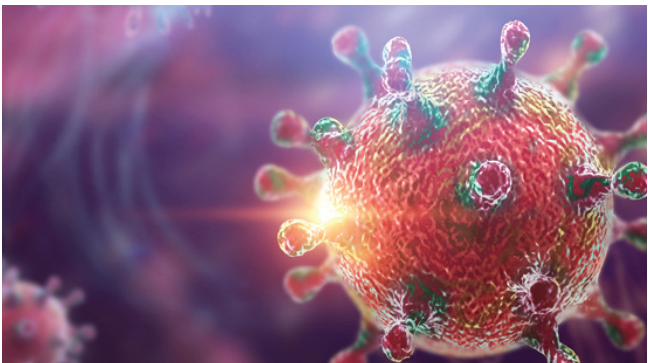




Are you safely **processing**
ready-to-eat products for
your consumers?

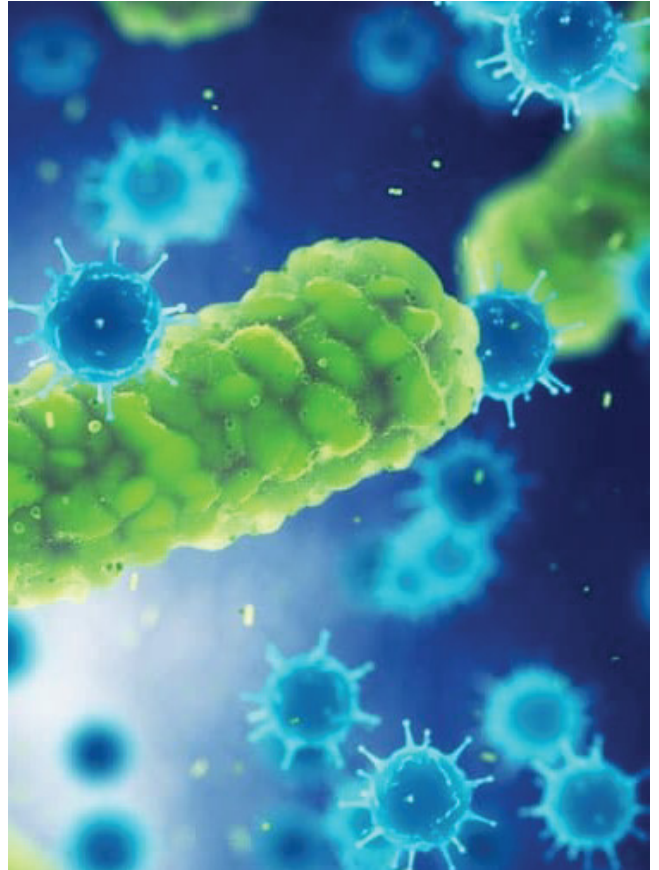


A guide to understanding
micro-organisms that can
contaminate your food.

Why are ready to eat meals tested?

Ready-to-eat (RTE) foods are intended to be consumed without any further processing by the final consumer that may eliminate or reduce pathogenic microorganisms that could be present to a safe level. They may be commodity based (e.g. dairy or meat products), but commonly include a combination of ingredients from more than one commodity group. The safety and suitability of RTE foods should be ensured through adherence to food handling controls and good hygiene practices that prevent or minimise contamination by and growth of pathogenic microorganisms.

Food samples may be taken for a variety of surveillance and monitoring purposes. When microbiological testing of food samples is carried out it is important that relevant tests and suitable limits are applied so results are interpreted correctly and consistently.

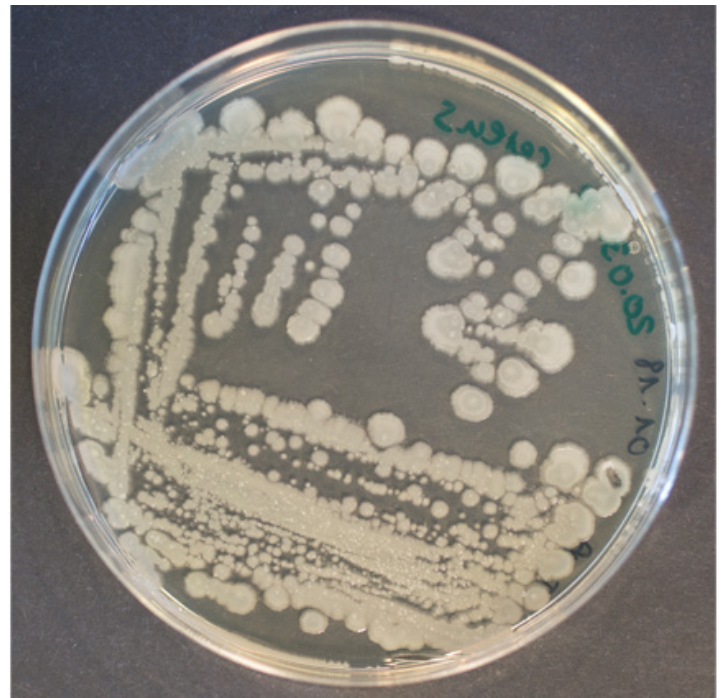


Bacillus cereus

Cooked foods such as:

- rice dishes including sushi
- potato and pasta dishes
- meat, vegetable and fish dishes (stews, curries etc.).

Spores are widespread in the environment and may be present on raw ingredients. The spores survive and are activated by cooking. When food is then cooled too slowly or displayed out of temperature control for extended periods, warm conditions allow for vegetative cells to grow to high levels and produce toxins.

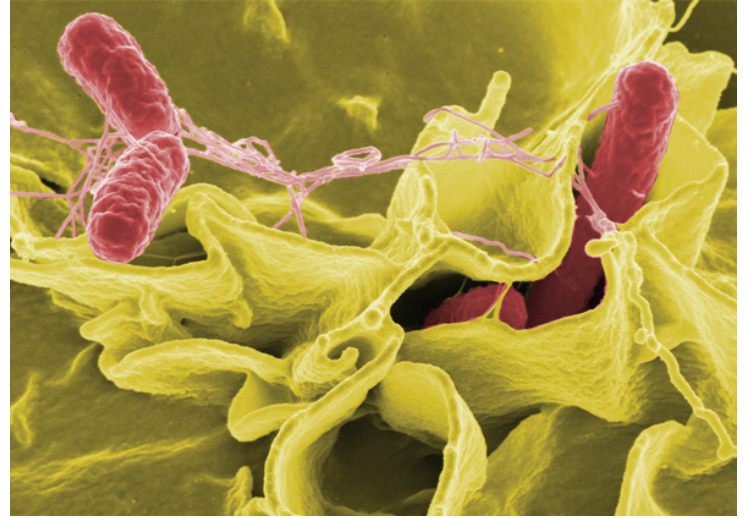


Campylobacter spp

Main food vehicles:

- undercooked/improperly handled poultry
- raw meat
- unpasteurised milk
- contaminated water.

Campylobacter spp. can colonise the intestinal tract of food-producing animals, such as chickens, cattle, sheep and pigs. Inadequate processing (e.g. undercooked poultry, unpasteurised milk) and cross contamination of RTE foods or food contact surfaces with raw meat and poultry can result in sufficient numbers being present in food to cause illness.

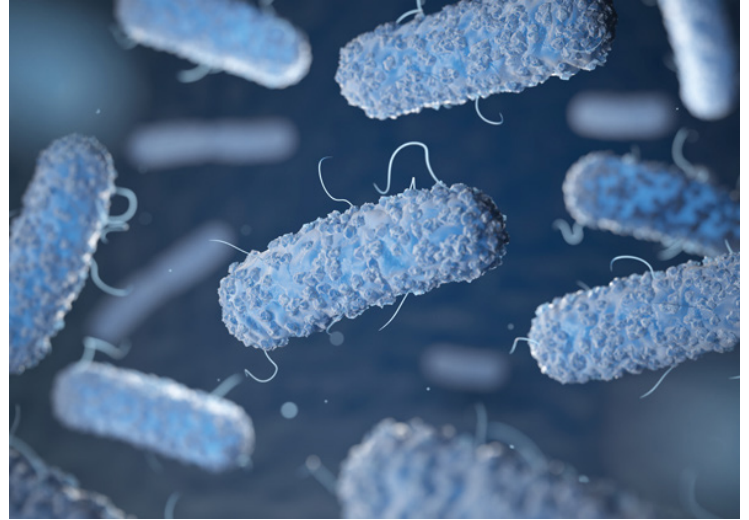


Clostridium perfringens

Cooked foods such as:

- meats, particularly rolled and large joints
- meat containing products such as stews, gravies, curries and pies
- vegetable dishes (curries, soups etc.)

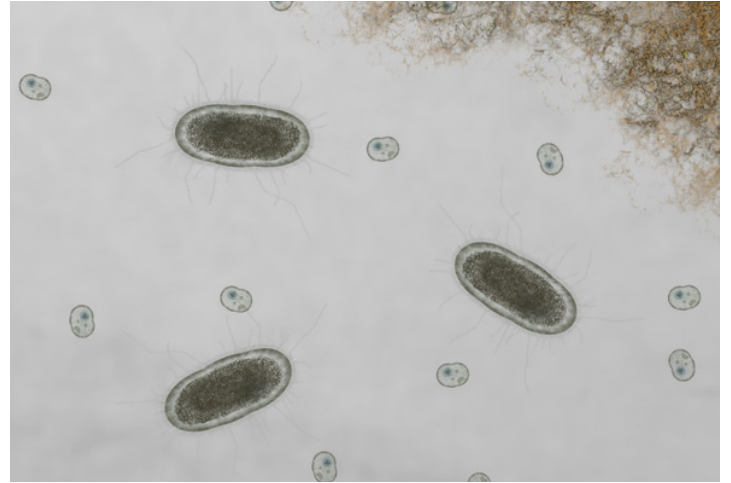
Spores are widespread in the environment and are a part of normal intestinal flora of animals. The spores survive and are activated by cooking. Slow cooling/reheating, particularly of large volumes of food, provides warm, anaerobic conditions that allow for vegetative cells to grow to high levels that cause illness when ingested.



Listeria monocytogenes

RTE foods that can support the growth of *Listeria monocytogenes* and have an extended refrigerated shelf life. Foods that have been associated with outbreaks include soft cheeses, delicatessen meats, cooked chicken, smoked seafood, salads and rockmelon.

Listeria monocytogenes is widespread in the environment and able to persist in food processing environments. RTE foods can become contaminated post processing through contamination from food contact surfaces. *Listeria monocytogenes* is able to grow at refrigeration temperatures and can reach high levels in food that supports its

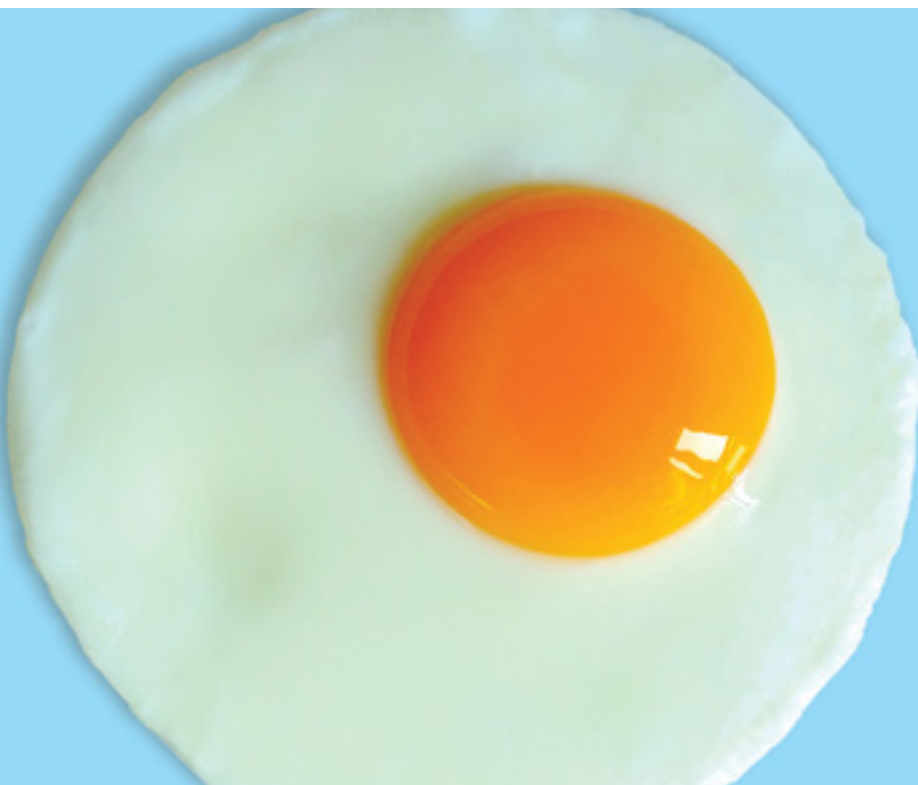


Salmonella spp.

A wide range of foods have been implicated in outbreaks of food-borne salmonellosis:

- animal products such as eggs (particularly raw or lightly cooked egg dishes), poultry, raw meat, milk and dairy products
- fresh produce (such as leafy greens, seed sprouts, melons)
- low moisture foods such as spices, peanut butter, chocolate and flour.

Salmonella is widely dispersed in the environment. A primary reservoir is the intestinal tracts of vertebrates, including livestock, wildlife, domestic pets, and humans. Contaminated raw foods that are eaten without further processing (such as cooking), cross contamination during food handling and poor hygiene and temperature control practices are factors contributing to food-borne salmonellosis.

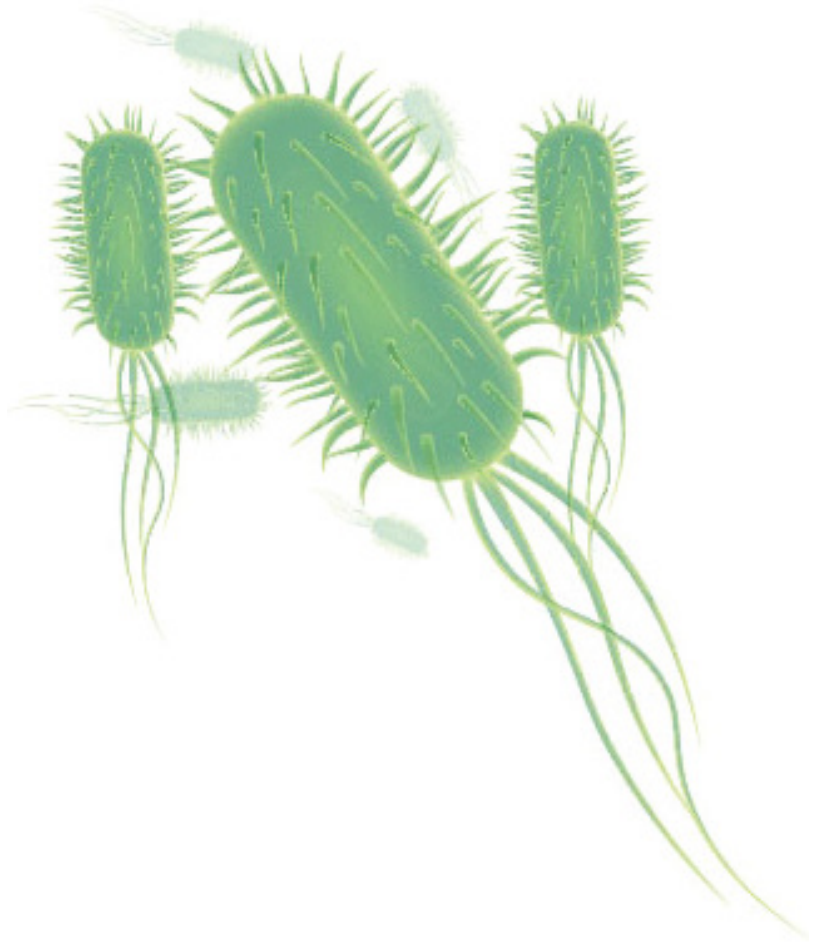


Shiga toxin-producing *Escherichia coli* (STEC)

Foods include:

- inadequately cooked ground beef (hamburger patties)
- uncooked fermented comminuted meat (e.g. salami)
- raw or inadequately pasteurised dairy products (milk and cheese)
- fresh produce such as leafy greens and sprouted seeds.

Ruminants, in particular cattle and sheep, are the major animal reservoir of STEC. Infected animals shed the bacteria in their faeces, resulting in contamination of the environment. Primary products (such as meat, milk and fresh produce) can be either contaminated directly by faecal material or indirectly via contaminated water or soil. STEC infection is associated with contaminated foods that are eaten without further processing or have been inadequately processed.



Staphylococcus aureus and other coagulasepositive staphylococci

A variety of foods, particularly those high in protein and requiring extensive handling during preparation. These can include:

- meat and meat products
- poultry and egg products
- milk and dairy products
- cream or custard filled bakery products
- sandwich fillings.

Food handlers are the main source of food contamination via direct contact (staphylococci can normally be present in people's nasal passages, throat and skin). Contamination of food can occur via hands or respiratory secretions. Time and temperature abuse of contaminated food can result in growth of *S. aureus* and production of enterotoxin in the food.



Vibrio parahaemolyticus

Foods predominantly associated with food-borne illness caused by *Vibrio parahaemolyticus* are fish, shellfish and crustaceans (particularly raw molluscs and crustacean).

Vibrio parahaemolyticus occurs in coastal and estuarine waters and is a natural contaminant of seafood. Initial levels will depend on environmental factors at harvest. Illness is associated with eating raw or lightly cooked seafood, or cooked seafood that has been cross-contaminated. Inadequate refrigeration of seafood contaminated with *Vibrio parahaemolyticus* allows growth to levels that cause illness.



Food safety is best ensured by implementing food hygiene controls at each stage of food handling throughout the food chain.

Microbiological testing can be a useful tool to support through-chain control measures. Microbiological criteria may be established to examine ingredients, in-process and environmental samples and food products that may be collected at different points in the food system, from primary producers, through production and retail.

Process hygiene criteria are microbiological criteria applied to verify hygiene measures or control of process. They can be applied at various stages throughout the production process to indicate whether the food safety controls in place are working as intended. Nonconformance with a process hygiene criteria should result in corrective actions to adjust the process, as appropriate, and ensure ongoing control of production.

