

**Imported food risk statement**  
**Uncooked ready-to-eat dried meat and *Listeria monocytogenes***

**Commodity:** Uncooked ready-to-eat (RTE) dried meat. Examples of this type of product include jerky and biltong.

**Microorganism:** *Listeria monocytogenes*

Recommendation and rationale
<p>Is <i>L. monocytogenes</i> in RTE dried meat 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>• Limited evidence for RTE dried meat being contaminated with <i>L. monocytogenes</i></li> <li>• No evidence of listeriosis being associated with RTE dried meat</li> <li>• Due to its low moisture and high salt content, RTE dried meat like jerky does not support the growth of <i>L. monocytogenes</i></li> </ul>

General description
<p><b>Nature of the microorganism:</b></p> <p><i>L. monocytogenes</i> is a Gram-positive, non-spore forming rod-shaped bacterium that can grow in both aerobic and anaerobic conditions. It is found throughout the environment and has been isolated from domestic and wild animals, birds, soil, vegetation, fodder and wet areas of food processing environments (FSANZ 2013).</p> <p>A distinguishing feature of <i>L. monocytogenes</i> is its ability to grow at refrigeration temperatures. Growth can occur at temperatures between 1.5 – 45.0°C, pH of 4.0 – 9.6 and a minimum water activity of 0.90 when other conditions are near optimum. Temperatures above 50°C are lethal to <i>L. monocytogenes</i>, however, it is able to survive frozen storage at -18°C (ICMSF 1996; FSANZ 2013).</p>
<p><b>Adverse health effects:</b></p> <p>For susceptible populations <i>L. monocytogenes</i> is a severe hazard as it can cause life threatening illness (ICMSF 2002). People at risk of invasive listeriosis include pregnant women and their foetuses, newborn babies, the elderly and immunocompromised individuals (such as cancer, transplant and HIV/AIDS patients). Less frequently reported, but also at a greater risk, are patients with diabetes, asthma, cirrhosis and ulcerative colitis (FSANZ 2013).</p> <p>In pregnant women invasive listeriosis can cause spontaneous abortion, stillbirth or neonatal infection. Influenza-like symptoms, fever, and gastrointestinal symptoms can also occur in the mother. In immunocompromised individuals and the elderly invasive listeriosis can cause potentially fatal bacterial meningitis with symptoms of fever, malaise, ataxia and altered mental status. The onset of illness of invasive listeriosis generally ranges from 3 days to 3 months after infection. Invasive listeriosis has a fatality rate of</p>

15 – 30% (FDA 2012; FSANZ 2013).

Nearly all cases of listeriosis in susceptible people result from the consumption of high numbers of the pathogen (Chen et al. 2003; FAO/WHO 2004). However, some foods support the growth of *L. monocytogenes*, enabling high levels of *L. monocytogenes* to be achieved that may lead to illness.

Exposure to *L. monocytogenes* has minimal impact on the general healthy population. If illness does occur it is often mild and may be mistaken for a viral infection or flu (FSANZ 2012).

#### **Consumption pattern:**

RTE dried meat was 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:**

Inadequate level of added curing substances (salt and nitrite) and inappropriate combinations of time, temperature and humidity applied to the drying process can contribute to the production of unsafe dried meat products (FSIS 2001; MLA 2003).

Post-processing contamination including cross contamination can occur as *L. monocytogenes* is a ubiquitous organism.

#### **Risk mitigation:**

Reducing the prevalence of *L. monocytogenes* in the processing plant environment and reducing the initial load of *L. monocytogenes* on finished RTE processed meat will lead to a significant reduction in the likelihood of listeriosis resulting from consumption of processed RTE meat (Ross et al. 2009). Good hygienic practices in food manufacturing and food handling will minimise *L. monocytogenes* contamination of RTE dried meats.

Salting and drying (temperatures of 55 - 65°C) are critical steps in the manufacture of RTE dried meat. The combination of these two enables the product to reach a low moisture level at around 30% (MLA 2003). The temperature and time combination applied to the drying step tends to vary from one manufacturer to another. Due to its low moisture content, RTE dried meat does not support the growth of *L. monocytogenes* (Ingham et al. 2006).

For dried meat products that are cooked, *L. monocytogenes* would be inactivated. For example, 65°C for 10min or equivalent (MLA 2003).

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. [Paragraph 2.2.1–5\(1\) of the Code](#) states that a food that is sold as a dried meat must be dried to a water activity of no more than 0.85.

[Schedule 27 of the Code](#) contains microbiological limits for *L. monocytogenes* in RTE food based on whether growth can occur or not:

- For RTE food in which growth of *L. monocytogenes* can occur n=5, c=0, m=not detected in 25g
- For RTE food in which growth of *L. monocytogenes* will not occur n=5, c=0, m=10<sup>2</sup> cfu/g.

Public information for vulnerable populations to avoid consumption of ready-to-eat food that supports the growth of

*L. monocytogenes* is available on various government websites [including FSANZ's website](#).

#### **Compliance history:**

The imported food compliance data sourced from the Imported Food Inspection Scheme of the Australian Department of Agriculture for January 2007 – June 2013 showed that of 31 *L. monocytogenes* tests applied to RTE dried meat there were no fails.

There have been three notifications on the European Commission's Rapid Alert System for Food and Feed (RASFF) for *L. monocytogenes* in vacuum packed dried grison meat and vacuum packed sliced dried beef produced in France and dried flavoured beef from Switzerland during the period January 2007 – June 2013. Among the notified products, counts of *L. monocytogenes* varied from <10 to 1900 CFU/g. There were an additional three notifications for *L. monocytogenes* in several undisclosed meat and delicatessen products from multiple countries, however, it was not stated if any of these products were RTE dried meat.

There have been no food recalls in Australia due to the presence of *L. monocytogenes* in imported or domestically produced RTE dried meat from January 2007 – June 2013.

#### Surveillance information:

Listeriosis is a notifiable disease in all Australian states and territories with a notification rate in 2012 of 0.4 cases per 100,000 population (93 cases). The previous five year mean was 0.3 cases per 100,000 population per year (ranging from 0.2 – 0.4 cases per 100,000 population per year) (FSANZ 2013).

#### Illness associated with consumption of RTE dried meat contaminated with *L. monocytogenes*

A literature search with the EBSCO Discovery Service did not identify any listeriosis outbreaks associated with consumption of RTE dried meat in the period of 1990 – June 2014.

#### Prevalence of *L. monocytogenes* in RTE dried meat

Data on the prevalence of *L. monocytogenes* in RTE dried meat is limited.

- Surveys conducted by the Food Safety and Inspection Service of the United States from 1990 – 1999, *L. monocytogenes* was isolated from 0.52% of jerky products (n = 770), although these were not enumerated (Levine et al. 2001)

#### 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)
- Codex guidelines on the application of general principles of food hygiene to the control of *L. monocytogenes* in foods *CAC/GL 61 – 2007* (Codex 2009) states:
  - For RTE foods in which growth of *L. monocytogenes* can occur the microbiological criterion for *L. monocytogenes* is n=5, c=0, m=absence in 25g
  - For RTE foods in which growth of *L. monocytogenes* cannot occur the microbiological criterion for *L. monocytogenes* is n=5, c=0, m=100 CFU/g

#### 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.

In the United States the production of poultry jerky must achieve at least a 7.0 log<sub>10</sub> reduction of *Salmonella* spp. as required by the Code of Federal Regulation 9 CFR 381.150. Beef jerky should achieve at least a 5.0 log<sub>10</sub> reduction of *Salmonella* spp. *Salmonella* is treated as a reference organism – if the process achieves sufficient reductions in *Salmonella* spp. then *L. monocytogenes* should also be reduced to a safe level (FSIS 2012). The United States has a zero tolerance for *L. monocytogenes* in RTE products as required by the Code of Federal Regulation 9 CFR 430 (FSIS 2014).

The European Commission regulation on microbiological criteria for foodstuffs (No. 2073/2005) specifies that n=5, c=0, m=100 CFU/g as food safety criteria for *L. monocytogenes* in RTE foods unable to support the growth of *L. monocytogenes* other than those intended for infants and for special medical purposes (e.g. dried meats) placed on the market during their shelf-life (European Commission 2005).

#### Other considerations

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

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