

Imported food risk statement
RTE cooked prawns and shrimp and *Aeromonas* spp.

Commodity: Ready-to-eat (RTE) cooked prawns and shrimp. This includes prawns, shrimp and seafood mixes containing prawns and shrimp (e.g. marinara mix), that are cooked. Other crustaceans and RTE cooked prawns and shrimp that are dried or in ambient stable sealed packages are not covered by this risk statement.

Microorganism: *Aeromonas* spp.

Recommendation and rationale
<p>Is <i>Aeromonas</i> spp. in RTE cooked prawns and shrimp 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>Rationale:</p> <ul style="list-style-type: none"> • There is uncertainty as to whether <i>Aeromonas</i> spp. can cause foodborne gastroenteritis. • There is limited evidence of human illness attributed to RTE cooked prawns and shrimp contaminated with <i>Aeromonas</i> spp. • <i>Aeromonas</i> spp. are inactivated by the cooking process applied during the production of RTE cooked prawns and shrimp. • International and Australian compliance and recall data has shown limited evidence of <i>Aeromonas</i> spp. associated with RTE cooked prawns and shrimp.
General description
<p>Nature of the microorganism:</p> <p><i>Aeromonas</i> spp. are facultative anaerobic, Gram-negative rod-shaped bacteria. They are found throughout aquatic environments and have been detected in drinking water, wastewater, freshwater environments and in brackish water (Forsythe et al. 2009; D'Sa and Harrison 2010; FDA 2012). Three species, <i>A. hydrophila</i>, <i>A. caviae</i>, and <i>A. veronii</i> bv. <i>sobria</i>, have been attributed to most human infections and clinical isolates associated with <i>Aeromonas</i> spp. The same three species are also commonly found in environmental samples (Janda and Abbott 2010).</p> <p>Growth of <i>Aeromonas</i> spp. can occur at temperatures ranging between 2 – 45°C, pH of <4.5 and a maximum NaCl concentration of <6%, when other conditions are near optimum (ICMSF 1996). <i>Aeromonas</i> spp. are considered to be heat sensitive compared to other foodborne pathogens. For example, in peptone water <i>Aeromonas</i> spp. were killed within two minutes at 55°C whereas other bacteria (<i>Escherichia coli</i> O157:H7, <i>Staphylococcus aureus</i> and <i>Salmonella typhimurium</i>) survived heating at 55°C for more than 15 minutes. <i>Aeromonas</i> spp. are readily inactivated by cooking (Nishikawa et al. 1993; USEPA 2006). <i>Aeromonas</i> spp. can survive frozen storage (Castro-Escarpulli et al. 2003; Kirov 2003; Ambili et al. 2007).</p>
<p>Adverse health effects:</p> <p>There is uncertainty as to whether <i>Aeromonas</i> spp. can cause food or waterborne gastroenteritis and their</p>

precise role in human illness remains unclear. Volunteer human feeding trials with up to 10^{11} cells failed to elicit human illness (Forsythe et al. 2009). However, the presence of *Aeromonas* spp. in the stools of individuals with diarrhoea in the absence of other known enteric pathogens suggests it has a role in causing foodborne illness. People of all ages are potentially susceptible to *Aeromonas*-related gastroenteritis. However, very young children (6 months to two years of age) and immunocompromised individuals are at a greater risk of infection. Immunocompromised individuals are more susceptible to severe illness. In these individuals *A. hydrophila* may spread through the body and cause systemic infections (Forsythe et al. 2009; Janda and Abbott 2010; FDA 2012).

Clinically, different types of gastroenteritis are associated with *Aeromonas* spp., ranging from mild diarrhoea to dysentery. The milder form of the disease is characterised by watery diarrhoea, low-grade fevers and abdominal pain, with symptoms normally lasting for 1 – 7 days. The more severe form of dysentery is less common and is characterized by cramping, abdominal pain and bloody mucoid stools that may last for several weeks (Forsythe et al. 2009; Janda and Abbott 2010; FDA 2012).

Consumption patterns:

In the 2011 – 2012 Nutrition and Physical Activity Survey (part of the 2011 – 2013 Australian Health Survey) <1% children (aged 2 – 16 years), 1% of adults (aged 17 – 69 years) and <1% of people aged 70 and above reported consumption of RTE cooked prawns and shrimp (Australian Bureau of Statistics 2011). Mixed foods that contained RTE cooked prawns and shrimp were excluded from the analysis. Survey data was derived from one day of dietary recall data.

Key risk factors:

Aeromonas spp. are aquatic microorganisms commonly associated with the shells of crustaceans (ICMSF 2005) and so may be a source of contamination in the processing facility.

Cross-contamination of raw and cooked RTE product has the potential to re-introduce pathogens, such as *Aeromonas* spp. into the cooked product. Temperature abuse post-harvest during handling, transport and/or storage may then allow the growth of *Aeromonas* spp. (FSANZ 2005).

Risk mitigation:

Adequate cooking will inactivate *Aeromonas* spp. For example, cooking to an internal temperature of 70°C for at least two minutes will inactivate *Aeromonas* spp. (USEPA 2006; Bell and Kyriakides 2009). However, post-cooking cross contamination can occur. Contamination may be mitigated through proper facility design to control product movement and by minimising contamination of cooked product from equipment and personnel in contact with raw product (ICMSF 2005; FSANZ 2005). Rapid chilling post-cooking and adherence to low temperatures (<5°C) during processing, transport and storage will reduce the rate of growth for most microbial pathogens (FSANZ 2005; Codex 2013).

In Australia Division 2 of [Standard 4.2.1 in the Australia New Zealand Food Standards Code](#) (the Code) states that a seafood business must systematically examine all of its primary production and processing operations to identify potential seafood safety hazards and implement controls that are commensurate with the food safety risk, and must take all necessary steps to prevent the likelihood of seafood being or becoming contaminated.

Compliance history:

RTE cooked prawns and shrimp are not currently tested for *Aeromonas* spp. under the Imported Food Inspection Scheme and therefore no compliance data is available from the Australian Department of Agriculture and Water Resources.

There were no notifications on the European Commission's Rapid Alert System for Food and Feed (RASFF) for *Aeromonas* spp. in cooked prawns and shrimp from January 2007 – May 2016.

There have been no food recalls in Australia due to the presence of *Aeromonas* spp. in imported or domestic cooked prawns and shrimp from January 2007 – May 2016.

Surveillance information:

Infection with *Aeromonas* spp. is not a notifiable disease in Australia. No Australian outbreaks were reported in the OzFoodNet reports for 2001 – 2013.

Illness associated with consumption of RTE cooked prawns and shrimp contaminated with *Aeromonas* spp.

A search of the scientific literature via Web of Science, PubMed, Scopus and other publications during the period 1990 - August 2016 identified limited outbreaks associated with *Aeromonas* spp. and consumption of RTE cooked prawns and shrimp:

- Outbreak in 1991 in Switzerland – one case of illness linked to consumption of a RTE shrimp cocktail. *A. hydrophila* was isolated from the patient's stool and from the left-over shrimp cocktail (Altwegg et al. 1991). RTE shrimp cocktail is a mixed food and contains other ingredients as well as RTE cooked shrimp.

Data on the prevalence of *Aeromonas* spp. in RTE cooked prawns and shrimp

A search of the scientific literature via Web of Science, PubMed, Scopus, and other publications during the period 1990 – August 2016 identified data on the prevalence of *Aeromonas* spp. in RTE cooked prawns and shrimp is limited:

- Survey with limited sample size in Italy in 2009/2010 – presumptive *Aeromonas* spp. were isolated in 75% of RTE peeled shrimp samples collected at retail (n=12) (not stated if the product was cooked). However, it was not stated if any of the nine presumptive samples were confirmed to be *Aeromonas* spp. via biochemical testing (Di Pinto et al. 2012).
- Survey with limited sample size in Switzerland (where samples were collected at retail) – one sample was identified as a presumptive *Aeromonas* spp., however this sample was found not to be *Aeromonas* via PCR (n=10), (Kingcombe et al. 2004).

Other relevant standards or guidelines

- 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 practice for fish and fishery products *CAC/RCP 52-2003* applies to the growing, harvesting, handling, production, processing, storage, transportation and retail of fish, shellfish and aquatic invertebrates and products thereof from marine and freshwater sources that are intended for human consumption. Section 14 of *CAC/RCP 52-2003* is specific to processing of shrimps and prawns and describes controls at individual processing steps (Codex 2013).
- Codex standard for quick frozen shrimps or prawns *CODEX STAN 92-1981* covers the production and processing of quick frozen shrimps or prawns, including fully cooked shrimps or prawns (Codex 2014).

Approach by overseas countries

Many countries and regions, such as the United States, Canada and the European Union, have HACCP-based regulatory measures in place for production of this commodity.

Other considerations

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

This risk statement was compiled by FSANZ in: November 2016

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