

Analysis of Milk and Milk Products Quality from Local Market in Thailand

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Abstract: *This research aimed to present some aspects regarding milk and milk products quality. The physico-chemical and microbiological properties of raw milk and milk products from local market, Thailand were studied. Four groups of milk products including UHT milk, pasteurized milk, sterilized milk and raw milk were the subjects of this research. Chemical analysis showed that all milk products contain lactose, reducing sugar, small amount of sodium chloride and phosphate. The average protein contents were 0.8818, 1.1746, 0.8851, 1.1893 mg/ml for UHT milk, pasteurized milk, sterilized milk and raw milk, respectively. For the microbiological analysis with Standard Plate Count and Biochemical Tests, the results showed that *Aeromonas veronii*, *A. hydrophila*, *A. salmonicida*, *Yersinia enterocolitica*, *Staphylococcus epidermidis*, *Shigella sonnei*, *Micrococcus luteus*, *Klebsiella oxytoca*, *Vibrio fischeri* were founded in raw cow milk and *M. varians*, *V. orientalis*, *V. splendidus*, *L. casei*, *Edwardsiella tarda*, *A. salmonicida*, *Citrobacter diversus*, *C. diversus*, *Erwinia chrysanthemi* and *Salmonella choleraesuis* were founded in raw goat milk. Therefore, it is imperative to establish food safety that combines strong controls with vigorous surveillance.*

Keywords: milk and milk products, food safety, bacterial contamination.

I. BACKGROUND/ OBJECTIVES AND GOALS

Milk is a white liquid produced by mammary glands of the mammal such as human, cow, goat, yak, which is a primary source of nutrition for infant mammals (Pehrsson et al., 2000).

World Health Organization (WHO) recommended the breastfeeding up to 6 months of age, with continued breastfeeding along with appropriate complementary foods up to two years of age or beyond (WHO, 2002). Some mothers who cannot produce enough milk for their children may feed goat milk to their babies instead (Basnet et al., 2010).

Milk also is a good food, not only for children but also for adolescences and adults. Milk can be process to be dairy products such as cream, yogurt, ice cream and cheese. In the dairy industry, can be extracted for casein, whey protein or lactose and can produce condensed milk and powdered milk which can be used in food industry.

Milk products which are usually found in Thailand market can be divided into 7 groups, fresh milk, semi-skimmed milk, skimmed milk, filled milk, flavored milk, fermented milk and condensed milk. Milk is the excellent medium for microbial growth because it contains high protein and carbohydrate. For food safety of consumers and for the longer shelf-life, the heating process to kill harmful pathogenic bacteria is necessary. There are 3 type of milk, divided depend on the process that kills microbes in milk, which are pasteurized milk, sterilized milk and Ultra High Temperature (UHT) milk. Pasteurized milk use temperature at least 60 °C for 30 minutes or heated to 73 °C for 16 seconds, then cool down at 5 °C immediately. Pasteurization is designed to eliminate pathogenic organisms that may be present in raw milk. This process can kill only pathogenic organisms but not kill the other non-pathogenic organisms which milk can be damaged. For this reason, this type of milk products has a

Manuscript received: 19 January 2019

Manuscript received in revised form: 13 February 2019

Manuscript accepted: 03 March 2019

Manuscript Available online: 10 March 2019

short shelf-life and always keeps in cool place. Sterilized milk uses the temperature not less than 100 °C and usually keeps the product in a can which provides the longer shelf-life than pasteurized milk, but the color and odor of sterilized milk is usually difference from the other process because of using the high temperature. Ultra High Temperature (UHT) uses the temperature at least 133 °C for at least 1 second, after that homogenized through a nozzle under pressure, and then packed in a pre-sterilized airtight container. This type of milk can keep the characteristic of the fresh milk with the long shelf-life storage in the room temperature (Dairy Farming Promotion Organization of Thailand, 2012).

This research were studied on physic-chemical and microbiological properties of milk products commercially available from local markets in Thailand including UHT milk, pasteurized milk, sterilized milk and raw milk. The nutrition and microbial contents in those milk and milk products were observed and compared to food safety for consumers.

II. METHODS

Nine samples of UHT cow milk, 7 samples of pasteurized cow milk, 4 samples of pasteurized semi-skimmed cow milk, 1 sample of pasteurized goat milk, 1 sample of sterilized cow milk, 1 sample of sterilized semi-skimmed cow milk were obtained from local market around Nonthaburi Province, Thailand. One sample of raw goat milk and one sample of raw cow milk from Ratchaburi Province, Thailand.

The chemical analysis, including protein content analysis by Biuret test, lactose analysis by Molisch’s test, reducing sugar analysis by Fehling’s test and Ammonical silver nitrate reduction method and determination of total solids content in milk and milk products by the qualitative analysis of sodium chloride and phosphate. The microbiological analysis of raw milk samples were evaluated by using Standard Plate Count Method.

III. RESULTS

Protein (casein) contents of all samples were showed in Table 1.

Table 1: Protein content in milk samples.

Product	Protein content (mg/ml)
UHT	
AFJ	56.222
AOJ	68.444
ACJ	71.407
AJJ	43.629
AEJ	46.222
ANJ	40.666
ATJ	41.037
AAJ	36.967
AGL	38.077
Pasteurized milk	
CFJ	46.222
CCJ	49.987
CDJ	46.962
CMJ	28.998
CSJ	56.962
Pasteurized semi-skimmed	
DFW	105.851
DCW	62.517
DDW	33.259
DMW	119.185
Sterilized milk	
EBJ	42.888
EBW	55.851
Raw milk	
Cow milk	66.592
Goat milk	65.111

All samples showed the positive results for lactose and reducing sugar test, and also show the small amount of sodium chloride and phosphate. Both raw cow milk and raw goat milk contain more amount of phosphate

precipitate than the process milk.

Microbial analysis of raw milk was used for evaluate milk quality, which microbial content of fine quality is <200,000 CFU/ml, good quality is 200,000-400,000 CFU/ml, and standard quality is 400,000-600,000 CFU/ml. Results showed that raw cow milk contained 360,000 CFU/ml (fine) and raw goat milk contained 420,000 CFU/ml (standard). There were founded microorganisms in raw cow milk such as *Aeromonas veronii*, *A. hydrophila*, *A. salmonicida*, *Yersinia enterocolitica*, *Staphylococcus epidermidis*, *Shigella sonnei*, *Micrococcus luteus*, *Klebsiella oxytoca*, *Vibrio fischeri* and those found in raw goat milk were *M. varians*, *V. orientalis*, *V. splendidus*, *L. casei*, *Edwardsiella tarda*, *A. salmonicida*, *Citrobacter diversus*, *C. diversus*, *Erwinia chrysanthemi* and *Salmonella choleraesuis*.

IV. DISCUSSION AND CONCLUSION

The average protein contents of UHT, pasteurized, sterilized, and raw milk were 48.790, 61.104, 49.369 and 65.851 mg/ml, respectively. The content of casein in UHT and in the sterilized milk were less than in the pasteurized milk because the high temperature in process causes the protein denatured in the products, so the highest content of protein content showed in the raw milks. The pasteurized semi-skimmed milk was contained more protein amount than normal pasteurized milk.

ACKNOWLEDGMENTS AND LEGAL

RESPONSIBILITY

This work was supported by grants from the King Mongkut's University of Technology North Bangkok Fund KMUTNB-GEN -58-34. The author cordially thanks Thai traditional medicine development center, Ministry of Public Health, Thailand and Faculty of Applied Science for the instrument support. Finally I would like to thank Mr. Teiansin Rerngkleang and Mr. Atapol Jansangeam and Dr. Jutamas Sangsai who helped to complete the research.

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