International Food Research Journal 24(3): 985-989 (June 2017)
Journal homepage: *http://www.ifrj.upm.edu.my*

Detection of *Bacillus cereus* in formula milk and ultra high temperature (UHT) treated milk products

[1*]Lesley, M. B., [1]Ernie, S.R., [1]Kasing, A. and [2,3]Son, R.

[1]Department of Molecular Biology, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300, Kota Samarahan, Sarawak, Malaysia
[2]Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia
[3]Food Safety and Food Integrity, Institute of Tropical Agriculture and Food Security, Universiti Putra Malaysia 34300 Serdang, Selangor, Malaysia

Article history

Received: 20 May 2016
Received in revised form: 6 June 2016
Accepted: 9 June 2016

Keywords

Bacillus cereus
Infant formula
UHT milk
PCR detection

Abstract

Ultra high temperature (UHT) treated milk products and formula milk are known to be frequently contaminated with *Bacillus cereus*. Presence of *B. cereus* in these milk products is of particular concern considering the majority of consumers are infants and children. Possible sources of contamination are contaminated raw milk, cross-contamination during processing, under-processing and mishandling of milk products. This study was conducted to detect the presence of *B. cereus* in both formula milk (n=12) and UHT milk (n=20) sold in selected retail markets. The approach consisted of enumerating by MPN/g followed by PCR assay aimed at detecting *gyrB* gene in *B. cereus,* that encode for the subunit B protein of DNA gyrase (topoisomerase type II). Contamination level of *B. cereus* in both types of samples examined ranged from < 3 to > 1100 MPN/g. The contamination level of *B. cereus* was found to be highest in full cream UHT milk (> 1100 MPN/g) and formula milk (> 1100 MPN/g). The PCR analysis showed that 41.7% (5/12) formula milk and 30% (6/20) UHT milk samples were detected with *B. cereus*, respectively. This is the first report of such study demonstrating the presence of *B. cereus* in formula milk from Malaysia. Therefore, constant surveillance of these milk products would reduce the potential risk of *B. cereus*-linked outbreaks.

Introduction

B. cereus is a Gram positive, facultative anaerobe, rod-shaped bacterium, a common soil-dweller and has the capability to form endospores which allows it to survive in extreme environmental conditions (Montanhini and Bersot, 2013). Due to their resistant endospores, the pathogen can thrive in various food processing procedures such as drying and heat treatment (Rosenquist *et al.*, 2005; Tunio *et al*., 2013). *B. cereus* has been reported in various foods such as dairy products, rice, vegetables and meat (Lee *et al*., 2010; Tunio *et al*., 2013). It is responsible for two different types of gastrointestinal disorders: emetic syndrome caused by ingestion of a preformed toxin in the food, and diarrheal syndrome, caused by a different toxin that can be formed in the food but also in the small intestine (Reyes *et al.*, 2007). Fatality linked to *B. cereus* had also been reported due to the consumption of contaminated pasta (Dierick *et al*., 2005).

Based on a report by European Food Safety Authority (EFSA) in 2005, 1 to 33% of food borne poisoning was attributed to B. cereus (Sandra *et al*., 2012). An increment of 122.2% in food poisonings cases caused by *B. cereus* in Europe were reported to the EFSA in the year 2011 (Messelhäusser *et al.*, 2014). Food poisoning cases associated with milk-based products have been reported and as high as 85% of enterotoxigenic *B. cereus* have been isolated from milk and milk products (Sadek *et al*., 2006). Occurrences of *B. cereus* in milk products are especially important concern in the baby formula industry. Infants are more susceptible to food borne infections due to under-developed immune system and absence of competing microorganisms in gut microflora. Moreover, infant and toddler milk powder often contain raw ingredients from various sources that are rich in nutrients. When reconstituted and left at ambient temperatures for a long periods, these milk products will become a suitable medium for proliferation and enterotoxin production of *B. cereus* (Tunio *et al.*, 2013). Hence, frequent exposure of infants and toddlers to these milk products increases the risk of contracting food borne illness. Recall of infant feeding products has been reported upon development of gastrointestinal disorders in infants which may be caused by microbial contamination

*Corresponding author.
Email: *mblesley@unimas.my, lesleymaurice@gmail.com*