

Effect of Different Seasons on the Milk Quality Parameters of Mohali District

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Abstract: The purpose of this research is to explore the effect of variation of different seasons on the composition of raw milk. The samples of raw milk were taken during winter, spring and summer season from a different region of Chandigarh. Biophysical and biochemical properties i.e. fat, protein, reducing sugars and lactose were analyzed. The result showed that summer milk had notable higher temperature, high pH, high reducing sugars, and high conductivity as compared to milk collected during spring and winter season. Whereas, protein, fat and lactose content were higher in winter as compared to spring and summer ($P < 0.05$). Contaminated milk is a global cover and social issue that exists in the rural and municipal countries. Growing and developing areas are at higher risk due to a lack of monitoring and policies. Consumption of contaminated milk leads to various serious threats to health causes fatal diseases and could impact on the food industry. In various industries to check the milk adulteration requires expensive techniques which small vendors cannot afford. A comprehensive study has been carried out on the detection of milk adulteration kits.

Keywords: milk, composition, change, season

I. INTRODUCTION

Milk is an essential label of a complete Indian diet. No indigenous platter is complete without milk products. This customary is not restricted to one country but the trend is existing throughout the world. The intake of milk in India is in various forms like tea and coffee or in shakes, smoothies, ice cream, shreekhand, curd, buttermilk, kheer and many more(2). Milk has plentiful recopies to relish but the most common one is to enjoy alone. This practice is not only because of taste but it has great nutritional and health impact. Milk is a rich source of Energy, Water, Carbohydrate, Fat, Protein, Vitamins, Minerals, and Minor Biological Proteins & Enzymes.(1). The energy in the milk is due to presence of carbohydrates, fats and proteins. Skim milk is an exception for this. The water content in milk 87% which is required or optimised metabolism of the body functioning. Lactose is the major form of carbohydrate present in milk. To accomplish the nutrition the bond of this disaccharide must be broken. This is the reason some people are unable to digest milk and develop the problem of lactose intolerance. Fats are mandatory for energy bank and to synthesize hormones. The body demands two essential fatty acids linoleic and linolenic, which we can't synthesize own. These two are engaged in muscle contraction, blood clotting and prostaglandin synthesis. The milk contains 5% of these essential fatty acids as human necessitate. The next important constituent is protein. Milk proteins are categorized in two groups casein and whey proteins. Later proteins are enriched with immunoglobulin's, which are the support system human defence mechanism. Vitamins in milk has wide working area like immune response, cofactors gene expression and reproduction.(1). All the above ingredients loaded in the milk can make it complete food item for human race. The unique characteristics of milk not only make it useful for individual benefits but also has emerged as world industry to reach at top most commercial horizons. Indian dairy market has scored value of INR 10,527 Billion in 2019 (3). Revolutionize nature and disturbed ambience has not only welcome the ill effects on human but also the fauna around us.(4) These disturbance

includes rise in temperature, altered relative humidity, precipitation, in addition to these extreme events such as heat waves, droughts, extreme precipitation, and floods. All these abiotic stresses are influencing animal metabolism and hormonal balance. And indirectly all these contributing to variation in milk composition as it contains all the animal endocrine products along with the components of human use. (5). A study conducted in Meghalaya, India indicates that in summer season the milk yield was higher than winter and rainy season(6). Another report available in Haryana, India which also represented that during summer season in crossbred cows the yield was maximum.(7). Modulation in milk composition is also due to different food intake of cows during different weather (8). This diet management can help breeder to use mix and match different diet supplements to attain appropriate milk composition (8). Solid not fat were significantly reported higher during December to April in research (9). Summer milk was found the most suitable for human race by a study conducted in 2012 (9). Another research conducted revealed that the in spite of high yield in summers the fat and protein values were decreased in summers (10). In lieu of above discussion present study was designed to investigate the variations in milk composition during different season in Mohali region of Punjab to provide database for research.

II. MATERIAL AND METHOD :

A) Collection of samples:

300 milk samples were collected from different region of Mohali and Landran during December-January, February-March and April - June. Samples were carefully taken to the lab in an ice box immediately.

Protein: Estimation of protein content was done by Lowry protein assay (12)

Fat: Fat determination was done by standard Gerber method (13)

Lactose determination: Lactose determination was done by the method explained in the report published by the

nutrition and food science department, university of Arizona.(14)

B) Statistical Analysis:

The Data were analysed by software program based upon 0.05% coefficient of error .The data were analysed by using IBM SPSS statistics 20. Such software program proved that samples were at normal conditions and after that the significant difference amid the data was studied through Anova (one – way) test and p-value was determined.

III. RESULT AND DISCUSSION:

The present study presented variation in milk parameters in different seasons in 300 cows in nearby region of Chandigarh. Season did not revealed any significant association with pH in fresh cow milk samples in our study. The value of pH in different seasons ranges between 6.5 and 6.7. However, the pH is a unit which measures the degree of acidity or alkalinity of a solution. It measures the H⁺ ion and OH⁻ ion concentration. The term pH is come from “potenz” which means “power” the mathematical symbol for negative logarithm and “H,” the chemical symbol for “Hydrogen”. Figure 1 and Table 1

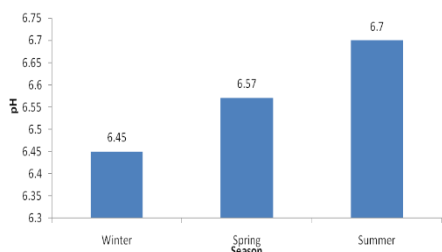


Fig. 1: Graphical representation of pH in different seasons

Table 1: Mean values of ph with standard error (se) in different seasons:

Season	Winter	Spring	Summer
pH	6.45±0.87	6.57±0.45	6.7±1.12

Depicts that as the season changes there is the variation of ph in the milk the highest pH value was seen in summer ,medium value was seen in spring, lowest value was seen in winter. The pH of milk is 6.5 to 6.7 which will changes over time. In sour milk the pH gets lower and get more acidic .This change will occurs due to the presence of bacteria in milk which converts the lactose sugar into lactic acid.

Nutrients in milk makes it nature's completely perfect food. As the Milk products contain a good amount of high quality proteins. Such as whey proteins constitute about 18 % of the protein content in milk. Casein i.e a milk protein contains all the good essential amino acids. In our study, the average value of protein content was significantly higher in winter as compare to spring and summer (Figure 2 and Table 2).

Table 2: Mean values of protein content in different seasons:

Season	Winter	Spring	Summer
PROTEIN	3.22±0.12	2.75±0.21	2.26±0.78

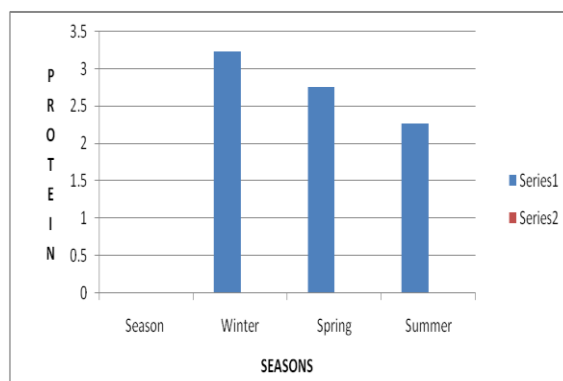


Fig. 2: protein content in different seasons

In our country fat percentage is one of the economic parameter that is directly related to farmers pocket. Milk Fats (triglycerides) are made from compounds such as diglycerides that have 2 fatty acids or monoglycerides that have 1 fatty acid attached glycerol, a 3 carbon- backbone. Both Monoglycerides and diglycerides are act as emulsifiers that make an emulsion of liquid fats in water (i.e which keep the fat and water from separating in foods like ice cream). In our study, season revealed a significant association with fat percentage. (P<0.05). The average value of fat content was higher in winter as compared to spring and summer. (Table 3, Figure 3).

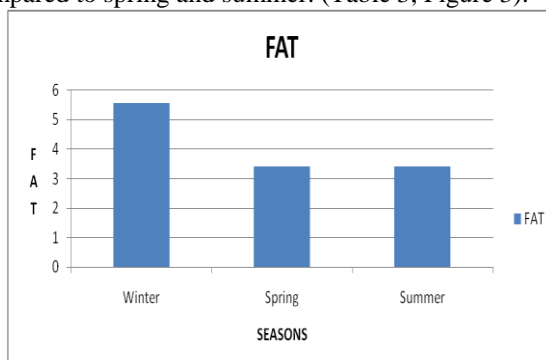


Fig. 3 : Graphical representation of Fat content in different seasons

Table 3:Mean Values of Fat % with Standard error (SE) in different seasons:

Season	Winter	Spring	Summer
FAT	5.56±0.56	3.41±0.32	3.41±0.23

(P<0.05)

Our results are in agreement with (16,17. These differences between summer and winter may be attributed to cold& long days (i.e. winter) result in a lower concentration and decreased rate of secretion of fat. As far as is known, climatic conditions as well as seasonal changes have impact on the milk composition. Fat of milk is the most variable parameter amid the milk components. Milk’s fat synthesis is affected by various factors especially dietary factor and environmental factors (Bayril et al., 2010).

Lactose is hewed into glucose and galactose inside the small intestine of the neonate (newborn child) by an enzymatic activity held by lactase (or β-galactosidase). Further galactose is converted into glucose-6-phosphate to

give another molecules of glucose by various enzyme. **Lactose** is a major source of energy and easily digestible as a source of glucose which provides energy for the neonate. In our study, lactose content revealed significant variation in different seasons ($P < 0.10$). The average value of lactose content was higher in winter but lower in spring and than higher in summer. (Figure 4, Table 4).

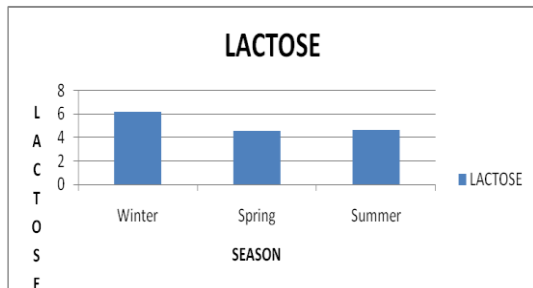


Fig. 4: Graphical representation of Lactose content in different seasons

Table 4: Mean Values of Lactose content with Standard error (SE) in different seasons ($P < 0.10$)

Season	Winter	Spring	Summer
LACTOSE	6.24±0.66	4.57±0.56	4.65±0.42

CONCLUSION :

In present study, season revealed significant changes in the major components of cow's milk (pH, fat, protein and Lactose.) fat % and protein % were higher in winter but lower in summer season. There number of non genetic factors that effect composition of milk like feed, management, seasonal variation and other environmental factors. Our study conducted on relatively small samples, however, recommendations must be taken under consideration to improve milk quality including:- feeding is good by some green foods in summer and autumn to maintain milk components percentage especially fat% apart from that standard operational protocols must be followed for clean milk production (19).

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