

**Imported food risk statement**  
**Cheese (production includes a heat treatment step) and *Salmonella* spp.**

**Commodity:** Cheese that has undergone a heat treatment step during production. Examples of this type of product include cheese prepared from pasteurised or thermised milk (with additional hurdles) or those subject to a high temperature curd cook.

**Microorganism:** *Salmonella* spp.

Recommendation and rationale
<p>Is <i>Salmonella</i> spp. in cheese that has undergone a heat treatment step during production a medium or high risk to public health*:</p> <p><input type="checkbox"/> Yes</p> <p><input checked="" type="checkbox"/> No</p> <p><input type="checkbox"/> Uncertain, further scientific assessment required</p> <p><b>Rationale:</b></p> <ul style="list-style-type: none"> <li>• Effective through chain controls include a heat treatment step sufficient to inactivate <i>Salmonella</i> spp.</li> <li>• There is limited evidence of salmonellosis attributed to this category of cheese, and where it has occurred it is generally related to a specific failure in process control</li> <li>• Compliance and surveillance data show a very low prevalence of <i>Salmonella</i> spp. in this category of cheese</li> </ul> <p>*Provided that effective through chain controls are in place</p>

General description
<p><b>Nature of the microorganism:</b></p> <p><i>Salmonella</i> spp. are facultative anaerobic Gram-negative, non-spore forming rod-shaped bacteria. They are found in the intestinal tract of warm and cold-blooded vertebrates and in the surrounding environment (FSANZ 2013).</p> <p>Growth of <i>Salmonella</i> spp. can occur at temperatures between 5.2 – 46.2°C, pH of 3.8 – 9.5 and a minimum water activity of 0.93 when other conditions are near optimum. <i>Salmonella</i> spp. can survive for months or even years in low moisture foods and are able to survive frozen storage at -20°C. <i>Salmonella</i> spp. are sensitive to normal cooking conditions, however, foods that are high in fat and low in moisture may have a protective effect against heat inactivation (FSANZ 2013; Li et al. 2013).</p>
<p><b>Adverse health effects:</b></p> <p><i>Salmonella</i> spp. are a serious hazard as they cause incapacitating but not usually life threatening illness of moderate duration, and sequelae are rare (ICMSF 2002). People of all ages are susceptible to salmonellosis. However, the elderly, infants and immunocompromised individuals are at a greater risk of infection and generally have more severe symptoms (FSANZ 2013).</p>

Salmonellosis symptoms include abdominal cramps, nausea, diarrhea, mild fever, vomiting, dehydration, headache and/or prostration. The onset of illness of salmonellosis is typically 24 – 48 hours after infection (range of 8 – 72 hours) and symptoms usually last for 2 – 7 days. Severe disease such as septicaemia sometimes develops, predominantly in immunocompromised individuals. The fatality rate for salmonellosis is generally less than 1% (FDA 2012; FSANZ 2013).

The particular food matrix and strain of *Salmonella* spp. influence the level of *Salmonella* spp. required for illness to occur. It has been reported that as low as one or 100 cells caused illness, however, in other cases significantly more cells were required for illness to occur (ICMSF 1996; FDA 2012).

#### **Consumption patterns:**

In the 2007 Australian National Children’s Nutrition and Physical Activity Survey, 71% of children aged 2 – 3 years and 67% of children aged 4 – 8 years reported consumption of this category of cheese (DOHA 2008). In the 2011 – 2012 Nutrition and Physical Activity Survey (part of the 2011 – 2013 Australian Health Survey), 43% of children aged 2 – 3 years, 39% of children aged 4 – 8 years and 31% of adults (aged 19 years and above) reported consumption of this category of cheese (ABS 2014). For both the 2007 and the 2011 – 2012 survey, mixed foods that contained cheese were excluded from the analysis. The 2007 survey derived data from two days of dietary recall data for each respondent (a respondent is counted as a consumer if the food was consumed on either day one or day two, or both days), compared with only one day of dietary recall data for the 2011 – 2012 survey. Using two days of data will result in a higher proportion of consumers compared to a single day only, meaning the results are not directly comparable.

#### **Key risk factors:**

*Salmonella* spp. can be a contaminant of milk sourced from infected herds. Through chain controls, including effective heat treatment during cheese production, will negate this risk.

A key risk factor for *Salmonella* spp. contamination in the finished product is inadequate heat treatment during processing or cross-contamination with raw milk during processing.

Post processing contamination can occur, although a number of processing factors and/or product characteristics influence the potential for growth of *Salmonella* spp. in cheese including pH, salt concentration, water activity and maturation/ripening conditions (FSANZ 2006).

#### **Risk mitigation:**

Pasteurisation of milk, or equivalent measures during production as specified under clause 16 of [Standard 4.2.4 in the Australia New Zealand Food Standards Code](#) (the Code), will inactivate *Salmonella* spp. Good hygienic practices in food manufacturing and food handling will minimise *Salmonella* spp. contamination of cheese.

In Australia [Standard 4.2.4 of the Code](#) sets out a number of food safety requirements for primary production and processing of dairy products, including the implementation of documented food safety programs for dairy primary production, collection, transportation and processing.

[Standard 1.6.1 of the Code](#) has a microbiological limit for soft and semi-soft cheese (moisture content >39%) with pH >5.0 for *Salmonella* spp. of n=5, c=0, m=not detected in 25g.

#### **Compliance history:**

The imported food compliance data sourced from the Imported Food Inspection Scheme of the Australian Department of Agriculture for January 2007 – January 2014 showed that of the 1880 *Salmonella* spp. tests applied to this category of cheese there were no fails.

There have been eight notifications on the European Commission’s Rapid Alert System for Food and Feed (RASFF) for *Salmonella* spp. in various types of cheese including brie, camembert and mozzarella from January 2007 – January 2014 (it was not stated if the production included heat treatment). Products were from multiple countries.

There were three food recalls in Australia for this category of cheese due to the presence of *Salmonella* spp. from January 2007 – January 2014. These recalls were all for domestically produced product and included Cheddar, Mozzarella and Ricotta cheese.

#### **Surveillance information:**

Salmonellosis is one of the most commonly reported enteric illnesses worldwide, and the second most frequently reported cause of enteric illness in Australia. It is a notifiable disease in all Australian states and territories with a notification rate in 2013 of 55.3 cases per 100,000 population (12,790 cases). This is an increase from the previous five year mean of 48.2 cases per 100,000 population per year (ranging from 38.6 – 55.0 cases per 100,000 population per year) (FSANZ 2013; NNDSS 2014).

#### **Illness associated with consumption of cheese (production includes a heat treatment step) contaminated with *Salmonella* spp.**

A search of the scientific literature via the EBSCO Discovery Service and the US CDC Foodborne Outbreak Online Database and other published literature during the period 1990 – September 2014, identified there are a number of reported salmonellosis outbreaks associated with consumption of this category of cheese, generally due to either inadequate heating of product during production or post-processing contamination. Examples are listed below:

- There were six salmonellosis outbreaks linked to consumption of pasteurised cheese on the US Foodborne Disease Outbreak Surveillance System during 1998 – 2011 (Gould et al. 2014)
- Outbreak in Canada in 1998, nearly 700 cases of illness linked to consumption of pasteurised Cheddar cheese. The outbreak *S. Enteritidis* strain was isolated from cheese samples (PHAC 1999; FSANZ 2006)

#### **Prevalence of *Salmonella* spp. in cheese (production includes a heat treatment step)**

A literature search with the EBSCO Discovery Service during the period 1990 – September 2014 and other published literature identified that data on the prevalence of *Salmonella* spp. in this category of cheese is limited.

- Survey in the United Kingdom in 2004 – 2005, where *Salmonella* spp. were not detected in unripened soft (fresh) cheese (n=412), ripened soft cheese (n=1622) or semi-hard cheese (n=584), samples were made from pasteurised milk and collected at retail (Little et al. 2008)
- Survey in Brazil, where *Salmonella* spp. were not detected in pasteurised Minas Frescal cheese samples at retail (n=32) (Carvalho et al. 2007)
- Surveys in Australia in 2003 – 2004, where *Salmonella* spp. were not detected in pasteurised cheese samples collected by the industry and submitted to Dairy Australia (n=837) (FSANZ 2006)

#### **Other relevant standards or guidelines**

- Codex general principles of food hygiene *CAC/RCP 1 – 1969* provides key hygiene controls from primary production through to final consumption (Codex 2003)
- Codex code of hygienic practice for milk and milk products *CAC/RCP 57-2004* covers additional hygienic provisions for the production, processing and handling of milk and milk products (Codex 2004)
- There are *E. coli* limits in [Standard 1.6.1 of the Code](#) for all cheeses. Generic *E. coli* is used as an indicator of process hygiene (ICMSF 2011)

#### **Approach by overseas countries**

Many countries, such as the European Union, the United States and Canada, have HACCP-based measures in place for production of this commodity.

### Other considerations

Quarantine restrictions apply to products under this commodity classification. Refer to the [ICON database](#).

**This risk statement was compiled by FSANZ in:** July 2015

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