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Short Communication

MICROBIAL LOAD IN LOCAL AND IMPORTED RAW MILK

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ABSTRACT: There was a complaint on supplying low quality milk to residents of Samdrup Jongkhar. This study was carried out in winter to evaluate and compare the milk quality from two main sources. The emphasis was given more on assessing the microbial load in raw milk for both local and imported milk. Samples from individual cans (N=35) and bulk tank (N=7) were collected for imported and local milk. A volume of 50 ml milk sample was collected aseptically in a 50 ml vial. The sample was transported to laboratory at 2- 8ºC, packed in cool box with ice packs. The microbial load in milk was estimated using Pour Plate Technique at 30±2ºC at 72 hours. The microbial load was calculated in cfu ml^{-1}. All microbial counts were converted to the base 10 logarithm of the number of colony forming units per ml of milk samples (log cfu ml^{-1}). T-test was conducted to compare the microbial loads between imported and local milk. The microbial load was significantly higher in imported milk (M=8.54±0.06) when compared with local milk (M=8.39±0.03). The mean values of microbial load for imported (N=35) and local milk (N=35) were 8.54 $\log_{10}$ cfu ml^{-1} and 8.39 $\log_{10}$ cfu ml^{-1}, respectively. The mean microbial load for both imported and local milk exceeded the EU and US standard. The mean microbial load for bulk tank samples was higher, compared with individual can samples from both sources. Timely monitoring of milk at producer's level, milkman and sales counter are necessary to minimize contamination of milk.

Keywords: Dairy; hygiene; microbial load; milk quality; raw milk.

1. INTRODUCTION

Milk is the best and cheapest source of nutrition. It is one of the daily diets, easily accepted and used by all age groups in the mankind (Ayub et al. 2007). In Bhutan, milk is an important food commodity for household consumption. Milk is consumed as fresh milk and in the form of butter, cheese, yogurt and whey. However, the safety of milk is important for consumers. Milk and milk products can harbor a variety of microorganisms and can be important sources of food borne pathogens. Hygienic quality of milk is of great importance since bacterial growth in milk can be a health hazard to consumers (Millogo 2010). Lack of hygiene, adulteration with various agents and improper cold chain facilities are primary contributors to low milk quality (Zia et al. 2011).

Recently, there has been dissatisfaction among consumers of milk in the district of Samdrupjongkha. The residents of Samdrup Jongkhar purchase milk from two sources and they complained of low milk quality and adulteration. Despite complaints, no study was carried out to investigate and establish if complaints are true. Therefore, this study was undertaken with the objective to evaluate the milk quality in terms of microbial load in raw milk.

2. MATERIALS AND METHOD

The study was conducted in Samdrup Jongkhar district, which is located at an altitude of 200 masl and temperature ranges from 14° to 36 °C. Milk samples from local and imported milk were collected. Five samples from individual cans and one sample from bulk tank were collected for seven rounds. The samples were collected once in a week. The amount of each sample was about 50 ml. Samples were packed and transported at 2-8°C within 24 hours for laboratory examination.

The laboratory examination of microbial load in milk was carried out following Pour Plate Technique at 32°C for 72 hours, as prescribed in the standard laboratory procedures (SOPs) (National Centre for Animal Health 2013). The microbial load was calculated in cfu ml^{-1}. All microbial counts were converted to the base 10 logarithm of the number of colony forming units per ml of milk samples (log cfu ml^{-1}). The data were entered in Microsoft Excel. It was then processed and analyzed in SPSS vs.16.0. Two sample t-test was used to compare microbial load content between local and imported milk.

3. RESULTS AND DISCUSSION

3.1 Total plate count

The microbial load was significantly higher in imported milk when compared with local milk (Figure 1). The mean microbial load in bulk tank samples were higher when compared with samples collected from individual cans for both imported milk and local milk. The microbial load mean value for both imported and local milk exceeded the European Union (EU) and United States (US) standard (Mc Langhlin 2006). This could be because of difference in air temperature, hygienic condition, milk cans used and difference in transportation facilities. Imported milk is usually brought inside Bhutan by several milk men with or without proper transport facilities. The milk is usually packed in jerry cans, which are actually difficult for maintaining hygiene and proper sanitation. The poor hygiene and sanitation of jerry cans could be the sources of contamination and microbial growth. The high air temperature of Assam could be other possible causes of milk contamination and spoilage. Whereas, the local milk is packed in aluminum cans, transported by proper milk van. Further, the sale counter is well equipped where optimum cold chain is maintained until distribution.

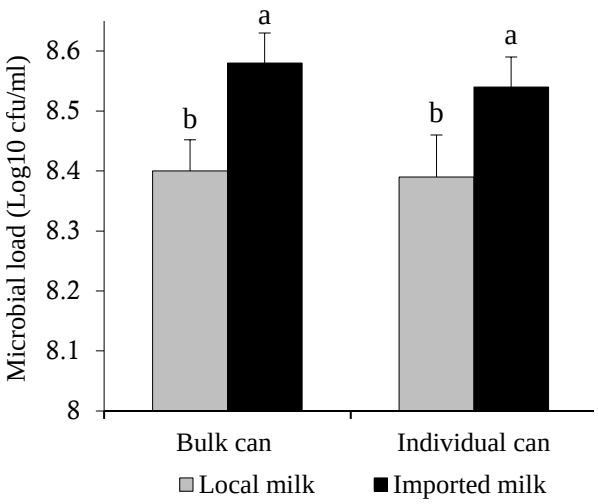

Figure 1: Microbial load of individual and bulk samples of local and imported milk

The microbial load in our study was higher than those reported for Pakistan and India (Reddy et al. 2012; Saxena and Rai 2013; Mohammed et al. 2009; Lingathurai and Vellathurai 2011; Khaliq et al. 2001). However, the microbial load was close to findings reported by Pant et al. (2013) and Hossain et al. (2011). Microbial load in milk has also been reported by several studies in Bangladesh, Nepal and Malaysia regions was lower (Dey and Karim 2013; Bhattarai and Singha 2010; Yuen et al. 2012). The microbial load has been reported to be lower in United States, European countries and African regions (Mattias Orregard 2013; Torkar and Teger 2008; Welearegy et al. 2012; Pantoja et al. 2009). The high microbial load in milk is due to inadequate sanitary conditions during milking, collections and transportation of milk (Devi and Sowmya 2012; Reddy et al. 2012; Minj and Behera 2012). The microbial load in milk is also affected by season and time (Pantoja et al. 2009; Donkor et al. 2007; Hassan et al. 2009; Muhammad et al. 2009).

4. CONCLUSION

The microbial load of both imported and local milk exceeds the EU and US standard limit. Therefore, the complaints of residents of Samdrup Jongkhar are justified. To minimize contamination, certain regulations and regular monitoring at all stages of production are essential. It is also important to fix the price of milk based on quality to encourage hygiene milk production and minimize contamination.

The current study focused only at one place. Similar investigation needs to be carried out at different places and at production and marketing stages across seasons.

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