



The dairy industry: meeting new consumer demands

Consumers are increasingly demanding the best of both worlds when it comes to dairy. For example, they want milk that is safe to drink and has a long shelf, but still tastes like farm-fresh raw milk.

Prof Elna Buys, head of the Department of Consumer and Food Sciences at the University of Pretoria's Faculty of Natural and Agricultural Sciences, writes about how the dairy industry has had to innovate to respond to these types of demands.

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“Farming is an important economic activity in South Africa, providing an income for large- and small-scale farmers, as well as jobs to thousands of people. Over the past few years, there has been an increase in the demand for animal products, such as meat and milk, and the dairy industry has been meeting this demand. The intake of unprocessed milk in South Africa increased 4,8% year-on-year in 2018. While raw milk is considered very desirable in parts of the country, it poses many possible safety hazards, such as a susceptibility to bacterial contamination. For this reason, the dairy industry has improved various technologies to ensure the safety and quality of milk.

A SNAPSHOT OF THE DAIRY MARKET

South Africa's secondary dairy industry consists of a few large processors operating nationally, a growing number of processors who operate in more than one region, a large number of smaller processors who operate in specific areas, and several milk producers who sell their own produce to retailers and consumers, known as producer-distributors (PDs). The number of PDs decreased 60% from January 2009 to March 2019, and milk processors decreased 32% over the same period. In South Africa, 98% of the milk produced is sold formally to commercial processors, which is different to the situation in most other African countries, where milk is mostly sold to smaller processors.

In 2018, the South African dairy market was divided into 62% liquid and 38% concentrate products. Pasteurised liquid milk and ultra-high temperature (UHT) milk are the major liquid products, while hard cheese is the main concentrated product.

The increase in milk production over the past few years can be attributed to an increase in the demand for fresh milk and about a 20% increase for milk products such as soft cheeses and flavoured milk.

PRODUCT SAFETY AND QUALITY

Some consumers demand that processed milk have a taste profile similar to that of unprocessed milk, while keeping its extended shelf life properties. Consequently, there has been an increased

variety of milk products using various processing techniques to achieve safe products with stable shelf-life attributes. Some of the products produced using these techniques include UHT milk and extended shelf-life (ESL) milk.

To provide consumers with product diversity and convenience, technological improvements in milk production have been made mostly in unit operations such as separation, standardisation, pasteurisation, homogenisation and packaging. These improvements have been possible through research and knowledge of the functional properties of the different ingredients and components of milk and the effect they will have on the structure and texture of the final product. Apart from extending the shelf life of milk, other improvements have been made in the continuously evolving dairy industry, including the standardisation of milk becoming faster and automated, which allows processors to receive results of milk analysis faster. Methods of adjusting milk to the required fat content have also improved.

SHELF LIFE

The dairy industry employs technologies aimed at extending product shelf life. Some commonly used methods include heat treatment of fluid milk products for a pre-determined time and temperature; acidification by the addition of starter culture in the case of cultured dairy products such as yoghurt, or buttermilk; the drying of milk concentrate to produce milk or skim milk powder; and the addition of preserving agents such as emulsifying salts in shelf-stable processed cheeses. Shelf life of fluid milk products, for instance, is dependent on various factors, namely heat treatment, quality of the incoming raw milk, additional processes such as micro-filtration, filling conditions, temperature control and packaging technologies. However, heat treatment remains the primary factor that determines shelf-life.

Heat treatment is the most widely used processing technology in the dairy industry. Its main purpose is to destroy micro-organisms, both pathogenic and spoilage, to ensure the milk is safe and has a reasonable shelf life. High-temperature





short time (HTST) pasteurisation increases the shelf life of milk to 10 to 14 days when refrigerated. (HTST milk is processed at 72°C for 15 seconds.) Another process used to further increase the shelf life of milk is UHT processing. UHT milk was introduced to create a product with a longer shelf life than HTST milk. UHT milk has a shelf life of nine months at ambient temperature and is processed at 135°C to 140°C for no more than two seconds by using either direct heating, steam injection or infusion. UHT milk can accommodate households with limited or inadequate refrigeration.

The consequences of using high heat during processing can become problematic, however. In the case of HTST milk, consumers want a product with a longer shelf life than what is offered.

In the case of UHT milk, the undesirable thermally derived changes to the product, such as the cooked or caramelised flavours caused by Maillard browning reactions between sugars and proteins in the milk, which also sometimes causes a slight browning of the milk due to the increased temperature during processing, combined with undesirable off-flavours and other flavour limitations, is problematic.

To meet consumer demands and keep consumer satisfaction for milk that has a longer shelf life than raw milk but still has a taste as close as possible to fresh milk, ESL milk was introduced. ESL has a shelf life of 21 to 28 days at 7°C.

Several factors affect the shelf life of milk, including the quality of raw milk used, its transportation, processing and storage conditions.

FOOD SAFETY MANAGEMENT

Historically, the dairy industry has been involved in the supply of safe products to consumers.

New technologies have always been followed worldwide to achieve this objective. Continuing to monitor the evolution of food law, regulations, analytical methods and quantitative risk and exposure assessment techniques, the industry will keep on implementing this risk-based food safety management approach. It allows all aspects of a food safety system, from the farm-to-fork (raw material, food processing consumer behaviour), to be taken into account, rather than separating responsibility for any particular component of the chain. ■ FW

