

Imported food risk statement
Uncooked ready-to-eat sausages and staphylococcal enterotoxin

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.

Microbial enterotoxin: Staphylococcal enterotoxin (SE)

Recommendation and rationale
<p>Is SE in uncooked RTE sausages 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"/> <i>Uncertain, further scientific assessment required</i></p> <p>Rationale:</p> <ul style="list-style-type: none"> Limited evidence for uncooked RTE sausages being contaminated with high levels of <i>Staphylococcus aureus</i> or the presence of SE Staphylococcal food poisoning attributed to the consumption of uncooked RTE sausages is rare

General description
<p>Nature of the microbial enterotoxin:</p> <p><i>Staphylococcus</i> spp. are facultative anaerobic Gram-positive, non-spore forming spherical-shaped bacteria. They are commonly found in the environment, humans (nose and skin) and animals. Although several <i>Staphylococcus</i> species can produce SEs, including both coagulase-negative and coagulase-positive isolates, the majority of staphylococcal food poisoning (SFP) is attributed to SE produced by coagulase-positive <i>S. aureus</i> (FDA 2012; FSANZ 2013).</p> <p>Growth of <i>S. aureus</i> can occur at temperatures between 7 – 48°C, pH of 4.0 – 10.0 and a minimum water activity of 0.83 when other conditions are near optimum. SEs are resistant to heat inactivation and cannot be destroyed by cooking. SEs remain stable under frozen storage (FSANZ 2013).</p>
<p>Adverse health effects:</p> <p>SE is a moderate hazard as it generally causes illness of short duration and usually no sequelae (ICMSF 2002). People of all ages are susceptible to SFP. However, the severity of symptoms may vary depending on the amount of SE consumed and the general health status of individuals. The young and elderly are more likely to develop more serious symptoms (FSANZ 2013).</p> <p>SFP is characterized by rapid onset gastroenteritis that appears around three hours after ingestion (normal range of 1 – 6 hours). Common symptoms of SFP include nausea, vomiting, abdominal cramps and diarrhea. Recovery is usually between 1 – 3 days (FSANZ 2013).</p> <p>People become ill after exposure to very small quantities of SE (less than 1 µg). These levels of toxin are generally observed when <i>S. aureus</i> populations exceed 10⁵ CFU/g of food (FDA 2012).</p>
<p>Consumption pattern:</p> <p>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</p>

(aged 2-16 years) reported consumption of uncooked RTE sausages (DOHA 2008).

Key risk factors:

Raw ingredients heavily contaminated by *S. aureus*, incorrect levels of added curing substance (nitrite and salt), and inappropriate combination of time and temperature applied to the production process are key risk factors (MLA 2003).

Temperature abuse may allow growth of *S. aureus* to high levels and potential SE production.

Risk mitigation:

Time and temperature abuse of food products should be avoided by applying good practices of temperature control in food manufacturing and handling. Good manufacturing practice and good hygienic practices in food manufacturing and handling also play a role in preventing SFP.

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 the fermentation, maturation and smoking process of uncooked comminuted fermented meat. [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 coagulase positive staphylococci of $n=5$, $c=1$, $m=10^3$, $M=10^4$ per gram

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 has been one notification on the European Commission's Rapid Alert System for Food and Feed (RASFF) for a high level of *S. aureus* in several undisclosed meat products from the Netherlands during the period of January 2007 – June 2013. It was not stated if any of these products were uncooked RTE sausage. There were no notifications for the presence of SE.

There has been one food recall in Australia of uncooked RTE sausage due to the presence of *Staphylococcus* spp. from January 2007 – June 2013. The recalled product was Chabi sausage produced domestically.

Surveillance information:

SFP is not a notifiable disease in Australia. While it is generally recognised that there may be significant under reporting of SFP due to the short duration of illness and self-limiting symptoms, there were two reported outbreaks in Australia in 2011 and two outbreaks reported in 2010. The foods associated with these outbreaks were thick shakes, rice noodles and mixed foods. Factors that contributed to the outbreaks included inadequate cleaning of equipment and temperature abuse of food. In Australia it is estimated that *S. aureus* accounts for 1% of foodborne illness caused by known pathogens (OzFoodNet 2011; OzFoodNet 2012; FSANZ 2013).

Illness associated with consumption of uncooked RTE sausages contaminated with SE

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

- Outbreak in the United States in 2000, 10 cases of SFP associated with consumption of Italian sausage (CDC 2013). It was not stated if the implicated product was an uncooked RTE sausage.

Prevalence of *S. aureus* in uncooked RTE sausages

Data on the prevalence of *S. aureus* in uncooked RTE sausages is limited.

- Surveys conducted by the New South Wales Food Authority from 2001 – 2012, coagulase positive staphylococci was not detected in uncooked fermented meat samples ($n=27$) (New South Wales

Food Authority, pers. com.)¹

- Between 1994 and December 2002, FSIS tested 3,105 RTE meat and poultry products for the presence of staphylococcal enterotoxins including more than 1668 uncooked RTE sausages, and all tests were negative. FSIS discontinued testing of RTE products for staphylococcal enterotoxins in January 2003 (Levine et al. 2001; USDA 2013)

Other relevant standard or guideline

- 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 *S. aureus* in raw fermented RTE sausages be limited to $n=5$, $c=1$, $m=2.5 \times 10^2$, $M=10^4$ (Health Canada 2008).

In the United States it is recommended that the pH of the product reaches a pH of 5.3 within a defined number of hours at a defined temperature in order to control the growth of *S. aureus* in fermented dry and semi-dry sausage products (AMIF 1997; FSIS 2013).

Other considerations

Testing for high levels of coagulase-positive staphylococci is an indicator test for the presence of SE.

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

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