

Effects of High-Temperature Milk Processing

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High temperature is defined as 90 to 150 °C. Many dairy processes, including extended shelf-life (ESL) and ultra-high-temperature (UHT) processing, in-container sterilization, yogurt milk heat treatment, pre-heating or forewarming milk for production of sterile concentrated milk and powders, manufacture of co-precipitate and dulce de leche, involve heat treatments in this temperature range. Pasteurization is not included in this paper as it is generally performed at 72–75 °C.

Keywords: heat treatment ; UHT ; sterilization ; ESL ; Maillard ; denaturation ; cross-linking ; vitamins ; furosine ; lactulose

Thermal treatments of milk in the temperature range of 90 to 150 °C cause a range of effects on the components of milk, many of which affect the nature and quality of processed milk and dairy products. The bacteriological and chemical changes and the practical consequences of the chemical changes are discussed in this paper.

The various heat treatments in the 90–150 °C range used in the dairy industry have their individual objectives. These are primarily bacteriological but, in some cases also chemical. As examples, ESL processing aims to destroy all bacteria which are likely to grow at low temperatures (because ESL milk is stored under refrigeration) and UHT processing is designed to destroy bacteria which are likely to grow at ambient temperatures ^[1] which can be up to ≥ 40 °C ^[2]. However, all heat treatments in this temperature range cause chemical changes which may or may not have consequences for the final products.

References

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