



Delivering a **Healthy WA**



Doubts About Sprouts

Environmental Health Guide

Think of healthy foods and fresh fruits and vegetables come to mind. Health authorities in Australia, as elsewhere, advocate the inclusion of fresh fruits and vegetables as part of a balanced, wholesome and healthy diet. Recent changes in nutrition and diets have seen pulses such as peas, beans and other sprouted seeds like alfalfa and bean sprouts become part of everyday meals.

Sprouts have a variety of culinary uses and are high in protein, vitamins, minerals and roughage. However, they are also at risk from food poisoning bacteria.

Growing sprouts presents special problems because of the potential for bacterial contamination and their rapid multiplication during the sprouting process. In addition, sprouts are eaten raw and not subject to cooking which can kill microorganisms.

Two features of sprouts enhance inherent problems associated with this product. One is the formation of biofilms on the sprout surface. The other is the intercellular presence of bacteria in seeds and sprouts. Biofilm bacteria are able to form complex communities with other microbes and are resistant to sanitisers ⁽³⁾.

Numerous investigations into food poisoning outbreaks in the United States, United Kingdom, Sweden, Finland, Japan, Denmark and Canada have identified sprouts as a potential problem food because they are mostly eaten raw with minimal processing ⁽¹⁾.

Salmonella was involved in an outbreak in Sweden and Finland in 1997. E. coli 0157:H7 was involved in two outbreaks in Japan in 1996 and 1997 with more than 6,000 reported cases. Smaller food poisoning outbreaks caused by E.coli contamination have been reported from the United States ^{(1), (2)}.

The back page of this document outlines strategies which can minimise the risk of food poisoning bacteria in sprouts.

What we Did

A major survey of the sprouts industry in Western Australia was undertaken between January and March 2000.

The survey focused on the microbiological quality of sprouts available at retail level, how they are stored and handled by retailers, and retailer's compliance with manufacturers' handling instructions.

Two hundred and sixty one (261) samples of sprouted seeds of various types and combinations were tested for Total Plate Count (TPC), Coliforms, Listeria, Salmonella, E.coli, Bacillus cereus and Coagulase positive Staphylococcus.

What we Found

No pathogens were isolated from the 261 samples tested. Pathogens such as Listeria and Salmonella were not recovered from any samples. However, a significant percentage of samples 88.51% and 96.93% exceeded acceptable values for TPC and Coliforms respectively. E. Coli was recovered from 7 samples (2.68%). None of the E.coli recovered were toxigenic or capable of producing food borne infections. For more information on Listeria, Salmonella and E. coli see the Food Watch (Number 4) - *Microbiological Guidelines for Ready-to-Eat Foods*





Retail Display Practices

The survey identified many vegetable display units that are unable to achieve or maintain a safe temperature i.e. below 5°C.

Two hundred and three (203) samples were displayed in refrigerated cabinets and 52 samples were displayed at ambient temperatures. Over 75% (154) of these samples in refrigerated cabinets were at or above 10°C. At these temperatures, bacteria will continue to grow slowly. Of the remaining 49 samples displayed in refrigerated cabinets below 9°C, over 93% contained elevated levels of microorganisms.

The microbiological quality of the 52 samples displayed at ambient temperatures was comparable to those samples displayed in refrigerated cabinets.

Compliance with Grower's Handling Instructions

There are inconsistencies in handling instructions provided by sprout growers and the compliance of retailers with grower's handling instructions.

Eighty percent (80%) of samples were displayed under refrigerated conditions, 24% being samples without storage instructions. Conversely, 13% of samples with storage instructions were not refrigerated.

Eighty-one samples or 31% had no storage instructions.

The finding suggests a lack of understanding by growers and retailers of the risks associated with seeded sprouts and reaffirms the need to adopt a coordinated approach in developing information packages for growers and retailers.

Why Are Sprouts a Potential Problem?

The various stages of sprout production are shown below starting with seed selection through to sprout transport. The growing process can take several days and throughout this process the sprouts are held in a warm, humid environment which is ideal for bacterial growth. Any pathogens introduced will quickly multiply to unacceptable levels.

Seed Order

Ensure the microbiological quality of seed stock and suppliers by conducting routine testing. This survey confirms findings by Curtin University and the US Food and Drug Administration that the microbiological load of seeds influences the microbiological quality of final sprouts.

Seed Storage

Seed should be stored off the floor and in secure containers or enclosures of suitable materials to prevent the entry of pests, rodents and animals. Growers should also minimize handling, as microbiological contaminants introduced at this stage will significantly increase with further processing.

Germination Soak

Soaking assists germination by softening the hull and swelling the seed. This step results in rapid bacterial growth. A variety of sanitisers may be used in the soak water to reduce seed surface microflora.

Seed Rinse

The rinse is the cleaning step to remove debris and sanitisers residue that may be present from the soak phase.

A variety of sanitisers may be used at this stage to reduce bacterial levels then rinsed off.



Growing Method, a) Rotating Drum

This system has automatic spray irrigation, lighting and vents to expel heat and gases. Sprout growth period provides ideal conditions for bacteria growth, with abundant moisture, suitable temperatures and nutrients from the seeds and dust residues.

Rotating drums are used for growing alfalfa and other fine seeded sprouts.

Growing Method, b) Growing Room

Growing rooms are commonly used for raising bean sprouts.

Large tubs with drainage slots at the base are housed in a dark room with overhead spray irrigation systems.

Harvesting

Harvesting techniques depends on the growing method and type of packaging used, from cutting off handfuls of sprouts then packing or simply picking up individual punnets from a growing bed.

Regular hand washing or wearing disposable gloves will minimise cross-contamination.

Packing

Packing may include bulk plastic bags with twist tie seals, to small individual punnets.

Chill Storage

Sprouts under refrigerated conditions can be stored up to 14 days.

Stackable plastic crates with slotted sides and base are ideal for this purpose. Shallow cardboard cartons with similar features are popular for short-term storage and transport.

Transport

Transport vehicle should maintain refrigerated conditions and be suitably designed to enable cleaning and sanitising.

Drivers should conduct regular temperature checks and record results during transport.

How to Minimise the Risk

Everyone who grows, sells, handles and consume sprouts can improve standards and reduce the risks.

Advice for Growers-

Introduce good manufacturing practice (GMP) principals across industry.

- Use seeds from growers with horticultural practices that minimize bacterial contamination.
- Confirm seed quality by conducting regular microbiological tests for pathogens.
- Use transport and storage conditions and practices that minimize contamination.
- Use appropriate sanitisers at select stages of sprout production. (See flow chart)
- Adequately label packaging with storage and handling instructions for retailer and consumer.
- Adopt hazard analysis critical control point (HACCP) principals into processes.

Advice for Retailers-

- Follow product storage and handling instructions.
- Maintain safe temperatures in storage and display compartments.
- Maintain good food safety practices, cleaning, removing damaged stock, stock rotation, etc.



Advice for Consumers-

- Purchase sprouts as the need arises.
- Avoid storing sprouts for long periods even in the refrigerator.
- Consume sprouts within the Use-By-Date.
- Keep refrigerated at all times; minimize the time spent at ambient temperatures.
- Wash sprouts before use.

Advice for EHOs-

- Consider sprouts as a high-risk food when investigating food poisoning incidents.
- Reinforce safe handling, temperature and storage practices with retailers and consumers.

Ensure manufacturers and retailers exercise good food safety practices.

Who was involved in the survey?

Metropolitan Local Government

Armadale, Bayswater, Cambridge, Cockburn, Fremantle, Gosnells, Joondalup, Kalamunda, Melville, Mosman Park, Mundaring, Nedlands, Perth, Rockingham, Serpentine, South Perth, Stirling, Subiaco, Swan, Victoria Park, Vincent.

Country Local Government

Bunbury, Busselton, Capel, Carnarvon, East Pilbara, Gerladton, Harvey, Kalgoorlie/Bolder, Kellerberin, Mandurah, Murray, Port Hedland, Roebourne.

PathCentre - Food Hygiene Laboratory
Queen Elizabeth Medical Centre, Nedlands

Curtin University of Technology
(Staff and Students)
(* Slide and flow chart courtesy Curtin University)

Sprouts Growers

Food Safety,
Health Department of
Western Australia

References

- (1) USA Food and Drug Administration "Microbiological Safety Evaluation and Recommendation on Sprouts". May 28, 1999
- (2) Yoshinori Itoh, Yoshiko Sugita-Konishi et al. "Enterohemorrhagic *Escherichia coli* O157:H7 Present in Radish Sprouts". Applied and Environmental Microbiology, April 1998:p.1532-1535
- (3) William F.F. "Naturally Occurring Biofilms on Alfalfa and Other Types of Sprouts". Journal of Food Protection, Vol 63, No 5. 2000 P. 625-632
- (4) WAFMP Food Watch #4, "Microbiological Guidelines for Ready-to-Eat Foods", April 1999



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