

Control of Salmonella Contamination in Agro Products

Salmonella is a genus of bacteria that are a major cause of foodborne illness throughout the world. Salmonella is 1 of the key cause of diarrhoeal diseases. *Salmonella* is a ubiquitous and hardy bacteria that can survive several weeks in a dry environment and several months in water.

Salmonella has evolved to live in the gastrointestinal tracts of animals and so the primary sources of contamination are animals and their faeces. Many different animals can be infected with *Salmonella*, often without suffering from any obvious symptoms. Birds, rodents, reptiles, frogs, fish and snails can all carry the bacteria. This can result in contamination of soil and surface waters, leading to infection of food animals and contamination of fruits and vegetables, herbs, spices, seeds, nuts. Food animals can also become infected via their feed or from other infected animals

All salmonellae can grow with or without oxygen (facultative anaerobes) and in atmospheres containing high levels of carbon dioxide (possibly up to 80 % in some conditions)

Salmonella is not especially resistant to sanitisers used in the food industry, but is able to form protective biofilms if cleaning is inadequate.

The disease

Salmonellosis is a disease caused by the bacteria *Salmonella*. It is usually characterized by acute onset of fever, abdominal pain, diarrhoea, nausea and sometimes vomiting.

The onset of disease symptoms occurs 6–72 hours (usually 12–36 hours) after ingestion of *Salmonella*, and illness lasts 2–7 days.

Symptoms of salmonellosis are relatively mild and patients will make a recovery without specific treatment in most cases. However, in some cases, particularly in children and elderly patients, the associated dehydration can become severe and life-threatening.

Sources and transmission

- *Salmonella* bacteria are widely distributed in domestic and wild animals. They are prevalent in food animals such as poultry, pigs, and cattle; and in pets, including cats, dogs, birds, and reptiles such as turtles.
- *Salmonella* can pass through the entire food chain from animal feed, primary production, and all the way to households or food-service establishments and institutions.
- Salmonellosis in humans is generally contracted through the consumption of contaminated food of animal origin (mainly eggs, meat, poultry, and milk), although other foods, including green vegetables contaminated by manure, have been implicated in its transmission.
- Person-to-person transmission can also occur through the faecal-oral route.

- Human cases also occur where individuals have contact with infected animals, including pets. These infected animals often do not show signs of disease. Hands are a common vehicle of transferring Salmonella.

In the growing field, Contamination with Salmonella and other dangerous microorganisms comes directly from faecal material and indirectly from:

- Poor personal hygiene practices of workers
- Human and animal faeces, including bird droppings in the growing fields
- Untreated faecal waste used as fertilizer
- Contaminated water sources
- Use of dirty harvest equipment, containers, and storage facilities

Recommendations for Farmers

Things to follow for growing safer farm produce: rural workers, including small farmers who grow crops for themselves, their families and for sale in local market with key practices to prevent microbial contamination.

Things to follow for disease free (Salmonella free) crop:

- Practice good personal hygiene.
- Protect fields from animal faecal contamination.
- Use treated faecal waste.
- Evaluate and manage risks from irrigation water.
- Keep harvest and storage equipment clean and dry.

Practice good personal hygiene.

- Wash and dry hands with a clean, dry towel after toileting, diapering a child and contact with animals
- Change clothes and bathe regularly
- Cover cuts, lesions and wounds
- Use a toilet or latrine to urinate and defaecate

Protect fields from animal faecal contamination

- Keep animals away from roaming in growing fields
- House livestock away from growing fields in a fenced area
- Remove trash from in and around growing field

Use treated faecal waste or compost

- Use faecal waste (manure and human excreta) that is properly treated
- Apply treated faecal waste (compost) to fields prior to planting
- Maximize the time between the application of treated faecal waste (Compost) and harvest

Evaluate and manage risks from irrigation water

- Identify all water sources relevant to your growing field

- Be aware of the risk of microbial contamination of water
- Protect water from faecal contamination
- Apply control measures when using water contaminated or of unknown quality

Keep harvest and storage equipment clean and dry

- Wash harvest and storage equipment with clean water and dry before use
- Keep containers off the ground before, during and after harvesting
- Remove visible dirt and debris from fruits and vegetables in the field
- Cool fruits and vegetables quickly
- Limit access of animals, children and other non-workers to the harvest and storage areas

Recommendations for agricultural produce processors

- Both professional and domestic agricultural produce processors should be vigilant while processing farm produce and should observe hygienic rules for processing.
- Professional produce handlers/workers who suffer from fever, diarrhoea, vomiting or visible infected skin lesions should report to their employer immediately.
- These recommendations from IOPEPC to educate consumers, processors. They are especially important in preventing food poisoning. Following things for Safer Produce are:
 - a. Keep your premises clean
 - b. separate processing of each produce (If Processing of different farm produce in same premises)
 - c. provide required temperature while processing thoroughly (If required in processing)
 - d. *Salmonella* can be effectively controlled by relatively mild heat treatments, but it is essential that adequate measures are in place to avoid cross contamination between raw material and final produce
 - e. keep products at safe temperatures
 - f. Use safe water and raw materials.