

**Imported food risk statement**  
**Uncooked ready-to-eat sausages and *Salmonella* spp.**

**Commodity:** Uncooked ready-to-eat (RTE) sausages. Examples of this type of product include salami, cacciatore, chorizo, dried sausages and semi-dried sausages. Spreadable sausages and sausages in ambient stable sealed packages are not covered by this risk statement.

**Microorganism:** *Salmonella* spp.

Recommendation and rationale
<p>Is <i>Salmonella</i> spp. in uncooked RTE sausages 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>• Human illness has been associated with uncooked RTE sausages contaminated with <i>Salmonella</i> spp. and salmonellosis can lead to incapacitating illness</li><li>• <i>Salmonella</i> spp. are zoonotic pathogens and are associated with farming animals from which raw meat is used to produce uncooked RTE sausages</li><li>• Food recall data in Australia and surveillance data internationally have shown detections of <i>Salmonella</i> spp. in uncooked RTE sausages</li></ul>

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> <p>Gastroenteritis symptoms include abdominal cramps, nausea, diarrhea, mild fever, vomiting, dehydration, headache and/or prostration. The onset of illness 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).</p> <p>The particular food matrix and strain of <i>Salmonella</i> spp. influence the level of <i>Salmonella</i> 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).</p>

**Consumption pattern:**

One percent of children (aged 2-16 years), 2% of adults (aged 17-69 years) and 1% of people aged 70 and above reported consumption of uncooked RTE sausages in the 1995 National Nutrition Survey (McLennan and Podger 1999). In the 2007 Australian National Children's Nutrition and Physical Activity Survey, 5% of children (aged 2-16 years) reported consumption of uncooked RTE sausages (DOHA 2008).

**Key risk factors:**

Key risk factors of *Salmonella* spp. contamination in the finished product includes but are not limited to (1) a high level of *Salmonella* spp. contamination in the raw ingredients, (2) incorrect time and temperature combination applied to the fermentation process, (3) incorrect time and temperature combination applied to the maturation process, and 4) failure in refrigerated storage. The latter refers to non-shelf-stable products only (MLA 2003).

**Risk mitigation:**

To manage *Salmonella* spp. contamination in the production of uncooked RTE sausages, source raw meat that has been produced such that the potential for *Salmonella* spp. contamination is minimised. Good manufacturing practice, good hygienic practices to prevent cross-contamination and good temperature control in food manufacturing and handling play an important role in minimising *Salmonella* spp. contamination. During the production of uncooked RTE sausages the fermentation induced pH reduction, and the reduction in water activity during maturation, contribute to the inactivation of *Salmonella* spp. present in the raw ingredient mix.

In Australia Division 3 of [Standard 4.2.3 of the Australia New Zealand Food Standards Code](#) (the Code) states that RTE meat must be produced under a food safety management system which identifies, evaluates and controls food safety hazards. Clause 5 includes additional requirements for uncooked comminuted fermented meat for the fermentation, maturation and smoking processes. [Standard 1.6.1 of the Code](#) has a microbiological limit for all comminuted fermented meat which has not been cooked during the production process for *Salmonella* spp. of n=5, c=0, m=0 per 25g.

**Compliance history:**

The imported food compliance data sourced from the Imported Food Inspection Scheme of the Australian Department of Agriculture indicated that during the period of January 2007 – June 2013 there were no imports of uncooked RTE sausages.

There have been 44 notifications on the European Commission's Rapid Alert System for Food and Feed (RASFF) for *Salmonella* spp. in various uncooked RTE sausages including chorizo, dried sausage, salami and tea sausages during the period January 2007 – June 2013. These detections were from multiple countries. There were an additional 14 notifications for *Salmonella* spp. in sausages from multiple countries and one notification for *Salmonella* spp. in several undisclosed meat products imported from Germany, however, it was not stated if any of these products were uncooked RTE sausages.

There have been three food recalls in Australia of uncooked RTE sausages due to the presence of *Salmonella* spp. from January 2007 – June 2013. The recalled products were cacciatore and salami produced domestically.

**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 2012 of 49.8 cases per 100,000 population (11,273 cases). The previous five year mean was 46.9 cases per 100,000 population per year (ranging from 38.6 – 54.2 cases per 100,000 population per year) (FSANZ 2013).

**Illness associated with consumption of uncooked RTE sausages contaminated with *Salmonella* spp.**

There are a number of reported salmonellosis outbreaks associated with consumption of uncooked RTE sausages. Examples are listed below:

- Outbreak in the United States in 2010 associated with consumption of salami made with black and red pepper, 272 cases of illness due to infection with *S. Montevideo*. *Salmonella* contamination occurred at the step where pepper was spread onto the surface of salami after the fermentation and maturation process (CDC 2010)
- Outbreak in Denmark in 2010 associated with consumption of salami imported from Germany, 20 cases of illness due to infection with *S. Typhimurium* (Kuhn et al. 2011)
- Outbreak in Norway in 2006 associated with domestically produced Danish-style salami, 54 cases of illness due to infection with *S. Kedougou* (Emberland et al. 2006)

#### **Prevalence of *Salmonella* spp. in uncooked RTE sausages**

Surveys of uncooked RTE sausages have isolated *Salmonella* spp. in 0 – 11% of samples (New South Wales Food Authority, pers. com.<sup>1</sup>; Cabedo et al. 2008). Examples of surveys are listed below:

- Surveys conducted by the New South Wales Food Authority from 2001 – 2012, *Salmonella* spp. were not detected in uncooked fermented meat samples (n=46) (New South Wales Food Authority, pers. com.)<sup>1</sup>
- Survey in Spain from 1998 – 2004, *Salmonella* spp. were isolated from 11.1% of cured dry pork sausages (n=81) (Cabedo et al. 2008)
- Survey in the United States from 1997 – 1999, *Salmonella* spp. were isolated from 1.43% of dry and semi-dry fermented sausages (uncooked RTE sausages) (n=698) (Levine et al. 2001)

#### **Other relevant standard, guideline or advice**

- Codex general principles of food hygiene *CAC/RCP 1 – 1969* follows the food chain from primary production through to final consumption, highlighting the key hygiene controls at each stage (Codex 2003)
- Codex code of hygienic practice for meat *CAC/RCP 58-2005* covers additional hygienic provisions for raw meat, meat preparations and manufactured meat from the time of live animal production up to the point of retail sale (Codex 2005)

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

Many countries, such as the European Union, the United States and Canada, have HACCP-based regulatory measures in place for meat products.

The Canadian microbiological guidelines recommends *Salmonella* spp. in raw fermented RTE sausages and uncooked non-fermented RTE sausages be limited to n=5, c=0, m=0 (Health Canada 2008).

In the United States there are no regulatory requirements regarding the level of reduction of *Salmonella* spp. in RTE dried, fermented sausages. However it is recommended that a 5 log<sub>10</sub> reduction in *Salmonella* spp. in meat products and a 7 log<sub>10</sub> reduction of *Salmonella* spp. in poultry products would produce a product safe for consumption (FSIS 2012).

#### **Other considerations**

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

**This Risk Statement was compiled by FSANZ in: August 2014**

<sup>1</sup> New South Wales Food Authority, personal communication 9<sup>th</sup> October 2013

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