Escherichia coli Fact Sheet

What is Escherichia coli?

E. coli is a part of the normal microbial flora in the intestinal tracts of humans and other warm-blooded animals. Most *E. coli* strains are harmless; however some strains are pathogenic.

Pathogenic *E. coli* strains are classified into specific groups based on the mechanism by which they cause disease and clinical symptoms. These groups include:

- Enteropathogenic *E. coli* (EPEC)
- Enteroaggregative *E. coli* (EAEC)
- Enteroinvasive *E. coli* (EIEC)
- Enterotoxigenic *E. coli* (ETEC)
- Diffusely adhering *E. coli* (DAEC)
- Enterohaemorrhagic *E. coli* (EHEC)

All categories of *E. coli* may be shed in the faeces of infected humans, creating the potential to be spread to other humans, animals and the environment. *E. coli* is often used as an indicator of faecal pollution.

The Shiga toxin producing ***E. coli*** **(STEC)** strains, are often associated with more severe illnesses, these belong to the EHEC group. Of these, O157:H7 is the most commonly reported in Australia.

What outbreaks have occurred?

Infection with STEC is a notifiable disease in all Australian states and territories. Seafood was not implicated in any Australian outbreaks between 1988 and 2010.

How is *E. coli* transmitted?

- Person-to person
- Cross-contamination
- Consumption of contaminated food or water
- Direct contact with infected animals

How much *E. coli* is a harmful dose?

Doses causing illness vary depending on the specific *E. coli* group and the immune response of individuals. The infectious dose (in healthy adults) ranges from 10-100 cells for EHEC to 10 million to 10 billion cells for ETEC and EPEC.

What are the symptoms?

Symptoms from STEC usually begin 3 to 4 days after exposure and most patients recover within 10 days. Infections may range from asymptomatic (no clinical symptoms) or can cause

- Diarrhoea, abdominal cramps, vomiting and fever.
- In some cases haemorrhagic colitis (characterised by severe abdominal cramps and bloody diarrhoea)
- Haemolytic uremic syndrome (a combination of anemia, low platelet count and acute kidney failure) which can result in death.

What can be done to manage *E. coli* in seafood?

Hazards from *E. coli* can be prevented by:

- Not harvesting from contaminated waters
- Prevention of contamination during processing by Good Manufacturing Practice (e.g. wearing gloves and proper personal protection), good personal hygiene, proper

sanitisation of food contact surfaces and utensils, and prohibiting people that are ill from working in food operations.

- Adequately cooking seafood to eliminate pathogens (e.g. heating to an internal temperature of 72 °C and maintaining for 1 minute)
- Maintaining seafood below 6.5 °C or above 49.4 °C to prevent growth

Use of *E. coli* for managing of shellfish food safety

Due to their prevalence as gut flora, general *E.coli* are used widely in shellfish growing area management as indicators of faecal pollution. They are used to classify production areas as to suitability for direct harvest, and to determine when the risks of faecal pollution are high, prompting closure of harvest areas. In this case they are acting as indicators for a wide range of bacterial and viral pathogens that can be difficult to monitor directly.

How can we test for *E. coli*?

E. coli can be measured through a variety of laboratory techniques that may be either culture based or DNA based. The technique chosen depends on the level of specificity required (i.e. whether you are looking for total *E. coli* or specific strains). DAFF provides different testing methods for general *E. coli*, *E. coli* non-O157 (STEC) and *E. coli* O157:H7 (see the reference below).

Regulatory standards

The Australian regulatory limit for *E. coli* can be found in Section 1.6.1 of the Australia New Zealand Food Standards Code, available at http://www.foodstandards.gov.au.

International regulatory limits can be found in the Trade & Market Access Database, available at www.frdc.com.au/trade.

Where can I access more information?

DAFF. 2006. *DAFF approved methods for microbiological testing of meat and meat products* [Online]. Available: http://www.daff.gov.au/__data/assets/pdf_file/0006/2157504/approved-methods-for-microbiological-testing.pdf [Accessed 3 September 2012].

FDA. 2012. Pathogenic *Escherichia coli* group. *In*: Bad Bug Book: Foodborne Pathogenic Microorganisms and Natural Toxins Handbook. 2nd Ed. Center for Food Safety and Applied Nutrition (CFSAN) of the Food and Drug Administration (FDA), U.S. Department of Health and Human Services.

FSANZ. 2013. Shiga toxin-producing *Escherichia coli* (STEC). *In*: Agents of Foodbourne Illness. 2nd ed. Food Standards Australia New Zealand, Canberra.

Contact us:

http://safefish.com.au

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Considering the Benefits and Risks of Seafood Consumption

Eating seafood confers many benefits: it provides top-quality protein, and is an excellent source of important nutrients like iodine, selenium, vitamins A and D, and long-chain polyunsaturated omega-3 fatty acids. However like all foods, some seafood products may contain substances that are harmful to health. Illness from seafood is rare, so the benefits of seafood consumption must be weighed against the risks. For most people, following the recommended national dietary guidelines is the best means of balancing risks and benefits. For some groups such as pregnant women and children, specific advisories on healthy and safe seafood choices should apply. For more information, see http://www.nap.edu/catalog.php?record_id=11762