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## Growing Sprouts at Retail

**Introduction:** The Food and Drug Administration (FDA) has identified sprouts as one of the top ten vehicles of foodborne illness causing organisms. Since 1990, there have been over 35 major foodborne outbreaks associated with the consumption of sprouts. These outbreaks have included salmonella, e coli, listeria and bacillus cereus. Over 2200 illness have been reported as a result of these outbreaks. Just recently the European Union (Germany) experienced a large outbreak of e Coli that sickened approximately 3500 and caused the death of over 40 people.

Concern and care must be taken by anyone who embarks on growing their own sprouts even if the sprouts are ultimately to be used in a cooked menu item. Processes used to grow sprouts face a challenge with regard to food safety. The vary nature of the seeds involved with their rough, pitted and creviced surfaces causes great difficulty in removing harmful bacteria or getting to the bacteria with adequate sanitizer solutions. Disease causing bacteria such as salmonella can survive on seeds for several weeks.

Additionally, if proper sanitizer levels are not maintained, harmful bacteria such as e coli can actually be drawn into the flesh of the plant during sprouting. When bacteria are taken into the plant itself it is impossible to kill the bacteria without a thorough heat treatment. While many restaurants use spouts only in cooked foods, inadequate heat treatment throughout the cooking process could result in a foodborne illness to the consumer(s). Therefore, the following guidance is provided from the FDA for anyone at retail level who desires to obtain a variance from the Oklahoma State Department of Health to grow their own sprouts:

**The following is reproduced directly from the FDA guidance document entitled “Growing Sprouts in Retail Food Establishment – CFP Issues 02-III-01 and 04-III-12”, dated December 2004.**

### **“CURRENT RETAIL SPROUTING INDUSTRY BEST PRACTICES:**

Often seeds are not identified as seed for sprouting during harvest but are considered an agricultural commodity that will probably be used to plant and grow additional fields of that crop. Consequently, the seeds may be mishandled or stored under conditions unsuitable for a food item. Sprouts are considered a ready-to-eat food with little additional processing. **There is no single treatment so far that has been shown to completely eliminate pathogens on seeds or sprouts that cause foodborne illness without affecting germination or yield.** Therefore, every precautionary measure should be taken to prevent high levels of bacteria from growing on the seeds or sprouts. Using the following retail sprout industry "Best Practices" will help ensure a safe and healthy product.

### Retail Sprouting Industry Best Practices

PROCESS STEP	SOURCE OF CONTAMINATION	CONTROL MEASURES
Receiving (Seeds or Sprouts)	<ul style="list-style-type: none"> <li>• Bacterial contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Approved source (purchase specifications - grown for human food, grown under Good Agricultural Practices (GAPs) including manure management, labeled with lot number for traceback to source)</li> <li>• Stored and handled under sanitary conditions during distribution</li> <li>• Inspection for torn bags or containers, rodent evidence (feces, urine - fluoresces in UV light)</li> <li>• Product condition (not wet or moldy)</li> </ul>
Seed Storage at Retail	<ul style="list-style-type: none"> <li>• Cross-contamination</li> <li>• Rodent Infestation</li> </ul>	<ul style="list-style-type: none"> <li>• Stored in clean, sanitized bins/containers</li> <li>• Seeds protected after opening</li> <li>• Have <u>SSOPs</u> in place (cleaning &amp; sanitizing, maintenance, pest control, etc.)</li> </ul>
Seed Treatment (Soaking & Rinsing)	<ul style="list-style-type: none"> <li>• Unsafe water</li> <li>• Physical contamination</li> <li>• Bacterial contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Use a public water supply or test private well water on a regular basis</li> <li>• Screen for stones and other debris</li> <li>• Protect all seeds from contamination especially if scarification is done to change germination</li> <li>• <b>Disinfection treatment</b></li> </ul>
Germination (Sprouting)  Germination (Sprouting) (Continued)	<ul style="list-style-type: none"> <li>• Dirty equipment</li> <li>• Unsafe water</li> <li>• Unsafe soil (if used for sprouts)</li> <li>• Airborne contamination</li> <li>• Bacterial</li> </ul>	<ul style="list-style-type: none"> <li>• Hot &amp; cold water available</li> <li>• Use potable irrigation water for sprouting seeds</li> <li>• Clean &amp; sanitize all surfaces that irrigation water and sprouts contact</li> <li>• Wash hands before and after handling sprouts</li> <li>• No broken or cracked utensils or equipment</li> </ul>

	<ul style="list-style-type: none"> <li>growth</li> <li>• Ill employees with infections</li> </ul>	<ul style="list-style-type: none"> <li>• Building enclosed</li> <li>• <b>Testing irrigation water for <i>Salmonella</i> and <i>E. coli</i> O157:H7</b></li> </ul>
Post-Germination (Harvesting/Packaging or Repackaging)	<ul style="list-style-type: none"> <li>• Unsafe water</li> <li>• Ill employees with infections</li> <li>• Inadequate label information</li> <li>• Unsafe packaging materials</li> </ul>	<ul style="list-style-type: none"> <li>• Use potable water rinse</li> <li>• Adequate and accessible restrooms and hand washing facilities</li> <li>• No bare hand contact with sprouts</li> <li>• Exclusion or restriction of ill employees</li> <li>• Sprout package label contains sprouter's name, address &amp; zipcode, lot code and "Keep Refrigerated" instructions</li> <li>• Food grade packaging materials</li> </ul>
Storage & Display	<ul style="list-style-type: none"> <li>• Bacterial Growth</li> <li>• Cross-contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Store/display at 41°/5°C or less</li> <li>• Protect sprouts from contamination</li> </ul>

## DISINFECTION TREATMENT:

**Seeds for sprouting should receive a treatment (such as 20,000 ppm calcium hypochlorite) that has been approved for reduction of pathogens in seeds or sprouts.** Some treatments can be applied at the sprouting facility or applied earlier in the seed production process. **However, at least one approved antimicrobial treatment should be applied immediately before sprouting.** Sprouters should carefully follow all label directions when mixing and using antimicrobial chemicals.

## VARIANCE APPLICATION AND HACCP PLAN:

Without a kill step to destroy pathogens that may be present on sprouts, other controls must be in place to assure that sprouts are safe to consume. When sprouting is done in a retail food store or food service establishment and sprouts are offered for sale or service directly to the consumer, the FDA Food Code requires the food establishment to obtain a variance from the regulatory authority, based on an approved HACCP Plan (See 2005 Food Code Section 3-502.11 (H) Variance Requirements).

As specified under Section 8-201.14 of the 2005 Food Code (Ref. 7), information to be included in the HACCP plan includes:

- A list of the types of seeds being sprouted in the food establishment
- A flow diagram or process description for each seed type that identifies the control measures, critical control points (CCPs) and critical limits, the methods and frequencies these CCPs are monitored, how and when management verifies that this has been done,

what corrective action will be done in the case of a problem and what records will be kept for documentation that the process has been done correctly

- Training on safe sprouting practices for employees
- Control measures showing which approved treatment method or combination of methods were used to achieve a reduction in pathogens and showing how the irrigation water from each batch of germinating sprouts is tested. There is zero tolerance for *Salmonella* and *E. coli* O157:H7 in raw sprouts.

## **REDUCED MICROBIAL RISK THROUGH INTERVENTIONS:**

Few alternative interventions have been found which will be effective against all pathogens associated with sprout outbreaks, be effective for all types of seeds and which will not affect germination rates, sprouting time, length of sprouts (yield) or quality of sprouts. Often a treatment that is effective for one type of seed may not be effective for other seeds. Some seeds are rough, wrinkled or have larger rough areas where the seed attaches to the pod during development (the hilum). Bacteria can easily attach to these rough areas and disinfection is more difficult. In some cases, the treatment reduces the level of pathogens leaving some injured bacteria that may show up in microbiological testing. Using an enrichment culture technique allows the bacteria to heal themselves and start to grow again showing that the disinfectant was not completely effective against that pathogen.

Seed disinfection is usually chosen over a treatment for sprouts because of the fragile nature of the sprout. In addition, contamination on the seeds or in the irrigation water can be taken up into the interior of the sprout tissue during the sprouting process where chemical disinfection treatment is ineffective. Disinfection appears to be more effective to remove any pathogens from the seed before sprouting begins but care must be taken so the sprouts are not recontaminated later by water, equipment or employees. It is also important to follow the specific instructions for any sanitizing/disinfection compounds and to apply the chosen treatment method to each batch of seeds. Inconsistent application has been identified as a factor contributing to several outbreaks.

Experimental treatments and technologies under development may provide alternate microbial intervention processes for sprouts in the future. Possibilities include: ethanol, hydrogen peroxide, ozone or ozonated water, calcium hydroxide, chlorous acid, dry heat, hot water, irradiation, UV light, ultrasound, pulsed light, high hydrostatic pressure, pulsed electrical or magnetic fields, gaseous antimicrobial compounds, vacuum infiltration of sodium or calcium hypochlorite, and non-pathogenic competitive exclusion.

Approval for irradiation of seeds is found in 21 Code of Federal Regulations (CFR) 179.26 (b)(10). Ozone in the gaseous or aqueous phase was declared Generally Recognized as Safe (GRAS) in 2001. Chemical compounds that are used in disinfectant treatments for seeds must be approved by the U.S. Environmental Protection Agency (EPA) for that purpose and used according to the instructions for use on the label. **Only calcium hypochlorite has been approved for seed disinfection to date.**

## VERIFICATION (TESTING):

Because no single treatment has been found to completely eliminate pathogens, FDA recommends microbial testing of spent irrigation water. Verification testing can be done on-site in the retail establishment if adequate equipment and qualified personnel are available or private laboratories can be contracted to perform the necessary tests. A seed disinfection treatment done in conjunction with microbial testing reduces the likelihood that contaminated product will be sold. Testing should be done for both the pathogens of concern, *E. coli* O157:H7 and *Salmonella*. There are reliable rapid tests kits that can be used but an enrichment step is required. Enrichment helps identify pathogens that may have been injured by the treatment method but not destroyed. It allows the bacteria to recover under conditions favorable to their growth. This method requires the use of a basic microbiology laboratory (media preparation area, flasks, pH meter, balance, autoclave and incubator). Testing sprout irrigation water is a reliable indicator of pathogen growth on the sprouts.

Samples should be taken by individuals trained to use aseptic (sterile) techniques and delivered to the testing laboratory that same day. Private laboratory personnel can either collect samples themselves or train employees in the retail food establishment in sampling technique. Analytical methods should be AOAC-approved screening tests or formal confirmatory tests which have been validated. Additional information about sampling and testing is found in FDA's "Guidance for Industry: Sampling and Microbial Testing of Spent Irrigation Water During Sprout Production".

## REFERENCES:

1. California Department of Health Services, Food and Drug Branch and the U.S. Food and Drug Administration. 2000. Safer Processing of Sprouts, A Food Safety Training Program (video and manual - \$23.60).
2. Inami, G. and R. Bryant. 1999. California Department of Health Services. Personal Communication.
3. National Advisory Committee on Microbiological Criteria for Food. 1999. [Microbiological Safety Evaluations and Recommendations on Sprouted Seeds](#)<sup>1</sup>. Intl. J. Food Microbiol. 52: 123-153.
4. U.S. Food and Drug Administration, Consumer Advisory. July 9, 1999. Consumers Advised of Risks Associated with Raw Sprouts.
5. U.S. Food and Drug Administration, CFSAN, October 27, 1999. [Guidance for Industry: Reducing Microbial Food Safety Hazards for Sprouted Seeds](#).<sup>2</sup>
6. U.S. Food and Drug Administration, CFSAN, October 27, 1999. [Guidance for Industry: Microbial Testing of Spent Irrigation Water During Sprout Production](#)<sup>3</sup>.
7. U.S. Food and Drug Administration. 2001. [Food Code, 2001 Recommendations of the United States Public Health Service Food and Drug Administration](#)<sup>4</sup>.

As you can see the requirements for sprouting at retail level are extensive. If after reviewing this document and investigating your costs you desire to continue with sprouting at your establishment, you must obtain a variance from the Department of Health for the State of Oklahoma. We have guidance documents to assist you with completing the required documentation and are available on request.

**Until your variance process is complete and approved by the Oklahoma State Department of Health, you must discontinue the practice of growing your own sprouts and purchase such items from an approved grower. Commercial growers are regulated by the FDA so any product purchased through a produce vending company should be approved for purchase.**