Available online at www.jpsscientificpublications.com
Volume – 2; Issue - 2; Year – 2016; Page: 523– 525

Indo – Asian Journal of Multidisciplinary Research (IAJMR)
ISSN: 2454-1370

MICROBIOLOGICAL STUDIES OF ULTRA HIGH TEMPERATURE TREATED MILK (UHT) IN AAVIN DAIRY

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Abstract

Pasteurization conditions are effective in eliminating potential pathogenic microorganisms from the milk. It is not sufficient to inactivate the thermoresistant spores in milk. Hence, Ultra High Temperature (UHT) treatment at 150 °C for 15 seconds is sought as an alternative method. In the present study, the shelf life of both pasteurized and UHT milk were compared based on the spores and plate count was least in the case of UHT treated milk even after 45 days of packing .

Key words: Milk, UHT, Heat-Resistant, Bacterial spores and Pasteurization.

1. Introduction

Ultra High Temperature (UHT) milk can be preserved for eight months. It is possible without refrigeration. After opening the pack, it must be put into refrigerator. For metropolitan cities, it is highly useful. While pasteurization conditions effectively eliminate potential pathogenic microorganisms, it is not sufficient to inactivate the thermo resistant spore in milk. The term sterilization refers to the complete elimination of all microorganisms. The food industry uses the more realistic tern commercial sterilization, a product is not necessarily free of all microorganisms, but those that survive the sterilization process are unlikely to during storage and cause product spoilage (Butter, 1994; Mackie and Mc Carney, 1996).

Milk can be made commercially sterile by subjecting it to temperatures in excess of 100 °C and packaging it in air tight containers. The milk may be packaged either before or after sterilization of food before or after sterilization (Robinson, 1995). Milk that is processed in this way using temperature exceeding 135 °C and permits a decrease in the necessary holding time enabling a continuous flow operation (William Frazier, 1997; Hilbert *et al*., 2007). The reduction in process time due to higher temperature (UHTST) and the minimal come - up and the cool down time leads to a higher quality product. Nowadays the milk market is considered to be worldwide due to 2 major innovations in milk treatment. Sterilization processes for HDPF long life milk bottles. One way light weight, low cost and totally recyclable individual packing, packaging material for UHT milk and High density polyethylene (HDPE). Hence in UHT milk, the package is more important. Nowadays, it is packed in Tetra birk. Naturally, the cost of UHT milk is higher than pasteurized and sterilized milk. This dairy type approach was widely used in Japan. It has been reported that more than 75 % of the soya milk in Japan is UHT processed and aseptically packaged. UHT milk gives the chance of worldwide distribution. The aim of the present study was to high lighten the quality of UHT milk. There, the importance was given not only for milk but also for the container and environment (Anantakrishnan, 2014).

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Received: 10.02.2016; *Revised*: 25.02.2016;
Accepted: 11.03.2016.

Microorganisms occurring in UHT milk may either be survivors of the heat treatment or might have gained entry to the product subsequent to heat treatment (Lundsweden, 2006). As regards the former possibility, the ultra high temperature (UHT) treated milk is almost free from common heat resistant spoilage organism (thermoduric) due to application of very high temperature (150 °C). Coupled with aseptic packaging the microflora present in the product UHT milk comprise certain heat resistant bacterial spores belonging mainly to Thermophilic bacilli. The present study was conducted to analyze the exact survival of different bacterial spores during UHT treatment of milk was presented.

2. Materials and Method

Different samples of old pasteurized milk, fresh pasteurized milk and UHT milk were taken and studied .By proper examination and analysis. For UHT milk, the milk has to go usually all the tests pasteurization. The only difference is heating the milk upto 150 °C for two seconds in order to remove spores. The UHT milk sample were tested by using Methylene blue reduction test, Fat test and SNF test and Cut open test (Cop test) was conducted only for UHT milk, Hand book of food analysis (Mahanta, 1993).

3. Result and Discussion

The UHT milk has maximum lethal effect on microorganism. The orgaholeptic and nutritional values of milk are only mildly affected. The UHT milk has better consumer acceptability colour, flavor are almost equal to raw milk. UHT milk can be kept for several weeks without refrigeration. This is advantage to developing countries. The ingredients of milk are as follows: Fat - 1.5 %, SNF – 9 %, Vitamin A – 2500 IU, Protein – 35 g, Carbohydrates - 4.8 g, Calcium – 125 mg and Energy – 56 cal. The survival of spore in UHT treatment at 130^0c /one sec was given in Table – 1. The efficacy heat processing is tested using colony counts, spore and sterility tests. For UHT milk plate count at 30 °C was less than 10^2/ml. For UHT milk, spore count/ml for *Bacillus cereus* was 8 and *Bacillus coagulans* was only 3. For pasteurized milk plate count at 30 °C was 3 × 10^6/ml. The following table brings out effectively the superior quality of UHT milk over different kinds of milk. Hence, from the Table - 2, it was clear UHT milk was superior to other kinds of milk. In fact, it is a boon to modern society.

The microbial failure of UHT products was usually due to post heat contamination rather than to the survival of very heat resistant microorganisms (Alfa Laval, 2008). Most UHT failures can be attributed to packing problems. Moreover, if suitable precautions are not taken before insoluble protein particles can occur in the final product (Yadar, 1994; Marth, 2005). Aseptic packaging of UHT treated milk is of at almost importance. The containers used for aseptic packaging are given microbial treatment. The packages of UHT milk are tetra pack. In Salem Aavin Dairy, UHT milk was checked at random. They will take a tetra pack and open it. It will go under lab tests. If it is defective, they will reject the whole bath. Undoubtedly, UHT milk was superior to pasteurized milk and sterilized milk. It was ideal for modern living. The present study was under taken to emphasize the market milk quality of UHT milk Manufactured by Aavin milk in Salem. The testing was carried out by collecting nine different samples of raw milk, pasteurized milk, UHT milk and comparing them. The efficacy of heat processing was tested using colony counts. Spore count and sterility tests. The flavor of UHT milk was similar to pasteurized, homogenized milk. Number of bacteria colonies per square centimeter in UHT milk was zero. The spore count per ml before UHT with regard to species *Bacillus cereus* was 8,70,000 and after UHT, it was only eight. Microorganisms occurring in UHT milk may either be survivors of heat treatment or might have gained entry to the product subsequent to heat treatment. With regard to UHT milk packing was very important. Spoilage of UHT milk was more frequently due to filling and sealing faults in packaging due to resistant surviving spores.

Table – 1: Microbiological analysis of UHT milk

Species	Spore count/ml	
	Before UHT	**After UHT**
Bacillus cereus	8,70,000	8
Bacillus coagulans	5,47,000	3

Table – 2: Characteristics of Pasteurized, Sterilized and UTH milk

Characters	**Pasteurized milk**	**Sterilized milk**	**UHT milk**
Pathogens	Eliminate psychropils	Destroy microbes and spores	Spoilage microbes & destroy it
Nutrition value	Retain Nutritive quality	Severe heat damage Nutrients	Minimum heat Damage to nutrients.
Flavour	Fresh flavor	Characteristics flavor	Minimal cooked flavor
Shelf life	Two weeks	Three months	Eight months

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