

Imported food risk statement
Raw milk cheese and *Salmonella* spp.

Commodity: Cheese that has not undergone a heat treatment step (such as pasteurisation, thermisation with additional hurdles or high temperature curd cook during production). A raw milk cheese must not support the growth of pathogenic microorganisms and have no net increase in pathogen levels during the manufacture of the cheese.

Microorganism: *Salmonella* spp.

Recommendation and rationale
<p>Is <i>Salmonella</i> spp. in raw milk cheese that does not support the growth of pathogenic microorganisms a medium or high risk to public health:</p> <p><input checked="" type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Uncertain, further scientific assessment required</p> <p>Rationale:</p> <ul style="list-style-type: none"> • Human illness has been associated with raw milk cheese contaminated with <i>Salmonella</i> spp. and salmonellosis can lead to incapacitating illness • <i>Salmonella</i> spp. are zoonotic pathogens and are associated with farming animals from which milk is used to produce raw milk cheese • The production of raw milk cheese lacks a process that would reliably inactivate <i>Salmonella</i> spp. • International surveillance data have shown detections of <i>Salmonella</i> spp. in raw milk cheese

General description
<p>Nature of the microorganism:</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>Adverse health effects:</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> <p>Salmonellosis symptoms include abdominal cramps, nausea, diarrhea, mild fever, vomiting, dehydration,</p>

headache and/or prostration. The onset 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:

Raw milk cheese was not identified as being consumed by respondents in the 2007 Australian National Children’s Nutrition and Physical Activity Survey (2-16 years) (DOHA 2008). Similarly, the 2011 – 2012 Nutrition and Physical Activity Survey (part of the 2011 – 2013 Australian Health Survey) did not identify any consumers of Roquefort or raw milk cheese specifically (ABS 2014). This indicates the small proportion of consumers of raw milk cheese in the population.

Data sourced from the Australian Bureau of Statistics for 2008 – 2014, indicates Australia imports about 25.5 tonnes of Roquefort cheese (semi-hard raw milk cheese) annually.

Key risk factors:

Salmonella spp. can be a contaminant of milk sourced from infected herds. As raw milk cheese production does not include a process that reliably inactivates pathogens, the microbiological quality of raw milk is critical. Other risk factors include temperature control of the raw milk, acidification process, curd cooking, maturation/ripening, salt concentration, water activity, pH and nitrate (FSANZ 2009).

Risk mitigation:

Control of *Salmonella* spp. is achieved through on farm and processing measures.

The food safety control system(s) should verify:

For primary production:

- Animal health measures are in place that ensure milk is only sourced from healthy animals which can be individually identified
- Milking hygiene controls are in place to minimise contamination during milking, cooling, storage and transport
- Time and temperature controls are in place during milk handling, storage and transport

For processing:

- The origin of the raw milk for processing can be ensured including verification that primary production controls are met
- The combination of control measures should effectively control any *Salmonella* present. These measures should address the following processing factors:
 - Starter culture activity and pH reduction
 - Salt concentration and moisture content
 - Storage time and temperature

In Australia [Standard 4.2.4 of the Australia New Zealand Food Standards Code](#) (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. Clause 16 of [Standard 4.2.4](#) includes the requirements for processing of dairy products to make cheese and cheese products.

Division 5 of [Standard 4.2.4](#) includes additional requirements for raw milk cheese. Specifically, clause 34 of [Standard 4.2.4](#) states the requirements to control specific food safety hazards:

- (1) Prior to the commencement of its processing, milk for raw milk cheese must be monitored to ensure its suitability.
- (2) The level of pathogenic microorganisms in a raw milk cheese must not exceed the level of pathogenic microorganisms in the milk from which the product was made as at the commencement of the processing of that milk.
- (3) A raw milk cheese must not support the growth of pathogenic microorganisms.

Additional information can be found in the FSANZ supporting documents for Proposal P1022 – Primary production and processing requirements for raw milk cheese. [Supporting document 1 – Guide to the requirements for raw milk cheese in Standard 4.2.4 – Primary production and processing standard for dairy products \(at Approval\)](#) includes additional explanation and information to support the implementation of requirements for raw milk cheese in Standard 4.2.4. [Supporting document 2 – Guide to the validation of raw milk cheese \(at Approval\)](#) was prepared to assist processors and enforcement agencies with the validation of processing control measures for raw milk cheese. [Supporting document 3 – Scientific information for the assessment of raw milk products – Cheeses \(at Approval\)](#) highlights the scientific information which may be used to develop the evidence to support the production of a raw milk cheese to achieve the food safety outcomes: (i) the intrinsic physico-chemical characteristics of the raw milk product do not support growth and (ii) controls during processing that result in no net increase in hazard levels during manufacture. Supporting document 3 covers:

- physico-chemical characteristics of retail cheeses
- the utility of predictive equations to determine the likelihood of pathogen growth
- milk and cheese challenge studies to determine the behaviour of pathogens during production and maturation
- information required to demonstrate no net increase in pathogen levels.

[Standard 1.6.1 of the Code](#) has a microbiological limit for all raw milk cheese (cheese made from milk not pasteurized or thermised) 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 76 *Salmonella* spp. tests applied to raw milk cheese there were no fails.

There have been five notifications on the European Commission’s Rapid Alert System for Food and Feed (RASFF) for *Salmonella* spp. in various types of raw milk cheese including cow milk cheese, goat milk cheese and sheep milk cheese during the period from January 2007 – January 2014. Products were from France and Germany. However from the description provided in RASFF, it could not be determined if these products would not support the growth of pathogens. Notifications for raw milk cheese that would support the growth of pathogens, such as soft cheese, have been excluded.

There have been no food recalls in Australia due to the presence of *Salmonella* spp. in raw milk cheese from January 2007 – January 2014.

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 raw milk cheese contaminated with *Salmonella* spp.

A search of the scientific literature via the EBSCO Discovery Service and the US CDC Foodborne Outbreak Online Database during the period 1990 – September 2014, identified there are a number of reported salmonellosis outbreaks associated with consumption of this category of cheese. Examples are listed below:

- Outbreak in France in 2008, 25 cases of illness linked to consumption of raw milk goat cheese. The outbreak *Salmonella* Muenster strain was isolated from the cheese collected from the producer. However, from the description provided in the scientific literature it could not be determined if the product would not support the growth of pathogens (van Cauteren et al. 2009)
- Outbreak in the United States in 2006 – 2007, 85 cases of illness linked to consumption of raw milk Cotija cheese (semi-hard Mexican-style aged cheese). The outbreak *Salmonella* Newport strain was isolated from the cheese at retail and raw milk from a local dairy farm (CDC 2008)
- Outbreak in the Netherlands in 2006, 224 cases of illness linked to consumption of raw milk hard farmhouse cheese. The outbreak *Salmonella* Typhimurium phage type DT7 strain was isolated from the dairy cattle, cheese production room and latter from cheeses from a dairy farm (Van Duynhoven et al. 2009)

Prevalence of *Salmonella* spp. in raw milk cheese

A literature search with the EBSCO Discovery Service and other published literature during the period 1990 – September 2014 identified that surveys of this category of cheese have detected *Salmonella* spp. in 0 – 6% of samples (Tekinsen and Ozdemir 2006; FSANZ 2009; Brooks et al. 2012). Examples of surveys are listed below:

- Survey in the United States, *Salmonella* spp. were not detected in semi-hard and hard raw milk cheese samples (n=29) at retail (Brooks et al. 2012)
- Survey in Turkey in 2004 – 2005, where *Salmonella* spp. were detected in 2.4% of Tulum cheese samples (semi-hard raw milk cheese) (n=250) at retail (Colak et al. 2007; FSANZ 2009)
- Survey in Turkey, where *Salmonella* spp. were detected in 6% of unripened Van otlu cheese samples (semi-hard raw milk cheese) (n=50) at retail (Tekinsen and Ozdemir 2006; FSANZ 2009)

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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