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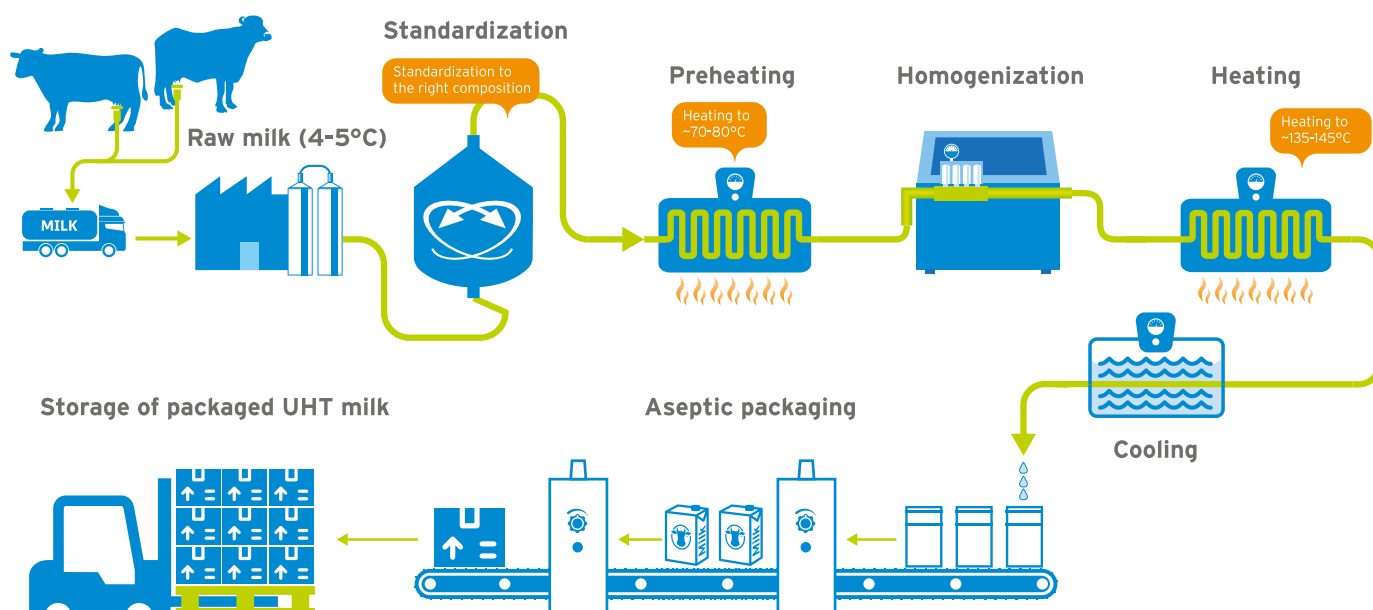
packaged milk processing

Introduction to the milk supply chain

In Pakistan, dairy farming is a vital component of the agricultural sector, supporting livelihoods for a diverse range of farmers, from small-scale traditional setups to large commercial operations. The milk supply chain begins at local dairy farms, where cows and buffaloes are raised for milk production, varying widely in their practices and scale, reflecting the rich diversity of Pakistan's dairy farming landscape. The milk supply chain distinguishes between loose (unprocessed) milk and packaged (processed) milk. Loose milk is directly sold from farms or vendors, while packaged milk undergoes processing, like pasteurization or ultra-high temperature (UHT) treatment, for standardized quality, longer shelf life and safety.

Loose milk offers immediacy and a misplaced perception of freshness. Conversely, packaged milk ensures consistent quality and safety due to processes like UHT treatment (Figure 1). Rigorous quality and safety testing are key components of the formal supply chain, ensuring that every product meets stringent standards before reaching consumers. This focus on testing underscores the reliability and safety of packaged milk. Additionally, UHT treatment, which enhances microbial safety and extends shelf life, further reinforces the benefits of choosing packaged milk.

FIGURE 1 A visual representation of how packaged (UHT) milk is made.





Nutrient composition and differences

When comparing boiled loose milk and packaged (UHT and pasteurized) milk, there are notable differences in nutrient retention. While both provide essential nutrients like protein, vitamins B2 and B12, calcium, phosphorus and potassium, loose milk often experiences unnecessary nutrient loss due to the uncontrolled boiling process. In contrast, UHT and pasteurized milk retain more nutrients because of advanced processing methods and technology. Additionally, packaged milk is sometimes fortified with additional nutrients.

Packaged milk undergoes processing, which reduces/eliminates microbial load compared to (boiled) loose milk. Packaged milk therefore provides a safer option in terms of microbial safety and more consistent option in terms of nutrient content.

Importance of milk processing such as pasteurization and ultra-high temperature (UHT)

Pasteurization involves heating milk to a specific temperature for a set period to kill harmful bacteria without significantly affecting its nutritional value or taste. This process helps extend the shelf life of milk and ensures its safety for consumption. Similarly, UHT processing involves heating milk to a specific high temperature, effectively sterilizing the milk and allowing for longer shelf life without refrigeration.

Milk processing, particularly pasteurization and UHT treatment, plays a critical role in ensuring milk safety by reducing the risk of foodborne illnesses caused by harmful bacteria, such as *E. coli* and *Salmonella*. These processes effectively eliminate pathogens while preserving the essential nutrients present in milk and extending the shelf life of the milk. As a result, processed milk is safer for consumption, particularly for vulnerable populations such as young children, pregnant women, and the elderly.

Exploring colour difference

In Pakistan, the colour of loose milk is often perceived as an indicator of quality, with a creamier or more yellow appearance being associated with higher quality. However, this is a misconception, as milk colour is not a reliable measure of its nutritional value or safety. In loose milk, the fat globules are larger and tend to separate as a top layer after boiling. In contrast, pasteurized and UHT milk undergo homogenization, a process that breaks down the fat globules into smaller particles, allowing for even distribution throughout the milk. This process results in a whiter color in UHT milk and prevents the cream/fat from separating during storage. Another factor influencing milk colour is the feed of dairy animals, which can cause natural variations. However, it's important to understand that these colour

differences are not indicative of the milk's freshness, purity, or richness. Factors such as the breed of cow, feed, and processing methods have a more significant impact on milk colour than its actual quality or nutritional content. In summary, while the colour of milk might vary, it should not be relied upon as an indicator of its quality or safety.

What are Tetra Pak cartons?

Tetra Pak cartons are widely used for packaging milk and other beverages due to their convenience and protective properties. The aseptic packaging technology used in Tetra Pak plays a crucial role in preserving the milk's nutrient content and significantly extending its shelf life. In this

process, the beverage is sterilized before being put into sterile packaging within a sterile environment.

Milk packaged in Tetra Pak cartons undergo stringent quality control measures after processing, ensuring enhanced safety and freshness. The aseptic design not only prevents spoilage but also protects the milk from environmental contamination.

As a result, processed milk packaged in Tetra Pak cartons is both safer and more convenient for consumption.

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Important note

Breastfeeding is the best nutrition for healthy growth and development of babies. Exclusive breastfeeding for six months is the optimal way of feeding infants. Thereafter infants should receive complementary foods with continued breastfeeding up to two years or beyond. Mothers should receive guidance on proper maternal nutrition in order to help sustain an adequate supply and quality of breast milk. Unnecessary introduction of bottle-feeding, partially or fully, or of other complementary foods and drinks may have a negative impact on breastfeeding, which may be irreversible. Mothers should consult their doctor and consider the social and financial implications before deciding to use breast milk substitutes or if they have difficulty breastfeeding. Usage, preparation and storage instructions of breast milk substitutes or of other complementary foods and drinks should be followed carefully as improper or unnecessary use may pose a health hazard.

FrieslandCampina Institute provides healthcare professionals with extensive information about dairy, nutrition and health following the most recent scientific developments. This information is solely meant for professionals and not for consumers, clients or patients.

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