

**Imported food risk statement**  
**Ready-to-eat cooked and processed meat products and *Salmonella* spp.**

**Commodity:** Ready-to-eat (RTE) cooked and processed meat products. This includes processed or manufactured meat, including pâtés and meat pastes, that are cooked and have undergone a processing step such as curing or comminuting. RTE cooked and processed meat products that are dried and/or 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 RTE cooked and processed meat products 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>• Prevalence of <i>Salmonella</i> spp. in RTE cooked and processed meat products is low and there is limited evidence of salmonellosis attributed to RTE cooked and processed meat products.</li> <li>• <i>Salmonella</i> spp. are inactivated by the cooking process applied during the production of RTE cooked and processed meat products.</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. Sequelae can occur but 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, 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</p>

sometimes develops, predominantly in immunocompromised individuals. A small number of individuals develop sequelae such as arthritis, appendicitis, meningitis or pneumonia as a consequence of infection. 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 pattern:**

In the 2007 Australian National Children's Nutrition and Physical Activity Survey, 27% of children aged 2 – 16 years reported consumption of RTE cooked and processed meat products (DOHA 2008). In the 2011 – 2012 Nutrition and Physical Activity Survey (part of the 2011 – 2013 Australian Health Survey) 29% of children (aged 2-16 years), 25% of adults (aged 17-69 years) and 28% of people aged 70 and above reported consumption of RTE cooked and processed meat products (Australian Bureau of Statistics 2011).

For both the 2007 and the 2011 – 2012 surveys, mixed foods that contained RTE cooked and processed meat products 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:**

Risk factors in the production of RTE cooked and processed meat products include inadequate cooking, ineffective cooling after cooking, lack of temperature control during storage and distribution, and poor standard of hygiene during post-processing handling and packing. For meat products that are cured and cooked, incorrect levels of added curing substances (salt and nitrite) also contribute (MLA 2015).

#### **Risk mitigation:**

Adequate cooking will inactivate *Salmonella* spp. For example, 65°C for 2 minutes or equivalent will achieve a greater than 7 log<sub>10</sub> reduction of *Salmonella* spp. in cooked beef, roast beef and cooked corned beef (FSIS 1999; FSIS 2005).

Good manufacturing practice and good hygienic practices to prevent cross-contamination in food manufacturing and handling play an important role in minimising *Salmonella* spp. contamination of RTE cooked and processed meat products.

In Australia Division 3 of [Standard 4.2.3 of the Australia New Zealand Food Standards Code](#) (the Code) requires producers of RTE meat to implement a food safety management system which identifies, evaluates and controls food safety hazards.

[Schedule 27 of the Code](#) has a microbiological limit for *Salmonella* in packaged cooked cured/salted meat of n=5, c=0, m=not detected in 25g and a limit for packaged heat treated meat paste and packaged heat treated pâté 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 and Water Resources for January 2007 – June 2013 showed that of the 166 *Salmonella* tests applied to RTE cooked and processed meat products there were no fails.

There were five notifications on the European Commission's Rapid Alert System for Food and Feed (RASFF) for the presence of *Salmonella* spp. in RTE cooked and processed meat products during the period January 2007 – December 2015. Products were from multiple countries and included cooked beef strips and meat spread. There were an additional two notifications for ham (not stated if it was cooked), two notifications for mixed meat products (not stated if these were RTE cooked and processed meat products) and one notification for pâté (not stated if it was meat pâté) from multiple countries.

There have been no food recalls in Australia due to the presence of *Salmonella* spp. in imported or domestically produced RTE cooked and processed meat products from January 2007 – December 2015. There was one recall for domestically produced salami, however, it was not stated if the product was cooked.

#### **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 2015 of 72.8 cases per 100,000 population (17,089 cases). This is an increase from the previous five year mean of 56.4 cases per 100,000 population per year (ranging from 49.2 – 69.4 cases per 100,000 population per year) (FSANZ 2013; NNDSS 2016).

#### **Illness associated with consumption of RTE cooked and processed meat products contaminated with *Salmonella* 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 – December 2015 identified limited reported salmonellosis outbreaks associated with consumption of RTE cooked and processed meat products.

- There were eight salmonellosis outbreaks linked to consumption of deli meats on the US CDC Foodborne Outbreak Online Database from 1998 – 2014. One of the outbreaks, described by Granzow (2007), was associated with cross-contamination at a grocery store (CDC 2015).

#### **Prevalence of *Salmonella* spp. in RTE cooked and processed meat products**

A literature search with the EBSCO Discovery Service during the period 1990 – July 2015 identified that surveys of RTE cooked and processed meat products have isolated *Salmonella* spp. in 0 – 2% of samples (Cabedo et al. 2008; Meldrum et al. 2014). Examples of surveys are listed below:

- Survey in Wales from 2011-2012, *Salmonella* spp. were not isolated from cooked sliced vacuum-packed meat samples (n=254) collected from the manufacturer (Meldrum et al. 2014)
- Survey in Spain from 2006-2012, *Salmonella* spp. were not isolated from cooked ham samples (n=316) collected from retail or industry (Domenech et al. 2015)
- Survey in Spain from 1998-2004, *Salmonella* spp. were isolated from 2% of cooked ham samples (n=53) and was not detected on frankfurter samples (n=54) collected from retail or industry (Cabedo et al. 2008)
- Survey in the United States from 1990-1999, *Salmonella* spp. were isolated from 0.22% of cooked, roasted or corned beef samples (n=5444), 0.2% of small diameter cooked comminuted meat products (such as frankfurters) (n=6996) and 0.07% of large diameter cooked comminuted meat products (n=4328) collected from the manufacturer (Levine et al. 2001).

#### **Other relevant standard or guideline**

- [FSANZ guidelines for the microbiological examination of ready-to-eat food](#) deem food to be potentially hazardous if any *Salmonella* spp. are detected (FSANZ 2001)
- 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 production of RTE cooked and processed meat products.

The United States has regulatory requirements for lethality processes for roast, cooked and corned beef (process to achieve at least a 6.5 log<sub>10</sub> reduction of *Salmonella* spp.) and cooked uncured meat patties (process to achieve at least a 5 log<sub>10</sub> reduction of *Salmonella* spp.). For other RTE cooked and processed meat products it is recommended that a process achieving at least a 5 log<sub>10</sub> reduction of *Salmonella* spp. is implemented (FSIS 2012).

The Canadian microbiological guidelines recommend that *Salmonella* spp. in heat treated sausage not be detected by a two-part sampling plan of n=5, c=0, m=0 (Health Canada 2008).

#### Other considerations

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

**This Risk Statement was compiled by FSANZ in: June 2016**

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