Dr. Angela Shaw is an Associate Professor of Food Safety at Iowa State University in the Department of Food Science and Human Nutrition, and a Food Safety Extension Specialist. Her expertise is in food law and regulations, while her research focuses on farm to retail food safety.

Shaw’s research addresses the needs of commodity and practice groups, while her extension work focuses on education about emerging food safety concerns and food regulations.

- Identify inherent risks when preparing and serving produce items.
- Implement strategies to mitigate risk of foodborne illness from produce.
- Recognize resources to use in developing standard operating procedures addressing produce procurement, storage, handling, and service.

**PRODUCE FOOD LAWS**
- Food Drug and Cosmetic Act of 1938
- FDA Food Safety Modernization Act Produce Safety Rule
- Various EPA, OSHA, state, and local rules for farm use
- FDA Food Code 2017 (latest)

**LEARNING OBJECTIVES**
- Food Safety Modernization Act (FSMA)
  - Produce Safety Rule
  - Preventive Controls for Human Food
  - Preventive Controls for Animal Food
  - Foreign Supplier Verification Programs
  - Accreditation of Third-Party Auditors/Certification Bodies
  - Sanitary Transportation of Human and Animal Food
  - Prevention of Intentional Contamination/Adulteration
ổ 48 million people become ill from foodborne illness yearly (CDC, 2018)
• 46% of foodborne illness outbreaks linked to fruit, vegetables, and nuts (CDC, 2013; CDC, 2018)

• Fresh produce is often consumed raw (i.e., not cooked)
• Microbial contamination on produce is extremely difficult to remove once present
  ▪ Natural openings, stem scars, bruises, cuts
  ▪ Rough surfaces, folds, netting
• Contamination is often sporadic
• Bacteria can multiply on produce surfaces and in fruit wounds, provided the right conditions are present
1. Agriculture Water
2. Biological Soil Amendments
3. Domesticated and Wild Animals
4. Worker Training, Health, and Hygiene
5. Equipment, Tools, and Buildings
6. Sprouts

1. Do you have an employee training program?
2. Do you test your water for generic Escherichia coli?
3. Do you use raw manure or compost?
4. How do you control wildlife and domesticated animals on your farm?
5. What is your cleaning and sanitizing practices?
Check list for retailers purchasing local produce
https://store.extension.iastate.edu/Product/12938

Standard Operating Procedures (SOP)

- Standard Operating Procedures or SOPs are a set of written instructions that describes, in detail, how to perform a task safely and effectively.
- SOPs in place for: Purchasing, receiving, storage, preparation, and service.

SOP for Purchasing Produce

- Use a checklist for contract standards for an approved list of vendors
  - Farmer follows Produce Safety Rule
  - Produce processor follows Preventive Control
  - Produce specifications for operation
  - Commodity risk of produce item
  - Allergens
  - Education and Training on-farm or by vendor
  - Testing of water and handling on farm

Receiving Produce

- Approved list of vendors to receive
- SOP for receiving produce
  - When to accept
  - When to reject
  - Who to contact if reject

Best Practices at Receiving

- The FDA Food Code defines TCS produce as follows:
  - Raw seed sprouts, cut melons, cut leafy greens, cut tomatoes or mixtures of cut tomatoes that are not modified in a way so that they are unable to support pathogenic microorganism growth or toxin formation.
  - Temperatures should be monitored and verified at 41°F or below.
**BEST PRACTICES AT RECEIVING**

- Elements of an SOP for when to accept or reject produce:
  - Maturity of the produce
  - Visible evidence of disease
  - Insect damage
  - Cutting and bruising
  - Temperature control (TCS Produce)

**STORAGE OF PRODUCE**

- Store produce at the appropriate temperature.
  - Coolers typically are set at 32º - 40º F with humidity at or above 90%.
  - Most produce is stored for seven days.
- Store in manner to prevent cross contamination.
- Clean and sanitize coolers and refrigerators on a routine basis.
- Store all produce at least 6 inches off the floor.

**STORAGE GUIDELINES FOR FRUITS AND VEGETABLES**

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Temperature</th>
<th>Humidity</th>
<th>Length of Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>32</td>
<td>90</td>
<td>2-6 months</td>
</tr>
<tr>
<td>Broccoli</td>
<td>32</td>
<td>95</td>
<td>10-14 days</td>
</tr>
<tr>
<td>Cabbage</td>
<td>32</td>
<td>95</td>
<td>3-6 weeks</td>
</tr>
<tr>
<td>Carrots</td>
<td>32</td>
<td>95</td>
<td>4-6 weeks</td>
</tr>
<tr>
<td>Celery</td>
<td>32</td>
<td>95</td>
<td>2-3 month</td>
</tr>
</tbody>
</table>

**WHAT SOPS SHOULD YOU HAVE?**

- Rotation of produce schedule (how long to store produce).
- Store only produce that is free from all visible evidence of disease, insect damage, and/or cutting and bruising.
- Cleaning and sanitation routine for storage units.
- Pest management practices for the facility.
- Storage temperatures for specific fruits and vegetables.

**RESOURCES**

- Bulletin #4135 Storage Conditions: Fruits and Vegetables - University of Maine
- Storage Guidelines for Fruits and Vegetables - Cornell Cooperative Extension
**PREPARING PRODUCE**

- Employee training
  - Health and hygiene
- Inspect produce for damage prior to preparing
- Clean and sanitize all equipment, utensils, and food contact surfaces
- Wash whole produce prior to serving
  - Clean hands; gloves not necessary

**BEST PRACTICES AT PREPARATION**

- Do not rewash packaged produce labeled “ready to eat”, “washed” or “triple washed”.
- Do not use soap or detergent for washing produce as these products are not food grade.

**DO NOT**

- Cleaning and sanitizing of workspace
- Inspection procedures of the produce
- When to wash and not to wash produce
- Hand hygiene
- Glove Use
- Temperature control for TCS

**ELEMENTS OF FRESH PRODUCE PREPARATION SOP**

- Prep room and food contact surfaces should be cleaned and monitored on a routine.
- Wash hands before beginning.
- There should be Sanitation SOPs developed for specific equipment, cutting boards, knives, and brushes.
- Pre-chill fruits and vegetables prior to cutting (below 41F).

**IF PROCESSING...**

- If vacuum packaging or other modified packaging used, review Food Code requirements about need for variance and HACCP plan to address concerns.
- Work with local health inspector to ensure safety and quality issues are addressed.
Cut produce should only be displayed for 6 hours at 41°F or less.
Label products to ensure names and allergens are presented.
Clean and sanitize food contact surfaces and utensils.

Use equipment with food shields or sneeze guards.
Cut produce should only be displayed for 6 hours or less without temperature controls.
Clean and sanitize all surfaces and utensils.
Label all foods.
Use dispensers or single use packaged salad dressings.
Ensure temperature is below 41°F and check every 2 hours during service.
Use small serving pans to reduce food waste.

Use potable water with produce misters and reservoirs that are cleaned and sanitized regularly.

Produce safety laws
On-farm best practices
Produce Receiving
Storage of produce
Preparing produce
Serving produce
RESOURCES

- Handling Fresh Produce on Salad Bars
- USDA Food Safety Produce Best Practice Guide
  - https://fns-prod.azureedge.net/sites/default/files/Food_Safety_Produce_Best_practices.pdf
- Produce Safety Best Practices Guide for Retailers
- North Carolina State University
  - https://ncfreshproducesafety.ces.ncsu.edu/ncfreshproducesafety-gaps-standard-operating-procedures/
- University of Massachusetts
  - https://ag.umass.edu/vegetable/fact-sheets/standard-operating-procedures

QUESTIONS?

Dr. Angela Shaw
Iowa State University
Associate Professor/ Extension and Outreach
2577 Food Science Building, Ames, IA 50011
Email: angelaml@iastate.edu
Phone: 515-294-0868

43

CERTIFICATES

Certificates will be emailed out within 5-7 business days following today’s webinar.

45

WEBINAR RESOURCE

For more information about our webinars and registration:

46

FOODHANDLER FOOD SAFETY RESOURCES

Downloads
- Restaurant Re-Opening Guidelines
- Daily Temperature Logs
- Temperature Chart For Safe Food
- Refrigerator Storage Chart
- Food Safety Doesn’t Happen By Accident

Videos
- Handwashing
- Why To Glove
- When To Glove
- How To Glove

48
Past Blogs
• Emergency Preparedness
• Hepatitis A
• Ready-to-eat Foods
• Risk Based Health Inspections

Upcoming Blogs
• Food Safety Culture/Accountability
• Listeria/Cyclospora
• Produce Safety
• Allergies in Foodservice

Please send us your questions or comments at: FoodSafety@foodhandler.com