



DATASHEET

Microbiological Hazard Series

Pathogen Name: *Salmonella*

Characteristics: *Salmonella* is a motile, non-spore forming, Gram-negative, rod-shaped bacterium of the family Enterobacteriaceae that is approximately 0.7-1.5 by 2.0-5.0µm in size. It has the ability to grow between a pH of 3.7-9.5 and a temperature of 7-48°C.

Pathogenicity: Salmonellosis is a zoonotic infection which means it can be transmitted to humans from animals.

Salmonella can cause two types of illness (1) nontyphoidal salmonellosis and (2) typhoid fever.

The symptoms of nontyphoidal salmonellosis can be quite unpleasant, but this illness is generally self-limiting among healthy people with an intact immune system (although it can cause life-threatening illness even in healthy people). Typhoid fever is more serious and has a higher mortality rate than nontyphoidal salmonellosis. Vulnerable people would be the young, elderly and those suffering from chronic illness or disease such as HIV.

Infectious Does: For Nontyphoidal Salmonellosis it can be as low as one cell depending on the age and health of the host. For Typhoid fever it can be fewer than 1,000 cells.

Sources (Including High - Risk food groups): Raw meats, poultry, eggs, unpasteurised milk and dairy products, seafood, fresh produce (including seed sprouts) and spices. *Salmonella* is also widely dispersed in nature and the environment. It can colonize in the intestinal tracts of vertebrates, including livestock, wildlife, domestic pets, and humans.

Onset Period: Nontyphoidal Salmonellosis: 6-72 hours of exposure to the bacteria. Typhoid Fever: Generally, 1 to 3 weeks, but may be as long as 2 months after exposure.

Illness, Symptoms, and Complications:

Salmonellosis symptoms include nausea, vomiting, abdominal cramps, diarrhoea, fever and headache and can last between 4-7 days with acute symptoms lasting 1-2 days depending on the host factors and the dose ingested.

Nontyphoidal *Salmonella* can sometimes escape from the gastrointestinal tract into the body and cause blood poisoning (septicemia) or infect the blood, internal organs, and/or joints (bacteremia).

Typhoid fever which symptoms include high fever, lethargy, gastrointestinal symptoms including abdominal pain, diarrhoea or constipation, achiness, loss of appetite. Sometimes a rash of flat rose-coloured spots can occur. Septicemia, with colonization of other tissues and organs, may lead to endocarditis. Septic arthritis may occur, in which the infection directly affects the joints and may be difficult to treat. Chronic infection of the gallbladder may occur, which may cause the infected person to become a carrier.

Controls to reduce the risk:

The control of *Salmonella* in food should start on the farm with the careful production of animal-derived raw materials such as eggs, poultry, pork and fresh produce. Suppliers should carefully source their ingredients and supplies from approved suppliers and in particular, purchase pasteurised products (such as milk or eggs). *Salmonella* can be effectively controlled by relatively mild heat processing (e.g pasteurisation) but it is essential that cross-contamination between food is avoided.

General good hygiene practices such as washing hands thoroughly after handling raw meat and effective temperature controls are also very important.

HACCP should be used to identify and implement adequate controls for *Salmonella* (ensuring the organism is absent) in all ready to eat food and drinks. To ensure that ready-to-eat foods remain free from *Salmonella*, careful handling and storage of product should be encouraged at the retail stage and in the consumer's home.

EXAMPLE OUTBREAKS		
YEAR	LOCATION	DETAILS
2006	UK	Chocolate bars became contaminated which resulted in 37 people falling ill.
2017	France	Infant formula became contaminated which resulted in 35 infants falling ill.
2018	USA	Raw sprouts that were not washed were served with sandwiches which resulted in 8 people falling ill.

SUMMARY TABLE	
Source	<ul style="list-style-type: none"> • Raw Meat • Poultry • Eggs • Seafood • Spices
Growth Temperature	<ul style="list-style-type: none"> • 7 and 48°C
Growth pH range	<ul style="list-style-type: none"> • 3.7-9.5
Onset period	<ul style="list-style-type: none"> • Non-typhoid: 6-72 hours • Typhoid: 1-3 weeks
At risk groups	<ul style="list-style-type: none"> • Immunocompromised Individuals and those suffering from chronic illnesses • Those with weaker immune systems - (The elderly and the very young)
Illness, Symptoms, Complications	<ul style="list-style-type: none"> • Diarrhoea • Fever • Vomiting • Serious cases can result in meningitis and septicemia
Controls	<ul style="list-style-type: none"> • Careful production of animal derived products at farm level • Mild heat processing treatments • Good hygiene procedures • Effective temperature control • Gloves • Personal Protective Clothing
Published Risk Assessments	<ul style="list-style-type: none"> • WHO: Risk Assessments of Salmonella in eggs and broiler chickens www.who.int/foodsafety/publications/salmonella/en/ • EFSA: Quantitative risk assessment of Salmonella Enteritidis in shell eggs http://onlinelibrary.wiley.com/doi/10.2903/j.efsa.2010.1588/epdf • ECDC: Multi-country outbreak of Salmonella Enteritidis, infections linked to Polish eggs https://ecdc.europa.eu/en/publications-data/multi-country-outbreak-salmonella-enteritidis-infections-linked-polish-eggs

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