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REVIEW ARTICLE

Review of Dairy Production, Processing, and Strategies for Milk Marketing Development

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Abstract: Dairy production and processing involve the conversion of raw milk into a variety of consumable products such as milk, cheese, butter, yogurt, and ice cream. The process begins at dairy farms, where milk is collected from animals like cows, goats, and sheep. It is then transported to processing facilities, where it undergoes several key stages, including pasteurization, homogenization, fermentation, and coagulation, to ensure safety, quality, and desirable sensory properties. Pasteurization eliminates harmful pathogens, while homogenization prevents cream separation, producing smooth, uniform milk. Fermentation, facilitated by specific bacterial cultures, is essential for products like yogurt and cheese, which develop their unique flavors and textures. Dairy production and processing remain a cornerstone of the global food industry, supporting nutritional needs, economic growth, and food security. As consumer preferences and environmental concerns evolve, the dairy industry continues to innovate, integrating sustainability practices and improving processing techniques to meet future challenges.
Keywords: Dairy, Milk Preservation, Feeding Management, Milk Marketing.

INTRODUCTION

There are numerous types of livestock products found in the market. Most of these products are consumed raw or in processed form. This chapter is going to discuss three products that are commonly found in the market as processed food products. Dairy processing is the series of steps that transform raw milk from animals, primarily cows, goats, and sheep, into a wide range of dairy products such as milk, cheese, butter, yogurt, and ice cream. The main objective of dairy processing is to enhance the safety, quality, and shelf life of milk while maintaining or improving its nutritional value. The processing of milk involves several critical stages, beginning with cleaning and pasteurization to eliminate harmful microorganisms. It also includes homogenization to break down fat molecules and ensure a smooth, uniform texture. For many dairy products, fermentation processes are used to create unique flavors and textures, as seen in yogurt and cheese production. Modern dairy processing employs advanced technologies, including automated systems and microbial cultures, to ensure consistency, efficiency, and high-quality products. Additionally, innovations such as lactose-free and plant-based dairy alternatives have expanded the variety of products available to meet changing consumer preferences. The dairy processing industry plays a vital role in the global food supply, supporting nutrition, food security, and the economy.

DAIRY

A few decades ago, dairy processing industries were mainly confined to the high potential areas and the industries were invariably located in large scale farms. However, the situation has changed drastically. Milk is now produced in most parts of the world and small-scale milk production has become the nucleus of the dairy industry, especially in developing countries like Africa. In a country like Kenya, small scale farms are now estimated to produce about 80% of all milk consumed in the country leaving 20% to the large-scale farm sector. In terms of raw materials, fresh milk is the most important raw material although polythene papers are also needed.

IMPORTANCE OF MILK

Milk is an important part of the traditional staple diet for most people around the world. The decline in the number of farm animals owned by individual households over the years, owing to frequent droughts has, however, led to a decline in the availability of this traditional staple. During the peak production periods, sufficient milk is available in many households and is in many cases consumed as the only food item, while some of it is used for making tea. During times of scarcity, some of the little milk available is used to prepare tea which is then taken in accompaniment with bread and other snacks.

Milk is obtained from several species of livestock, the most common being cattle, goats, and camels. The ability of the camel to withstand adverse drought conditions has made it the species of choice for purposes of milk and meat production during the dry seasons, especially in arid and semi- arid areas. Annual yield estimates show the camel as a better provider of milk in these areas than the cow, or the goa because the animal is able to produce milk long into the dry period even after other animals have stopped producing (Campbell & Marshall, 2016).

MILK PRESERVATION

There are several methods used in preserving milk obtained from different livestock.

Fermentation: This is the main traditional method of preserving milk. In this method, fresh milk is put in a gourd and left to stand for some time, usually a day or two. In Africa, especially in Kenya, the product of this process is then eaten with ugali or even just drunk separately. The main disadvantage with fermentation is that the milk so preserved does not keep for long and so would not offer a solution where the aim is to keep the milk for long periods, say several weeks.

Refrigeration and pasteurization: These are conventional methods of preserving milk. Both refrigeration and pasteurization are either not common, or are not feasible in most developing countries such as Africa.

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Evaporative condensation and sweetening: Evaporative condensation and sweetening of milk has been initiated, as a possible method of preservation, to help extend the shelf-life and therefore the supply of milk into the dry period, when there is a general shortage in most households. Although production of sweetened condensed milk is well documented for cows' milk, there exists little information pertaining to this product with respect to other milk such as camel and goat milk. It has, however, been demonstrated using cow's milk that during evaporative condensation, biochemical reactions take place leading to losses in quality (Campbell & Marshall, 2016).Such information is almost unavailable in the case of camel and goat milk. Traditionally, condensation of milk is practiced by a simple process.The process involves:

- Mixing one part by volume of sugar to four parts by volume of milk
- Then heating in an open metal pan to evaporate most of the water
- The condensed milk is then filled into tin cans, fitted with lids

This product is then stored and thereafter eaten either directly or used in preparing tea. Either way, the product is scooped from the can with a spoon until it is all used up. The time taken to complete each can depends on the rate of use. It would, therefore, be useful to know for how long such a product would stay wholesome. It is also not known for how long the same product can keep in cans that are not scooped from. Accessibility is an important aspect of food security. Even if a food is available locally, it is not likely to benefit the community unless it is affordable (financial access), it is within one hour's travel one way from the residence, or the specific family has sufficient stocks one month before food from the next season is ready (Physical access) and there are no inhibitions to its utilization owing to cultural aspects such as beliefs, food taboos and norms (Social access). It is not known how much fresh and condensed milk are accessible to the average member of households, especially during dry weather (Campbell & Marshall, 2016).

FACTORS THAT INFLUENCE MILK PRODUCTION

Milk production is affected by several factors. These include:

- Animal breed
- Stage of lactation
- Feeding management
- Climate
- Health of animal

Level of feeding during rearing has the greatest influence on subsequent milk production (the higher the quality of feed given to the animal the higher the milk yield and quality). The milk production peak is determined by feeding rate and quality between calving and peak production. The milk yield has also been found to increase with the stage of lactation. Milk yield also increases with the age of the animal and reaches a peak at maximum maturity (Approximately 7 years) and then starts to decline. In an ordinary commercial herd, a good average milk yield per cow for a year should at least range between 2900 to 3600 liters. For instance, Friesian cows which are well fed and managed should give an average milk yield of 3,825 liters per year with an average lactating period of 305 days. Zero grazing system has a good potential for the small scale farmer.

Disease control could be reduced by maintaining good hygiene at the farm, good fencing to prevent foreign animals from entering the farm, and have regular regional vaccination of threatening disease and regular tick control. Further, although tick control is expensive, it is cheaper than the treatment of tick born disease because it costs approximately 20% of the total treatment cost. Tick-borne diseases (particularly East Coast Fever -ECF), anaplasmosis, babesiosis (Red water fever) and heart water disease, are great killers of cows, especially exotic ones. Other common diseases associated with poor management are mastitis and helminthiasis, caused by heavy worm infestation. Further, it is important to regularly spray and deworm for good health and effective milk production (Campbell & Marshall, 2016).

OBSERVING MILK HYGIENE

There are several techniques for observing hygiene in dairy milk production and processing. These include:

- Washing the udder with warm water
- Feeding the cow with concentrates
- Gently squeezing and stripping the teats while milking
- Seasonal variation affects milk yield

Milking should be done in small mouthed pails to prevent contamination of the milk with dirt from the animal's body and surroundings. A hygienic and clean environment is also required because milk tends to absorb odors from the environment quite easily.

MILK MARKETING

There are factors that influence the price of milk. These include:

- Costs of production
- Government pricing support programs
- Domestic supply and consumer demand
- Dairy farmer's cooperatives
- Dairy product import policies

There is always some ultimate government responsibility in setting prices for milk. Controlling prices to make milk available to all people gives uneconomic returns to farmers lead to decreased interest in dairying and an unfair advantage to private raw milk sellers.

DECISION-MAKING IN MILK MARKETING

To understand purchase behavior, one has to understand who a consumer is, what a consumer is about and what consumers go through in making their purchase decisions. A consumer is one who determines needs, purchases or uses products. Before a buyer eventually makes a decision on what to buy, he follows a process that involves recognition of needs and wants, awareness of product choices that would meet the needs recognized, gathering of information on the various offerings, and evaluation of alternatives that may be available. The goal of a buyer is to satisfy his desires by obtaining goods and services.

The purchase decision is, therefore, the ultimate goal of consumer behavior. In reaching this goal, the individual has to make decisions on whether, what, when, where and how to purchase products and services. Studying consumers provides clues for information about them before the purchase is made. This leads to either high or low involvement in a purchase decision. Complex decision-making is where consumer thinks before acting. The process requires consumers to develop brand attributes and evaluate brand alternatives in detail before reaching a purchase decision. This mainly takes place when the item to

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be purchased involves a lot of money or requires technical understanding and the consumer has to seek information widely before making a commitment to purchase (Chandan et al, 2015).

An advertisement carried out on a newly launched product may trigger purchase when noticed on shelves of a retail outlet. Consumers, in this case, may experiment on a variety of brands due to the desire for change and search for novelty and not due to any form of dissatisfaction. Certain purchases involve complex decision-making. This is where a great deal of thought and deliberation is important due to the financial outlay and importance of the product. The consumer would search for a lot of information before deciding on a product to buy. Low involvement purchase is where the consumer does not consider the purchase to be risky and important, thus does not give it a great deal of thought and consideration. The consumer, therefore, uses various strategies to minimize time and effort in making decisions. He can buy the most familiar products on the shelf; buy the lowest priced brand, or leading brands being sold on a price deal or with coupons. The level of involvement in a purchase decision and amount of financial outlay required for purchase, therefore, determine brand choice made by a consumer. A simple model of consumer behavior states how consumers are exposed to various marketing stimuli (purchase related communications), which are designed to influence consumers' decisions. These are in the form of product itself or various marketing strategies (promotions and price). Consumers' reaction to the stimuli is based on three sets of variables;

DEVELOPMENT OF MILK PROCESSING INDUSTRY

- Development of the milk processing industry could be based on various production systems. These systems include:
- The small-scale milk production system
- Large capital intensive milk production system
- Highly specialized system
- There are several factors that influence the development of milk
- production system. Some of these factors include:
- A strong and long-term government commitments
- Adequate market
- Physical characteristics (such as water, soil, and climate which determine feed, pasture and range availability)
- Economic factors (which determine the relative profitability
- within the farming system and the land use patterns) (Chandan et al, 2015).
- There are several advantages to zero-grazing. These include:
- Increased milk production

Regarding the return on labor, zero grazing system generates a return exceeding the farmer's alternative employment opportunities. Furthermore, the cash-return on labor is supplemented by an income in kind in the form of milk for home consumption at a rate of 4 liters per farm per day or more. The cash-return on labor exceeds the salary of casual labor which enables farmers to hire labor during peak periods and sometimes even permanently.

Another way through which the government can help the dairy industry is through teaching dairy farmers the best feeding practices of their animals. The provision of high-level feeding for the animal is the most important factor in good livestock management and good animal husbandry. Cattle fed well produce well. Normally the cost of feeding amounts to 50-75% of the total milk production costs. Feeds include fodder, crop residues, and concentrates. Like other crops, the planted pasture needs a lot of care, at least 2-3 weeding per year, but this increases the cost of production in terms of labor. Pasture management amounts to 5-10% of the total production cost. Zero grazing system enables a higher stocking rate per acre, especially when tall grass like elephant grass is grown. Stocking rate, soil fertility, and rainfall determine the productivity of the pasture. The pasture should be good, that is, there should be a mixture of planted grass and legumes at a ratio of at least 7:3 to obtain 4.5 kg of milk per day and any additional liter of milk are brought by supplementary feeding of with dairy meal. Maize stover is the most widely used crop residues for zero grazing in Africa. The limitation, however, is its low protein content, but its energy content is acceptable if it is cut when green. Additionally, sweet potato vines combine high protein content with a good digestibility if grown on fertile soils. The vines also form a very good supplement to a ration consisting of Napier grass/maize stover. However, feeding of sweet potato vines should be discouraged as well as banana peelings because these vary widely in nutritive value. This is because these crops residues are bulky, fibrous and deficient in protein, energy and minerals. These feeds can nevertheless be fed to dry cows and other livestock on the farm. For greater milk yield, cows should be given concentrates. These are recommended for cows which produce more than 7 kgs of milk per day. They should be fed dairy meal or dairy cubes at a rate of 1 kg for every extra 1.5 kg of milk above the 7 kgs. It is also recommended that the animals be given mineral licks at all times (Campbell & Marshall, 2016). Dairy cows must consume sufficient water to produce large quantities of milk.

The amount of water drunk by an animal depends on:

- Ambient temperature
- Kind of feed eaten by the animal
- Type of cow
- Quality of the water

Information on calf rearing is another area that the government can help in developing the dairy industry. Calf-rearing is a very important aspect of the dairy farming industry because today's calf will be tomorrow's cow. Fertility affects the number of calves born and total milk production during the lifespan of a cow. A good measure of fertility is the calving intervals. In the ideal situation, the cow gives birth every year. It is reported that reproductive failure is more often a result of human error rather than the reproductive distinction of the cow (Datta, 2015). Many human errors leading to reduced fertility include:

- Underfeeding
- Poor heat detection
- Poor housing and sanitation
- Unhygienic measures are taken at calving
- Lack of proper health care

The most economical type of breeding in a small commercial herd is by artificial insemination. This is because it eliminates the cost of buying a bull and maintains it, and the farmer can easily plan the seasons and dates of calving of cows with a view of maintaining optimum milk production throughout the year. Non-lactating cows do not require as much fodder as lactating ones, but they must nevertheless be given enough food to enable them to give birth to well-developed calves. The calf should be fed on colostrum, milk, early wean pellets and should be regularly dewormed and vaccinated accordingly.

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CONCLUSION

In conclusion, the production and processing of dairy products is a highly technical and dynamic field, driven by innovations in machinery, biotechnology, and food science. The process of converting raw milk into valuable dairy products requires careful attention to hygiene, temperature control, and quality assurance to ensure that the final products meet the safety and nutritional standards required by consumers. With ongoing advancements in processing techniques, such as high-pressure processing (HPP) and improved fermentation methods, the dairy industry continues to evolve, providing an ever-expanding range of products. As demand for dairy products grows globally, sustainability and environmental impact are also becoming crucial considerations for future production practices.

REFERENCES

1. Campbell,J. and Marshall, R.T. (2016). Dairy Production and Processing: The Science of Milk and Milk Products. New York: Waveland Press, (25-83).
2. Nivedita Datta, P. M. (2015). Emerging Dairy Processing Technologies: Opportunities for the Dairy Industry. Florida: John Wiley & Sons, (pp. 360).
3. Ramesh C. Chandan, Arun Kilara, Nagendra P. Shah. (2015). Dairy Processing and Quality Assurance. New Jersey: John Wiley & Sons, (41-77).

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CONFLICTS OF INTEREST

"The authors declare no conflict of interest".