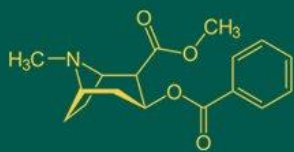


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## Impact of stage of lactation on chemical composition of red Sindhi cow milk

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### Abstract

The current study was carried on “Impact of stage of lactation on composition of Red Sindhi cow milk” on 20 healthy cows (Red Sindhi cow) selected from dairy farm of Agriculture college Dhule, Dhule. Cows were housed in barn under similar management conditions. Clean milk sanitary precautions were undertaken to produce clean milk by dry full hand method of milking. In different stage of lactation viz. 1<sup>st</sup> (Between 07 and 30 days), 2<sup>nd</sup> (Between 31 and 60 days), 3<sup>rd</sup> (Between 61 and 150 days) and 4<sup>th</sup> (Between 151 and 270 days) representative samples of 200 ml milk were collected. Fresh milk samples which collected in different lactation stages were analysed for fat, lactose, protein, ash and total solid (T.S.). It was found that stage of lactation had significant impact on fat, protein, ash and total solid (T.S.) while non-significant impact on lactose content of cow milk.

**Keywords:** Red Sindhi cow, milk quality, stage of lactation

### 1. Introduction

In India with the expansion in dairy industry it becomes necessary for its future glory to find out Indigenous cow breeds from different zone of our country. Red Sindhi is an important milch breed of cattle originated from the Sindh state of Pakistan. The animal of the breed is heavy and heat tolerant. Cows of this breed are good milkers and milk potential of the cow is comparable with Sahiwal breed. The Red Sindhi breed exported to more than 20 countries including America, Australia, Brazil and Sri Lanka etc. In India breed is facing endangered population status as animal of this breed is not available in field condition. Breed presently maintained only in few organized herds of the country.

Milk, is the normal mammary secretion derived from the complete milking of a healthy milch animal without either addition there to or extraction there from. Free from colostrum, contains all the nutrients essential for growth i.e., water, fat, proteins, lactose, minerals vitamins and ash and has been recognized as a vegetarian food since ancient times and all Indians consume milk and milk products without reticence. The substances in milk provide both building materials and energy the necessary for growth. Additionally, milk also contains antibiotics which protect the young mammals and shield against infection. Milk and its products are excellent source of vital nutrients. It is described as nature’s nearly perfect food. Milk proteins offer a high-quality animal protein in diet. Milk fat fractions are now being recognized to possess interesting anti-cancer properties. Minerals and vitamins contents of milk contribute significantly to human nutrition. Calcium is needed for protection against brittle bones in the latter part of life. It is now considered to play a vital role in controlling blood pressure in protecting colon from cancer. It is especially beneficial for young ones as it contains nutrients for growth and development particularly a sufficient concentration of quality protein, mineral and vitamins. Especially vitamin A, riboflavin and vitamin B12 is also the richest natural source of calcium in the best available form, (Pathak 2003) [8]. However, in this study on Red Sindhi we have focused only on gross chemical composition of the milk as how it affected by stage of lactation.

### 2. Methodology

The research experiment entitled “Impact of stage of lactation on composition of Red Sindhi cow milk” was carried at Department of Animal Husbandry and Dairy Science, Agriculture

college Dhule dairy farm, Dhule. The Experiment was conducted during the year 2022-23. Milk sample were collected from 20 healthy Red sindhi cow. All experimental animals were housed in a barn and managed under more or less similar managemental conditions. Sanitary precautions like clipping of long hair at udder and flank, grooming, washing of hind quarters, wiping udder with towel soaked in 2% Dettol solution, tying tail with legs etc. were taken care prior to collection of milk samples. Cows were milked by full and dry hand method of milking. Two streams of fore milk from each quarter of udder were discarded and a sample of 200 ml milk was collected directly into sterilized conical flasks and plugged immediately. Milk samples were brought to laboratory for chemical analysis and the fat, lactose, protein, ash and total solid (T.S.) content were determined. All milk samples analyzed at laboratory of Dept. of Agriculture Chemistry and Soil Science, PGI and Department of Food Processing Engineering, Dr. Annasaheb Shinde College of Agriculture Engineering, M.P.K.V., Rahuri.

Stage of lactation (Factor for study)

1. Between 07 and 30 days	:	S1
2. Between 31 and 60 days	:	S2
3. Between 61 and 150 days	:	S3
4. Between 151 and 270 days	:	S4

**Table 1:** Distribution of experimental animals

	R1	R2	R3
A. Red Sindhi			
S1 (07-30 days)			
S2 (31-60 days)			
S3 (61-150 days)			
S4 (151-270 days)			

## 2.1 Parameters determined in milk were as follows

- i. Fat percent
- ii. Lactose
- iii. Protein
- iv. Ash
- v. Total solid (TS)

## 3. Results and Discussion

### 3.1 Fat

The most important variable constituents in the milk next to water is milk fat. fat of milk (4.33) was significantly affected by stage of lactation. It was noticed that average fat content in the sample was observed to be 4.09, 4.23, 4.41 and 4.57 percent for 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> stage of lactation. As the lactation period progress there was increase in fat content of milk. The reason could be as lactation goes on mammary epithelial cells become more proficient in synthesizing and secreting milk components. The cell epithelial accumulates more fat globules result in more fat in milk. These results are in line up with those reported by Rashida *et al.* (2004) [11], Ghade *et al.* (2005) [12].

### 3.2 Lactose

The lactose content of milk was not significantly affected by stage of lactation. The values for lactose content for stage of lactation were almost similar in 1<sup>st</sup> (4.32), 2<sup>nd</sup> (4.33), 3<sup>rd</sup> (4.33) and 4<sup>th</sup> (4.33) stage lactation. Pollott (2004) [9] reported similar result for stages of lactation that the lactose and water secretion rates are essentially consistent during

lactation in cow. However, slightly different trend has been reported by Bhat *et al.* (2000) [4]. They observed a gradual rise in lactose content of milk from 1<sup>st</sup> to 3<sup>rd</sup> fortnight of lactation and a gradual decrease thereafter. It could also be noticed that the effect of lactation order on the lactose content in the milk was non-significant.

### 3.3 Protein

The results for stage of lactation were significant. As the lactation period progress the protein content increased from 3.17 in 1<sup>st</sup> stage to 3.42 in 4<sup>th</sup> stage of lactation. The potential of mammary gland to get more protein in milk increases as the lactation period progress and can be attributed to the cattle fed with balance and protein rich diet which results cattle produce milk with higher protein content. A similar trend of mean protein content in milk of HF x Deoni as (3.10, 3.30 and 4.30%) and Jersey x Deoni as (3.40, 3.70 and 3.82%) during early, middle and late lactations, respectively was reported by Puranik *et al.* (2000) [13].

### 3.4 Ash

In cow milk ash content shows noticeable variation as the lactation period goes on. The term "ash" describes the inorganic mineral content present in milk, which includes minerals such as calcium, phosphorus, potassium, sodium, and magnesium. The ash content was 0.65, 0.68, 0.69 and 0.74 percent in 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> stage of lactation respectively. Puranik *et al.* (2000) [13] also observed this pattern and noted that the ash content in the milk of H.F. x Deoni cattle was 0.64, 0.67, and 0.70 percent, but in Jersey x Deoni milk it was 0.70, 0.73 and 0.76 percent, respectively in early, middle and late lactation.

### 3.5 Total solid

It is revealed that the total solid content was significantly influenced by the stage of lactation. As the stage of lactation advanced there was a significant increase in total solid content. As the lactation period progress the total solid content increased from 12.26 to 12.95 percent as fat, lactose, protein, ash and other solid constituent's increases with lactation period progress This might be due to increased intake of feed as the lactation period progress with increased potential of mammary gland to get more protein in milk.

**Table 1:** Impact of stage of lactation on chemical composition of Red Sindhi cow milk

Parameters	Season					Results
	SL1	SL2	SL3	SL4	Overall value (%)	
Fat	4.09	4.23	4.41	4.57	4.33	S
Lactose	4.32	4.33	4.33	4.33	4.32	NS
Protein	3.17	3.22	3.32	3.42	3.28	S
Ash	0.65	0.68	0.69	0.74	0.70	S
Total solid	12.26	12.47	12.79	12.95	12.60	S

Note-S=Significant, NS=Non-Significant

## Conclusion

It can be concluded that stage of lactation had significant impact on fat, protein, ash and total solid (T.S.) whereas, non-significant impact found on lactose content of Red Sindhi cow milk.

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