ability and functionality of milk and milk products are determined by the properties and concentrations of its principal constituents i.e. proteins, lipids, lactose and salts. Therefore, an attempt is made to analyse the composition of Deoni cattle milk in this study.

The present study entitled "Performance of Deoni cattle under field conditions in Bidar district" was carried out in 13 villages of Bidar (12 villages are of taluk Bhalki and one village of Aurad taluk). A baseline survey was carried out to identify Deoni animals being reared by farmers in the breeding tract of Deoni cattle in the state of Karnataka under the project "Field Performance Recording of Deoni cattle in Bidar District" as part of Rashtriya Gokul Mission sponsored by Karnataka Livestock Development Agency.

The state animal husbandry department along with National Dairy Development Board of India has started registration of Deoni cattle in Information Network for Animal Productivity and Health (INAPH) for performance recording of animals.

It provides unique identification of animal along with the pedigree facts, lactation yields, record keeping of all activities related to breeding, nutrition, health and other important information related to the animal.

The performance records from April 2017 to October 2018 of 123 Deoni cows were compiled and analysed. The age group and parity of the animals were recorded. Season of calving was recorded as summer (March to June), rainy (July to October) and winter (November to February) based on agro-climatic conditions of the region.

### Milk composition

The collected milk samples were stirred using a stirrer and then subjected to analysis for fat, SNF, protein, lactose and salt content by using a milk analyser (Vector®). The values were promptly recorded.



Fig 1: Testing of milk sample in milk tester

## Results and Discussion

### Milk Composition of Deoni cattle and Factors Affecting Composition

#### 1. Fat

The overall mean for milk fat in Deoni cattle was observed to be  $4.492 \pm 0.0233$  %. It was observed that age group had significant effect while parity and season was had no significant effect on milk fat percentage of the cows.

Highest fat percentage of  $4.681 \pm 0.0910$  was observed in the age group 10-12 years and lowest of  $4.451 \pm 0.0890$  in 12-14 years. Fat content in age groups 4-6, 6-8 and 8-10 years were  $4.549 \pm 0.1095$ ,  $4.451 \pm 0.0952$  and  $4.441 \pm 0.0781$ %, respectively. Highest fat percentage ( $4.809 \pm 0.2063$ ) was observed in 8<sup>th</sup> parity and lowest ( $4.356 \pm 0.2700$ ) in 9<sup>th</sup> parity, though the differences were non-significant. Cows calved in winter season had highest milk fat percentage of  $4.57 \pm 0.051$  followed by rainy  $4.49 \pm 0.050$  and summer  $4.48 \pm 0.155$ .

#### 2. Solids Not Fat

The overall mean of SNF percentage was found to be  $8.181 \pm 0.0117$ . Age group, parity and season of calving had no significant effect on SNF content of Deoni milk.

Highest SNF of  $8.264 \pm 0.0558$  % was observed in the age group 4-6 years and lowest of  $8.138 \pm 0.0398$  % was in 8-10 years age group. Highest SNF content of  $8.401 \pm 0.1052$  % was observed in 8<sup>th</sup> parity while lowest of  $8.038 \pm 0.1377$  % was in 9<sup>th</sup> parity. SNF content in 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> parities were  $8.144 \pm 0.0549$ ,  $8.184 \pm 0.0416$ ,  $8.169 \pm 0.0365$ ,  $8.208 \pm 0.0365$ ,  $8.237 \pm 0.0417$ ,  $8.190 \pm 0.0587$  and  $8.170 \pm 0.0646$  %, respectively.

SNF percentage in milk varied from  $8.207 \pm 0.0791$  in summer,  $8.188 \pm 0.0256$  in rainy to  $8.185 \pm 0.0259$  in winter season of calving, though differences were not significant.

#### 3. Protein

The overall mean of protein content was found to be  $3.156 \pm 0.0073$  %. There was no significant effect of age group, parity and season on milk protein content of Deoni cattle.

Protein percentage in the age group 4-6, 6-8, 8-10 and 10-12 years were  $3.199 \pm 0.0342$ ,  $3.199 \pm 0.0298$ ,  $3.188 \pm 0.0244$ ,  $3.197 \pm 0.0285$  and  $3.214 \pm 0.0279$ , respectively.

7<sup>th</sup> parity of Deoni cows had lowest protein content of  $3.115 \pm 0.0397$  % and 9<sup>th</sup> parity cows had highest of  $3.402 \pm 0.0845$  %. Protein percentage was highest in cows calving in summer season ( $3.246 \pm 0.0486$  %), intermediate in winter ( $3.190 \pm 0.0159$ ) and lowest in rainy season ( $3.163 \pm 0.0157$  %).

#### 4. Lactose

The overall mean for lactose percentage in milk of Deoni cattle was observed to be  $4.410 \pm 0.0112$ . It was observed that age group, parity and season had no significant effect on lactose content of milk.

Cows of the age group 4-6 years had lactose percentage of  $4.512 \pm 0.0529$  while  $4.355 \pm 0.0430$  was observed in 12-14 years age group. 8<sup>th</sup> parity had  $4.577 \pm 0.0997$  % lactose content while 3<sup>rd</sup> and 2<sup>nd</sup> parity had  $4.36 \pm 0.035$  and  $4.36 \pm 0.039$  %, respectively. Lactose content was  $4.455 \pm 0.0750$ ,  $4.449 \pm 0.0242$  and  $4.406 \pm 0.0246$  % in summer, rainy and winter season of calving, respectively.

#### 5. Salts

The overall mean of salt percentage in Deoni cow milk was found to be  $0.6374 \pm 0.00176$ . Age of the cow and parity had no significant effect on salt content of Deoni milk. Season of calving was found to have significant effect on milk salts content.

A trend of decreasing salt content with age group of the animal was observed, age group of 4-6 years had salt content of  $0.6519 \pm 0.00834$  % and 12-14 years was  $0.6367 \pm 0.00678$  %. Salt content was increasing with the parity of cow. 1<sup>st</sup> parity had highest salt content of  $0.6299 \pm 0.00820$  % while 9<sup>th</sup> had lowest salt content of  $0.6624 \pm 0.02057$  %.

Season had a significant ( $p < 0.05$ ) effect on salt content of milk. Highest salt content of  $0.6467 \pm 0.00382$  % was observed in rainy season followed by summer  $0.6449 \pm 0.01182$  % and winter  $0.6372 \pm 0.00388$  %.

### Milk composition of Deoni cattle and factors affecting it

The mean milk constituents are calculated by the Test Interval Method specified by the International Committee for Animal Recording. The overall mean for various milk components

were fat  $4.492 \pm 0.0233$  %, SNF  $8.181 \pm 0.0117$  %, protein  $3.156 \pm 0.0073$  %, lactose  $4.410 \pm 0.0112$  and salts  $0.6374 \pm 0.00176$  % which was in comparison with Kumar (2004) (fat  $4.07 \pm 0.39$  %, SNF  $9.11 \pm 0.36$  %, lactose  $5.37 \pm 0.16$  %) and Patil (2014) (fat  $4.25 \pm 0.11$  and SNF  $0.02 \pm 0.06$ ).

### 1. Effect of age at calving

There was no significant effect of age on SNF, protein, lactose and salts content in milk of Deoni cow. Significant effect of age was observed on fat content of milk. Highest fat percentage ( $4.681 \pm 0.0910$ ) was observed in the age group 10-12 years while lowest ( $4.441 \pm 0.0781$ ) in 8-10 years.

### 2. Season of calving

Season of calving had no significant effect on fat, SNF, lactose or protein. Effect of season of calving was found to be significant on salt composition. The mean values for fat percentage in summer were 4.480, rainy 4.494 and winter

4.566 which was comparable with the findings of Munde (2016) [5] (summer  $4.77 \pm 0.10$  %, winter  $4.43 \pm 0.07$  %) and Balasaheb (2018) [1], (summer 3.57 % fat and 8.51 % SNF, in rainy season 3.23 % fat and 8.43 % SNF and highest in winter 3.92 % fat and 8.71 % SNF).

### 3. Effect of parity

The effect of parity on composition was not significant. Highest fat percentage ( $4.809 \pm 0.2063$ ) was observed in 8<sup>th</sup> parity and lowest ( $4.356 \pm 0.2700$ ) in 9<sup>th</sup> parity. Highest SNF content of  $8.401 \pm 0.1052$  % was observed in 8<sup>th</sup> parity while lowest of  $8.038 \pm 0.1377$  % was in 9<sup>th</sup> parity. This was in contrast with results of Munde (2016) [5] where higher fat % was observed during sixth ( $4.91 \pm 0.27$  %) and lower during first parity ( $4.41 \pm 0.10$  %) in Deoni cattle. Also, higher SNF % was observed during sixth ( $9.42 \pm 0.29$  %) and lower during seventh parity ( $8.69 \pm 0.33$  %).

Table 1: Conflict of Interest

Sl.	Group	n	Mean	±SE	Mean±	SE	Mean±	SE	Mean±	SE	Mean±	SE
			Fat		SNF		Protein		Lactose		Salts	
1.	Age Group (years)											
	4-6	25	4.549 <sup>ab</sup> ±	0.1095	8.264±	0.0558	3.199±	0.0342	4.512±	0.0529	0.6519±	0.00834
	6-8	28	4.451 <sup>b</sup> ±	0.0952	8.188±	0.0486	3.199±	0.0298	4.443±	0.0461	0.6478±	0.00726
	8-10	38	4.441 <sup>b</sup> ±	0.0781	8.138±	0.0398	3.188±	0.0244	4.418±	0.0378	0.6409±	0.00595
	10-12	15	4.681 <sup>a</sup> ±	0.0910	8.195±	0.0464	3.197±	0.0285	4.454±	0.0440	0.6373±	0.00693
	12-14	17	4.446 <sup>b</sup> ±	0.0890	8.181±	0.0454	3.214±	0.0279	4.355±	0.0430	0.6367±	0.00678
2.	Parity											
	1	13	4.453±	0.1077	8.144±	0.0549	3.221±	0.0337	4.396±	0.0520	0.6299±	0.00820
	2	23	4.462±	0.0816	8.184±	0.0416	3.179±	0.0255	4.363±	0.0395	0.6357±	0.00622
	3	25	4.523±	0.0715	8.169±	0.0365	3.171±	0.0224	4.359±	0.0346	0.6338±	0.00545
	4	22	4.465±	0.0739	8.208±	0.0377	3.183±	0.0231	4.435±	0.0357	0.6289±	0.00563
	5	22	4.563±	0.0817	8.237±	0.0417	3.192±	0.0256	4.459±	0.0395	0.6434±	0.00623
	6	07	4.510±	0.1151	8.190±	0.0587	3.162±	0.0360	4.444±	0.0556	0.6406±	0.00876
	7	08	4.482±	0.1268	8.170±	0.0646	3.115±	0.0397	4.496±	0.0613	0.6496±	0.00966
	8	02	4.809±	0.2063	8.401±	0.1052	3.170±	0.0645	4.577±	0.0997	0.6619±	0.01571
	9	01	4.356±	0.2700	8.038±	0.1377	3.402±	0.0845	4.400±	0.1305	0.6624±	0.02057
3.	Season											
	Summer (Mar-Jun)	03	4.480±	0.1553	8.207±	0.0791	3.246±	0.0486	4.455±	0.0750	0.6449 <sup>ab</sup> ±	0.01182
	Rainy (Jul-Oct)	70	4.494±	0.0501	8.188±	0.0256	3.163±	0.0157	4.449±	0.0242	0.6467 <sup>a</sup> ±	0.00382
	Winter (Nov-Feb)	50	4.566±	0.0509	8.185±	0.0259	3.190±	0.0159	4.406±	0.0246	0.6372 <sup>b</sup> ±	0.00388
	Overall	123	4.492±	±0.0233	8.181±	±0.0117	3.156±	±0.0073	4.410±0.0112		0.6374±	0.00176

### Conclusion

The non-significant differences in milk composition, in general, indicate that milk production function was not affected by season of calving or parity.

**Conflict of Interest:** None

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