

Comparative study of total milk protein and Casein content in different animals

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Abstract

In addition to having nine of the necessary amino acids needed by humans, milk has 3.3% total protein. One of the main types of protein in milk is casein. The amount of total proteins in milk samples was determined using a number of techniques.

Casein contains many important properties that make it useful in a variety of applications, including food, pharmaceuticals, and industrial product. Milk is supposed to be more beneficial if quantity of casein increases. From this research it is concluded that sheep milk is more beneficial with casein percentage in un-boiled milk and in boiled milk sample in case of natural milk samples.

In the present study milk samples of sheep, cow, goat, buffalo and camel shown the protein content by formalin method showed 6.29, 4.09, 4.08, 7.48 and 4.50% whereas extracted Casein content of buffalo, cow and camel was found to be 1.22, 1.22 and 0.606 respectively. Maximum casein content was estimated in sheep milk while minimum in goat.

Keywords: *Casein, Protein, Formalin method, Natural milk.*

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I. Introduction

Water, proteins, lactose, fat, vitamins, and minerals make up the majority of the physiologically and biologically complex fluid known as milk (Urgu et al., 2019). Lactose, proteins, fats, and mineral salts make up 5%, 3.2%, 4%, and 0.7% of the milk's content, respectively. A biotic fluid called milk was developed by mammals to nourish their young and supply nutrients necessary for development and growth (Playne et al., 2003). The antibacterial and immunomodulatory properties of milk proteins, specifically lactoferrin and lactoperoxidase, are the most well-known (Chen et al., 2019). According to Ahmed et al. (2016), the content of milk varies depending on the species. For example, buffalo milk has 43% less cholesterol and 58% and 40% more calcium and protein, respectively, than cow milk.

Many different types of proteins make up milk's overall protein content. The caseins are the main class of proteins found in milk. Most species' milk contains three or four caseins, each of which is a unique molecule with a similar structure. Whey proteins are the collective term for all other proteins present in milk. In cow milk, β -lactoglobulin and α -lactalbumin are the main whey proteins.

Only the mammary gland can create the key milk proteins, such as caseins, β -lactoglobulin, and α -lactalbumin, which are synthesised in the mammary epithelial cells.

Milk is rich in many nutrients that are essential for good health, stronger bones, immune system and healthy skin, energy source etc.

II. Materials and Methods

Sources of milk: Sheep, Camel, Goat, Buffalo and cow collected from nearby milk centres and animal breeders in and around Bhiwandi, Thane (Maharashtra)

A. Estimation of Total protein :

Step 1. Take 10ml of milk sample in a conical flask to which Add 3 drops of phenolphthalein indicator and 0.4ml of neutral saturated potassium oxalate.

Step 2. Mix well and allow standing for 5 min then neutralizing the sample with 0.1N NaOH to pH 7 then Add 2ml of formalin mix well and allow it to stand for 5-10 min.

Step 3: Titrate it against 0.1N NaOH till pink color appears. Run a blank as follows: Take 10ml D/W. Add 3 drops of phenolphthalein indicator.

Step 4. Add 2ml of formalin and titrate it against 0.1N NaOH.

Calculate protein content in gm% : $(A-B) \times 1.7$

B.Extraction

- i. Sample of non-fat milk is precipitated using acetic acid after heating milk, the separates from the sample leaving a clear solution.
- ii. Stirring the solution while adding acid, the casein separates from the milky solution amorphous mass which could be removed using suction filtration.
- iii. When acetic acid is added into the milk sample it forms precipitates.
- iv. Other precipitates are then washed 2 or 3 times using water after decanting off the filtrate which is then rubbed with sufficient amount of 0.1% sodium hydroxide solution and then resulting solution is filtered using a cloth.
- v. Precipitates termed as casein, are then treated with absolute alcohol in a beaker.
- vi. The separated casein is then mixed with the ether solution for a few minutes, the ether is allowed to settle, and the process is repeated with a second portion of ether.
- vii. After the second washing with ether, again filter the product.
- viii. The ether washings remove any small quantities of fat that may have precipitated with the casein.

III. Results and conclusion

Table:1 Protein content in milk of different animals

Name of Source of Milk	Total Protein content in Milk (in gram %)
Cow	4.59
Buffalo	7.48
Camel	5.44
Goat	4.08
Sheep	3.8

Table:2 Casein content in milk of different animals

Name of Source of Milk	Total Protein content in Milk (in gram %)
Cow	0.829
Buffalo	1.22
Camel	0.606
Goat	0.332
Sheep	1.406

After performing comparative test on total protein content of milk from five different milk (Buffalo, Cow, Sheep, Goat and Camel) it was found that the protein content is maximum in the milk sample of Buffalo i.e. 7.48% milk as compare to all other animals.

Sheep has minimum amount of total protein in collected milk sample i.e. 3.8 gram%. Among those five samples three have intermediate protein content, as follows; camel with 5.44 gram%, cow with 4.59 gram% and goat with 4.08 gram%. Casein was extracted from five collected milk sample by using acetic acid and found that the sheep has maximum amount of casein i.e. 1.406gm per 10ml. Goat milk has minimum amount of casein with 0.332gm per 10ml and in remaining three samples casein content is less than Sheep and more than Goat i.e. Buffalo with 1.22gm per 10ml, Cow with 0.829gm per 10ml and Camel with 0.606gm per 10ml.

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