

**Imported food risk statement**  
**Raw milk cheese and *Brucella* 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:** *Brucella* spp.

| Recommendation and rationale  |
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| <p>Is <i>Brucella</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><b>Rationale:</b></p> <ul style="list-style-type: none"> <li>• <i>Brucella</i> spp. are zoonotic pathogens that are associated with farming animals from which milk is used to produce raw milk cheese, and can cause incapacitating illness</li> <li>• The production of raw milk cheese lacks a process that would reliably inactivate <i>Brucella</i> spp.</li> <li>• Human illness has been associated with raw milk cheese contaminated with <i>Brucella</i> spp. and international surveillance data have shown detections of <i>Brucella</i> spp. in raw milk cheese</li> </ul> |

| General description   |
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| <p><b>Nature of the microorganism:</b></p> <p><i>Brucella</i> spp. are aerobic, Gram-negative, non-sporeforming short spherical to rod-shaped bacteria. <i>Brucella</i> spp. are pathogenic for a wide range of animals, with four species of <i>Brucella</i> also known to be pathogenic for humans (FSANZ 2006; Perkins et al. 2010). They can colonise virtually all organs and tissues of an infected individual and can persist intracellularly for years and may cause recurrent infections. <i>Brucella</i> spp. can be transmitted zoonotically via the consumption of raw products from an infected animal or through contact with infected animals at the farm and during slaughter (ICMSF 1996; FDA 2012).</p> <p><i>Brucella</i> spp. can grow at temperatures between 6 – 42°C, pH of 4.5 – 8.8 and up to a maximum NaCl content of 4% when other conditions are near optimum. Pasteurisation of milk at 72°C for 15 seconds (or equivalent) is sufficient to inactivate <i>Brucella</i> spp. Also, <i>Brucella</i> spp. are able to survive frozen storage. Foods that are high in fat may have a protective effect, with <i>Brucella</i> spp. able to survive for longer periods of time in these products (ICMSF 1996; FSANZ 2006).</p> |
| <p><b>Adverse health effects:</b></p> <p><i>Brucella</i> spp. are considered a serious hazard as they cause incapacitating but not usually life threatening illness of moderate duration and sequelae are rare, although if diagnosis of brucellosis is delayed, it can lead to chronic disease. People of all ages are susceptible to brucellosis. However, the elderly, infants and</p>   |

immunocompromised individuals are at a greater risk of infection and developing more severe symptoms (ICMSF 2002; FSANZ 2006; FDA 2012).

Initial symptoms of brucellosis include undulant fever, chills, sweating, weakness, malaise, headache and joint and muscle pain. In some cases additional symptoms develop such as shortness of breath, irregular heartbeat, edema, chest pain, severe headaches, stiff neck, confusion, seizures or back pain. The onset of illness is usually within 3 weeks; however a longer incubation period can occur. The symptoms of brucellosis usually only last for a few weeks when antibacterial therapy is used, however, symptoms may reappear and last for months or even years. The fatality rate for brucellosis is generally less than 2% (FDA 2012).

It has been estimated that fewer than 500 cells of *Brucella* spp. can cause illness. Humans appear to be more susceptible to *B. melitensis* than to other *Brucella* spp. that infect humans (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:**

*Brucella* 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:**

The primary control for *Brucella* spp. is that milk used for raw milk cheese processing is only sourced from animals belonging to herds that are officially free of brucellosis in accordance with the OIE *Terrestrial Animal Health Code*.

The food safety control system in place should ensure the origin of raw milk for processing.

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.

#### **Compliance history:**

Imported raw milk cheese is not currently required to be tested for *Brucella* spp., and therefore no compliance data is available from the Imported Food Inspection Scheme of the Australian Department of Agriculture.

There has been one notification on the European Commission's Rapid Alert System for Food and Feed (RASFF) for *Brucella* spp. in raw cow milk cheese from France from January 2007 – January 2014, however from the description provided in RASFF, it could not be determined if this product would not support the growth of pathogens.

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

#### **Surveillance information:**

Australia is free from bovine brucellosis (FSANZ 2006).

Brucellosis is a notifiable disease in all Australian states and territories, with a reported incidence rate in 2013 of 0.1 cases per 100,000 population (14 cases). This is the same as the previous five year mean of 0.1 cases per 100,000 population per year (ranging from 0.1 – 0.2 cases per 100,000 population per year) (NNDSS 2014). All cases of *B. melitensis* or *B. abortus* in Australia are related to overseas travel. *B. suis* infection is confined to some areas of Queensland, where it occurs in feral pigs (NNDSS 2013).

#### **Illness associated with consumption of raw milk cheese contaminated with *Brucella* spp.**

A search of the scientific literature via the EBSCO Discovery Service, the US CDC Foodborne Outbreak Online Database and other published literature during the period 1990 – September 2014, identified a number of reported *Brucella* spp. outbreaks associated with consumption of raw milk cheese. Outbreaks associated with raw milk cheese that support growth of pathogens have occurred, such as the outbreak described by Roman (2013), although this product would not meet clause 34 of [Standard 4.2.4 of the Code](#). Other examples of outbreaks are listed below, however from the descriptions provided in the scientific literature it could not be determined if the products would not support the growth of pathogens:

- Outbreak in the United States in 2006, 5 cases of illness linked to consumption of raw Chevre (goat milk cheese) (CDC 2014)
- Outbreak in Spain in 2002, 11 cases of illness linked to consumption of raw goat milk cheese. The goats in the herd that provided the raw goat milk were found to be positive for *B. melitensis*. (FSANZ 2009; Mendez Maratinez et al. 2014)

A matched case-control study in Lebanon that examined risk factors associated with brucellosis infection during an outbreak in the summer of 2009 found that consumption of raw milk cheese was a significant risk factor for contracting brucellosis. However, from the description provided in the scientific literature it could not be determined if the raw milk cheese would not support the growth of pathogens (Al-Shaar et al. 2014).

### Data on the prevalence of *Brucella* 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 data on the prevalence of *Brucella* spp. in raw milk cheese is limited.

*Brucella* spp. have been detected in raw milk cheese that support growth of pathogens, such as the survey described by Acedo (1997), although these products would not meet clause 34 of [Standard 4.2.4 of the Code](#). Other surveys are listed below, however from the descriptions provided in the scientific literature it could not be determined if the products would not support the growth of pathogens:

- Survey in Turkey, where *Brucella* spp. were detected in 14.2% of raw sheep milk cheese samples (n=35). *Brucella* spp. were not detected in raw cow milk cheese (n=35) (Kasimoglu 2002; FSANZ 2009)
- Survey in Italy, where *Brucella* spp. were detected in 46% of raw milk cheese made from sheep and/or goat milk (n=46) (Tantillo et al. 2001; 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)

### 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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