Oncology & Cancer

Extended Abstract

UHT Treatment of Milk and Dairy Products

Nivedita Datta,

Abstract

Global consumptions of Ultra-high-temperature (UHT) treated milk and dairy products are on the increase. He UHT treated dairy products are mainly custard and high protein beverages. Milk protein ingredients, e.g. milk protein concentrate (MPC) or isolate (MPI) or milk casein concentrate (MCC) or whey protein concentrate (WPC) or isolate (WPI) are typically added into bovine milk to enrich the protein component of UHT beverages, or to water to make a protein-based beverage. He main reason for increased consumption UHT treated milk and dairy products lies in the fact of its long shelf-life at ambient temperature storage. At present the shelf-life of UHT treated milk and dairy products at ambient temperature storage is 3-9 months. UHT treatment comprises of heating milk and dairy products to a high temperature (~135-145°C) and holding it at that temperature for a short time (1-10 sec) followed by rapid cooling in a contLnuous-flow system. HLs produces a "commercially sterile" product, i.e. a product in which bacterial growth is highly unlikely to occur at ambient storage conditions. Since heating and cooling takes place relatively quicker in a UHT process, the heat penetration problems of in-container sterilization are avoided. HLs rapid heat transfer rate minimizes undesirable changes in the taste and nutritional quality of the UHT treated products. Since UHT treatment is a continuous process, it produces uniform product quality which does not depend on the size of a container, contrasting in-container sterilization. HLs attribute is especially important for products containing heat-sensitive ingredients, and highly viscous products (high protein beverages) with poor heat transfer properties. Aseptic processing consists of UHT processing followed by fillLnJ the product into sterile containers in a sterile environment and sealing the containers in a sterile manner in a continuous process. In commercial practice, UHT-processed product is usually transferred to an aseptic tank before it is aseptically filled into packages. HLs practice oZers greater operational flexLbLlLty and allows the use of processing and aseptic packaging with dLZerent capacities. He most popular aseptic packages are the tetrahedral-shaped paperboard cartons exemplLfied by Tetra Pak and Combibloc products, although multilayered plastic bottles are also now popular. He introduction of UHT treatment in milk and dairy products, coupled with aseptic packaging, made a sLJnLficant improvement in the bacteriological safety of milk and extended its shelf-life from the typical 2-3 weeks for refrigerated pasteurized milk to 3-9 months without refrigeration. UHT treated milk and dairy products do not contain any preservative for its extended shelf-life at room temperature, and have a clean label, a vital point for today's additiveconscious consumer. UHT products are very appropriate in tropical countries where environmental temperatures are high, and home delivery and refrigeration are not common. UHT treated milk and dairy products are also ideal for other situations involving lack of refrigeration or requiring added convenience, e.g. emergency preparedness, traveling, disaster response, camping, and space travel. In addition, UHT treatment could be valuable for countering bio-terrorism as it can produce bacteriologically safe product even if the raw material is contaminated with pathogenic organisms. UHT treatments are also used in some special cases where other processes are inadequate. As an example, in the production of mLcrofiltered whole milk, the cream part of the milk, which contains fat globules which cannot pass through the mLcrofiltratLon membrane, is UHT processed and finally mixed with the mLcrofiltered skim milk to produce an extended-shelf-life (ESL) product. Although, UHT technology has been successfully applied in commercial dairy processing for more than fiiy years, several aspects of the technology still present challenges for UHT processors. A clear understanding of the ambient storage of UHT treated products is required for ensuring quality of the products. He ambient temperature storage of UHT treated products is a mandatory requirement, where the product could remain stable throughout the entire period of shelf life. However, the local understanding of what constitutes ambient temperature varies from 10-55°C in dLZerent parts of the world, which needs to be taken into consideration during shelf-life assessment of UHT treated milk and dairy products. Moreover, exporting UHT treated products from long distance countries to local market (China, South East Asia and Africa) demands longer shelf-life (more than twelve months). As stated earlier, the physical and chemical changes occurring during heating and storage limit the shelf life of UHT treated products. He most common storage defects in UHT treated milk and dairy products include gelation, sedimentation, fat separation, and the presence of oZodours. Improvement of heat stability of whey proteins and reduction of viscosity of MPC are the key processing steps which also present challenges for UHT researchers and processors for manufacturing shelf-stable high protein beverages. Carrying out innovative research on these aspects and development of rapid methods to underpin the storage defects of UHT treated products are of utmost importance in providing the control mechanisms to achieve better quality UHT treated milk and dairy products.

Nivedita Datta,
Marie Sklodowska-Curie-Career FIT Fellow School of Food and Nutritional Sciences, University College Cork, College Road, Cork T12 YN60, Irela
nivedita.datta@ucc.ie