SHORT COMMOUNICATION

A review on milk analysis

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ABSTRACT

Milk is a high-nutrition, low-cost product with a high palatability and digestion. Milk and other dairy products are thus an essential resource of calories for people of all ages. Dairy products' nutritive qualities have been extensively researched, and referrals to various current publications on the field are included. We get and eat food to get the energy we need to be alive, as well as the amino acids, vitamins, and minerals we need for regular physiological processes.

Key Words: *Low-cost product; Dairy products; Nutritive qualities*

INTRODUCTION

Complete milk provides the majority of these nutrients in different levels and in a form that is relatively easy to separate. As a result, the complex problem of varied economic and nutritional values of milk solids arises. Milk fat is a source of energy and has an essential role in the flavour and consumer acceptability of dairy dishes. To date, it has attracted a lot of economic attention when it comes to milk price. However, no unique nutritional qualities have been discovered to support this value, and it appears that milk fat must compete with fats derived from plants, which provide dietary energy at a lower cost. Lactose adds useful characteristics to milk and dairy products, but it lacks the nutritional content that would justify its increased commercial value. While minerals and vitamins are essential components, their quantity is insufficient to justify extra financial value. Because of its favourable balance of necessary amino acids, the protein component of milk has special nutritional importance. Milk's protein content is always lower than its fat content. Milk protein might have a higher economic value, which would be necessary to stimulate future dairying to produce more protein than fat [1].

Milk and fat yield records are an important and vital aspect of a dairy cow herd development programmer. There are approximately 1,123,000 dairy cows of milking age in Illinois at the moment, with less than 4% being evaluated for output. This is far too tiny a sample size to provide a reliable foundation for widespread change. The cost of testing may be a limiting factor in limiting its scope. This inquiry was performed in order to design a way of testing that would involve fewer time and labor on the side of the tester and the cow proprietor, allowing screening efforts to be spread out across a larger area [2].

Although Liquid milk sales have been steadily declining in recent years, but per capita consumption of other dairy products such as yoghurt and cheese has climbed in the United States. Milk consumption declined. Although total consumption has fallen, changes in the sort of milk most commonly purchased have also been seen. Low-fat milk sales climbed by 30.0% between 1966 and 1987, while whole milk sales declined by 44.8%. Throughout January 2005, sales of 2% lowered milk have consistently outsold whole milk, but skim milk sales have stayed relatively flat (Economic Research Service, 2014). Milk's fat adds a variety of flavors, mouthfeel, and visual characteristics. Previous research has shown that the pleasant flavors in milk are derived from molecules that are likely specific to milk fat [3].

The greater the profits from dairy industries, the better the milk are in its desirable ingredients such as fat, etc., provided it does not cost more to make the affluent than the thin milk. Consider, for instance, two cows with the same worth and upkeep: The milk out of one produces 125 Ib. of fat, which can be used to make 125 Ib. of butter; conversely, the milk from the other produces 150 Ib. of fat, which can be used to make 150 Ib. of butter under the same circumstances [4]. The appearance, aroma, texture, and flavor of milk can all be used to characterize its sensory properties. The dairy business places a high value on milk's sensory characteristics since they are linked to product quality and consumer approval. The contribution of fat to the sensory qualities of milk has received little attention over the years, despite the fact that knowing whether fat influences the sensory aspects of milk is critical if fat replacements for fat free milk are to be developed. Prior study on the effect of fat on milk sensory qualities has given intriguing results, although the data of research groups have occasionally contradicted [5].

The ability to quickly and directly determine the fat and protein composition of milk has long been a dream of breeding organizations, the dairy industry, and regulatory laboratories. The chemical analysis technique is still the greatest extensively used method for measuring the milk component. The Geber method, the Rose-Gottlieb technique, the Babcock method, and the Tesa method, among others, are chemical methods for determining fat content. The Geber approach and the Rose-Gottlieb method are the most often used at the moment. The Kjeldahl determination of N method, the Udy dye binding method, the formal titration method, and other chemical methods for assessing protein concentration are the most common. The Kjeldahl N determination method is the international standard amongst these. Because all of these methodologies are inherently off-line, costly, time and labor intensive, and infrequent, they have been progressively substituted by rapid methods such as spectroscopy analysis methods (including the infrared, middle infrared, near-infrared, and ultraviolet, among others) and ultrasonic techniques, among others. Spectroscopy analysis methods are the most common and precise presently, however they are too complicated interactively [6].

The dairy sector has found that converting milk to a standard fat content based on its calories has been helpful in comparing the advantages of milks with varying fat levels. If weight and fat content are utilized as the basis for judging cow worth, fat-corrected milks should demand comparable market pricing [7]. Infrared analysis is now used for practically all milk payment and dairy herd improvement testing. Milko-testers are still used in a small number of certified payment tests. Chemical procedures, such as Babcock and Gerber, are used in an even fewer number of formal payment tests. In the late 1960s, milko-testers swiftly replaced most chemical testing for fat determination, providing greater testing speed and labor efficiency. Infrared scanners were developed in response to the dairy industry's request for information on the protein, lactose, and SNF content of milk, and quickly took over the majority of the testing. These tools can quickly and cheaply determine the fat, protein, and lactose levels of milk. Combinations of the three basic signals can be used to calculate the SNF and total solids. The dairy sector has faced numerous new issues as a result of the shift from chemical to instrumental milk testing. Once Milk testers were available, precise criteria for calibration and measurement accuracy validation were developed. Most

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regulatory bodies produced guidelines for calibrating infrared milk testing equipment as a modification of Milko-tester methods. In many cases, the dairy industry and regulatory bodies did not understand the variations in fundamental ideas of assessment [8]. The fact that the infrared technique is faster and less expensive than existing viable techniques for milk testing has piqued people's interest. Two technicians can prepare samples and complete analyses for fat, protein, and lactose at a pace of one sample per minute using the Infrared Milk Analyzer (IRMA). Using a base rate of $2 per hour, the labor cost for a three component analysis is around $7. The instrument cost per sample is less than 2 if the equipment expense is amortized over a ten-year timeframe and interest is calculated at 6% increased yearly. As a result, a cost of $10 per specimen is a reasonable estimate of the cost of a three-component examination, and it is less than one-tenth the expense of identical chemical tests [9].

Along with its rapidity, precision, and affordability, Infrared (IR) analysis of milk has become a common analytical technique in industrialized milk-producing countries. Integrated laboratory for paying and dairy herd assessment (milk recording) programmers are the organizations that profit the most from such equipment. Advantages gained from IR instrumentation's large sample volume and data acquisition abilities. Since key decisions (such as breeding, payment, and management) are reliant on this knowledge, organizations of this caliber are also dependent on the correctness of their knowledge. The Dairy Herd Analysis Service (DHAS), based at Macdonald College of McGill University, is however one agency that offers farmers with management data. The DHAS will take over the federally run Record of Productivity (ROP) programmer, which will be phased down in favor of on-farm Babcock analytical fat testing. Farmers affected by the shift, however, have raised concern that the value of their breeding stock, which is based on the fat test, may be harmed as a result of the change. This research addresses this issue by contrasting IR results with chemical based techniques [10]. Milk reimbursement monitoring and dairy herd development records are both done using Mid-Infrared (MIR) emission spectrophotometry. The precision of fat and protein level measurements in milking is critical since it has a direct impact on payments to individual dairy farmers. The creation of harmonized protocols for interlaboratory research benefited in method performance enhancement and produced a harmonized set of technique performance data that would provide measurements of anticipated algorithm will work. Small errors in testing have a big financial impact when applied to high milk quantities in the United States as farms have grown in size. As farms grow larger and the value of milk fat and protein rises, ongoing development in the reliability of milk fat and protein analysis becomes increasingly crucial. In the MIR area, the carbonyl stretch (C=O), also known as fat A, and the symmetrical carbon hydrogen stretch (C–H), also known as fat B, have traditionally been employed to assess fat [11].

To assess the effects of various preservatives on Milko-tester results, 10-day composites were made in the lab by adding 15 ml of fresh milk every day for 10 days. Each composite contained: (i) 2 mercuric chloride tablets or (ii) 2 potassium dichromate tablets, or (iii) formaldehyde solution, or (iv) paraformaldehyde. After adding the milk, the composites were spun every day and stored at laboratory conditions, shielded from light. The samples were heated to 98-103 °F following 10 days and evaluated for fat using the Werner Schmid and Gerber techniques, as well as the Milko-tester [12].

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