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

Commodity: Uncooked spreadable sausages that are ready-to-eat (RTE). An example of this type of product includes some varieties of teewurst. Ambient stable sealed packages are not covered by this risk statement.

Microorganism: *Salmonella* spp.

Recommendation and rationale

Is *Salmonella* spp. in uncooked RTE spreadable sausages a medium or high risk to public health:

☑ *Yes*

☐ *No*

☐ *Uncertain, further scientific assessment required*

Rationale:

- Human illness has been associated with uncooked RTE spreadable sausages contaminated with *Salmonella* spp., and salmonellosis can lead to incapacitating illness
- *Salmonella* spp. are zoonotic pathogens and are associated with farming animals from which raw meat is used to produce uncooked RTE spreadable sausages
- International surveillance data have shown detections of *Salmonella* spp. in uncooked RTE spreadable sausages

General description

Nature of the microorganism:

Salmonella 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).

Growth of *Salmonella* 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. *Salmonella* spp. can survive for months or even years in low moisture foods and are able to survive frozen storage at -20°C. *Salmonella* 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).

Adverse health effects:

Salmonella 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).

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).

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:

Uncooked RTE spreadable sausages were not identified as being consumed by any of the respondents (2 years and over) in the 1995 National Nutrition Survey (McLennan and Podger 1999) or the respondents (2-16 years) in the 2007 Australian National Children's Nutrition and Physical Activity Survey (DOHA 2008).

Key risk factors:

Key risk factors for *Salmonella* spp. contamination in the finished product mainly include *Salmonella* spp. contamination in the raw ingredients, and to a lesser extent failure in refrigerated storage (MLA 2003). Uncooked spreadable sausages are typically low in acid content and high in moisture content (Brown 2000). These conditions favour the growth of *Salmonella* spp.

Risk mitigation:

To manage *Salmonella* spp. contamination in the production of uncooked RTE spreadable sausages, only deep muscle meat should be used or raw meat that is not contaminated with *Salmonella* spp. 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. Production of uncooked RTE spreadable sausages involves minimal periods of fermentation/maturation; therefore these should not be relied upon as a control measure to inactivate any *Salmonella* spp. that may contaminate the raw ingredients.

Growth of *Salmonella* spp. in uncooked RTE spreadable sausages is negatively affected by a high level of lactic acid bacteria in the product (Birzele et al. 2005).

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 4 notifications on the European Commission's Rapid Alert System for Food and Feed (RASFF) for *Salmonella* spp. in uncooked RTE spreadable sausages. One of the products was from Belgium, another from France and two were from Germany. 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 spreadable sausages.

There have been no food recalls in Australia due to the presence of *Salmonella* spp. in imported or domestically produced uncooked RTE spreadable sausages from January 2007 – June 2013.

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 spreadable sausages contaminated with *Salmonella* spp.

There are limited reports of salmonellosis outbreaks associated with consumption of uncooked RTE spreadable sausages.

- Sub-outbreak in Denmark in 2010 associated with consumption of an uncooked RTE spreadable pork sausage (teewurst) and infection with *Salmonella* Typhimurium U323. The sub-outbreak was part of an overall outbreak involving 172 cases of illness due to consumption of pork and pork products. The outbreak strain was isolated from the pig slaughterhouse, pork and some pork products (Kuhn et al. 2013).

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

Data on the prevalence of *Salmonella* spp. in uncooked RTE spreadable sausages is limited.

- Survey in Germany in 1996, *Salmonella* spp. was isolated from 8.2% of fresh spreadable poultry mettwurst samples (n=122) and 3.8% of fresh spreadable beef and/or pork mettwurst samples (n=392). In a different survey in Germany in 1995, *Salmonella* spp. was isolated from 16.6% of fresh spreadable poultry mettwurst samples (n=96) and 2.3% of fresh spreadable beef and/or pork mettwurst samples (n=977) (Bundesinstituts fur gesundheitlichen Verbraucherschutz und veterinarmedizin 1999)

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).

The FSIS of the United States Department of Agriculture recommended that a 5 $\log_{10}$ reduction in *Salmonella* spp. in RTE meat products and a 7 $\log_{10}$ reduction of *Salmonella* spp. in RTE 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

References

Birzele B, Djordjevic S, Kramer J (2005) A study of the role of different nitrite concentrations on human pathogenic bacteria in fresh spreadable ham and onion sausage. Food Control 16:695–699

Brown MH (2000) Processed meat products. Ch 18 In: Lund BM, Baird-Parker TC, and Gould GW (eds) The microbiological safety and quality of food, vol.1. Aspen Publishers, Gaithersburg, p. 389–419

Bundesinstituts fur gesundheitlichen Verbraucherschutz und veterinarmedizin (1999) Bundesweite erhebung zum mikrobiologischen status von frischen streichfahigen mettwursten. Bundesgesundheitsbl - Gesundheitsforsch - Gesundheitsschutz 42(965):966

Codex (2003) General principles of food hygiene (CAC/RCP 1 - 1969). Codex Alimentarius Commission, Geneva

Codex (2005) Code of hygienic practice for meat (CAC/RCP 58 - 2005). Codex Alimentarius Commission, Geneva

DOHA (2008) 2007 Australian national children's nutrition and physical activity survey - Main findings. Department of Health and Ageing, Canberra. http://www.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-strateg-food-monitoring.htm#07survey. Accessed 6 August 2014

FDA (2012) Bad bug book: Foodborne pathogenic microorganisms and natural toxins handbook, 2nd ed. US Food and Drug Administration, Silver Spring. http://www.fda.gov/Food/FoodborneIllnessContaminants/CausesOfIllnessBadBugBook/ucm2006773.htm. Accessed 27 March 2013

FSANZ (2013) Agents of foodborne illness. 2nd ed, Food Standards Australia New Zealand, Canberra. http://www.foodstandards.gov.au/publications/Documents/FSANZ_FoodborneIllness_2013_WEB.pdf. Accessed 4 September 2013

FSIS (2012) FSIS compliance guideline for meat and poultry jerky produced by small and very small establishments - 2012 updated compliance guideline. US Department of Agriculture, Washington DC. http://www.fsis.usda.gov/wps/wcm/connect/5fd4a01d-a381-4134-8b91-99617e56a90a/Compliance_Guideline_Jerky_2012.pdf?MOD=AJPERES. Accessed 14 March 2014

Health Canada (2008) Health products and food branch (HPFB) - Standards and guidelines for microbiological safety of food - An interpretive summary. In: Compendium of Analytical Methods, Volume 1. Health Canada, Ottawa,

ICMSF (1996) Salmonellae. Ch 14 In: Microorganisms in food 5: Microbiological specifications of food pathogens. Blackie Academic and Professional, London, p. 217–264

ICMSF (2002) Microorganisms in Food 7: Microbiological testing in food safety management. Kluwer Academic/Plenum Publishers, New York

Kuhn KG, Sorensen G, Torpdahl M, Kjeldsen MK, Jensen T, Gubbels S, Bjerager GO, Wingstrand A, Porsbo LJ, Ethelberg S (2013) A long-lasting outbreak of *Salmonella* Typhimurium U323 associated with several pork products, Denmark, 2010. Epidemiology and Infection 141:260–268

Li H, Wang H, D'Aoust JY, Maurer J (2013) *Salmonella* species. Ch 10 In: Doyle MP, Beuchat LR (eds) Food microbiology: Fundamentals and frontiers. 4th ed, ASM Press, Washington D.C., p. 225–261

McLennan W, Podger A (1999) National nutrition survey. Foods eaten. Australia. 1995. ABS Catalogue number 4804.0. Australian Bureau of Statistics and Commonwealth Department of Health and Family Services, Canberra. http://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/4804.0?OpenDocument. Accessed 6 August 2014

MLA (2003) Guidelines for the safe manufacture of smallgoods. Meat & Livestock Australia, Sydney