



What are Salmonella?

Salmonella are facultative anaerobic, non-sporulating, Gram negative bacteria. The genus *Salmonella* consists of the two species *Salmonella enterica* and *Salmonella bongori*. *S. enterica* has six subspecies and 1,500 serotypes. *S. enterica* is a frequently reported cause of foodborne illness, occurring in both food poisoning-triggered epidemics and in isolated cases.

How is Salmonella transmitted?

- *Salmonella* are widely distributed in nature and can enter the aquatic environment, food and water through animals, domestic stock, poor sanitation and inappropriate disposal of human and animal wastes.
- *Salmonella* related gastroenteritis has been frequently linked with the consumption of contaminated fresh produce, raw meats, poultry, eggs and dairy products.
- A small number of outbreaks have been associated with seafood. The presence of *Salmonella* in seafood may derive from contamination occurring in the natural aquatic environment, in aquaculture or during processing and storage.

What outbreaks have occurred?

- In Australia, only five outbreaks including 60 cases have been reported in relation to the consumption of seafood.
- *Salmonella* have been identified as a cause of seafood related outbreaks in the European Union, the United States and in other countries.

- The US FDA has demonstrated the presence of *Salmonella* in a variety of fish and shellfish, including ready-to-eat seafood products, seafood products requiring minimal cooking, and shellfish eaten raw.

What are the symptoms?

S. enterica predominantly causes two distinct diseases:

- Gastroenteritis or “food poisoning” caused by non-typhoidal *Salmonella* serotypes. It is characterised by sudden nausea, vomiting, abdominal cramps, diarrhoea, headache, chills and fever. The symptoms can be mild to severe and may last between 5-7 days.
- Typhoid fever is caused by *S. enterica* Typhi and Paratyphi, which only occurs in humans. If untreated, the fever can last for weeks; however, with antimicrobial treatment patients recover within 10-14 days. Effective vaccination against typhoid fever is possible.

How much is a harmful dose?

- The infectious dose of *Salmonella* varies with both serotype and the contaminated food matrix.
- Human trials suggest approximately 10^5 colony forming units are required to infect healthy adults.

What can be done to inactivate or eliminate Salmonella?

Salmonella can be killed by exposure to :

- ≥ 60 °C for 4-6 minutes,
- $\geq 30\%$ NaCl (salt) concentration,
- water activity of below 0.94,

- pH of less than 3.8, although this is dependent on the type of acid used,
- A high concentration of chlorine. It has been found that this can achieve a 1 – 2.5 log₁₀ reduction in colony units per gram of food, and
- Irradiation, although effectiveness is dependent on food product and the level of pathogen contamination.

What can be done to manage *Salmonella* in seafood?

- Good Manufacturing Practice
- Good Hygiene Practice

Where can I access more information?

JAY, S., DAVOS, D., DUNDAS, M., FRANKISH, E. & LIGHTFOOT, D. 2003. *Salmonella*. In: HOCKING, A. D. (ed.) *Foodborne Microorganisms of Public Health Significance*. Sixth ed. New South Wales: Australian Institute of Food Science and Technology Inc.

SUMNER, J. 2011. Hazards affecting Australian seafood. South Australia: Australian Seafood Cooperative Research Centre, Fisheries Research and Development Corporation.

How can we test for *Salmonella*?

There are several testing methods for *Salmonella* in foods. The recommended methods are based on the International Standard (ISO 6579) and Australian Standard (AS 5013.10-2009).

Regulatory standards

The Australian regulatory limit for *Salmonella* can be found at Food Standard 1.6.1 (<http://www.foodstandards.gov.au/>).

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

Contact us:

<http://safefish.com.au>



AUSTRALIAN
SEAFOOD
COOPERATIVE
RESEARCH CENTRE



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

