

Imported food risk statement
Ready-to-eat cooked pig meat and Shiga toxin-producing *Escherichia coli*

Commodity: Ready-to-eat (RTE) cooked pig meat (stored chilled or frozen). This includes cooked pig meat that has been sliced, diced, marinated or flavoured etc. Ambient stable sealed packages are not covered by this risk statement.

Microorganism: Shiga toxin-producing *Escherichia coli* (STEC)

Recommendation and rationale
<p>Is STEC in RTE cooked pig 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"/> <i>Uncertain, further scientific assessment required</i></p> <p>Rationale:</p> <ul style="list-style-type: none">• The prevalence of STEC in pigs is low• Limited evidence for RTE cooked pig meat being contaminated with STEC or causing illness in humans• Cooking to an internal temperature of 63°C for 4 minutes or equivalent will achieve a greater than 7 log₁₀ reduction in STEC

General description
<p>Nature of the microorganism:</p> <p><i>E. coli</i> are facultative anaerobic, Gram-negative, rod-shaped bacteria. They are found in warm-blooded animals and humans as part of the normal intestinal flora (FSANZ 2013). The majority of <i>E. coli</i> are harmless, however some have acquired specific virulence attributes, such as Shiga toxin-producing <i>E. coli</i> (STEC), which can cause severe diarrheal disease in humans (FDA 2012). Major foodborne pathogenic STEC strains include O26, O45, O103, O111, O121, O145, O157 (FDA 2012) and O104 (ECDC/EFSA 2011). The major animal reservoir of STEC is ruminants. STEC can also colonise other animals and birds, although the incidence of STEC is lower than in ruminants (FSANZ 2013; Meng et al. 2013).</p> <p>Growth of <i>E. coli</i> can occur at temperatures between 7 – 46°C, pH of 4.4 – 10.0 and a minimum water activity of 0.95 when other conditions are near optimum. Some STEC strains are able to survive at pH 2.5 – 3.0 for over 4 hours. STEC is able to survive frozen storage at -20°C, however, it is readily inactivated by cooking (FSANZ 2013; Meng et al. 2013).</p>
<p>Adverse health effects:</p> <p>STEC is a severe hazard as it can cause life threatening illness or substantial chronic sequelae (ICMSF 2002). People of all ages are susceptible to infection with STEC. However, the young and the elderly are more susceptible and are more likely to develop serious symptoms (FSANZ 2013).</p> <p>Symptoms include diarrhoea, abdominal pain, vomiting and fever. The onset of illness is typically 3 – 8 days and most patients recover within 10 days of the initial onset of symptoms. Acute STEC infections (haemorrhagic colitis) are characterised by severe abdominal cramps and bloody diarrhoea. In some cases, patients develop haemolytic uraemic syndrome (HUS) which can lead to kidney failure. HUS can also have neurological effects and cause seizures, stroke and coma. Approximately 3 – 7% of haemorrhagic colitis cases develop HUS. The fatality rate of HUS is 3 – 5% (FDA 2012; FSANZ 2013).</p> <p>It is generally accepted that very low levels (10 – 100 cells) of STEC can cause illness. However, depending on the food matrix and strain of STEC, illness may occur at exposure to even lower levels of STEC (FSANZ 2003; Meng et al. 2013).</p>

FDA 2012).

Consumption patterns:

Four percent of children (aged 2-16 years), 5% of adults (aged 17-69 years) and 5% of people aged 70 and above reported consumption of cooked pig meat in the 1995 National Nutrition Survey (McLennan and Podger 1999). In the 2007 Australian National Children's Nutrition and Physical Activity Survey, 7% of children (aged 2-16 years) reported consumption of cooked pig meat (DOHA 2008).

Key risk factors:

There is a low prevalence of STEC in Australian pig meat and no reported outbreaks associated with STEC and pig meat in Australia. Therefore pathogenic *E. coli* (including STEC) was not identified as a microbiological hazard associated with the primary production or processing of pig meat in previous work by FSANZ (2009).

Risk mitigation:

Adequate cooking will inactivate STEC. For example, 63°C for 4 minutes or equivalent will achieve a greater than 7 log₁₀ reduction in STEC in pig meat (ICMSF 1996; FSIS 2005; FSIS 2011). Good hygienic practices in food manufacturing and food handling minimise STEC contamination of food.

In Australia Division 3 of [Standard 4.2.3 of the Australia New Zealand Food Standards Code](#) states that RTE meat must be produced under a food safety management system which identifies, evaluates and controls food safety hazards.

Compliance history:

The imported food compliance data sourced from the Imported Food Inspection Scheme of the Australian Department of Agriculture for August 2006 – February 2013 showed that of six generic *E. coli* tests applied to cooked pig meat there were no fails.

There were no notifications on the European Commission's Rapid Alert System for Food and Feed (RASFF) for STEC or excessive levels of generic *E. coli* in pig meat from January 2007 – June 2013.

There have been no food recalls in Australia due to the presence of STEC or excessive levels of *E. coli* in imported or domestically produced cooked pig meat from January 2007 – June 2013.

Surveillance information:

Infection with STEC is a notifiable disease in all Australian states and territories. The incidence of STEC infections notified in Australia in 2012 was 0.5 cases per 100,000 population (112 cases), which includes both foodborne and non-foodborne cases. This is the same as the previous five year mean of 0.5 cases per 100,000 population per year (ranging from 0.4 – 0.6 cases per 100,000 population per year). The most common STEC serotype identified in Australia in 2010 was O157 (58.8% of cases), O111 was the next most common serotype (FSANZ 2013).

Illness associated with consumption of RTE cooked pig meat contaminated with STEC

A literature search with the EBSCO Discovery Service did not identify any outbreaks associated with STEC and consumption of precooked pig meat in the period of 1990 – June 2014. Illness has occurred, such as the outbreak described by Trotz-Williams (2012), involving consumption of pig meat that was inadequately cooked and improperly cooled and stored.

Prevalence of STEC in RTE cooked pig meat

Data on the prevalence of STEC in RTE cooked packaged pig meat is limited.

- Survey in the United Kingdom in 2007, STEC was not detected in sliced RTE cooked pork meat samples at retail (n=1,096) (FSA 2011)

Other relevant standards or guidelines

- [FSANZ guidelines for the microbiological examination of ready-to-eat food](#) has a satisfactory level for generic *E. coli* of <3 CFU/g. Food is deemed potentially hazardous if any pathogenic strains of *E. coli* are detected (including STEC) (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 meat products.

Other considerations

Generic *E. coli* is commonly used as an indicator of process hygiene (ICMSF 2011).

Quarantine restrictions apply to products under this commodity classification and include specific time and temperature requirements which would be sufficient to inactivate STEC, depending on country disease status. Refer to the [ICON database](#).

This risk statement was compiled by FSANZ in: August 2014

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