

Comparative Study of Casein and Lactose Content Present in Cow, Buffalo and Goat Milk Samples Collected from Various Areas of Kutch Region

Vinayak S¹, Sara K², Afrin K³, Lipi M⁴, Zunaira S⁵

¹HOD Department of chemistry Adani public School Mundra

^{2,3,4,5}Department of chemistry, Adani public School, Nana Kapya Mundra, Kutch, Gujarat

Abstract

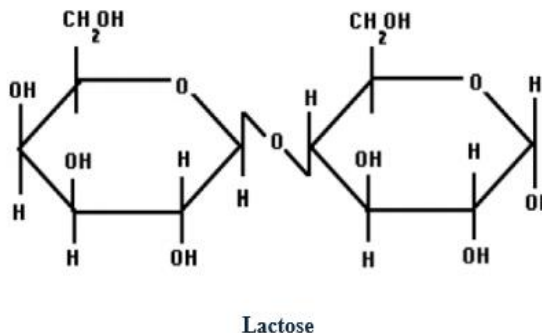
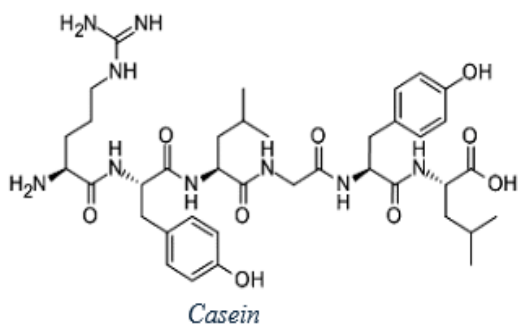
Milk is a primary source of nutrient for human. Milk proteins consist of 80% of casein and 20% whey protein. Casein, the chief protein in milk while lactose is a primary carbohydrate which on hydrolysis gives glucose and galactose. The present study studied and investigated the casein and lactose content in Cow, Buffalo and Goat milk. The milk samples were collected from various towns of Mundra, Mandvi, Gandhidham and Bhuj districts of Gujarat states. The comparative analysis of casein and lactose in selected varieties has been done. The objective of this study was to ascertain the casein concentration of different milk samples of Cow, Buffalo and Goat.

Keywords: Cow, Buffalo and Goat milk, Kutch region, Casein, lactose.

INTRODUCTION:

Milk is a nutrient rich fluid containing minerals, vitamins, carbohydrates and proteins¹. Casein is a one of the important proteins commonly found in mammalian milk. Due to presence of proline residue in milk casein acts as suspension of particles called casein micelle. The interior of casein micelle is highly hydrated and casein in the micelle are held together by calcium ions². Milk contains approximately 80 % of protein, casein is a soluble protein makes about 70-80% of milk and lactose is type of milk fat makes up to 2-8% of milk³. The name of casein is related to the family of phosphoproteins. Drinking milk has taken the advantage of the expensive nutritional value not only to the child, but also to the adult and the elder. In recent year milk constituent have become recognized as functional food⁴.

Lactose on hydrolysis produces glucose and galactose by lactase enzyme in the intestine. Concentration of lactose can change a lot in different milk samples.



METHODS AND MATERIALS

Sources of milk: Cow, Buffalo and Goat collected from animal breeders in and around Kutch district, Gujarat.

Isolation of Casein from milk

Procedure

1. Measure 100 mL of fresh milk into a beaker.
2. Slowly add 10% acetic acid while stirring gently until the pH reaches 4.6-4.7. This will cause the casein to precipitate out of the solution.
3. Continue stirring for a few minutes to ensure complete coagulation.
4. Discard the supernatant liquid (whey) and resuspend the casein curds in distilled water and then filter the content using cloth cotton.
5. Transfer the casein into 100 ml beaker and wash 2-3 times with ethanol to remove any remaining impurities.
6. Again filter the content and squeeze out as much liquid as possible from the casein.
7. Transfer the casein to a petri dish or watch glass.
8. Dry the casein in an oven at 50-60°C. and weigh the powder.

Isolation of Lactose from milk

1. T supernatant liquid (whey) was boiled for 20-30 minutes to concentrate lactose and evaporate the excess water.
2. Immediately after, the concentrated solution was places in ice water bath to induce lactose crystallization.
3. Once the crystals formed, the remaining liquid was removed and collected lactose was transferred in watch glass to dry it completely.

RESULTS AND DISCUSSION

The observations casein and lactose contents varied across the milk types. The sample details and results are recorded in the following tables. The casein content in cow milk samples were observed in the range of 6.2 to 6.7 %, in buffalo milk samples were in the range of 6.1 to 6.3% and in goat milk samples were in the range of 5.3 to 7.3%.

The lactose content in cow milk samples were observed in the range of 3.8 to 4.6 %, in buffalo milk samples were in the range of 3.1 to 5.4% and in goat milk samples were in the range of 3.0 to 5.4%.

Table no:1 – Sample details

Sample	Species	Code Lactose	Code Casein
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ANJAR	Cow	AL ₁	AC ₁
	Buffalo	AL ₂	AC ₂
	Goat	AL ₃	AC ₃
BHUJ	Cow	BL ₁	BC ₁
	Buffalo	BL ₂	BC ₂
	Goat	BL ₃	BL ₃
MANDAVI	Cow	ML ₁	MC ₁
	Buffalo	ML ₂	MC ₂
	Goat	ML ₃	MC ₃
MUNDRA	Cow	ML ₄	MC ₄
	Buffalo	ML ₅	MC ₅
	Goat	ML ₆	MC ₆

Table no:2 Approximate percentage of casein and lactose

Variety	% Casein	% Lactose
Cow	2.1- 3.8	4.5-5.0
Buffalo	2.7-3.0	4.7-5.2
Goat	2.2 -3.3	4.1-4.5

Table no:3- Results analysis

Sample	AL ₁	AL ₂	AL ₃	BL ₁	BL ₂	BL ₃	ML ₁	ML ₂	ML ₃	ML ₄	ML ₅	ML ₆
% of lactose	4.50	5.20	5.40	4.37	4.30	4.72	4.69	4.50	3.04	3.85	3.15	3.00
Sample	AC ₁	AC ₂	AC ₃	BC ₁	BC ₂	BC ₃	MC ₁	MC ₂	MC ₃	MC ₄	MC ₅	MC ₆
% of casein	6.70	6.50	5.30	6.20	6.10	6.50	6.20	6.00	6.00	6.70	6.30	5.30

CONCLUSION

The present study clearly suggests that the casein and lactose in selected samples are slightly varied. The close alignment of the experimental data with WHO norms indicates the quality nature of the milk samples. The concentration of casein and lactose confirms the sample's nutritional value and suggests the milk is suitable for general consumption. Usually, Goat milk is highly nutritious because they eat different varieties of plants, but its hard to digest. We suggest cow milk which is little less hard to digest and having similar nutritional values.

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