Imported food risk statement
Cheese (production includes a heat treatment step) and *Mycobacterium bovis*

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: *Mycobacterium bovis*

Recommendation and rationale
Is *Mycobacterium bovis* in cheese that has undergone a heat treatment step during production a medium or high risk to public health*: ☐ *Yes* ☑ *No* ☐ *Uncertain, further scientific assessment required* **Rationale:** • Effective through chain controls include a heat treatment step sufficient to inactivate *M. bovis* • Lack of evidence identified in the scientific literature for this category of cheese being contaminated with *M. bovis* or causing illness in humans *Provided that effective through chain controls are in place

General description
Nature of the microorganism: *M. bovis* is an aerobic, Gram-positive, non-spore forming, rod-shaped bacteria. It is widely distributed in the environment and is found in soil and water. As the causative agent of bovine tuberculosis, *M. bovis* causes systemic infections in cattle and other animals, where it initially infects the gastrointestinal tract before spreading to other parts of the body. *M. bovis* can be shed directly from infected mammary glands into milk and subsequently transmitted to humans via consumption of contaminated raw milk products (FSANZ 2006). *M. bovis* is a very slow growing microaerophilic organism. Growth can occur between 25°C and 45°C, with an optimum growth rate at 37°C. *M. bovis* survives better under cool conditions (i.e. during winter) and survives dry conditions well. Pasteurisation of milk at 72°C for 15 seconds (or equivalent) is lethal to *M. bovis* (Lake et al. 2002; FSANZ 2006; Rowe and Donaghy 2008).
Adverse health effects: *M. bovis* is a severe hazard as it causes illness of long duration and can be life-threatening (ICMSF 2002). Children and immunocompromised individuals are more susceptible to *M. bovis* tuberculosis, and immunocompromised individuals are more susceptible to re-activation of an infection acquired in the past (Lake et al. 2002; Gallivan et al. 2015). Symptoms associated with *M. bovis* tuberculosis include fever, chills, weight loss, abdominal pain, diarrhoea or constipation. Symptoms of further infection depend on the organs infected. The onset of illness of

tuberculosis can be years after infection and even in immunocompromised individuals the incubation period can be several months. Symptoms may last for months or years. In a small proportion of people the infection can prove fatal (Lake et al. 2002; FSANZ 2006; Rowe and Donaghy 2008).

Large quantities of *M. bovis* (10^4 – 10^6 cells or more) appear to be required to cause illness via the oral route (FSANZ 2006).

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:

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

Post processing contamination can occur, although a number of processing factors and/or product characteristics influence the potential for growth of *M. bovis* 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 *M. bovis*. Good hygienic practices in food manufacturing and food handling will minimise *M. bovis* 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.

Compliance history:

Imported cheese of this category is not currently required to be tested for *M. bovis* and therefore no compliance data is available from the Imported Food Inspection Scheme of the Australian Department of Agriculture.

There have been no notifications on the European Commission's Rapid Alert System for Food and Feed (RASFF) for *M. bovis* in this category of cheese from January 2007 – January 2014.

There have been no food recalls in Australia due to the presence of *M. bovis* in imported or domestic cheese of this category from January 2007 – January 2014.

Surveillance information:

Australia was declared free from bovine tuberculosis in 1997, following an extensive eradication program (FSANZ 2006).

Tuberculosis is a notifiable disease in all Australian states and territories, with a reported incidence rate in 2013 of 5.5 cases per 100,000 population (1,262 cases) with most cases occurring in individuals born overseas. This is a slight reduction from the previous five year mean of 6.0 cases per 100,000 population per year (ranging from 5.7 – 6.2 cases per 100,000 population per year.) The proportion of these cases that were

caused by *M. bovis* (non-vaccine strain) is very low, 0.2% of cases (2 cases) in 2010 (Health 2010; Australian Mycobacterium Reference Laboratory Network 2013; NNDSS 2014).

Illness associated with consumption of cheese (production includes a heat treatment step) contaminated with *M. bovis*

A search of the scientific literature via the EBSCO Discovery Service and the US CDC Foodborne Outbreak Online Database and during the period 1990 – September 2014 failed to identify any outbreaks of *M. bovis* associated with consumption of this category of cheese.

Data on the prevalence of *M. bovis* in cheese (production includes a heat treatment step)

A search of the scientific literature via the EBSCO Discovery during the period 1990 – September 2014 did not find any data on the prevalence of *M. bovis* in this category of cheese. There was one survey, described by Harris et al. (2007), however it was uncertain whether the production of these cheeses included a heat treatment step.

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)

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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