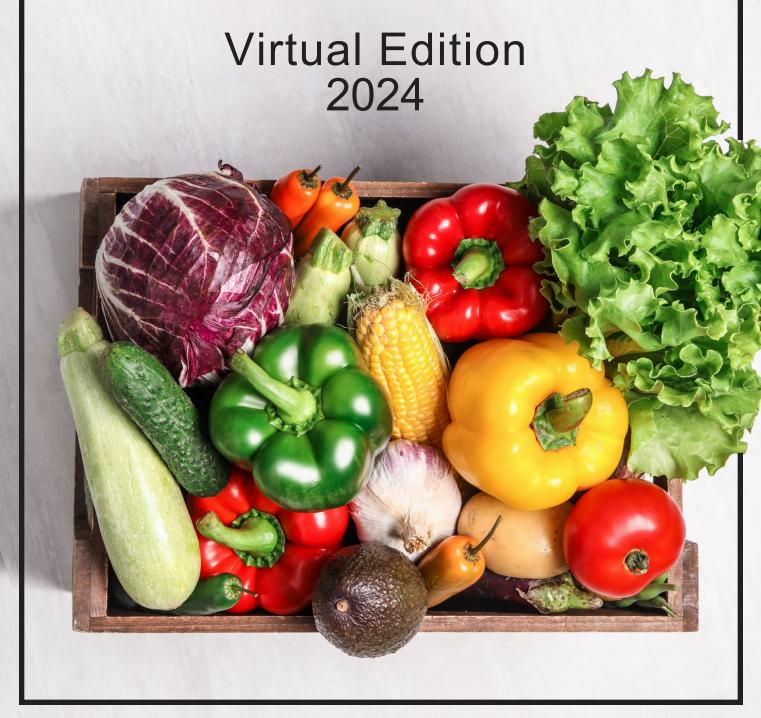


# Produce Safety University



#### **Table of Contents**

| My Action Notes   | 3   |
|---|-----|
| Goals and Objectives  | 4   |
| Where Does Your Produce Come From   | 6   |
| Epidemiological Investigation Activity  | 33  |
| Growing Food Safely   | 47  |
| GAPs Activity   | 68  |
| Checklist for Retail Purchasing of Local Fresh Produce                                    | 73  |
| Understanding FSMA – The Produce Safety Rule  | 77  |
| Buy Smart, Save Smart   | 86  |
| Buy Smart, Save Smart Activity  | 99  |
| AP EP Calculator & Produce Yield Finder   | 100 |
| Is An Apple Always An Apple?  | 101 |
| Insurance Coverage Options for Fresh Produce Growers                                      | 102 |
| Decision Tree: How Will You Bring Local Foods into the Cafeteria with Your Next Purchase? |     |
| Buy American – Supporting Local Agriculture in School Meals                               | 106 |
| Farm to School  |     |
| Garden Safety Checklist   | 127 |
| Get the Facts on Food Safety  | 129 |
| Food Safety Information and Resources for the Farm to School Community                    | 131 |
| The Food Safety Modernization Act and the Produce Safety Rule                             | 133 |
| Food Safety FAQs: FSMA and Its Impact on Farm To School Activities                        | 136 |
| An Overview of Good Agricultural Practices  | 140 |
| Overview: HARPC and HACCP   | 142 |
| Quality and Condition   | 147 |
| Market News   | 165 |
| Fresh-Cut Produce   | 176 |
| Mock Recall Activity  | 193 |
| Receiving and Storage   | 212 |
| Optimal Storage Temperature and Factor Guide  | 226 |
| Writing Specifications  | 237 |
| Writing Specifications Activity   | 254 |
| U.S. Standards for Grades of Fresh Tomatoes   | 260 |
| Safe Preparation and Service  | 275 |
| Using USDA DoD Fresh to Purchase Local Produce  | 293 |
| PSU Lab Logs  | 296 |
| Additional Pasaureas  | 226 |

# **My Action Notes**

#### When I get back I want to:

| Do this   | Because  |
|---|--|
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| Take-Home Training for Professional Standards slides and speakers notes are available to use and train others. Visit: <a href="https://www.fns.usda.gov/psu/graduates">https://www.fns.usda.gov/psu/graduates</a> for more information! | This knowledge is too great to keep to myself! |

#### **Overall Goals of Produce Safety University (PSU)**

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## **Provide Child Nutrition Professionals with the tools to:**

- Identify and mitigate food safety risks associated with produce.
- Increase produce shelf life, prevent spoilage, and reduce waste.
- Improve student acceptance of produce.
- Control produce costs.
- Engage the community and support local agriculture.
- Apply best practices for writing produce specifications.

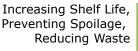
#### **PSU Objectives**

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## Look for these icons that connect to PSU objectives addressed in various presentations



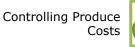
Identifying and Mitigating Food Safety Risks







Improving Student Acceptance







Engaging the Community, Supporting Local Agriculture Applying Specification Writing Best Practices







#### **Objectives**

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Identify different growing areas and types, harvesting, processing and distribution of fresh produce.



Explain the complexities and challenges of food safety in the global food supply.

#### **Key Points to Consider**

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#### Key Points

#### **What**

 Diverse production systems and broad geographic distributions influence the food safety considerations of our fresh produce supplies.

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#### **Key Points to Consider...**

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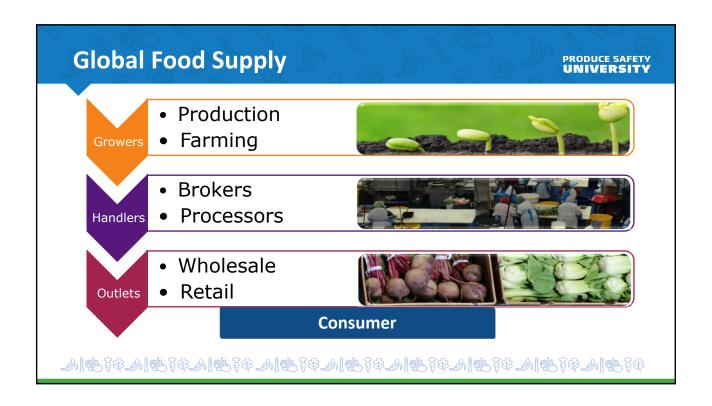
#### Key Points

#### <u>Why</u>

 Knowledge of where and how produce is grown and handled helps SNPs to identify, assess, and address potential food safety concerns across varied production and purchasing options.

#### **How**

Resources for Implementation: <u>Guidance for Industry: Guide</u>
 <u>to Minimize Microbial Food Safety Hazards for Fresh</u>
 <u>Fruits and Vegetables</u> (<a href="https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-industry-guide-minimize-microbial-food-safety-hazards-fresh-fruits-and-vegetables">https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-industry-guide-minimize-microbial-food-safety-hazards-fresh-fruits-and-vegetables</a>)





#### **Primary Production Farm**

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- Under one management in one general location
- Growing crops
- Harvesting Crops
- Raising Animals
- Pack or hold raw agricultural commodities



#### **Secondary Farm Activities**

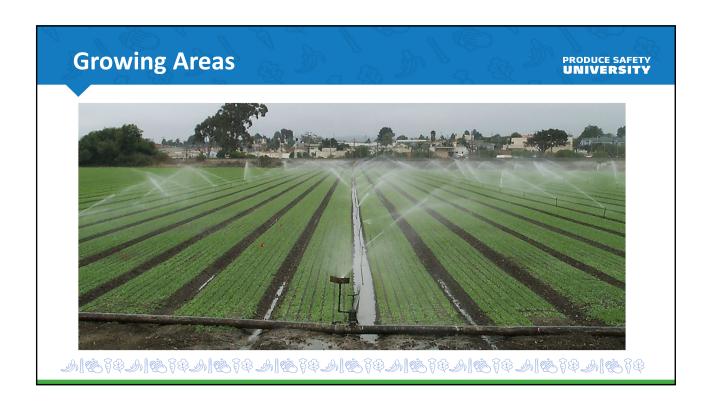
PRODUCE SAFETY

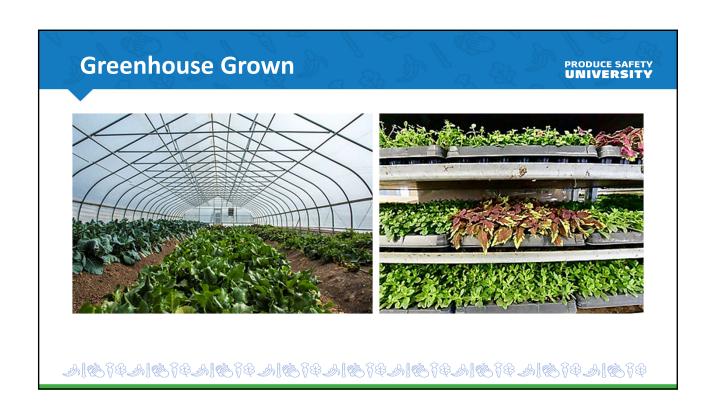


- Separate location from the primary production farm but majority owned by the same entity as the primary farm.
- Activities include:
  - shelling,
  - hulling,
  - packing or holding.









#### **Greenhouse Cucumbers**

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#### **Hydroponic Growing**

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# **Aquaponic Growing**

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#### **Urban Growing**

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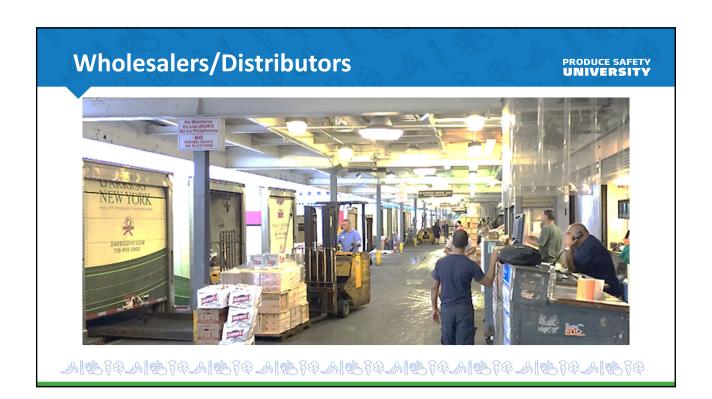


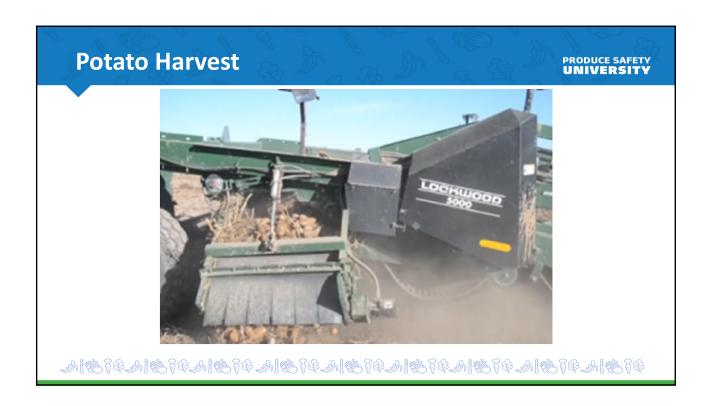


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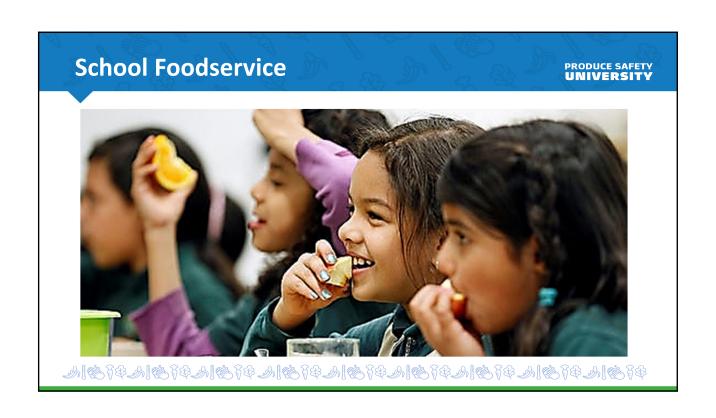
# Processors Produce safety University











#### **Summary**

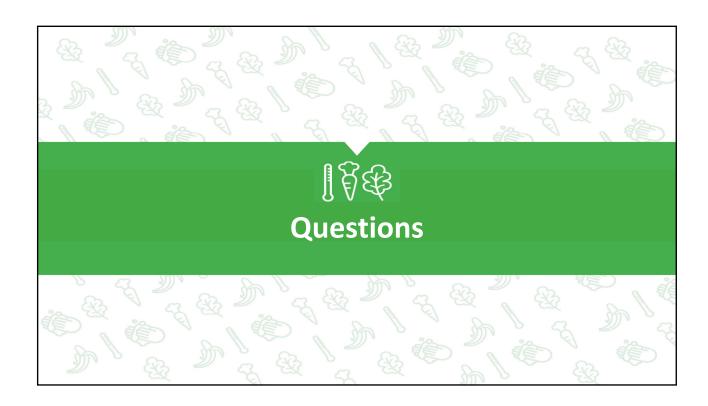
PRODUCE SAFETY UNIVERSITY



Identified different growing areas and types, harvesting, processing and distribution of fresh produce.



Explained the complexities and challenges of food safety in the global food supply.







#### **Objectives**

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Provide a brief overview of the food safety system in the United States.



Understand the food safety hazards associated with fresh produce.





Identify which foodborne illnesses are typically associated with produce.

#### Introduction

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#### Key Points

#### **What**

- Discuss the U.S. food safety system, food safety hazards associated with fresh produce, and foodborne illnesses typically associated with produce.
- Understand the importance of food safety regulations and identify the three different types of food safety hazards.

#### **Why**

- Foodborne illness outbreaks associated with fresh produce continue to be a concern.
- Understanding the food safety risks and how to reduce them can help to prevent foodborne illness among students and ensure the availability of healthy and balanced meals that are safe.

#### How

Resource for Implementation:
 Foodborne Illness Causing Organisms in the
 U.S. (https://www.fda.gov/media/77727/download)

#### What is Food Safety?

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- Conditions and practices that prevent unintentional contamination of food and foodborne illnesses
- Unintentional contamination may result from food safety hazards
- A food safety hazard is a biological, chemical, or physical property that may cause a food to be unsafe for human consumption
- Hazard Analysis and Critical Control Point (HACCP) plans/systems are intended to identify and control food safety hazards.

#### **The Why Behind Food Safety**

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Video from the California Leafy Greens Marketing Agreement (LGMA) https://www.youtube.com/watch?v=VN56\_ZEavaA&t=26s





#### **The Role of Government**

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- Set food safety standards
- Check if standards are met (through inspections and investigations)
- Conduct enforcement to address non-compliance
- Collaborate and partner across organizations to expand awareness, education, improvement, and compliance

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#### **Federal Food Safety**

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FSIS: Regulates meat, poultry, egg products, and catfish



• FDA: Regulates shell eggs, seafood, and all other foods, including produce



**CDC**: Investigates and monitors foodborne illnesses and outbreaks

# Food Safety in FNS Child Nutrition Programs

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- The Richard B. Russell National School Lunch Act (NSLA) is a 1946 federal law that created the National School Lunch Program (NSLP).
- The Child Nutrition and WIC Reauthorization Act of 2004 amended the NSLA and required implementation of a Hazard Analysis and Critical Control Point (HACCP) approach to food safety.

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# **Food Safety in FNS Child Nutrition Programs**

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- The Healthy, Hunger Free Kids Act of 2010 expanded the Hazard Analysis and Critical Control Point (HACCP) approach to any facility, or part of it, where food is stored, prepared, or served for the NSLP.
- The HACCP approach helps to reduce the risk of foodborne hazards.



#### **State and Local Food Safety**

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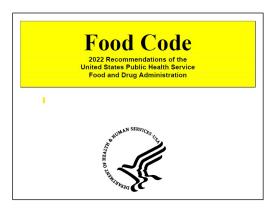


- At the State level, departments of agriculture and/or departments of public health are involved in food safety regulation.
- Both State and local regulatory agencies are responsible for enforcing the respective state and local food safety laws.
- Local (and sometimes State) public health departments typically regulate retail food establishments including schools.

#### **State and Local Food Safety**

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- Schools follow the FDA Food Code for retail foodservice operations.
- The latest version was published in 2022. The FDA Food Code is updated every 4 years.
- Many regulatory agencies use different versions of the FDA Food Code. The link below shows a list of food codes used in different States.



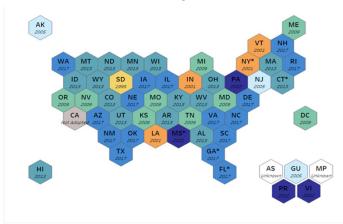
https://www.fda.gov/food/fda-food-code/state-retail-and-food-service-codes-and-regulations-state

https://www.fda.gov/food/fda-food-code/food-code-2022

#### **State and Local Food Safety**

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Adoption of the FDA Food Code by State and Territorial Agencies



An asterick indicates that a State has multiple agencies. This map displays the agency that has adopted the most recent version of FDA Food

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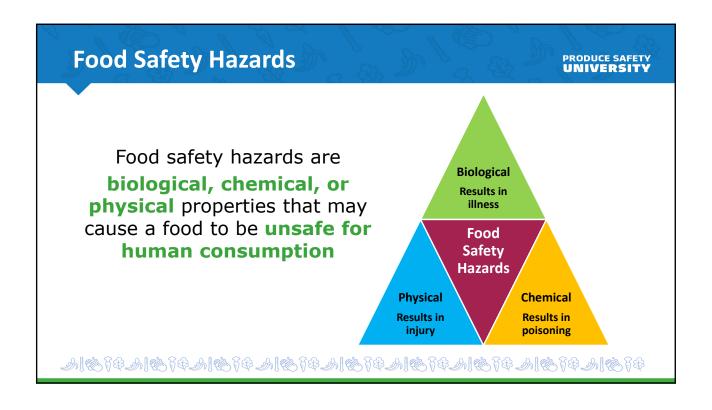
#### **Food Safety Versus Food Quality**

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- Food safety and food quality are different - Food quality refers to the features of a product that affect its value and shelf life
- Grading for quality is voluntary based on standards developed for each product and is paid for by the producer/processor
- Inspection for safety (wholesomeness) is mandatory and is paid for with public funds





#### **Physical Hazards**

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- Naturally occurring
  - Bones, insects (or parts), pits, seeds, shells, etc.
- Added: Foreign materials
   Metal, plastic, glass, rubber, bone, stones, wood, personal items, etc.

**Risks: Traumatic injury** 

Choking, laceration, damage to the mouth/throat/digestive tract, etc.

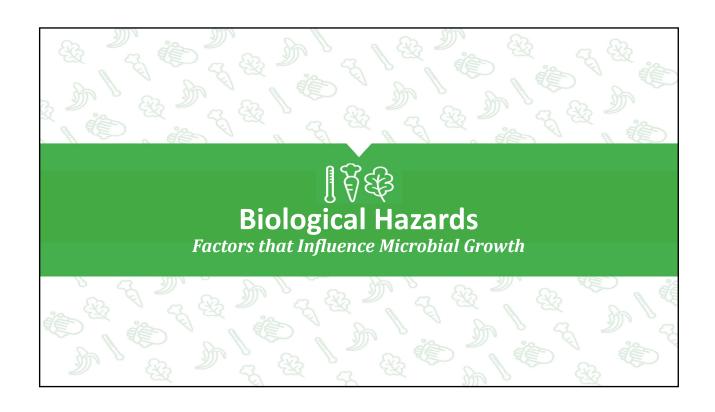
#### **Chemical Hazards**

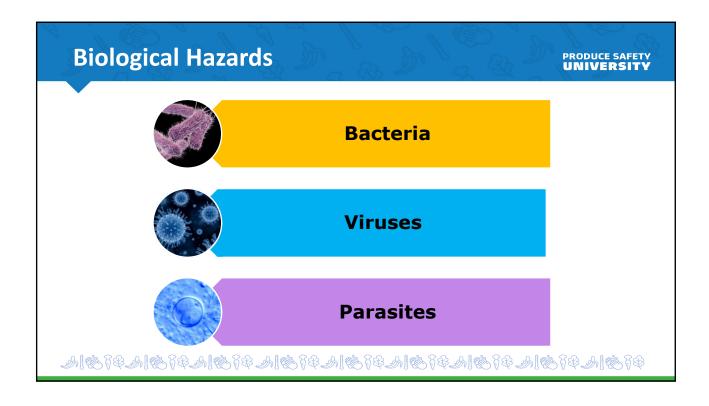
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- Naturally occurring
  - Mycotoxins: aflatoxins, patulin
  - Toxic mushroom species
  - Food allergens
- Added
  - Environmental contaminants: improperly used fertilizers and pesticides
  - Nonfood grade chemicals



**Risks: Acute poisoning or chronic illness** 





#### **Biological Hazards**

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#### **Bacteria**

- Naturally present in the environment, animals, and plants
- Certain bacteria can cause illness (pathogens)
  - Salmonella, Shiga Toxin Producing E.coli (STEC), Campylobacter, Listeria, Staphylococcus
- Can contaminate produce during harvest, processing, and preparation
- Are destroyed at cooking temperatures and growth prevented at refrigeration temperatures

#### **Biological Hazards**

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#### **Viruses**

- Require a living cell or host to multiply
- Foodborne viruses spread through humans handling foods who are infected with viruses
  - Norovirus, Hepatitis A, Other gastroenteritis causing viruses
- Can spread rapidly and be highly contagious
- Cooking is not effective at destroying foodborne viruses, must prevent human contamination through good personal hygiene.

#### **Biological Hazards**

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#### **Parasites**

- Require live animal or human hosts as part of their life cycles
- Exist naturally in the environment, but generally introduced to humans when sewage or fecal material contaminates water or food
  - Cyclospora, Giardia, Parasitic Worms (Tape Worms)
- Controlled through avoidance of contaminated water and proper sewage control

#### **Factors That Influence Bacterial Growth**

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Food

Temperature



Acidity

Oxygen





Moisture

#### **Bacteria need six components** to grow in food

- Food
- **A**cidity
- **T**ime
- **T**emperature
- Oxygen
- **M**oisture

# **Produce Contamination Risks During Processing**

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Fresh-cut produce, by definition, indicates that the plant's **protective cell layers are injured** 



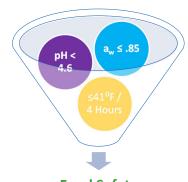
The natural exterior barrier is broken, and provides opportunity for pathogens to be introduced and grow if present

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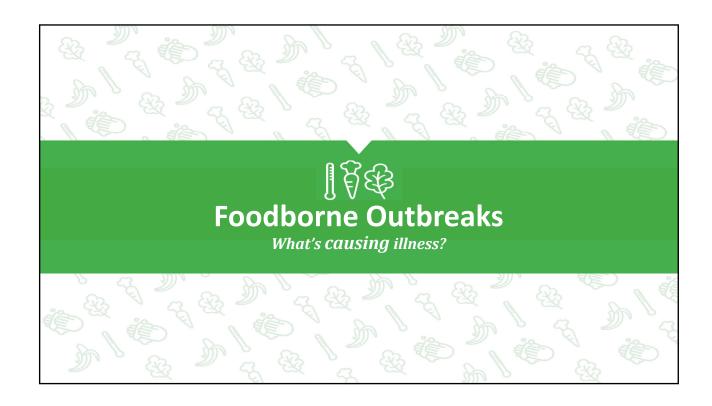
#### The Food Code and Biological Hazards

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- The FDA Food Code lists raw seed sprouts, cut melons, cut leafy greens, and cut tomatoes as TCS foods.
- Requires time / temperature control to limit pathogen growth or toxin formation
- Acidity (pH) and moisture (a<sub>w</sub>) content determine if a food is TCS.



**Food Safety**Note: Values shown in image are general.



#### **Poll Question By Show of Hands**

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The majority of foodborne illnesses associated with outbreaks in schools are caused by which of these foodborne pathogens?

- 1. Salmonella
- 2. Norovirus
- 3. E. coli
- 4. Hepatitis A virus
- 5. Staphylococcus aureus

#### **Foodborne Illness and Outbreaks**

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- Foodborne illness: Results from eating contaminated food
- Foodborne outbreak: Two or more persons experience a similar illness after ingestion of a common food and analysis implicates the food as the source of the illness

# Produce Associated Foodborne Outbreaks in the U.S.

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2004 to 2010 Multistate Produce Outbreaks:
163 Outbreaks
4949 Illnesses
895 Hospitalizations
9 Deaths

2010 to 2017 Multistate Produce Outbreaks:
228 Outbreaks
4748 Illnesses
1190 Hospitalizations
55 Deaths

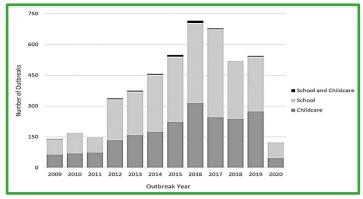
https://www.ncbi.nlm.nih.gov/pmc/articles/P MC6883221/



# Childcare and School Acute Gastroenteritis Outbreaks, 2009-2020

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Most outbreaks were caused by Norovirus and Shigella spp. and spread via person-to-person transmission



https://stacks.cdc.gov/view/cdc/126388/cdc 126388 DS1.pdf

# **FDA Foodborne Illness Risk Factor Study for Schools**

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Improper holding/time and temperature (66.2%)and poor personal hygiene (57.5%) were the top 2 foodborne illness risk factors that were out of compliance in schools

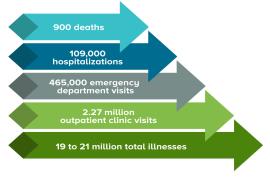
| Foodborne Illness Risk Factor            | Schools | Total<br>Obs. | % OUT |
|--|---------|---------------|-------|
|  | (# OUT) | (IN &<br>OUT) |       |
| Poor Personal Hygiene                    | 231     | 402           | 57.5% |
| Contaminated Equipment                   | 145     | 402           | 36.1% |
| Improper Holding/Time and<br>Temperature | 266     | 402           | 66.2% |
| Inadequate Cooking                       | 13      | 263           | 4.9%  |

https://www.fda.gov/science-research/fda-science-forum/2023-fda-science-forum-06132023

#### The Burden of Norovirus in the USA

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#### Norovirus causes 58 % of foodborne illnesses in the United States



\*Estimates of the annual number of illnesses and associated outcomes of norovirus disease in the U.S., across all age groups.

https://www.cdc.gov/norovirus/burden.html

#### **Strategies to Reduce the Risk of Norovirus**

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- · Effective surface cleaning and sanitizing
- Proper hand hygiene
  - handwashing
    - no bare hand contact with ready to eat foods
    - glove use
- Exclusion and restriction of ill food employees

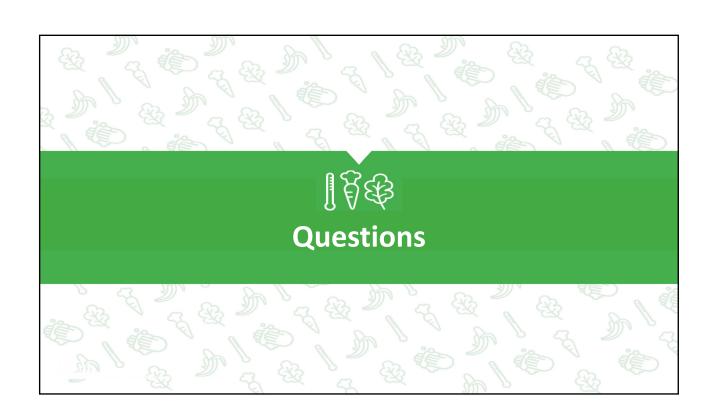
https://www.fda.gov/food/cfsan-risk-safetyassessments/risk-assessment-norovirus-transmissionfood-establishments

#### **Conclusion**

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Produce safety is important and food safety hazards can be minimized to ensure that food we serve to students is safe to eat.







# Produce Safety University Epidemiological Investigation Activity

### **Objectives:**

- Simulate an epidemiological investigation that would follow a foodborne illness outbreak, including identifying the cause/source of the outbreak.
- Discuss institutional food safety concerns.

### **Instructions:**

Form small groups of 3-4 people. Designate one cook, and two or more investigators. **Only the cook should read the notes on page 6.** 



### Scenario:

- The George Washington Elementary School had a lunchtime Field Day school picnic on September 19<sup>th</sup>
  with the menu items shown above.
- Following the picnic, students started reporting similar symptoms: abdominal cramps, diarrhea, fever, and vomiting.
- If you are the cook: Proceed to the confidential information on page 6.
- If you are an investigator: Continue reading for your instructions. Do not read beyond page 5.

### **Investigator Instructions**

Foodborne illness is suspected, so your team of investigators is called in three days later on September 22<sup>nd</sup>. Get ready to investigate. Good luck!

- Your fellow investigators already interviewed all the teachers and students who attended the picnic on September 19<sup>th</sup>. They compiled a chart showing all of the foods eaten by students and teachers at the picnic. This chart also reports who got sick, as well as who did not (page 3).
- You received an organism chart to help identify which organism caused the foodborne illness (page 4).
- Your fellow investigators also plotted the time of incidence for new foodborne illness cases. This epi curve (page 5), combined with the organism chart (page 4), can help you develop a hypothesis (proposed explanation) about the type of pathogen causing the illness.

### Step 1

Your goal is to form a hypothesis regarding the food item that contained the pathogen, the pathogen that caused illness, and the likely cause of contamination.

- To determine the food source of the outbreak, look at the chart on page 3.
- To determine the organism causing the outbreak, compare the signs and symptoms given with the chart on page 4.
- To determine the exact organism causing the outbreak, compare the time of onset column on the organism chart listed on page 4 with the epi curve on page 5.

### Step 2

- Prepare to interview the cook. Interview questions have been provided to help you get started. Add others if appropriate and necessary.
- While interviewing the cook, record potential food safety violations and/or risks.

### **Sample Cook Interview Questions**

- What foods did you need to cook? What foods were ready to eat?
- At what points in preparing the food did you wash your hands?
- Was there any bare hand contact with any ready to eat foods?
- At what points in preparing the food did you sanitize any knife and cutting board used?
- Did you take any food temperatures? Which food item did you check the temperature of?
- What time did you start and finish serving lunch?

### Step 3

- Discuss the hypothesis you developed in Step 1 with the cook.
- Based upon the information learned from the cook, what actions may have led to the outbreak?

The facilitator will call you back together for a large group discussion.

In Epidemiology, an **attack rate** is defined as the proportion of those who became ill after a specified exposure. To identify the potential vehicle in a foodborne disease outbreak, **the food-specific attack rate** is often calculated, which is the attack rate for consumption of a specified food, calculated as:

### # of sick people among those who ate food "X" Total # of people who ate food "X"

To discover the source of the illness, a second attack rate must be calculated for those who did not eat food "X". **Relative risk**, or risk ratio, is a method used to determine the likelihood of an event (e.g., disease) occurring in an exposed group versus an unexposed group. The two attack rates can be compared with each other to determine relative risk, which is calculated as:

### Attack rate among eaters Attack rate among non-eaters

For example, you can interpret the relative risk for ranch dressing as "those who ate ranch dressing were about 1 times as likely (or equally likely) as those who did not eat ranch dressing to become ill". Therefore, the ranch dressing is unlikely to be the cause of the contamination. Comparing the attack rate for those who ate the food to those who did not helps to determine the cause of the illness.

|                                 | Number of people who ate specific food item |      |       | Number of people who did not eat specific food item |      |      |       |                |                  |
|---------------------------------|---|------|-------|---|------|------|-------|----------------|------------------|
| Food Item                       | Sick  | Well | Total | Attack<br>Rate                                      | Sick | Well | Total | Attack<br>Rate | Relative<br>Risk |
| Chicken                         | 40  | 94   | 135   | 30%   | 53   | 112  | 165   | 32%            | 0.94             |
| Whole Wheat<br>Sandwich<br>Buns | 37  | 109  | 146   | 25%   | 42   | 112  | 154   | 27%            | 0.93             |
| Lettuce for sandwiches          | 41  | 70   | 111   | 37%   | 68   | 121  | 189   | 36%            | 1.03             |
| Tomatoes for sandwiches         | 38  | 84   | 122   | 31%   | 51   | 127  | 178   | 29%            | 1.07             |
| Ranch<br>Dressing               | 40  | 110  | 150   | 27%   | 40   | 110  | 150   | 27%            | 1.00             |
| Mixed Greens<br>Salad           | 77  | 26   | 103   | 75%   | 14   | 183  | 197   | 7%             | 10.71            |
| Carrots                         | 30  | 160  | 190   | 16%   | 12   | 98   | 110   | 11%            | 1.45             |
| Fruit Salad                     | 110   | 22   | 132   | 83%   | 6    | 162  | 168   | 4%             | 20.75            |
| Milk                            | 78  | 220  | 300   | 26%   | 0    | 0    | 0     | -              | -                |





| Organism                | Illness<br>Onset time | Signs and Symptoms   | Food Sources  |
|-------------------------|-----------------------|--|---|
| Norovirus               | 12-48 hours           | Nausea, vomiting, abdominal cramps, diarrhea,<br>fever, headache                           | Raw produce, contaminated drinking water, uncooked/cooked foods that are not reheated after contact with an infected food handler, shellfish from contaminated waters |
| Salmonella              | 6-48 hours            | Diarrhea, fever, abdominal cramps, and vomiting  | Eggs, poultry, meat, raw milk/juice,<br>cheese, contaminated raw fruits<br>and vegetables   |
| Clostridium perfringens | 8-16 hours            | Severe abdominal cramps and watery diarrhea  | Meats, poultry, gravy, dried/precooked foods, time/temperature-abused foods   |
| Campylobacter jejuni    | 2-5 days              | Diarrhea (possibly bloody), abdominal cramps,<br>fever, and vomiting                       | Raw/undercooked poultry, raw milk,<br>contaminated water  |
| Staphylococcus aureus   | 1-6 hours             | Sudden and severe nausea and vomiting,<br>abdominal cramps, possible diarrhea<br>and fever | Unrefrigerated/improperly refrigerated<br>meats, potato/egg salads, cream pastries  |
| E. coli 0157:H7         | 1-8 days              | Severe diarrhea (often bloody), abdominal pain,<br>vomiting, possible kidney failure       | Undercooked beef (e.g., hamburger)<br>raw milk/juice, raw fruits and<br>vegetables, contaminated water/food   |

<sup>\*</sup>Most organisms can also cross contaminate other foods such as fresh produce

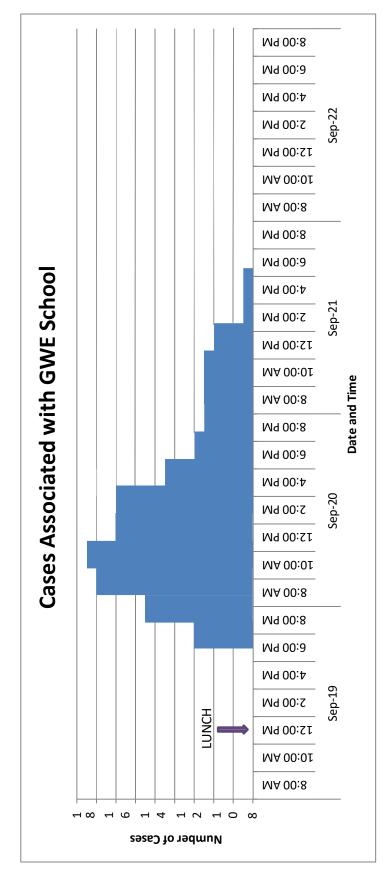
# Sources:

https://www.fda.gov/food/consumers/what-you-need-know-about-foodborne-illnesses http://www.fda.gov/downloads/Food/FoodbornellInessContaminants/UCM187482.pdf



# **Epidemic Curves**

exposure. An epidemic curve can help determine the pathogen causing the illness. For example, an illness that takes 24 hours to show symptoms An epidemic (epi) curve is a visual display of the onset of illness among cases associated with an outbreak. It can show the distribution of cases over time, "outliers" or cases that stand apart from the overall pattern, the magnitude, the pattern of spread, and the most likely time of is unlikely to have many cases 6 hours after exposure. In point source outbreaks, individuals are exposed to the same source during a brief time, such as a single meal or event, and there's a rapid rise person spread. There is a classic epi curve shape of progressively taller peaks, each being one incubation period apart, versus one sharp peak in in cases to a peak and a gradual fall. In continuous common source outbreaks, there is exposure to the same source that is prolonged for days, weeks, or longer. The epi curve rises gradually and might plateau. In **propagated outbreaks**, there is no common source because of person-tothe number of cases.



### **Cook Instructions**

There is a suspected outbreak of foodborne illness in your school. Investigators will come to interview you shortly. Familiarize yourself with your notes below so you can answer their questions.



- I ordered all of the food for the picnic, including frozen raw
  chicken cutlets, bags of mixed greens lettuce salad, whole grain buns, pre-packaged bags
  of baby carrots, heads of lettuce, and whole apples, grapes, and melons for the fruit salad. We
  already had individual packages of ranch dressing. The day before the picnic I put the chicken
  cutlets into the fridge to thaw.
- We received the tomatoes from the school garden. We partner with a local farmer to teach
  the kids how our food is grown and the day before our picnic, the 5<sup>th</sup> grade science class
  harvested the tomatoes for our Field Day event.
- On the day of the picnic, I arrived to work around 7:00 AM. I washed my hands before I started to prepare the food. I went to the walk-in refrigerator to get the lettuce, tomatoes, and the salad mix. I gathered a cutting board, my favorite knife, 2 colanders, and some other utensils that were cleaned in the warewashing machine the day before at the end of the shift.
- I washed the heads of lettuce and the tomatoes under cool, running water in the colander in the prep sink. I used the cutting board and my favorite knife to cut the lettuce and tomatoes up to use on sandwiches.
- I went to the fridge to get the chicken. I used the cutting board and knife to cut up the chicken cutlets; one cutlet was big enough to make two sandwiches. I wiped my hand off with a clean paper towel.
- I opened the bagged salad mix and emptied the bag into a large bowl. I added the rest of the
  cut-up lettuce to the bowl with the bagged salad mix. I tossed the salad in the bowl with my
  hands to mix it all together.
- I gathered the fruits from the dry storage room and walk in cooler. I washed the fruits under cool, running water using the second colander in the prep sink. I used the cutting board and knife to slice up the fruits. After slicing up the fruits, I sanitized my cutting board and knife.
- I prepared and grilled the chicken. I checked the temperature; when the cutlets reached 165 degrees F I knew they were done. I prepared and roasted the baby carrots in the oven; they reached 135 degrees F so I knew they were ready. After cooking the chicken and roasting the carrots, I washed my hands.
- We had a large turnout for the picnic-about 300 teachers and students attended. We began to set up the food around 11:30 AM. We began to serve lunch at noon and served the final student a few minutes after 1:00 PM.

### **Cook Instructions**

Review the following interview questions that an investigator may ask and note your responses.

- What foods did you need to cook? What foods were ready to eat?
- At what points in preparing the food did you wash your hands?
- Was there any bare hand contact with any ready to eat foods?
- At what points in preparing the food did you sanitize any knife and cutting board used?
- Did you take any food temperatures? Which food item did you check the temperature of?
- What time did you start and finish serving lunch?

# Produce Safety University Epidemiological Investigation Activity Key Takeaways

- It's important to **use food safety control measures at critical control points** throughout the food preparation process. The cook used control measures, but some were missing at critical points and times. For example, proper cooking temperatures were measured and reached, however, the cook did not **practice good personal hygiene and prevent cross-contamination**.
- **Proper and routine handwashing** should occur between changes in tasks and at key times, Including before and after handling certain foods. Handwashing occurred before and after food preparation but the cook only wiped his hands with a paper towel, after handling raw chicken and before preparing ready-to-eat food.
- Avoid bare hand contact with ready to eat foods. The cook did not prevent bare hand contact with ready to eat food properly by wearing and changing gloves or using a utensil/barrier, such as tongs, instead of tossing the mixed greens salad with bare hands.
  - **Clean and sanitized food contact surfaces** should be used to prevent cross-contamination of foods. The cook used a cutting board and knife that was not cleaned or sanitized to slice the raw chicken followed by the fruit salad ingredients, which led to cross-contamination.
- Multiple sources of information are needed in outbreak investigations to support the
  hypothesis about the source and cause of illness. The symptoms experienced may be caused by
  3 different pathogens on the chart, however, the chart's food sources that match with the
  menu, and onset time of illness helped to pinpoint the most likely pathogen.
- This was a point source outbreak based on the outbreak descriptions provided and the shape
  of the epidemic curve.
- Since symptoms of illness started close to the 6-hour mark after the meal was eaten then reported cases started to subside around the 48-hour mark, the most likely pathogen is Salmonella which has an incubation period of 6-48 hours.
- The relative risk and food history data helped to identify the food items that most likely caused illness; the highest relative risk was for the fruit salad followed by the mixed greens salad. The higher the relative risk, indicates an increased risk of illness.
- Contributing factors are the practices and factors that lead to outbreaks; the three types are
  contamination (the introduction of pathogens/hazards to food), proliferation (the growth of
  pathogens in food), and survival (pathogens not being destroyed or reduced by a process, such
  as cooking). The cook's interview also helped to identify the implicated food items and most
  likely contributing factor which was contamination.





### **Objectives**

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Identify on the farm best growing practices for fresh produce to reduce the risk of foodborne illness.



Recognize previously voluntary growing practices and Good Agricultural Practices are now required by the Food Safety Modernization Act (FSMA).

### **Key Points to Consider**

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### Key Points

### **What**

Good Agricultural Practices (GAPs) are required by the FSMA Produce Safety rule and are important tools to identify and help reduce the risks of foodborne illness through the assessment of operations, training programs, monitoring and evaluation program, and more.

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### **Key Points to Consider Continued...**

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## **Key Points**

### <u>Why</u>

- Understanding GAPs and their impact on food safety supports safe meals for students. Since produce is often eaten fresh, there is no kill step to protect the consumer from foodborne illness.
- There are various potential sources of contamination in growing areas, this presentation highlights several of those sources and how GAPs can mitigate contamination.

### How

Resource For Implementation: <u>Good Agricultural Practices (GAP)</u>
 <u>Audits</u> (https://www.ams.usda.gov/services/auditing/gap-qhp)



### **Let's Test What You Know!**

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Which of the following areas of potential foodborne contamination has had the largest impact on pathogen transfer?

- 1. Water
- 2. Soil
- 3. Hygiene
- 4. Compost
- 5. Equipment



### Let's Test What You Know!

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### What are the top reasons a food might be recalled?

- 1. Defective, adulterated, allergen, and or contaminated
- 2. Misbranded, under weight, under size
- 3. Mislabeled, immature, overmature



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### Let's Test What You Know!

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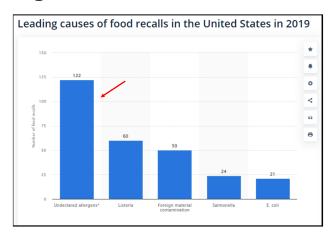
### What is the most common cause of food recalls?

- 1. Listeria
- 2. Salmonella
- 3. Food packaging
- 4. Presence of undeclared allergens

### Let's Test What You Know!

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### Leading cause of food recalls in the U.S.



### A New Era of Produce Safety

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### **FSMA Produce Safety Rule**

Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption

(21 CFR 112)

### **Crops Covered Under the Rule**

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- All fruit and berries such as apples, strawberries, cherries, and stone fruit
- All lettuces and greens such as romaine, iceberg, cabbage and leafy greens; herbs
- All melons such as cantaloupe, honeydews, variety melons and watermelons
- Vegetables such as tomato, summer squash, broccoli, cabbage, onions, etc.

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### **Crops Not Covered Under the Rule**

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### **Crops Not Covered Under the Rule**

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### **Rarely Consumed Raw:**

- Fruits such as sour "tart" cherries
- Vegetables; all beans, beets, ginger root, chickpeas, lentils, collards, eggplants, potatoes, pumpkins, winter squash, sweet potatoes, horseradish, water chestnuts, okra, rhubarb, etc.
- · Grains, including sweet corn

### **Potential Points of Contamination**

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### **Current Good Agricultural Practices**

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### **USDA Fresh Audit Types**

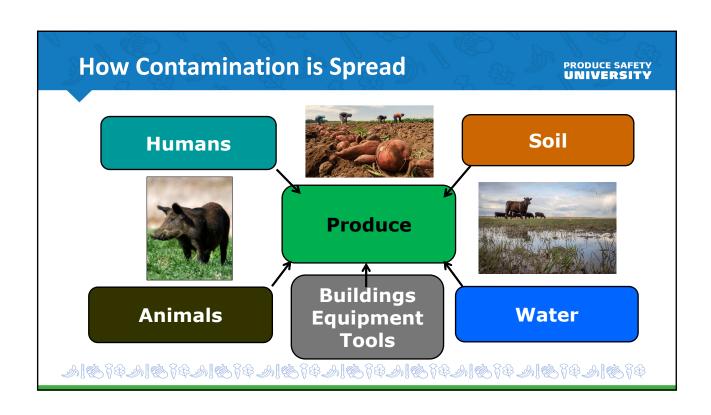
PRODUCE SAFETY UNIVERSITY

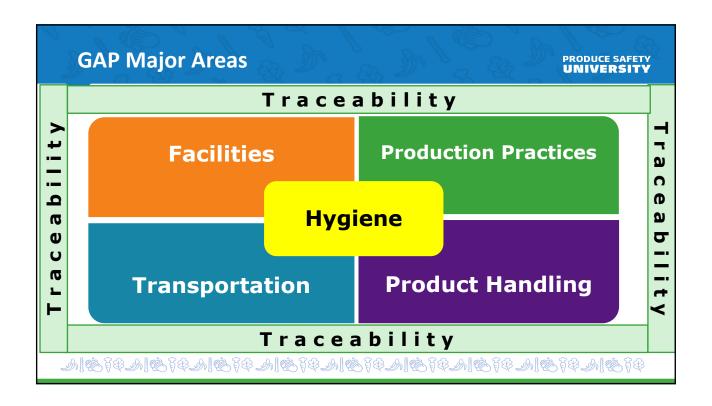
- USDA GAP&GHP Audit
- Harmonized GAP Audit
- Group GAP
- Mushroom GAP
- Arizona (LGMA)
- California (LGMA)

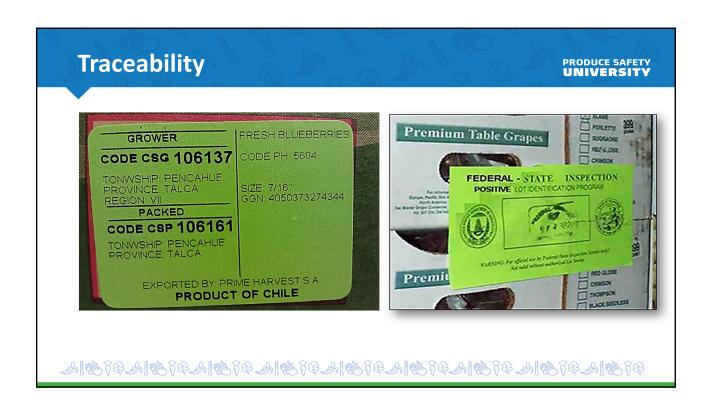












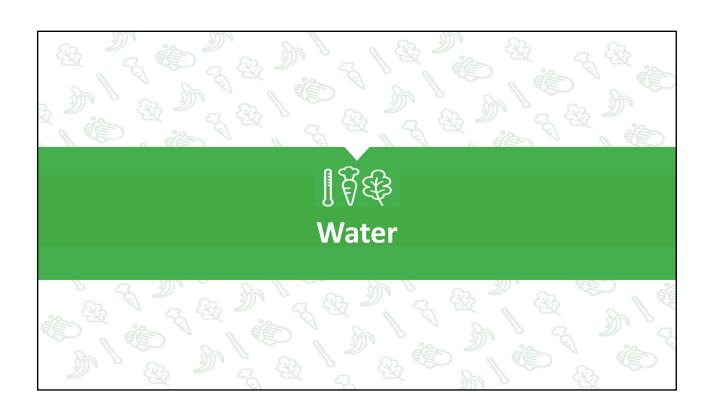
### **Reducing Risks**

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### Reduce contamination risks using:

- Worker training programs
- Water monitoring, testing, treatment
- Manure and compost management
- Wildlife and animal monitoring
- Sanitation programs





### **Sources of Contamination**

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### Water

Can carry and spread human pathogens, contaminating entire fields of large amounts of produce.



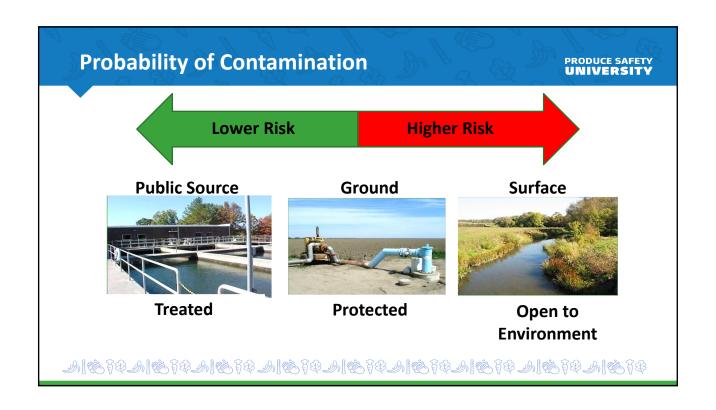
### **FSMA - Agricultural Water**

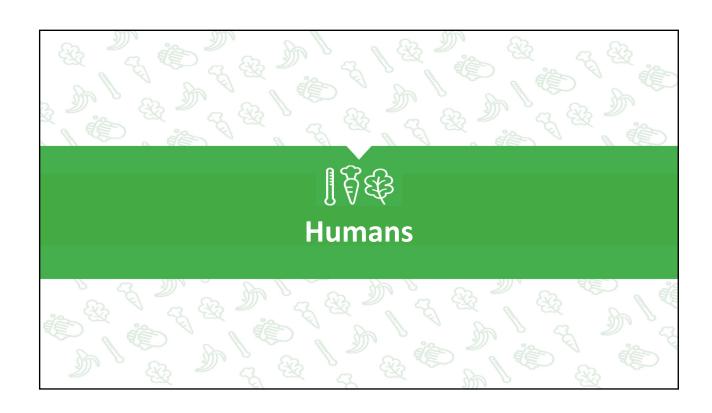
### **Definition:**

"Water intended to, or is likely to, contact covered produce or food contact surfaces". All agricultural water must be safe and of adequate sanitary quality for its intended use."

Applies to farms covered by the FMSA rule







### **Sources of Contamination: Workers**

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Workers can spread pathogens to produce by directly handling fruits and vegetables.

### Improper health and hygiene practices

- Lack of training and hand washing
- Lack of adequate toilet facilities

### **Illness or injury**

- Working while sick
- Injuries that result in blood contacting fresh produce





### **Sources of Contamination: Soil Amendments**

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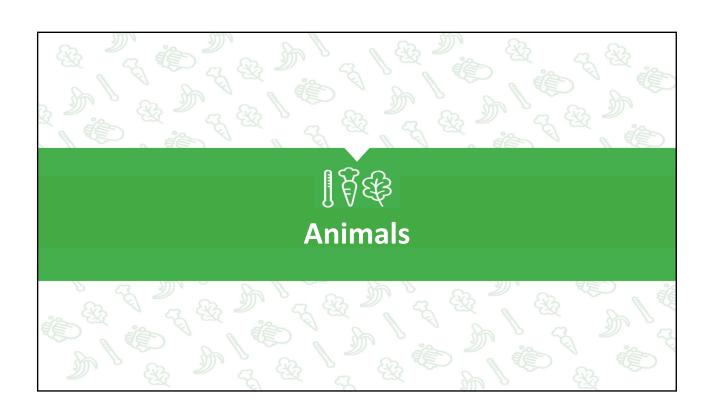
### **Soil Amendments:**

**Any** chemical, biological, or physical materials **intentionally added** to the soil to improve and support plant growth and development.

### **Examples:**

- Fertilizers
- Stabilized compost
- Manure
- Non-fecal animal byproducts
- Peat moss
- Perlite

- Vegetable waste
- Sewage sludge biosolids
- Table waste
- Agricultural tea and yard trimmings



### **Sources of Contamination: Animals**

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# <u>Domestic and wild animals</u> can carry and transmit human pathogens to produce.

- May result in direct fecal contamination of crops and fields.
- Animal feeding, rooting, and movement
- Animals can contaminate water sources
- Manure run-off can contaminate fields



### **Sources of Contamination: Equipment**

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Continue produce safety practices by keeping things clean during harvest and postharvest handling.

### Consider everything that touches, or impacts produce:

- Picking and packing containers
- Packing equipment
- Packing area (open or closed environment)
- Hands and clothing
- Buildings (i.e., coolers, storage areas)
- Transport vehicles





### **Distributors**

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### Produce Distributors (including cooperatives and food hubs) must adhere to FSMA rules including:

- Current Good Manufacturing Practices (cGMP)
- Food Traceability
- Food Defense (intentional contamination)
- Sanitary Transportation





### **Buying From GAP Certified Producers**

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### Must I buy from a GAP certified producer?

- There is **NO** federal requirement that child nutrition operations purchase from GAP certified producers.
- Many growers use GAP practices but are not certified.
- You can conduct an informal audit to make sure that you are comfortable with the producer's food safety (good agricultural) practices and plans.

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### **Locating GAP Audited Growers** https://www.ams.usda.gov/services/auditing/gap-ghp

# United States Department of Agricultur

### Find a USDA Gap-Certified Company

- By Location
- By Commodity
- By Company Name
- By Audit Type, Commodity, Location and Company



# Locating GAP Audited Growers Country: United States, Canada Location: All Locations All Locations Locations Locations Locations Locations Locations All Locations Locations Locations Locations Locations All Locations Locations



### **Summary**

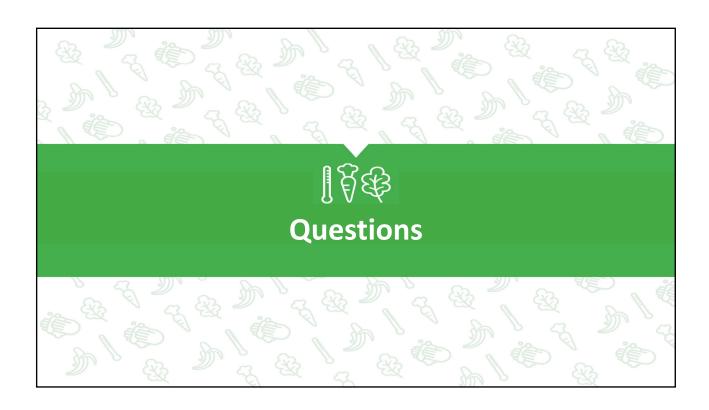
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Identified on the farm best growing practices for fresh produce to reduce the risk of foodborne illness.



Reviewed previously voluntary growing practices and Good Agricultural Practices that are now required by the FSMA.



### **Good Agricultural Practices (GAPs) Activity**

As part of the new purchasing requirements, your school district will only purchase from local farmers that have a food safety program. Sally works with you and has been asked to meet with the local farmer Tom Mato to determine if they have a food safety program in place. The school has been buying tomatoes from Tom for several years. Sally calls Tom and informs him of the new requirement and they agree to an 8:00 AM tour of the farm the following week. Prior to the visit, Sally asks Tom to complete a self-audit checklist which she will review during the tour.

Tom Mato Farms is owned and operated by Tom Mato Jr. It is a local family farm that grows tomatoes, sweet peppers, squash, and several other crops which the family sells at the local farmer's market. The farm is located just out of town adjacent to several other small farms.





When Sally arrives at the farm, Tom offers to take Sally in his truck to drive around the property so she can visit the fields before a tour of the packing operations. Sally gladly accepts his offer as this will give her a chance to discuss his food safety practices.





As they ride along, Sally notices the farmhouse where Tom and his family live, several buildings for storing equipment and packing materials, and an open packing house with a small cold box for storing product. Tom explains that the family farm has been in operation for 50 years and that he has been managing it for the last fifteen.





### SCENARIO - Farm Visit Observations

As they drive down the fields, Sally notes people picking the tomatoes into plastic buckets and loading them on to an open flatbed truck that will take them directly to the packing shed. They stop to observe for a while and to check the portable toilets. The restrooms are clean, have adequate supplies, and provide clean water. They watch for a while, and then return to the packing facilities to complete the tour. Sally notices that some of the fields are being irrigated; Tom states that they are lucky to have a stream accessible. As they pull in, chickens are loose in the yard and Tom is quick to promote his fresh eggs for sale every weekend at the farmer's market.













When they arrive back at the packing shed, their timing is perfect; product has arrived from the field and is being packed into clean 25lb. cardboard cartons that are perfect for your school. The packing operation is low-tech but appears clean and orderly. Sally notices some of the workers are cleaning the tomatoes with a wet cloth. Tom explains that due to the rain last week, some of the tomatoes are a bit muddy and they are not set up with a wash tank for cleaning the tomatoes. He also explains that part of his food safety plan is to minimize risk by eliminating wash tanks which could contribute to cross contamination.





Sally asked to review some of the food safety policies and training records. Tom escorts her to his office inside the farmhouse and points out the restrooms for the packing facility that are also inside the house in case she needs to wash up. A review of the food safety plan, production logs, and records indicate practices are generally in good order. However, Sally noted that some of the training records were two years old and that as a visitor, she was not requested to follow the same visitor and hygiene practices required in his plan. Tom explained that all family members and employees receive training upon hiring, and he made a onetime exception to the policy today for Sally due to her awareness of food safety practices and knew she did not pose a risk. Sally thanks Tom for the opportunity to visit his farm and tells him she will be contacting him shortly.

| Name of op | Processing / Wash Up / Post-Harvest Sanitation Log  operation: Tom Mato Farms |   |               |  |                         |            |         |           |
|------------|---|---|---------------|--|-------------------------|------------|---------|-----------|
| Please see | the food sa   | ••  |               | mation on process                          | s/packing line w        | ater contr |         |           |
| Date       |   | Cleaning List (check each) Date Treatment Cle |               |  |                         |            | Cleaned |           |
|            | Contact<br>Surface  | Water<br>Holding<br>Tanks                     | Wash<br>Tanks | Harvest<br>Totes/Containers                | Cooler<br>Shelves/Floor | Cleaned    |         | (name)    |
|            | Packing<br>Table  | Tested, within tolerance                      |               | Ppressure washed,<br>sanitized with bleach | Shelves Sanitized       | 7/18/2020  | Bleach  | Molly Mat |



| C                    |                 | IVIDUAL TR         | AINING REC             | ORDS         |                      |
|----------------------|-----------------|--------------------|------------------------|--------------|----------------------|
| Employe              | ee Name: Tom Ju | nior               |                        |              |                      |
| Job Title<br>Departn | ·: =            |                    | Shift:                 |              |                      |
| Date                 | Task            | Training Completed | Effectiveness Checking | Observations | Trainer<br>Signature |
| 7/18                 | Food Safety     | 7/20/18            | 85%                    | None         | Tsenior              |
|                      |                 |                    |                        |              |                      |
|                      |                 |                    |                        |              |                      |



### Personnel

### \* Are employees properly trained in personal hygiene and the prevention of microbial contamination of produce?

Workers should understand the consequences of poor sanitation for their own health and the potential for spreading foodborne illness to others. The grower should clearly outline sanitation policies. These policies should apply to anyone with direct contact with the produce, in addition to equipment operators, pest control operators and potential buyers. Personnel must understand

### **SCENARIO - Farm Visit Observations**

Compost pile, adjacent growing field.





Irrigation water





### **Group #1 Question**

| What GAP practices does the farm do well?                   |  |
|---|--|
|   |  |
| Group #2 Question   |  |
| What problems were observed, as to irrigation or water use. |  |
|   |  |
| How can they be addressed?                                  |  |
|   |  |

### **SCENARIO - Farm Visit Observations**

| Group #3 Question  |
|--|
| What are the food safety concerns concerning animals?          |
|  |
| How can they be addressed?                                     |
|  |
| Group #4   |
| What are the food safety concerns concerning the packing area? |
|  |
| How can they be addressed?                                     |
|  |
| Group #5   |
| Is the food safety documentation adequate and sufficient?      |
|  |
| Are there areas in need of improvement?                        |
|  |
| Group Conversation   |
| What additional questions should Sally ask?                    |
|  |
| Would you buy from this farm?                                  |
|  |

# Checklist for Retail Purchasing of Local Fresh Produce

It is important for buyers of fresh, whole produce to have assurances that safe food handling practices were followed on the farm and during delivery to their facilities. Growers can provide documentation of food safety assurances through a buyer's onsite review of their farm, a certificate of attendance at good agricultural practices (GAPs) trainings or Produce Safety Alliance (PSA) workshops, or with documentation from a third-party audit.



While some growers must comply with the Produce Safety Rule of the Food Safety Modernization Act (FMSA) and attend PSA trainings, it is not required for all growers, such as for growers of products not typically consumed raw or produce that will be further processed. Completion of this checklist can provide documentation to the buyer that GAPs were followed on the farm, and that the buyer took reasonable care when purchasing fruits and vegetables directly from a grower. This checklist can also guide the conversation between retail buyers of fresh produce and local growers as they establish terms of the purchasing arrangement to ensure safe food practices are followed.

### Items on this checklist are based on GAPs and elements of the FSMA Produce Safety Rule.

| Name of Producer/Farm  |                                       |     |    |  |
|--|---------------------------------------|-----|----|--|
| City   | State Zip                             |     |    |  |
| Telephone  | E-mail                                |     |    |  |
| Total acres of fresh produce farmed  | Availability of promotional materials | YES | NO |  |
| Products available for purchase:   |                                       |     |    |  |
| Product Insurance Liability is held:   | YES (Dollar amount                    | )   | NO |  |
| Is produce from the farm USDA Certified Organic? (Note: USDA Certified Organic is a certification of practices and does not focus on food safety). |                                       | YES | NO |  |
| ls the farm USDA GAP certified or food s<br>(such as SQF or GlobalGAP)?  | afety third party certified           | YES | NO |  |
| Has the person in charge of the farm pro   | duce completed GAPs or PSA training?  | YES | NO |  |
| Can buyers schedule a tour of the farm during the production season?   |                                       |     | NO |  |

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| Production Practices   | Yes | No | N/A |
|--|-----|----|-----|
| Are wells protected from contamination?  |     |    |     |
| What is the source of irrigation water? ☐ Well ☐ Stream ☐ Pond ☐ Municipal ☐ Other   |     |    |     |
| What method(s) of irrigation is used on the farm? $\square$ Drip $\square$ Overhead $\square$ Flood Note: <i>Drip is recommended for leafy greens</i> .                                    |     |    |     |
| Are generic <i>E. coli</i> tests conducted on agricultural water used in fields?   |     |    |     |
| What types of manure are used on produce crops? ☐ Raw manure ☐ Composted ☐ Aged ☐ No manure is u   | sed |    |     |
| Is the manure composted onsite or purchased commercially? $\ \square$ Onsite composting $\ \square$ Purchased commercially   | У   |    |     |
| Is there documentation of composting methods used to validate the safety of the product?   |     |    |     |
| Is raw manure incorporated into soil two weeks prior to planting or 120 days prior to harvest to avoid raw manure from touching edible portion of the produce? (USDA Organic Standard)     |     |    |     |
| Is the manure application schedule documented and available?   |     |    |     |
| Is land use history available to determine risk of product contamination from sources such as runoff from upstream, flooding, chemical spills, or excessive agricultural crop application? |     |    |     |
| Is the field protected from animal confinement or grazing area runoff?   |     |    |     |
| Is land that frequently floods used to grow food crops?  |     |    |     |
| Are there preventive procedures in place to protect fresh produce in the field from flooding?  |     |    |     |
| Are preventive measures in place to restrict livestock, domesticated animals, and wildlife from growing areas?   |     |    |     |
| Are portable toilets used in a way that prevents field contamination such as located away from growing areas on even ground surfaces and emptied regularly?                                |     |    |     |
| Are there policies or procedures on how to deal with contaminated produce in the field?  |     |    |     |
|  |     |    |     |

| Product Handling   | Yes | No | N/A |
|--|-----|----|-----|
| Is produce checked for signs of contamination from sources such as animal feces or footprints prior to harvest?  |     |    |     |
| Are baskets, totes, or other containers kept off the soil during harvesting?   |     |    |     |
| Are harvesting baskets, totes, or other containers kept covered and cleaned (with potable water) routinely?  |     |    |     |
| Is harvesting equipment, machinery, and tools that come into contact with produce crops kept as clean as possible?   |     |    |     |
| Do procedures used in field packing of produce items minimize risk of contamination? Examples would include elevation of boxes from the ground or wearing of clean gloves? |     |    |     |
| Are the same containers used for produce items typically eaten raw and other produce? If so, are containers cleaned and sanitized between uses?                            |     |    |     |
| Is dirt, mud, or other debris removed from product before packing?   |     |    |     |
| Are there policies or procedures in place about how to deal with contaminated produce during packing?  |     |    |     |
| Is the water used for cleaning products after harvest from a tested, potable water source?   |     |    |     |
| Are food-grade packaging materials stored in areas protected from pets, livestock, wild animals, and other contaminants?   |     |    |     |
| Is product protected from contamination as it travels from field to packing facility?  |     |    |     |

| Facilities   | Yes | No | N/A |
|--|-----|----|-----|
| What source of water is used for cleaning purposes on the farm? ☐ Well ☐ Municipal ☐ Other   |     |    |     |
| Is this water source tested for generic <i>E. coli</i> at least once per year with results kept on file?   |     |    |     |
| Are temperatures of storage coolers monitored and documented?  |     |    |     |
| Is a product packing area in use? Is there space for culling and storage of produce?   |     |    |     |
| Are packing and storage facilities located away from growing areas?  |     |    |     |
| Are packing areas protected from wild and domestic animals?  |     |    |     |
| Are food grade packaging materials used?   |     |    |     |
| Are toilets and hand washing stations that use potable water cleaned and serviced routinely?   |     |    |     |
| Is a pest control program in place?  |     |    |     |
| Are there standard operating procedures for cleaning and sanitizing?   |     |    |     |
| Are cleaning and sanitizing procedures routinely followed with food contact surfaces regularly washed and rinsed with potable water, and then sanitized? |     |    |     |
| Are there policies or procedures on how to manage human waste spills, including septic spills?   |     |    |     |

| Worker Health and Hygiene   | Yes | No | N/A |
|---|-----|----|-----|
| Is a worker food safety training program in place with records of dates, topics, and participants?  |     |    |     |
| Are workers trained about hygiene practices and sanitation?   |     |    |     |
| Is smoking and eating confined to designated areas separate from product handling?  |     |    |     |
| Are adequate restroom facilities with washing facilities (potable water, soap, and disposable towels) readily available for all workers or anyone who touches the product?  Note: OSHA requires one toilet and one handwashing facility per every 20 workers within ¼ mile of the working area. |     |    |     |
| Do workers practice good hygiene when harvesting and packing product by:  |     |    |     |
| Wearing clean clothing and shoes daily?   |     |    |     |
| Keeping hair covered or restrained?   |     |    |     |
| Not wearing jewelry in the packing area?  |     |    |     |
| Washing hands after touching soiled surfaces, using the toilet, and before handling produce?  |     |    |     |
| Covering open wounds with clean bandages and another protective layer such as a disposable glove?   |     |    |     |

| Transportation   | Yes | No | N/A |
|--|-----|----|-----|
| Is the product kept protected from physical damage and contamination during transit to customers?  |     |    |     |
| Is the transport vehicle inspected for cleanliness before loading product?   |     |    |     |
| Is there a cleaning schedule for the transport vehicle, and is there documentation to show it is followed?                                 |     |    |     |
| Are there designated areas in transport vehicles for storage of food products and non-food items to avoid the risk of cross-contamination? |     |    |     |
| Does the transportation schedule mitigate risk of temperature abuse of products?   |     |    |     |

I confirm that to the best of my knowledge, the information provided is accurate.

| Signature of Seller: | Date |  |
|----------------------|------|--|
|                      |      |  |



Updated by Catherine Strohbehn, adjunct professor and extension specialist in human sciences, Joe Hannan, commercial horticulture specialist, Angela Shaw, associate professor in food science and human nutrition and extension food safety specialist, Linda Naeve, extension specialist with Value Added Agriculture, and Manreet Bhullar, graduate research assistant in food science and human nutrition at lowa State University. Originally prepared by Amy Casselman, graduate student, Strohbehn, and Sam Beattie, extension food safety specialist at lowa State University.

Photos by Linda Naeve.

### FS 0030 June 2018

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### **Food Safety Modernization Act**

The Food Safety Modernization Act (FSMA) is considered to be the most sweeping reform of food safety laws in more than 70 years. Signed into law by President Obama on January 4, 2011, it directs the U.S. Food and Drug Administration (FDA) to shift the focus away from merely responding to contamination events toward establishing systems to prevent them from occurring. Seven regulations were written under the law, each of which will affect the vast and complex food production, processing, and distribution network that provides consumers with an uninterrupted supply of safe, nutritious, and affordable food. One of these regulations, "Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption," is of critical importance to growers of fresh produce. Known more simply as the "Produce Safety Rule," this regulation establishes, for the first time, science-based minimum food safety standards for growing, harvesting, packing, and holding fruits, vegetables, mushrooms, and sprouts intended for human consumption.

The following is a discussion of (1) farming activities and types of produce that are covered under the rule, (2) key requirements within the regulation, (3) certain exemptions and modified requirements for which farms may be eligible, and (4) deadlines for complying with the rule.

# Coverage under the Produce Safety Rule

When we say that a type of produce, a produce-growing activity, or a farm or orchard is "covered" under the regulation, we mean that growers who meet the criteria for coverage will need to comply with the farm food safety standards written in the regulation. Not all produce or growing activities are covered. Retail establishments where produce is sold or served to consumers (e.g., farm stands, farmers markets, grocery stores, and restaurants) are not covered under the regulation, although they may be covered under other state or local regulations. Only commercial produce farms are affected. Home gardens are not regulated.

Criteria for determining which farms or types of produce are covered are based on the size of the farm in terms of annual sales and the inherent risk for some commodities to cause illness if they were to become contaminated.

Fruits, vegetables, sprouts, and mushrooms covered under the regulation are:

 Grown on commercial farms with average annual produce sales of at least \$25,000 calculated over the previous three years of production. Sales values in the regulation written in 2011 must be adjusted upward each year to account for inflation (see the calculation tool on the FDA website at tinyurl.com/InflationTool).  Likely to be eaten raw (e.g., leafy greens, cucumbers, tomatoes, summer squash, and most fruits). Raw produce is considered riskier than cooked fruits and vegetables where any harmful microorganisms are likely to be destroyed.

Put another way, produce not covered under the regulation includes those commodities that are:

- Grown on farms with average annual produce sales less than \$25,000 (increased each year to account for inflation).
- Rarely eaten raw (e.g., potatoes, winter squash, pumpkins, and some root crops). FDA has an exhaustive list of produce that is rarely consumed raw, and thus not covered under the regulation, at tinyurl.com/RarelyConsumedRaw.

Qualified and processing exemptions are available wherein all parts of the rule are not required and only certain modified requirements are in place. These will be discussed later in this article. Keep in mind that even if you think your produce is not covered, you are still required to do all that you can to prevent contamination with harmful microorganisms.

The regulation states that only produce likely to be eaten raw that is grown on farms with at least \$25,000 in produce sales is covered."

# **Key Requirements in the Produce Safety Rule**

The Produce Safety Rule is divided into key requirements that are intended to prevent contamination of produce during production, harvesting, and after harvesting. Each of these will be discussed separately in detail:

- 1. Worker Health, Hygiene, and Training
- 2. Agricultural Water for Pre- and Postharvest Uses
- 3. Biological Soil Amendments
- 4. Domesticated and Wild Animals
- 5. Equipment, Tools, Buildings, and Sanitation
- 6. Required Records

### Worker Health, Hygiene, and Training

FDA requires that all personnel who harvest or handle fresh produce covered under the regulation, and those who supervise them, receive food safety training that is appropriate to their assigned duties. Training must be offered upon hiring and periodically thereafter, and it must be presented in a language that all workers can understand.

Specific training outcomes required for harvesters and handlers include:

- Recognizing the importance of health and personal hygiene for all personnel and visitors, including knowing symptoms of a health condition that is reasonably likely to result in contamination of produce or food-contact surfaces with harmful microorganisms.
- Knowledge of appropriate hygienic practices when handling produce or food-contact surfaces. This includes washing and drying hands when necessary, especially after using the toilet, and removing or covering jewelry that could fall into the product.
- 3. The ability to recognize produce that should not be harvested because it is likely to be contaminated with harmful microorganisms.
- 4. Understanding the importance of inspecting harvest containers and equipment prior to harvest so that they are functioning properly, clean, and maintained.

In addition to these requirements, at least one supervisor or responsible person on a covered farm must have completed food safety training at least equivalent to that received under a standardized curriculum recognized by FDA. The Produce Safety Alliance (PSA), in association with FDA, has created a seven-hour training curriculum. Grower training courses are offered throughout the country and can be found on the Produce Safety Alliance website at <code>tinyurl.com/GrowerTraining</code>. In Pennsylvania, Penn State Extension offers regular produce safety certification courses. Visit the Penn State Extension FSMA website at <code>extension.psu.edu/fsma</code> for a list of upcoming courses in Pennsylvania.

Harvesters, handlers, and supervisors must receive training appropriate to their assigned duties."

# Agricultural Water for Pre- and Postharvest Uses

Water is used extensively in farming operations. Preharvest uses include irrigation, chemical crop sprays, cooling, and frost control. Postharvest uses include washing or cooling harvested produce or cleaning food-contact surfaces. Handwashing and drinking water are also important uses of water on the farm. In the Produce Safety Rule, FDA only regulates the safety of preand postharvest "agricultural water," a term FDA has defined as water that is intended to, or likely to, contact the harvestable part of the growing crop, the harvested produce, or surfaces that can come into contact with the product.

The source from which agricultural water is obtained is strongly associated with its potential to become contaminated. Surface water has the highest level of risk because it is a shared resource that may be subject to sudden and unexpected contamination from animal intrusion, manure runoff from neighboring livestock operations, or wastewater septic tank discharge. Groundwater is considered safer, although shallow, improperly constructed or located wells may be subject to surface water contamination from runoff or during flooding events. Municipal water is the safest because it is regularly monitored and usually treated to eliminate harmful bacteria. Indirect irrigation methods, such as drip systems, are considered to have the lowest risk for produce contamination because the water is unlikely to contact the harvestable part of the crop. On the other hand, overhead spray systems are at a higher risk because the water will likely contact the harvestable part of the crop.

Only water that is intended to, or likely to, contact the harvestable part of the crop is regulated."

Microbiological Testing Requirements

Frequency of testing. FDA requires growers to periodically monitor the quality of pre- and postharvest agricultural water through microbiological testing. The frequency of agricultural water testing is based on its source. For surface water, FDA requires farms to do an initial survey using a minimum of 20 samples collected as close as practicable to harvest over the course of two to four years. For untreated groundwater, FDA requires farms to do an initial survey using a minimum of four samples during the growing season or over a period of one year. There is no requirement to test agricultural water that is received from public water systems.

The frequency of water testing required under the rule varies depending on the source of the water."

Microbiological criteria for agricultural water. Microbial limits established for agricultural water are based on levels of *E. coli* bacteria. *E. coli* is a common inhabitant of the intestinal tract of humans and animals and thus is a widely accepted indicator of fecal contamination and therefore the presence of human pathogens. See the FDA website for a list of several

laboratory methods that are approved for this test. Growers are required to make two calculations from the *E. coli* data obtained during testing: the geometric mean (GM) and the statistical threshold value (STV).

- The GM represents a type of average value for the amount of generic E. coli in a water sample. Multiple E. coli values determined over time are transformed into logarithmic (log) values. Then the average of the log values is determined, and this value is transformed back to the non-log form. It is called a rolling average because once a new test result is obtained, an older one within a defined interval is removed. For surface water, the number of samples in the rolling average is 20. For groundwater, the number of samples is four. The maximum allowable rolling GM value for water that contacts the harvestable part of the crop is 126 cells of E. coli per 100-milliliter sample. FDA recognizes that any E. coli that is present on the surface of fresh produce will rapidly begin to die immediately after direct water application. Therefore, growers are permitted to adjust their laboratory-obtained values downward by 0.5 log unit (about a two-thirds reduction) for each day between when the water was applied and harvested for a maximum of four days.
- The STV reflects the level of variability in *E. coli* levels among the samples such as could happen when sporadic rain showers wash waste into rivers and creeks. It can be thought of as the microbial level at which 90 percent of the samples are below the value. The maximum allowable STV for water that contacts the harvestable part of the crop is 410 cells of *E. coli* per 100-milliliter sample.

If the GM or STV values exceed the limits during the baseline sampling, then the cause of the deviation must be determined and corrective actions taken. A new baseline study as described above must then be conducted. If the results are at or below the GM and STV limits, the number of samples taken each year can be reduced to five or one for surface water or groundwater, respectively.

In addition to testing, you must conduct an annual inspection of your entire water system to determine any conditions that might lead to a contaminated water supply.

FDA allows growers to treat agricultural water with EPA- and FDA-approved chemical sanitizers as long as the product is labeled for crop contact and used according to label directions. Other treatments such as ozone or UV irradiation can be used as long as scientific evidence that proves its effectiveness is presented. Microbial testing of treated water is not required, although treatment variables (e.g., concentration, pH, and application method) must be monitored and documented for each use.

The agricultural water standards are among the more controversial sections of the Produce Safety Rule. FDA anticipated that growers would need extra time to learn how to take sam-

ples, do the necessary calculations, and take corrective actions if the water supply were found to be noncompliant. FDA therefore allowed an additional two years beyond the compliance date for the regulation before water requirements would be enforced.

However, the negative reaction to these standards was more than FDA had expected. Many growers and commodity groups have expressed that the sampling and testing requirements are overly burdensome and the required calculations too complex for most to carry out, document, and interpret. In response, FDA has indicated their intent to simplify the requirements for agricultural water, and has also proposed an additional two years beyond the original deadline before compliance will be enforced while they evaluate the practicability and scientific basis for policies and procedures written in the regulation.

In the meantime, growers are advised to continue testing their agricultural water during the growing season to help them understand seasonal trends and potential sources of contamination.

### **Biological Soil Amendments**

Biological soil amendments are materials of animal or plant origin that are intentionally added to the soil to improve its chemical or physical properties (e.g., compost and manure). Animal manures are often added to soil because they are a rich source of nutrients that support plant growth. However, untreated animal manure is a potential food safety hazard if it comes into contact with the harvestable part of the crop. For this reason, the Produce Safety Rule establishes farm food standards for the application of biological soil amendments of animal origin. The regulation forbids the use of human waste except for sewage sludge biosolids that have been treated according to applicable federal or state regulations.

FDA has established standards in the Produce Safety Rule for the use of raw animal manure and compost prepared from raw animal manure as soil supplements.

Only raw or composted animal manure that can come into contact with the harvestable part of the crop is regulated.

### Raw Manure

FDA states that it is highly likely that raw animal manure contains one or more microbial species that can cause human illness. However, scientific studies have shown that once human pathogens are no longer within the protective environment of the animal colon, they begin to die in response to the destructive effects of sunlight and less favorable temperature and humidity

conditions. FDA is currently sponsoring studies to measure the rate at which pathogens die as affected by climatological conditions, application methods, and soil type. Of particular interest is determining the number of days needed between field application and harvest to reduce pathogens to safe levels.

FDA has stated that this will require several years of research under actual farming conditions. Until these studies are complete, FDA does not object to farmers adhering to the raw manure application standards described in the USDA National Organic Program, which call for a 120-day interval between the application of raw manure for crops likely to come in contact with the soil amendment, and 90 days for crops that do not contact the soil. They further state that all untreated biological soil amendments of animal origin, including raw manure, must be applied in a manner that does not contact produce during application, and minimizes the potential for contact with covered produce after application. FDA advises that adherence to these standards is a prudent step toward minimizing the likelihood of contamination while the issue continues to be studied.

### Compost Containing Materials of Animal Origin

FDA has established microbial reduction targets for processes used to treat biological soil amendments, including manure. Safe compost must have no detectable levels of *Listeria monocytogenes*, *Salmonella* spp., and *E. coli* O157:H7. Alternatively, if only *Salmonella* species are tested, they must be absent in a 4-gram dried sample, and fecal coliforms must be fewer than 1,000 colony-forming units per gram (CFU/gm).

The Produce Safety Rule provides two examples of scientifically valid composting methods that will meet these standards:

- 1. Static composting that maintains aerobic (i.e., oxygenated) conditions at a minimum of 131°F (55°C) for three consecutive days and followed by adequate curing
- 2. Turned composting that maintains aerobic conditions at a minimum of 131°F (55°C) for 15 days (which do not have to be consecutive), with a minimum of five turnings followed by adequate curing

There is no restriction on the number of days between application of compost and harvesting for either of these two methods. Any composting method that deviates from these protocols must follow the application intervals for raw manure. In addition to compost preparation requirements, FDA requires that preventive measures be taken to minimize the potential for contact of the compost with produce during and after application. Research will continue to develop and validate alternative composting methods that can meet the microbial reduction standards, and further guidance will become available in the future.

### **Domesticated and Wild Animals**

The Produce Safety Rule addresses concerns about the potential for grazing animals (e.g., livestock and dairy cattle), working animals used in fields for various purposes (e.g., mules or horses), and intrusion by wild animals (e.g., birds, deer, or feral swine) into fields. Growers must take measures to prevent entry of domesticated animals such as cattle, swine, and poultry into fields. Control measures include confining them to designated areas that are not accessible to fields, and being aware of potential routes for contamination, such as wind-blown dust or water runoff.

During the growing season, fields must be inspected for evidence of fecal contamination and measures must be taken as necessary to ensure that contamination cannot occur during harvesting. For example, placing brightly colored flags or cones around a contamination site is a recommended way to notify harvesters that they should not harvest produce within the designated perimeter.

FDA recognizes the challenges associated with preventing wildlife intrusion and does not expect growers to completely eliminate this potential hazard, such as by surrounding fields with fences. FDA also acknowledges that unwarranted killing or trapping of animals is not recommended if they threaten protected species. Instead, all reasonable and practical nonlethal methods, such as noise cannons, decoys, or netting, are appropriate.

FDA requires that reasonable and practical measures be taken to ensure that wild and domesticated animals do not become a source of contamination.

# Equipment, Tools, Buildings, and Sanitation

Sanitation standards for equipment and tools that are likely to contact produce during harvesting and postharvest handling are written into the Produce Safety Rule. Knives, implements, mechanical harvesters, hydro-coolers, grading belts, sizers, and equipment used to store or convey harvested, covered produce (e.g., containers, bins, food-packing material, dump tanks, flumes, and transport vehicles) are examples of equipment with produce-contact surfaces.

Equipment and tools must be designed and constructed so they can be easily cleaned and, when necessary, properly sanitized. They must be stored and maintained to protect produce from becoming contaminated and to prevent them from attracting and harboring pests.

Postharvest packing or storage facilities must be suitable in size, construction, and design to facilitate maintenance and sanitary operations that reduce the potential for produce contamination. Packing buildings must have adequate space for efficient operation, pest intrusion must be monitored and controlled, and overhead drip or condensate minimized. There must be adequate drainage to prevent accumulation of water and waste liquids on the floor. Readily accessible toilet facilities must be provided that are designed, located, equipped, and maintained so they cannot become a source of contamination.

FDA has no objection to packing or sorting activities that are conducted outdoors or in buildings with open walls, as long as measures are taken to prevent pests from becoming established and to trap or otherwise remove them when necessary.

Postharvest equipment, containers, tools, and the packing environment must not be potential sources of contamination.

# Exemptions to the Rule and Modified Requirements for Exempt Farms

Discussed above are the full requirements for growers who are covered under the regulation. However, some produce farms covered under the regulation may be eligible for certain exemptions and may not have to comply with all parts of the Produce Safety Rule. Two types of exemptions are available for some growers: the qualified exemption and the processing exemption. These two exemptions are discussed below, in addition to a brief review of the mixed type facility exemption that falls under another FSMA regulation. The following discussion should help you decide if you are eligible for either of these exemptions.

### **Qualified Exemption**

Determination of Eligibility

In an attempt to further lighten the regulatory burden on smaller farms, Congress wrote into the law that produce farms with average annual food sales of less than \$500,000 over the previous three years may be eligible for a qualified exemption (QE). Again, note that because of inflation, this number is increased each year.

It is important to understand that, in contrast to criteria for coverage, which is based on average annual gross produce sales, QE eligibility is based on three-year average annual farm food sales. This means that in addition to gross receipts for fruits and vegetables, sales of grains for human or animal consumption, animals raised for human food, dairy products, and farm-processed food products are also factored in. This may be a particularly important factor for highly diversified farms where a variety of agricultural food and feed products are produced. A further requirement for QE eligibility is that more than half of the average annual food sales must be made directly to qualified end users (QEU). FDA defines QEUs in either of the following ways:

- 1. Consumers who purchase food directly from a farmer such as at a farmers market or farm stand, over the Internet, or at a community supported agriculture (CSA) operation
- 2. Retail grocery stores or food service establishments (restaurants) that are located in the same state as the farm where the produce was grown or within 275 miles of the farm (note that indirect sales where the produce is resold, such as to distributors, warehouses, and fresh-cut processors, do not fall into this category)

Eligibility for a qualified exemption is based on average annual total food sales."

### Modified Requirements

Farms that have attained qualified exemption status are not subject to the full standards and recordkeeping requirements in the areas of worker health, hygiene, and training; the use of biological soil amendments containing animal manure; sampling and testing of agricultural water; exclusion of domesticated and wild animals; and sanitation of equipment, tools, and buildings. However, compliance with these farm food safety standards is still highly recommended since FDA may withdraw an exemption if at any time they determine that your farming practices could put consumers at risk of illness.

Qualified exempt growers are subject to the following modified requirements:

- If the produce is displayed and sold in unpackaged form, such as at a farmers market, the name and complete business address of the farm where the produce was grown must be prominently displayed on a label, poster, sign, or placard at the point of purchase. This information must include the street address or post office box, city, state, and Zip code.
- If the produce is packaged for retail display and sale, the same type of name and business address information must be prominently displayed on the label.

### **Processing Exemption**

Determination of Eligibility

As mentioned above, the Produce Safety Rule only applies to produce that is likely to be eaten raw. However, some fruits and vegetables could be grown for either the fresh market or further processing. For instance, a tomato grower might sell at least some of the crop to a grocery store where it would be displayed and sold in its fresh form. On the other hand, at least some portion of the harvest might be sold to a commercial cannery where the tomatoes would be subjected to high temperatures that are sufficient to kill harmful microorganisms. Other examples of processes with "kill steps" include blanching prior to freezing, fermenting, or distilling. If evidence can be presented that proves the process is adequate to reduce harmful microorganisms to safe levels, then that portion of the crop destined for further processing would be eligible for this exemption. The rest of the crop would not be eligible, although it is possible that the qualified exemption could apply.

Covered produce that is further processed may not be subject to all parts of the rule."

### Modified Requirements

Farms claiming a processing exemption are not subject to all parts of the Produce Safety Rule. However, the following modified requirements apply:

- You must disclose in documents accompanying shipment of the produce, whether directly to the processor or to an intermediary broker or distributor, that it has not yet been adequately processed.
- 2. You must obtain annual written assurance from either the processor that adequate processing procedures are followed or a broker or distributor that "not yet adequately processed" documents must accompany further shipments and adequate processing was performed before the final product was sold to consumers.

### Mixed Type Facility Exemption

There is another type of exemption that some growers might be interested in. It is not written in the Produce Safety Rule but instead to another FSMA regulation, the Preventive Controls for Human Food Rule. This is for mixed type facilities (MTF) where both growing and processing activities take place. MTF exemptions to the Preventive Controls Rule are available, but only for certain products and processes that FDA has determined to be "low risk." For instance, in addition to

growing fresh produce, a farmer might also have an on-farm side business where baked goods are cooked, packaged, and sold to customers. If your farm is a MTF, see the article on the Preventive Controls for Human Food Rule to learn more about this exemption.

### **Required Records**

Unlike third-party audits mandated by many wholesale produce buyers, the FDA Produce Safety Rule does not require a written food safety plan. However, in order to remain compliant with the regulation, certain records must be kept for at least two years past the date the record was created. Records used to satisfy the criteria for a qualified exemption must be kept as long as necessary to support the farm's status during the applicable calendar year.

FDA has a list of required records that must be kept to document compliance with food safety standards."

### **Personnel Qualifications and Training**

You must keep a record that proves at least one supervisor or responsible person on your farm has successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the FDA. Training information was provided in the "Coverage under the Produce Safety Rule" section above.

### Agricultural Water

Recordkeeping is relatively simple but can become more burdensome if you choose to use treatments or methods not specifically provided in the regulation. You must keep records showing the following:

- 1. The findings of the required inspection of the agricultural water system.
- Results of any analytical tests conducted on agricultural water. Laboratory results must be reviewed, dated, and signed by a supervisor or responsible party within a reasonable time after the records are made.
- 3. You must document any corrective measures you have taken if agricultural water does not meet the geometric mean and statistical threshold water quality criteria.
- 4. If you are treating your agricultural water with chemical sanitizers or physical treatments such as UV irradiation, you must keep treatment monitoring records and scientific data or information that proves the adequacy of the water treatments.

- 5. If public municipal water is used, annual documentation of testing results or certificates of compliance provided by the public water system must be kept on file.
- If you are claiming a specific microbial die-off reduction during washing or storage, you must have on hand the results of scientific studies that support your claim.
- 7. If you use microbial water quality criteria sampling frequencies or laboratory testing methods other than those stated in the regulation, you must provide the results of scientific studies supporting your claim that your water is safe for its intended use.

# Biological Soil Amendments of Animal Origin

If compost is prepared on the farm, records must be kept documenting that proper time, temperature, and number of turnings were achieved. Records related to on-farm soil amendment treatment must be reviewed, dated, and signed by a supervisor or responsible party within a reasonable time after the records are made.

When soil amendments are purchased from outside vendors, growers must document annually that:

- The method used to treat or compost the biological soil amendment of animal origin is a scientifically valid process that was carried out with appropriate process monitoring.
- Upon receipt on the farm, the soil amendment has been handled, conveyed, and stored in a manner and location that minimizes the risk of contamination from untreated or incompletely composted biological soil amendments of animal origin.

### Equipment, Tools, Buildings, and Sanitation

Records must be kept showing the date and method that food-contact equipment used during harvesting, packing, or holding was cleaned and sanitized. The records must be reviewed, dated, and signed by a supervisor or responsible party within a reasonable time after they are made.

### **Qualified Exemption Requirements**

Qualified exemption status is not automatic. You must keep at least three years of records, such as receipts, demonstrating that your farm meets the average annual food sales criteria. Receipts must be dated, but no signature is required. You must review your eligibility for the qualified exemption each year and keep a written record of the annual review that verifies your continued eligibility for the exemption. The annual review record must be dated and signed by a supervisor or responsible party within a reasonable time after the records are made. Growers are encouraged to begin keeping records from previous and upcoming years so they will be ready to claim the exemption once the enforcement date occurs.

### **Processing Exemption Requirements**

To claim a processing exemption, you must obtain written assurance from the business that processes your product that it has adequate processes in place to reduce microorganisms of public health significance to safe levels. Processors are required by other state or federal regulations to prove the adequacy of their processing methods, so they should be able to provide this to you. These records must be updated annually.

# **Deadlines for Compliance** with the Rule

Compliance dates are based on three-year average annual produce sales as shown in the table below. The deadline for larger growers with sales greater than \$500,000 is January 26, 2018. Small businesses with sales between \$250,000 and \$500,000 have until January 28, 2019. Very small businesses with sales between \$25,000 and \$250,000 have until January 27, 2020. For each category, an additional two years are given for compliance with the agricultural water standards issued in the regulation. In 2017, FDA proposed additional extensions for the agricultural water compliance deadline. Readers can keep up to date on any changes to the regulation at any of the websites listed in the Additional Resources section of this article.

| Business<br>Category | Produce<br>Sales Criteria*          |           |           |
|----------------------|-------------------------------------|-----------|-----------|
| Very small           | More than \$25,000 up to \$250,000  | 1/27/2020 | 1/26/2022 |
| Small                | More than \$250,000 up to \$500,000 | 1/28/2019 | 1/26/2021 |
| Other                | More than \$500,000                 | 1/26/2018 | 1/27/2020 |

<sup>\*</sup>Sales values are in 2011 dollars.

As you can tell by now, the definitions and criteria for coverage and exemptions are complex. For a further explanation of coverage and exemption options, watch the video from Penn State Extension at extension.psu.edu/fsma.

### **Additional Resources**

The Produce Safety Alliance. Cornell University. producesafetyalliance.cornell.edu

Information on training opportunities, farm food safety resources, and the latest news on the Produce Safety Rule.

**FDA Food Safety Modernization Act (FSMA).** U.S. Food and Drug Administration (FDA).

### www.fda.gov/Food/GuidanceRegulation/FSMA

Official site for all the regulations under FSMA including "Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption" (the Produce Safety Rule). Contains the complete regulation, fact sheets, and regular updates on Guidance Documents.

### The Penn State Extension FSMA Website.

extension.psu.edu/fsma

Interpretative videos, decision trees, and fact sheets explaining coverage and exemption criteria and a list of upcoming FSMA Produce Safety certification training opportunities in Pennsylvania.

Prepared by Luke LaBorde, professor of food science.

### extension.psu.edu

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### **Objectives**

PRODUCE SAFETY UNIVERSITY



Review the Food Safety Modernization Act (FSMA) rules followed by reputable vendors.



Identify the benefits and challenges to food traceability in school meals programs



Describe the Buy American Provision procurement requirements and exceptions.



Apply fresh produce cost saving measures in school meal operations.

### **Key Points to Consider**

PRODUCE SAFETY UNIVERSITY

# Key Points

### What

- Produce purchased for Federally funded Child Nutrition meals must meet Federal, state, and local regulations, including the Buy American Provision.
- Food safety practices that address traceability shelf-life, yield, and quality can save program operators money and safeguard our customers. This includes inspecting produce when receiving, implementing a food traceability system, using correct tools and equipment, and using appropriate preparation techniques and calculating edible portion (yield).

Al@fesicates

### **Key Points to Consider Continued...**

PRODUCE SAFETY UNIVERSITY

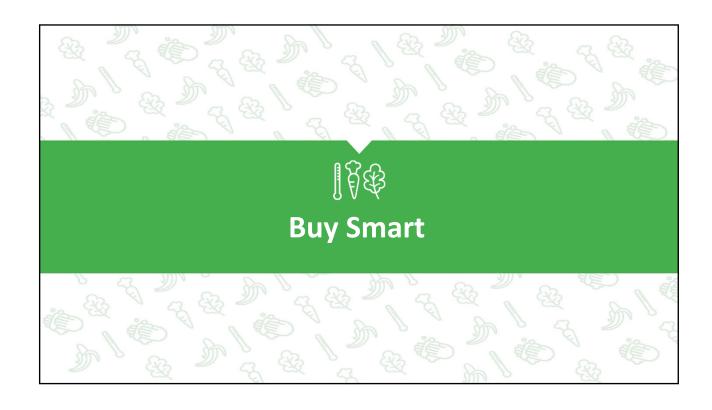
## Key Points

### <u>Why</u>

- Purchasing produce from a reputable supplier is important to ensure foods are safe at the point of receiving and can ensure adherence to FSMA rules.
- Implementing a food traceability system supports food safety, prevents bioterrorism, and reduces the costs of the recall process.
- Maximizing produce yields can help school nutrition operations by reducing waste and controlling portion costs.

### **How**

- Resource for Implementation: <u>Food Safety Practices to Expect From Your Fresh Produce Distributor</u>
- Resource for Training: <u>USDA Food Buying Guide</u>; How to Conduct a Mock Recall of Fresh Produce in School Meal Programs – NEED LINK HERE
- · AP to EP Tech Tool from Chef Cyndie and Chef Brenda



# Global and Local Sources Distributors Broad Line Produce Specific Local and Regional Sources Produce Cooperatives Food Hubs Direct from the Farm School Gardens

### Who's Supplying You?

PRODUCE SAFETY UNIVERSITY

Select the types of vendors supplying fresh fruits and vegetables to your school nutrition program (select all that apply):

- Broad Line Distributor
- Produce Distributor
- Produce Cooperative
- Food Hub
- · Direct from the Farm
- · Farmer's Market
- School Garden
- Does not apply to my job

Al@fesicates

### **Food Safety Practices**

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# Produce Distributors (including cooperatives and food hubs)

Must adhere to FSMA rules including:

- Current Good Manufacturing Practices (cGMP)
- Food Traceability
- Intentional Adulteration (Food Defense)
- Sanitary Transportation



### **Food Safety Practices**

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# **Current Good Manufacturing Practices (cGMP)**

Written food safety plan includes:

- Identified hazards with preventive controls
- Monitoring and corrective actions
- Verification procedures
- Supply chain program
- Product recall system



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### **Food Safety Practices**

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### **Food Traceability**

- Food Traceability List (FTL)
   Includes cucumbers, fresh herbs, leafy greens, melons, peppers, sprouts, tomatoes, tropical tree fruits, and all precut fruit and vegetables
- Create product traceability lot code
- Provide electronic, sortable spreadsheet upon FDA request



### **Food Safety Practices**

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### **Intentional Adulteration (Food Defense)**

- Conduct vulnerability assessment
- · Implement mitigation strategies



### **Food Safety Practices**

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# Sanitary Transportation Rule

- Proper refrigeration
- · Cleaning between loads
- Prevent cross contamination and allergen cross contact



# **Buyer Due Diligence: From the wholesale** market

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### A smart buyer will:

- Require a letter of food safety assurances or guarantee from all food vendors.
  - Submit letters with bid documents
  - Request applicable food safety certification documentation
- <u>Visit your supplier</u> to observe food safety practices.
- Determine food product liability insurance requirements and documentation.

# Buyer Due Diligence: Directly from the Farm

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### A smart buyer will:

- Request Good Agricultural Practices or food safety documentation.
  - May require third-party GAP certification
  - May require signed checklist
- Make farm visits to review Good Agricultural Practices or food safety documentation.
- Determine food product liability insurance requirements and documentation.

### **Buyer Due Diligence: Trace Your Case!**

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# Traceability Systems used in School Districts (N=124)

### **Current System Perception of Completeness:**

- One-third (36%) complete
- Over half (55%) partially complete

Source: Boutros, B., Roberts, K., Lin, N., & Sauer, K.. Food Traceability in School Foodservice Operations: Benefits and Challenges (2019). *Health and Sport Science Faculty Publications*. 102

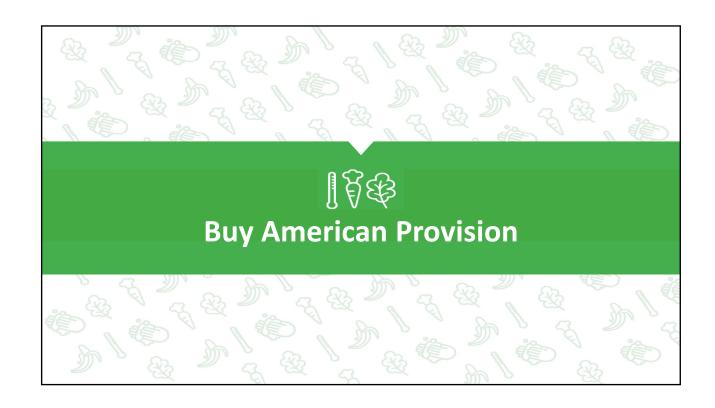
### **Buyer Due Diligence: Trace Your Case!**

PRODUCE SAFETY

### Recommendations

- Review your traceability system for completeness
- Track food supply in all stages of production, preparation, and service
- Clearly define substitutions in bid solicitation
- Conduct a Mock Recall with vendors to test effectiveness

Source: Boutros, B., Roberts, K., Lin, N., & Sauer, K.. Food Traceability in School Foodservice Operations: Benefits and Challenges (2019). Health and Sport Science Faculty Publications. 102



### **Buy American**

PRODUCE SAFETY

### **Provision requires nutrition operators to:**

Purchase to the maximum extent practicable, domestic commodity or product that is processed domestically using 51% U.S. grown foods by weight or volume.

BUY AMERICAN:
SUPPORTING DOMESTIC AGRICULTURE
IN SCHOOL MEALS

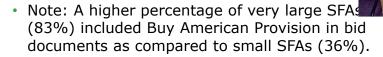


### Are we compliant?

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To ensure compliance, School Food Authorities (SFAs) (N=562):

- Include clause in bid solicitation (49%)
- Examine food product packaging (48%)
- Include in product specification (42%)
- Request certification on food product origin (34%)



Source: Williams, K., Kimathi, M., Papa, F., Miller, M., Beyler, N. (2021). Study of School Food Authority Procurement Practices. U.S. Department of Agriculture. Food and Nutrition Service.

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### **Buy American Provision**

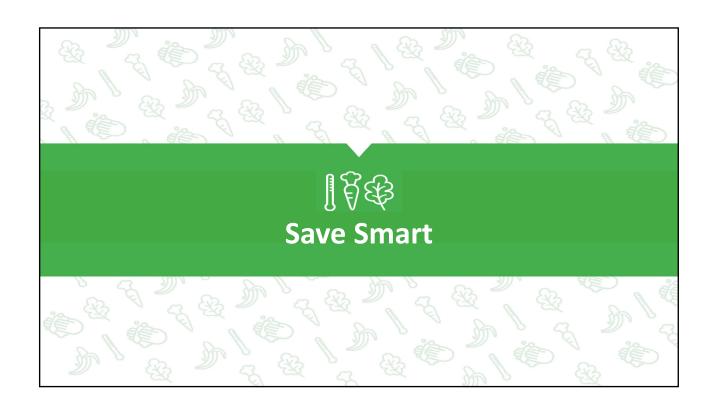
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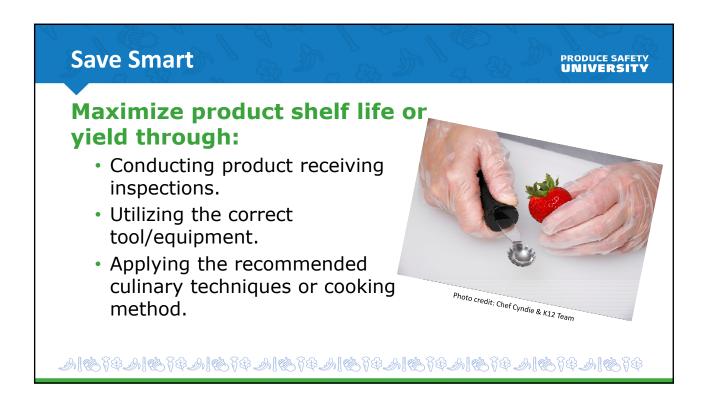


### **Exception to the rule:**

- Domestic product is determined to be cost prohibitive.
- Product is not domestically grown in sufficient quantities & in satisfactory quality.

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### **Save Smart**

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# As Purchased to Edible Portion – Know the Yield!

### **USDA Food Buying Guide**

- Cantaloupe, peeled and diced (.56/lb)
- Cucumber, diced (.98/lb)
- Romaine, diced (.65/lb)
- Watermelon, peeled and diced (.61/lb)



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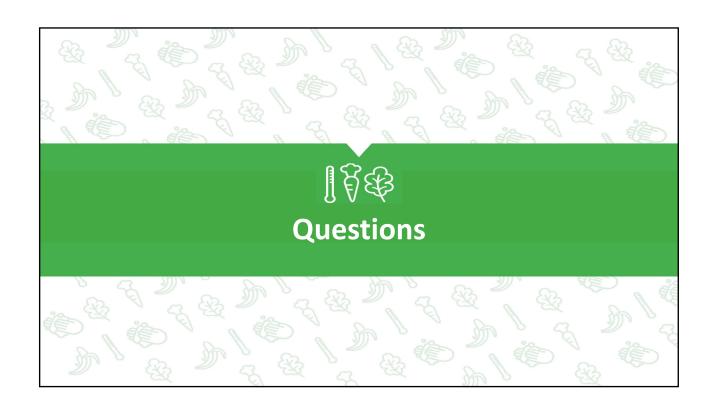
### **Save Smart**

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# Calculate As Purchased to Edible Portion – Chef Cyndie Tech Tool



https://bery.app/





### **PSU Save Smart Activity: As Purchased to Edible Portion**

Instructions: Watch Chef Cyndie's live demonstration and record the answers for questions 1-4. After viewing the demo, answer question number 5 by calculating the yield using the formula provided.

- 1. What is the AP weight of Pepper 1 (Good)? \_\_\_\_\_oz
- 2. What is the AP weight of Pepper 2 (Poor)? \_\_\_\_\_ oz
- What is the EP weight of Pepper 1 (Good)? \_\_\_\_\_oz
- 4. What is the EP weight of Pepper 2 (Poor)? \_\_\_\_\_oz

Hint: AP weight will always be greater than EP weight.

5. Calculate the yield using the following formula:  $EP \div AP =$ \_\_\_\_\_ yield

\_\_\_\_\_ EP ÷ \_\_\_\_\_ AP = \_\_\_\_\_ yield – Good Condition Pepper

\_\_\_\_\_ EP ÷ \_\_\_\_\_ AP = \_\_\_\_\_ yield - Poor Condition Pepper

Recommend yield based on the USDA Food Buying Guide: <u>.80</u>

### Step-by-Step Instructional Photos



Example Pepper: 3.8 oz (EP)  $\div$  4.6 oz (AP) = .82 yield

Step 6 (EP 3.8 oz)



### **Chef Cyndie Produce Yield Finder**



### Brought to you by Chef Cyndie Story and Chef Brenda Wattles

As purchased (AP) is the weight, volume or count of a product as it comes in your back door. School operators pay for the AP item, but the final cost of a product is based on the Edible Portion (EP). EP is the weight or volume of a product after fabrication (peeled, chopped, etc.)

Use the AP to EP Calculator to determine how much yield on average a school chef should try to obtain during food production. Providing AP and EP on school standardized recipes is very helpful to control food costs and provide the correct nutrition for students.

The As Purchased to Edible Portion calculations, in pounds, for the following items are included:

| Fresh Fruits   | Fresh Vegetables   |
|--|--|
| Apples, unpeeled, cored  | Avocados, all sizes, peeled, seeded                          |
| Apples, peeled, cored  | Avocados, California (48 ct), peeled, seeded                 |
| Apricots, unpeeled, seeded   | Avocados, Florida, peeled, seeded                            |
| Bananas, peeled, sliced  | Beets, without tops, pared, diced or sticks                  |
| Cantaloupe, 15 ct, peeled, seeded, diced                           | Broccoli, untrimmed, spears                                  |
| Cantaloupe, 18 ct, peeled, seeded, diced                           | Cabbage, Celery or Napa, strips                              |
| Cherries, red, tart, pitted  | Cabbage, Green, chopped or shredded                          |
| Cherries, sweet, pitted  | Cabbage, red, chopped  |
| Grapefruit, sections, peeled (with membrane)                       | Cabbage, red, shredded                                       |
| Grapefruit, sections, peeled (without membrane)                    | Carrots, without tops, sticks (3"x4"x1/2")                   |
| Honeydew melon   | Carrots, without tops, peeled, chopped                       |
| Kiwi, 33-39 ct, peeled, chunks                                     | Carrots, without tops, peeled, shredded                      |
| Kiwi, 33-39 ct, unpeeled, chunks                                   | Cauliflower, whole, trimmed, florets or sliced               |
| Kiwi, 33-39 ct, peeled, slices                                     | Celery, trimmed, sticks (3"x4"x1/2")                         |
| Kiwi, 33-39 ct, unpeeled, slices Celery, trimmed, chopped or diced |  |
| Mangoes, cubed or sliced   | Cilantro, trimmed, chopped                                   |
| Papaya, peeled, cubed or mashed                                    | Cucumbers, unpared, diced                                    |
| Peaches, 80 ct, unpeeled, pitted, diced or sliced                  | Cucumbers, pared, diced                                      |
| Peaches, 60 & 64 ct, unpeeled, pitted, diced or sliced             | Eggplant, cubed  |
| Peaches, 56 ct, unpeeled, pitted, diced                            | Green beans, whole, trimmed                                  |
| Pears, 120 ct, peeled, diced                                       | Kale, trimmed, leaves only                                   |
| Pears, 100 ct, unpeeled, cored                                     | Kale, trimmed, leaves and stems                              |
| Pineapple, peeled, cubed   | Lettuce, leaf  |
| Pineapple, peeled, sticks (1/2 "x 3")                              | Lettuce, Romaine   |
| Strawberries, whole  | Lettuce, Iceberg   |
| Ugli Fruit, peeled, chopped  | Mushrooms, sliced  |
| Watermelon, peeled, diced  | Onions, all sizes, chopped or sliced                         |
|  | Parsley, curly, chopped                                      |
|  | Peppers, bell, red, green, orange or yellow, diced or sliced |
|  | Spinach, partly trimmed, chopped                             |
|  | Squash, summer, yellow or zucchini, sliced                   |
|  | Tomatoes, all sizes, diced or sliced                         |

Based on the USDA Food Buying Guide

Fruit and Vegetable Yield Tables and Custom Yield Studies

### Is An Apple Always An Apple?

The question is - if I can't find the size of the apple I purchase in the Food Buying Guide, how do I determine how to credit the apple?



Using the Food Buying Guide to determine the meal contribution of different sizes of apples:

- There are 14.80 (column 3)  $\frac{1}{4}$  cup servings (column 4) per pound (column 2) of edible portion (EP) for 125-138 count whole unpeeled, uncored apples (column 1).
- ✓ That equals .91 lb. or 3 2/3 cups of ready-to-cook or serve raw, cored, unpeeled apples for every pound of apples as purchased (AP) (column 6).
- ✓ The Serving Size per Meal Contribution column (column 4) in the Food Buying Guide gives you the information that there are about  $4 \frac{1}{4}$  cup serving (1 cup) per apple.

However, if you are purchasing a 150-163 count apple, how would you determine how many  $\frac{1}{4}$  cup servings you would get from each apple?

### Try This:

Divide the case weight by the largest number of apples in the case to equal the average weight per apple. The next step is, times the average weight per apple by the amount of edible portions per cup. The answer is the meal contribution.

### Example:

40 ÷ 163 = .2453

 $.2453 \times 3.66 = .89 \text{ round down to } .75$ 

- 1. 40# case weight ÷ by 163 as the number of apples in a case = .2453 which is the average weight of each apple.
- 2. .2453 (average weight of each apple) X 3.66 (cups of edible portion per as purchased pound = .89 rounded down to .75 which would equal  $\frac{3}{4}$  cup is the amount of meal contribution of a 163 count apple.

What if I don't know how many apples are in the case?

### Try This:

- 1. Go to the USDA Team Nutrition book Fruits and Vegetables Galore. Use the section on Quality Food Quality Meals-Buying Fruits and Vegetables. Look up apples on page 30. You can compare your apple to the size chart or measure the diameter by cutting crosswise through the thickest part of the apple and then comparing it to the count size chart. Now you are ready to use the formula above.
- 2. You can cut the apple close to the core and then cube the apple and place in a dry measure cup. How many  $\frac{1}{4}$  cup serving does the apple equal?

It's not just apples; these steps can be used for many other fruits and vegetables. Use the Food Buying Guide and Fruits and Vegetables Galore as guides for fruit and vegetable size contribution calculations.





2008).

Fresh produce growers today face several risks associated with foodborne illness outbreaks. First, consumers affected by these outbreaks can take legal action against growers to claim monetary damages due to illness (also called liability risk). Second, regulators can issue a product recall or warning because of the outbreak, causing a catastrophic drop in sales and damaging the farm's or product's reputation. As foodborne illness outbreaks increase, so does the risk of economic loss. Insurance against economic loss from foodborne illness helps growers safeguard their business operations. With the variety of insurance coverage or policies available, fresh produce growers should understand what policies best cover their farms.

### General Farm Liability Insurance Policy

General farm liability insurance typically protects against claims for bodily injury and property damage that occur on the farm premises or as a result of farm operations (IRMI, 2008). These policies cover accidents that affect farmers, employees, guests, and customers.<sup>1</sup> Outlaw (2007) and the New England Small Farm Institute (2008) suggest that these general commercial or farm liability policies are appropriate for growers with pick-your-own operations and on-farm stands. The New England Small Farm Institute (2008) further explains that farm liability insurance covers lawsuits only from activities considered "farming," which is usually defined to include only agricultural production activities and on-farm roadside stands. These policies also typically cover the sale of produce in its raw, unprocessed state, whether sold on-farm or at a farmers' market. The sale of produce grown by another farmer, even if the produce is sold "raw and unprocessed," is not covered under a general farm liability policy.

### **Commercial Business Liability Insurance**

Commercial business liability insurance may be necessary if the grower also undertakes activities that are not considered "agricultural" or "farming" (New England Small Farm Institute, 2008). It works essentially the same way as general farm liability insurance. The insurance is appropriate for growers who have fresh-produce processing facilities. This insurance is also appropriate for

against claims of injury from contaminated fresh produce that causes foodborne illness. But as Hamilton (1999) explains, this is not generally

that their general farm liability policy protects the case, because the injury usually happens off the farm premises. In this case, a product liability insurance policy is appropriate, as it protects against consumer claims of injury caused by a defective or hazardous product such as contaminated fresh produce. (Holland, 2007). A growing number of retail stores require that food products they carry have a minimum level of product liability coverage (normally a \$1 million policy or more). It is important to understand, however, that food product liability insurance strictly covers claims of injured parties and not recall costs.

growers that sell in farmers' markets or sell more

than a certain percentage of products that origi-

nate off-farm (New England Small Farm Institute,

Many fresh produce growers mistakenly believe

**Product Liability Insurance Policy** 

The cost of food product liability coverage is difficult to estimate. Insurance providers are often reluctant to provide quotes because there is no "standard" premium rate for food products, and the industry is very competitive. Instead, most insurance companies that offer this coverage provide an estimate only when growers submit a detailed description of their product and business operations (production, distribution, and marketing plans). However, an approximate rule of thumb in the industry is around \$1,000 per year for a \$1 million policy.

Based on an informal survey of insurance providers undertaken in May 1998, Holland (2007) indicates that the annual premiums for food product liability insurance ranged from \$500 to \$20,000 for a \$1 million policy. The average food product liability premium was found to be \$3,000 for a \$1 million policy. The most significant factors contributing to the premium charged are: level of gross sales or annual payroll, prior claims (claims history), level of coverage, type of product, type of market, and recall plan.

### **Product Recall Insurance Policy**

A product recall insurance policy typically covers only the actual or direct costs of a product recall, such as costs associated with getting the contami-



<sup>&</sup>lt;sup>1</sup> Note, however, that this policy does not replace Worker's Compensation insurance and only typically covers activities considered "farming."

nated product off the shelf and destroyed, cost of replacing contaminated products, and transportation costs. It does not cover other indirect costs or losses due to the product recall or an outbreak warning, such as third party expenses, loss of profit, and business interruption losses. Third-party expenses refer to those costs that occur when a downstream retailer loses business as a result of the contamination.2 Loss of profit refers to instances when the product recall or warning damages consumer confidence in the grower, negatively affecting revenues in the current or next business cycle. Business interruption losses are those losses resulting from a period where the growers' operations shut down.

An important issue to consider in the purchase of product recall insurance is that it covers recall costs only for growers responsible for contamination or outbreak. For those growers that were not a source of contamination but whose products were also taken off the shelf as a precaution, recall losses may not be covered. This can be a problem if, for example, no government entity officially traced or narrowed the source of the contamination (Odza, 2008).

### **Accidental or Product Contamination Policy**

A more comprehensive policy that covers both the direct and indirect costs of product recall is the accidental or product contamination policy. It also insures growers against claims resulting from their own unintentional distribution of a product deemed unsafe. However, as with the product recall policy above, this coverage applies only to those growers whose product was contaminated. Those growers who suffered loss of profit or business interruption losses but were not contaminated (their product was rejected as a precaution or due to a market scare) typically will not be covered under this policy.

### **Malicious Tampering Insurance**

Malicious tampering insurance is a more comprehensive insurance policy that covers losses from criminal actions of sabotage against the grower, as well as the losses covered in the accidental or product contamination policy (the indirect and direct recall costs). An example of a private company that sells this type of comprehensive coverage is MRM MacDougall Risk Management (Skees et al., 2001).3 Damages due to malicious product tampering are indemnified for up to \$75 million, while damages due to accidental product contamination are indemnified for up to \$50 million. Under the accidental contamination provision of the policy, losses are categorized into four areas: (1) recall expenses, (2) lost gross profit, (3) rehabilitation expenses, and (4) crisis response. The second category covers loss for "12 months following discovery" or lost profit during a shorter period when the sales revenue

remains lower that would have been reasonably projected had the product contamination not occurred. Indemnities are even paid to rebuild the lost market share. Table 1 (see back cover) provides examples of other companies that offer product recall insurance, accidental contamination insurance, malicious tampering insurance, and combinations thereof. Again, the shortcoming of this product, as with the product recall and accidental contamination, is that it applies only to growers whose product was contaminated.

### **Combination Policies**

Some insurance companies offer combination or package policies. For example, the general farm liability policy and commercial business coverage can be combined with a homeowner's policy. A combination policy makes sense for growers whose farms have both residential and commercial characteristics. Such policies are especially appropriate for family- and individuallyoperated farms (rather than large corporate farming operations). Combination policies generally offer the additional advantage of a lower premium than for two policies purchased separately.

### Excess/Umbrella/Surplus Lines of Insurance

Excess/Umbrella/Surplus lines of insurance are the terms used to describe insurance coverage that provides catastrophic loss protection when the underlying insurance is inadequate. For example, there are some risks that North Carolina-licensed insurance companies may not cover. The excess or surplus lines market is an insurance marketplace for unique or hard-to-place risks. For fresh produce growers, these excess or surplus lines provide additional protection above and beyond the losses covered under other policies. An excess or surplus insurance policy can be tailored to protect against losses from foodborne illness outbreaks even when the grower's product is not contaminated. The disadvantage of these types of policies is that premium rates are not regulated under state laws, and the Insurance Guaranty Association offers no protection for companies that sell these lines. Therefore, if the surplus lines insurer has financial difficulties, claims against the policy might not be paid. Note that product liability insurance in North Carolina sometimes falls under excess or surplus lines of insurance.

### Adjusted Gross Revenue (AGR) or Adjusted Gross Revenue-Lite (AGR-Lite) Crop Insurance

All of the insurance policy options discussed so far are private-industry provided (and underwritten), and these policies are not a part of the government-supported Federal Crop Insurance (FCI) program. 4 Except for the excess/surplus lines, these privately provided insurance options cover only losses related to food-

<sup>&</sup>lt;sup>2</sup>Third party expenses may also include the liability the grower faces from downstream retailers whose brand names may be tarnished as a result of the contaminated fresh produce supplied to them. <sup>3</sup>This policy is underwritten by Lloyd's of London.

<sup>&</sup>lt;sup>4</sup>The FCI program is overseen by the United States (US) Dept. of Agriculture Risk Management Agency (USDA-RMA). This is a publicly supported, privately delivered program that provides insurance products that help protect farmers from yield/revenue losses due to natural perils (such as drought or flood.). AGR and AGR-Lite are offered under this program. AGR-Lite is currently available in North Carolina.

borne illness outbreaks if the particular grower's fresh produce was contaminated. The insurance options previously discussed (except for the excess/surplus lines) do not cover growers that were not contaminated, even if they suffered product recall expenses such as loss of profit or business-interruption losses.

The Adjusted Gross Revenue (AGR) or the Adjusted Gross Revenue-Lite (AGR-Lite) insurance products offered under the FCI program may cover some of the lost profits or revenues due to a foodborne illness outbreak even if the grower's product is not contaminated. AGR and AGR-Lite are whole-farm revenue protection plans. They protect against low farm revenues due to unavoidable natural disasters or market fluctuations that affect income during the insurance year. This coverage extends to fresh produce, as well as to most farm-raised crops and animals (any source of non-value-added agricultural revenue in the farm). The plans can partially cover a catastrophic drop in fresh produce revenues due to a foodborne illness outbreak. The revenue loss can either be from a precipitous price drop or a substantially low (or zero) demand for the fresh produce due to the outbreak.5

AGR and AGR-Lite use a grower's five-year historical farm average revenue as reported on the IRS tax return form (Schedule F or equivalent) and an annual farm report as a basis to provide a level of guaranteed revenue for the insurance period. If actual revenue for the period falls under the revenue guarantee chosen by the grower, then the AGR or AGR-Lite policy will provide indemnity payments. Note, however, that there are limits to the amount of revenue that can be insured, depending on the coverage and payment rates chosen. Large corporate farms with revenues above these limits may not qualify. For more details on AGR and AGR-Lite, see the RMA factsheets about them (RMA, 2007).

For more details about which insurance may apply to their particular operation, growers should contact their *insurance agents*.

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For Assistance in Finding Authorized Insurance Services in North Carolina: N.C. Department of Insurance

### For assistance finding insurance, regularly licensed companies and surplus lines:

MAP (919) 733-9811 For help with unauthorized insurance 1-800-546-5664 consumer services (919) 733-7487 agent services

<sup>&</sup>lt;sup>5</sup>Note that this is the authors' interpretation of the policy. However, there is a clause in the AGR-Lite policy where losses from the following may not be covered: "inability to market the agricultural commodities due to quarantines, boycotts, or refusal of any person to accept your agricultural commodities." We have contacted RMA for clarification of this issue and were told that a product warning that causes a revenue reduction (due to an industry wide drop in prices, for example) would be covered under AGR-Lite. The warning that caused low prices is a "market fluctuation" and should be covered. However, we were unable to get a definitive interpretation of whether revenue losses from a direct, government-announced product recall falls under this clause.

Table 1. Examples of Product Recall, Contamination, and Malicious Tampering Policies offered by Private Companies (From Skees et al., 2001).

| Company  | Product   | Description  |
|--|---|--|
| AIG Insurance  | Recall Plus   | Includes First Party Recall, Third Party Product Recall Expenses, and Third Party Impaired Property Expenses. The First Party Recall covers the traditional recall expenses and also has a "rehabilitation coverage option that covers the cost of restoring the company's sales or market share to the level expected prior to the product recall." a   |
| Fireman's Fund   | Liability insurance and product withdrawal expense coverage | Covers expenses for recalls, including communications, office supplies, additional labor costs, shipping, and the costs to dispose withdrawn products. "If a defective product is discovered, you can act quickly and confidently by initiating a withdrawal without obtaining prior approval." Also offers business interruption coverage. <sup>b</sup> |
| Liberty Mutual   | Product recall expense insurance                            | Covers expenses for recalls, including communications, overtime compensation, and product disposal. Included as a general liability endorsement.   |
| Triple S. Inc: Subsidiary of National Food Processors Assoc. | Product<br>Contamination<br>Insurance                       | Covers expenses to inspect, withdraw, and destroy product; value of product itself; and "extra expenses to rehabilitate and re-establish the product in the marketplace." For members of the National Food Processors Assoc. only.d  |
| Chubb Group  | Reputational damages liability insurance                    | Protects against claims for financial damages made by a customer or franchisee alleging that a foodborne illness harmed its reputation and resulted in a loss of income.   |
| Zurich, U.S.   | Brand protection insurance                                  | Covers recall expenses, including those of third party. Also covers "loss of profit relating to recall incident and costs to rehabilitate or re-establish processor's reputation and product's market share."  |
| IBS (Insurance Brokers<br>Service)                           | Total recall plus   | "Provide up to \$25 million in protection from the unexpected costs of recall management and gross profit loss" and brand protection.g   |
| CAN Commercial<br>Insurance                                  | FOOD program  | Allows food companies to "take preventative action by getting products off the shelves quickly if there is any question of food safety."   |
| MRM MacDougall   | Recall insurance  | Offers up to \$50 million in protection for a recall and \$75 million for malicious tampering with food products. Insures recovery expenses as well as damage to sales and reputation.   |

<sup>&</sup>lt;sup>a</sup> Source: Company Web site is: http://firemansfund.com/spd/cfm? spi=liability and Mancini, L. 1997. "Before disaster strikes:property and product liability insurance for food companies." Chilton's Food Engineering. 69(4): 95-98.

### Produced by

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### **NC STATE UNIVERSITY**

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<sup>&</sup>lt;sup>c</sup> Source: Company Web site is: http://www/libertymutual.com/business/specialp.html and Demetrakakes, P. 1999. "Backlash." Food Processing. 60(8): 16-21.

<sup>&</sup>lt;sup>d</sup> Source: Company Web site is: http://www.nfpa-food.org/triplesbrochure and Mancini, L. 1997. "Before disaster strikes:property and product liability insurance for food companies." Chilton's Food Engineering. 69(4): 95-98.

<sup>&</sup>lt;sup>c</sup> Source: by Goch "Chubb liability insurance designed for food industry," Best's Review – Property-Casualty Insurance Edition, November 1998, p. 86 and Company Press Release, Aug. 24, 1998 "Chubb protects food processors and suppliers from losses when customers and franchisees sue for 'reputational damages' stemming from foodborne illness."

<sup>&</sup>lt;sup>f</sup> Source: Demetrakakes, P. 1999. "Backlash." Food Processing. 60(8): 16-21.

g Source: Dwyer, S. 1999. "Is your brand bulletproof?" Prepared Foods. 168(6): 29-30.



contact ONLY vendors

offering local products.

# **DECISION TREE:** How Will You Bring Local Foods into the Cafeteria with Your Next Food Purchase?



related to local.

LOCAL can't be used as a product specification in a school food solicitation, but there are many ways to buy local products.

This chart presents several options for including your desire for local foods in the procurement process.

Tip: If your purchase is Tip: The federal small Is your purchase valued over valued under \$3,500, purchase threshold is it is below the federal the small purchase threshold \$150,000. Many states micropurchase threshold. and localities set more that applies to you? This means that as long restrictive thresholds, so be as your state or local rules sure to contact your state aren't more restrictive, you department of education to can purchase products find out what the applicable under this threshold without YES threshold is. obtaining multiple bids. Tip: When conducting You can conduct an informal You will conduct a formal procurement. an informal Will price be the only evaluation factor? procurement. procurement, be sure to document specifications and record quotes. You should issue an invitation for You should issue a request for Here are options for targeting bids (IFB). Here are options for proposals (RFP). Here are options local in an informal procurement. targeting local in an IFB. for targeting local in an RFP. With an informal In an informal or formal procurement, you can With an RFP, you can also incorporate technical requirements, product procurement, you may use evaluation criteria

specifications, or geographic preference in your

solicitation to target local products.

### Informal Procurement

The primary difference between formal and informal procurement is that a formal procurement must be publicly advertised. This means that when conducting an informal procurement, you are in control of who you request quotes from and you can choose to make requests only from vendors supplying local products. If there are not three local vendors to request quotes from, you can request products from both local and nonlocal sources and target local products by using product specifications, technical requirements or geographic preference. When conducting an informal procurement, you can collect quotes over the phone, via email, or even at the farmers market! Just be sure to document your requirements, specifications, and quotes in writing.

### **Technical Requirements and Product Specifications**

In any type of procurement, you can use technical requirements and product specifications to target local products. In order for a vendor to be considered responsive and responsible, the vendor must meet the product specifications and other requirements outlined in your solicitation. Consider using requirements or specifications that target local products, such as:

- \* Freshness (e.g. "delivered within 48 hours of harvest");
- \* Harvest techniques;
- \* Production practices;
- \* State of origin labelling; and/or
- \* Ability to provide farm visits or visit classrooms.

Specifications such as these help increase the chances of getting products that are produced nearby, but do not explicitly require that the products be local. When using specifications related to particular crop varieties and freshness factors, be sure not to overly restrict competition; do the market research necessary to ensure there are multiple vendors able to meet your specifications.

### **Evaluation Criteria**

In an RFP, you are not just evaluating price but the whole package of services and/or products the vendor is offering. Therefore RFPs allow you to give weight to factors in addition to price. RFPs should describe all evaluation criteria, their relative importance, and how they will be used to assess the proposals. The weight of each evaluation factor distinguishes which elements are most important, but elements included as evaluation criteria are not requirements.

You can use some of the same measures mentioned in the technical requirements and product specifications section as evaluation criteria, noting that if these factors are used as evaluation criteria, their relative importance will be evaluated when reviewing proposals and if they are used as technical requirements or product specifications, the factors *must* be met in order for the bid or proposal to be considered.

### Geographic Preference

The 2008 Farm Bill directed USDA to allow child nutrition program operators to use a geographic preference for the procurement of unprocessed, locally grown or raised agricultural products. See the resources listed below for more information.

### Learn more

FNS's **Procuring Local Foods webpage** is chock full of resources to help you buy local including a comprehensive guide, **Procuring Local Foods for Child Nutrition Programs**; twelve webinars that dissect each step or method for buying local; and fact sheets on a range of procurement-related topics.

For more information, and to sign up for the bi-weekly e-letter from the Food and Nutrition Service's Office of Community Food Systems, please visit www.usda.gov/farmtoschool. Questions? Email us at farmtoschool@fns.usda.gov.

USDA is an equal opportunity provider and employer. Updated August 2017.





# **BUY AMERICAN:**

# SUPPORTING DOMESTIC AGRICULTURE IN SCHOOL MEALS





The **BUY AMERICAN PROVISION** safeguards the health and well-being of our Nation's children and supports the U.S. economy, American farmers, and small and local agricultural businesses (7 CFR 210.21 (d) and Memo SP 38-2017).

School food authorities (SFAs) in the continental United States\* must purchase domestic agricultural commodities and food products. For foods that are unprocessed, the agricultural commodities must be domestic, and for foods that are processed, they must be processed domestically using domestic agricultural food components that are comprised of over 51% domestically grown items, by weight or volume. A domestic creditable food component is the portion that counts toward a reimbursable school meal (meats/meat alternates, grains, vegetables, fruits, and fluid milk).

 Foods and food products of Guam, American Samoa, U.S. Virgin Islands, Puerto Rico, and the Northern Mariana Islands are considered domestic.

### **How SFAs Can Buy American Foods**

- Develop menus that include only domestic foods and domestic food products. \*\*
- Include the Buy American provision and Geographic Preference option in written procurement procedures, specifications in solicitations, and contracts for food; be sure to monitor contractor performance.
- Require suppliers to attest that their final food products are either 100% domestic commodities or a food product containing over 51% domestic food components, by weight or volume.
- Use USDA Foods and food products processed in the United States using USDA Foods.
- Participate in USDA's Farm to School Grant Program.

### **Exceptions to Buy American**

There are two limited exceptions when non-domestic foods may be purchased. These exceptions are determined by the SFA:

- The food or food product is not produced or manufactured in the United States in sufficient and reasonably available quantities of a satisfactory quality; or
- Competitive bids reveal the cost of a United States food or food product is significantly higher than the nondomestic product.

### **REMEMBER:**

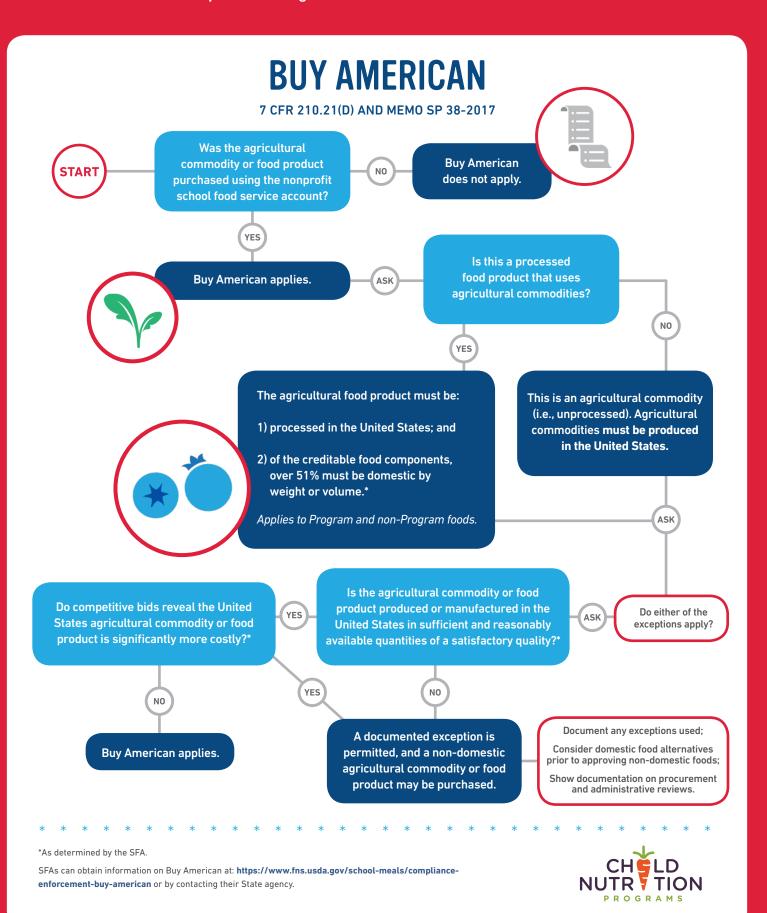
Document exceptions and keep records!

\*SFAs in Alaska, Hawaii, and the U.S. territories are exempt from the Buy American provision. However, SFAs in Hawaii are required to purchase food products produced in Hawaii in sufficient quantities, as determined by the SFA, per 7 CFR 210.21(d) (3). Likewise, SFAs in Puerto Rico are required to purchase food products produced in Puerto Rico in sufficient quantities, under 42 USC 1760(n)[4].













#### **Objectives**

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Understand the concept of farm to school.



Reemphasize food safety practices for handling fresh produce and learn how they apply to locally sourced foods.



Learn how to use geographic preference to procure local food when writing specifications.



Understand how robust farm to school programs can mitigate supply chain disruptions.

#### **Key Points to Consider**

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### **Key Points**

#### **What**

- Farm to school promotes a healthy and diverse diet.
- Local produce (including school gardens) help meet meal pattern requirements and assist in creating markets for local farmers.
- Soil and water conditions, harvesting techniques, documentation, and specifications play important roles in ensuring the safety of produce procured locally, or grown in a school garden.

#### **Key Points to Consider Continued...**

PRODUCE SAFETY

#### Key Points

#### Why

- Buying locally will support your community, producers, and children and help you consistently satisfy the Buy American requirement.
- Greater transparency and predictability of local procurement may alleviate issues caused by supply chain disruptions.

#### <u>How</u>

- Resources for Implementation: <u>www.fns.usda.gov/f2s/farm-to-school</u>
- · Farm to School Regional Specialists

#### What is Farm to School?

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- Bringing locally or regionally produced foods into child nutrition programs (i.e., school cafeterias)
- Hands-on learning activities
- The integration of food-related education into school curriculum

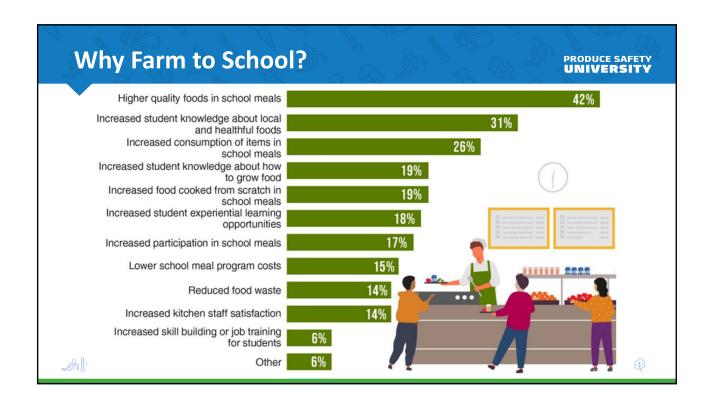
#### **Poll Question**

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#### Does your school nutrition program participate in farm to school or buy locally-grown produce?

- 1.Yes
- 2.No
- 3.Not sure





#### Where to Find Local Foods

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- √Through distributors
- √Through food service management companies
- √From food processors
- √Through USDA DoD Fresh
- √ From individual producers
- ✓ From producer coops/food hubs
- ✓ From school gardens



#### **USDA Requirements**

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#### **Important**

### USDA has no rules prohibiting school garden or local produce from being served in school cafeterias.

 Schools determine their own food safety standards for all vendors.

#### **Local Foods and Food Safety**

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#### **Good Agricultural Practices**

GAPs are food safety best practices, not a federal requirement for school gardens or local farms

- A school may choose to make this a part of their food safety policy, but it's not federally required
- Food from local farms or school gardens is not inherently riskier than food from other sources
- Consult an expert!

#### **Potential Food Safety Risks in Farm to School**

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- · Soil
- Design
- Water source
- Growing
- Harvesting
- Washing
- Training
- Storage and Preparation (same for other products)
- Documentation
- State and Local Regulations



#### Soil







- Free of biological and chemical contaminants
- · Soil testing
  - Lead and other contaminants
  - Nutrient status
- Compost must be fully cured compost
- · Natural or organic soil amendments

#### Design

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- Garden goals (if applicable)
- Site
- Size
- Soil and beds
- Crops and livestock
- · Keeping pests out
- Other structures and spaces

#### Water

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- Municipal/tap water is tested for safety regularly!
- Surface water not recommended
- Rain barrel is acceptable in school gardens
  - √ Water the roots, not the leaves

#### Harvesting

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#### Harvest protocols include:

- · Hand washing
- · Clean harvest tools
- · Observation for contaminates
- Harvesting into clean, food grade containers that are kept off ground
- · Minimal produce washing
- · Proper storage/cooling
- Detailed Documentation!



#### **Know Your Produce!**

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- Know the difference between dirty and rotting
- · Some dirt is expected
- Washing in kitchens is encouraged over field washing
- · Shower is better than bath
- · Soil can contain beneficial bacteria!

#### **Training is Crucial!**

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Farm employees
Volunteers
Students
Teachers
Harvesters

Cafeteria Staff Custodial Staff

#### **Documentation: Understanding the Basics**

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#### **Important**

- Follow good food safety practices
- Stakeholders have been trained
- · Soil and water sources are safe
- Harvest containers are cleaned and sanitized regularly
- Harvest details (products, harvesters, pounds, etc.)



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#### DO

- Use product specifications
- Use additional requirements to determine vendor responsiveness

#### DO NOT

- Use local as a product specification
- Use language like:
  - √"This RFP is restricted to producers within the State."
  - √"We are soliciting bids from producers within a 150-mile radius"

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- · Be flexible
- Don't include unnecessary requirements
- Consider what a vendor new to the school food market might not know
  - ✓ Condition upon receipt of product
  - √ Food safety needs
  - √ Size uniformity



#### **Writing Specifications for Local Food**

PRODUCE SAFETY

#### Potential Specifications, Requirements, and Evaluation Criteria to Target Local Products

- · Varieties unique to the region
- Freshness (e.g., delivered within 48 hours)
- Size of farm
- Harvest techniques
- Crop diversity
- Origin labeling
- · Able to provide cafeteria or class visits

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#### **Geographic Preference**

- Schools may express a preference for local food
  - ✓ It's a preference, not a requirement or specification!
  - ✓ Can be used for all procurement methods
  - √Can only be used with certain products
    - For "unprocessed agricultural products" that retain their inherent character
      - » NOT heating, cooking, or canning

#### **Geographic Preference Solicitation Example**

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|   | LAURIE'S<br>LEGUMES | PAULA'S<br>PULSES | GARY'S<br>GRAINS |
|---|---------------------|-------------------|------------------|
| Price = 60  | 40                  | 50                | 60               |
| Three references,<br>past history = 20                            | 20                  | 20                | 20               |
| Able to provide farm/<br>facility tour or classroom<br>visits = 5 | 0                   | 5                 | 5                |
| Able to provide state of origin on all products = 5               | 0                   | 5                 | 5                |
| Ability to provide<br>products sourced within<br>the state = 15   | 0                   | 15                | 7                |
| 100 possible points   | 60                  | 95                | 97               |

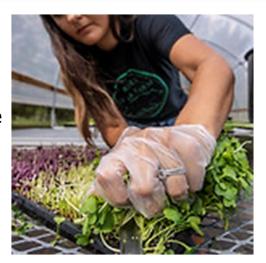
Paula's Pulses sources 75% within the state = 15 points

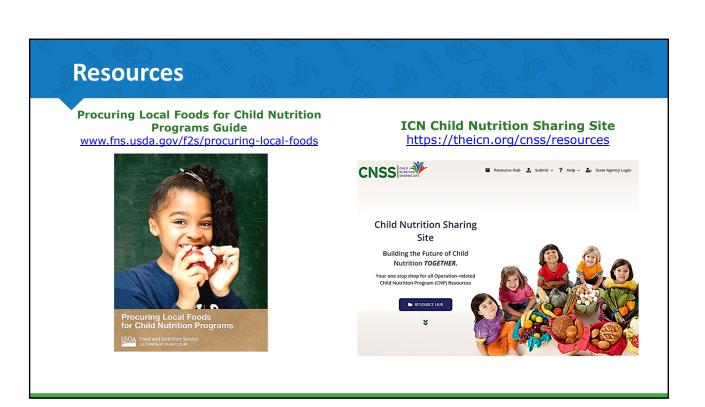
Gary's Grains can source 55% within the state = 7 points

Laurie's legumes cannot guarantee any products within the state = 0 points

PRODUCE SAFETY UNIVERSITY

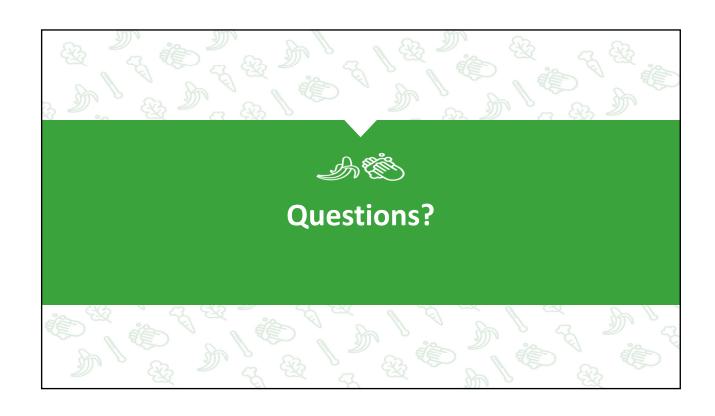
- Define local
- Determine the procurement method to use
- Decide how much preference local products will receive
- Be very clear in the solicitation how the preference will be applied











# CHECKLIST GARDEN SAFETY

Office of the State Superintendent of Education School Garden and Farm to School Program



|                | Item # | # ITEMS  | YES | NON | N/A |
|----------------|--------|--|-----|-----|-----|
| u              | _      | Obtain historical information of the planned/ existing garden site and test the soil for toxins such as arsenic and lead.                  |     |     |     |
| Site<br>Site   | C)     | Site garden away from hazards such as garbage, water run-off, flood zones and utilities.   |     |     |     |
| <b>₽</b> \$    | 8      | Contact "Miss Utility" (1-800-257-7777) before digging in the soil.  |     |     |     |
| 120            | 4      | Compost bins are well maintained and prevent pests.  |     |     |     |
| odwo(          | 5      | Compost collection station is staffed and monitored by an adult or a trained student.  |     |     |     |
| ) & lic        | 9      | Only properly treated, commercially-prepared manure is used. Soil testing is done every three years.                                       |     |     |     |
| PS             | 7      | Label instructions for soils, compost, and fertilizers are followed. Fertilizers are only applied by adults.                               |     |     |     |
| tion           | 80     | Containers used to transport harvested items are food-grade, properly cleaned, and in good condition.                                      |     |     |     |
| ebara          | 6      | Persons who are currently ill or are known to be contagious are prevented from working in the garden or handling any food.                 |     |     |     |
| 14 & p         | 10     | All persons have access to restrooms (with potable hot running water/soap/paper towels).   |     |     |     |
| òuilbu         | 7      | Proper personal hygiene practices are in place. All persons wash hands before harvesting food for public.                                  |     |     |     |
| eH bo          | 12     | USDA "Best Practices for Handling Fresh Produce in Schools" procedures are being followed for items destined for consumption.              |     |     |     |
| )OH            | 13     | Harvested items are labeled and properly stored prior to use in cafeteria or otherwise consumed.   |     |     |     |
| noit           | 14     | Gray water, waste water, and/or runoff water from surfaces that may contain toxins is not used to water edibles or wash produce.           |     |     |     |
| lrriga         | 15     | Rainwater is collected from a roof with appropriate roofing material and stored in a food grade container.                                 |     |     |     |
| ier &          | 16     | Storage tanks such as cisterns or rain barrels are properly cleaned and flushed.   |     |     |     |
| tsW            | 17     | Backflow prevention devices are installed as part of the irrigation system.  |     |     |     |
|                | 18     | Non-toxic, non-leaching materials are used for edible garden beds.   |     |     |     |
| Sarde<br>Desig | 0 T    | Clear signage is provided regarding proper garden procedures such as composting, hand washing, and tool use.                               |     |     |     |
|                | 20     | Only non-allergenic and non-toxic plants are used.   |     |     |     |
| S              | 21     | Tools and utensils are properly cleaned and sanitized.   |     |     |     |
| looT           | 22     | Tools are properly stored and locked. Tools not suited for children such as sharp tools should be out of reach and closely monitored.      |     |     |     |
| S              | 23     | Integrated Pest Management policies and procedures are followed.   |     |     |     |
| Jest I         | 24     | Hands are washed with soap and water after being in an animal area and going back into the produce production area.                        |     |     |     |
| s suc          | 25     | Animals are humanely housed in an enclosed area down-slope from the production area and are kept out of growing areas at all times.        |     |     |     |
| lsmin          | 26     | There is no evidence of abuse from domestic and/or wild animals.   |     |     |     |
| A              | 27     | Bees are placed in a low traffic section of the garden that receives excellent sunlight.   |     |     |     |
| Hilb           | 28     | A well-stocked first aid kit is readily available in the garden.   |     |     |     |
| e9H            | 29     | All persons are wearing closed-toed shoes, and are encouraged to wear appropriate clothing to protect themselves from sun, cold, and heat. |     |     |     |















### GET THE FACTS ABOUT FOOD SAFETY

**EACH YEAR,** a growing number of schools are sourcing and serving safe, locally grown foods from nearby farmers or school gardens. Misconceptions about food safety should not keep schools from enjoying these nutritious and fresh food options. **Let's look at the facts:** 



#### **Grow Your Own**

School Food Authorities (SFA) can use school garden produce in their school kitchens. There is no Federal regulation that prohibits the use of school garden or school farm produce in school meal programs. In fact, it is encouraged! SFAs have multiple options for using school garden produce to benefit school meals. For more information, refer to the United States Department of Agriculture (USDA) Food and Nutrition Service (FNS) policy memo Farm to School and School Garden Expenses (SP06-2015).

Keep in mind that there may be local, State, or Tribal laws governing the use of school garden or farm produce in the school cafeteria. It is important to be aware of any additional laws that exist, and how they may impact your program. For more information, contact your State Departments of Agriculture, Education, and/or Health.

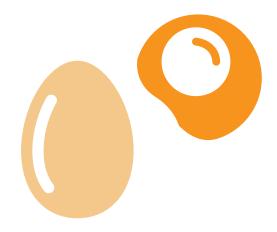
#### **Eggs at the Source**

Schools are free to use "shell eggs" from campus chickens (chickens raised on school grounds) in their school meal programs; there are no Federal rules prohibiting this. For additional information, refer to FNS policy memo Procuring Local Meat, Poultry, Game, and Eggs for Child Nutrition Programs (SP01-2016, CACFP 01-2016,

Schools intending to use shell eggs from campus chickens in their meal program should consult with their State

Departments of Agriculture, Education, and/or Health, to ensure that their campus chickens comply with both State animal health standards and food quality rules. Schools also should take special care to follow guidelines for proper storage and handling of shell eggs to mitigate the risk of foodborne illnesses.

For more information on egg safety, please refer to the USDA Food Safety and Inspection Service, "Shell Eggs from Farm to Table" fact sheet and the Centers for Disease Control and Prevention (CDC) "Safe Handling Tips for Eggs" guidance.







SFSP 01-2016).



#### **Practice Safety**

Good Agricultural Practices (GAPs) are voluntary audits that a farm can request to verify that their fruits and vegetables are packed, handled, and stored as safely as possible to minimize the risk of microbial food safety hazards. GAPs are recommended but not required for local farms. The USDA Agricultural Marketing Service (AMS) maintains a database of farms and companies that meet GAP and Good Handling Practices (GHP) criteria. For more information, or to view the database, please visit the AMS GAP and GHP acceptance database webpage at https://apps.ams.usda.gov/GAPGHP/reportG01.aspx.

It is important to note that farms can implement GAPs without having a formal GAP certification. There is no Federal requirement for schools to purchase food from farms that have passed a GAP audit. Schools may purchase food directly from any farm that meets the applicable food safety requirements defined by the school as well as any existing State, local, and/or Tribal regulations.

#### **Small and Mighty**

Local foods are not riskier than food sourced from largescale distributors.

The supply chain in a local food system is shorter and has fewer "touchpoints" than food that travels through a large-scale distribution system. In many cases, this means there are fewer opportunities for food safety issues to arise.

A growing number of large distributors now are sourcing and selling local food. It is the responsibility of the SFA to verify that they are purchasing food from a reputable supplier that engages in safe food practices. Be sure to ask questions and ensure your source is properly handling your food supply, whether it is a small farmer or a large distributor. For more information, refer to the Food Safety Practices to Expect from your Fresh Produce Distributor fact sheet and the Verifying On-Farm Food Safety fact sheet.

#### **Looking Out for You**

The U. S. Department of Agriculture works with the Food and Drug Administration (FDA) to ensure America's overall food supply is safe.

The FDA is the Federal agency responsible for ensuring the security and safety of much of America's food, including fresh fruits and vegetables. Most farms are required to comply with the FDA Food Safety Modernization Act (FSMA) Produce Safety Rule. However, there are **exemptions** for small farms and businesses.

USDA has specific food safety requirements for food supplied through USDA Foods and the Department of Defense Fresh Fruit and Vegetable programs. All fresh fruit and vegetables purchased directly by USDA must come from a vendor that has passed a USDA GAP as well as a GHP audit.

While USDA does not require farms to have insurance in order to sell to schools, it may be beneficial to partner with farmers who do have insurance coverage if that coverage applies to visitor-related injuries, such as those that could happen on a school field trip, and risks associated with the sale of farm products, including any illnesses caused by farm-related products.



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### FOOD SAFETY INFORMATION AND RESOURCES FOR THE FARM TO SCHOOL COMMUNITY



The U.S. Department of Agriculture (USDA) works with the U.S. Food and Drug Administration (FDA) to ensure the Nation's food supply is safe. The FDA is the Federal agency responsible for ensuring the security and safety of many foods, including fresh fruits and vegetables. Many farms are required to comply with the <u>Food Safety Modernization Act (FSMA)</u> and <u>Produce Safety Rule (PSR)</u> and many commercial food operations that manufacture, process, pack, or hold human food are required to comply with the <u>Preventive Controls for Human Food Rule (PCHF)</u>. 1,2,3

- The FDA <u>Technical Assistance Network (TAN)</u> is a central source of information for questions related to the FSMA rules, programs, and implementation strategies.<sup>4</sup> Answers have been provided in response to <u>frequently asked</u> <u>questions on the FSMA</u> and the <u>FSMA Rules and Guidance for Industry</u> can also be used to find answers to questions.<sup>5,6</sup>
- The FDA has a <u>Cooperative Agreement Program</u> with many States to implement the PSR. Your <u>State agency</u> may offer assistance and more information, and if this does not apply to your State or territory, you can visit the FDA <u>Produce Safety Network</u> for more information.<sup>7,8,9</sup>
- The <u>Produce Safety Alliance (PSA)</u> is a collaboration between Cornell University, the FDA, and the USDA which offers approved trainings to prepare fresh produce growers to meet the regulatory requirements included in the FSMA Produce Safety Rule.<sup>10</sup>
- The <u>Food Safety Preventive Controls Alliance (FSPCA)</u> is an alliance consisting of industry, academic and government stakeholders that develops curricula, and training and outreach programs to support compliance with the prevention-oriented standards of the FSMA.<sup>11</sup>
- Many <u>local Cooperative Extension</u> offices provide information about available resources and training opportunities focused on food safety and produce safety.<sup>12</sup>
- Information and resources about farm to school activities can be found on the <u>USDA Food and Nutrition Service (FNS)</u>

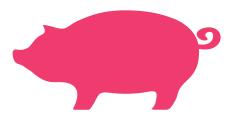
  <u>Farm to School webpage</u>. For information about local foods or school gardens, contact your <u>USDA FNS Farm to</u>

  <u>School Regional Specialist</u> or email us at <u>SM.FN.FarmToSchool@usda.gov</u>. 4
- For information about food safety in the Child Nutrition Programs, visit the <u>USDA FNS Food Safety: Food Safety at</u>
  <u>FNS webpage</u>. 15



#### References

- (1) Full Text of the Food Safety Modernization Act (FSMA)
  www.fda.gov/food/food-safety-modernization-act-fsma/full-text-food-safety-modernization-act-fsma
- (2) FSMA Final Rule on Produce Safety
  www.fda.gov/food/food-safety-modernization-act-fsma/fsma-final-rule-produce-safety
- (3) FSMA Final Rule for Preventive Controls for Human Food www.fda.gov/food/food-safety-modernization-act-fsma/fsma-final-rule-preventive-controls-human-food
- (4) FSMA Technical Assistance Network (TAN) www.fda.gov/food/food-safety-modernization-act-fsma/fsma-technical-assistance-network-tan
- (5) FSMA Frequently Asked Questions www.fda.gov/food/food-safety-modernization-act-fsma/frequently-asked-questions-fsma
- (6) FSMA Rules and Guidance for Industry www.fda.gov/food/food-safety-modernization-act-fsma/fsma-rules-guidance-industry
- (7) FDA-State Produce Safety Implementation Cooperative Agreement Program www.fda.gov/ForFederalStateandLocalOfficials/FundingOpportunities/GrantsCoopAgrmts/ucm517991.htm
- (8) FoodSafety.gov State Agency Information www.foodsafety.gov/about
- [9] FDA Produce Safety Network www.fda.gov/food/food-safety-modernization-act-fsma/produce-safety-network
- (10) Produce Safety Alliance (PSA) producesafetyalliance.cornell.edu/
- (11) Food Safety Preventive Controls Alliance (FSPCA) www.ifsh.iit.edu/fspca
- (12) Local Cooperative Extension Offices
  <a href="https://www.nifa.usda.gov/land-grant-colleges-and-universities-partner-website-directory">www.nifa.usda.gov/land-grant-colleges-and-universities-partner-website-directory</a>
- (13) USDA Food and Nutrition Service (FNS) Farm to School Webpage www.fns.usda.gov/f2s/farm-to-school
- (14) USDA FNS Farm to School Regional Specialists www.fns.usda.gov/f2s/usda-farm-school-staff
- (15) USDA FNS Food Safety: Food Safety at FNS webpage www.fns.usda.gov/fs/food-safety



For more information and to sign up for The Dirt, the e-newsletter from the Patrick Leahy Farm to School Program, visit

www.fns.usda.gov/f2s/e-letter-archive.

Questions? Email us at SM.FN.FarmToSchool@usda.gov.



### THE FOOD SAFETY MODERNIZATION ACT (FSMA) AND THE PRODUCE SAFETY RULE (PSR)

Fruits and vegetables are a vital component of a healthy diet and it's important that these key sources of nutrition are safe to eat. The <u>Food Safety Modernization Act (FSMA)</u> was signed into law in 2011 and is implemented by the **U.S. Food and Drug Administration (FDA)**. The FSMA protects public health by taking a proactive approach to strengthening the Nation's food safety system. It allows the FDA to focus on reducing and preventing food safety problems at each point of the supply chain, rather than responding after they happen.

The FSMA has seven rules, including science-based Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption, which is widely known as the Produce Safety Rule (PSR).<sup>2</sup> The rule went into effect in January 2016 and aims to reduce foodborne illnesses associated with consuming contaminated produce which, according to research by the U.S. Centers for Disease Control and Prevention (CDC), accounted for nearly half of all foodborne illnesses from 1998 to 2008.<sup>3</sup>

The PSR applies to commercial growers, harvesters, and packers of produce that the FDA has deemed likely to be eaten raw and that is grown on farms with greater than \$25,000 in average annual produce sales. Produce items that the FDA has identified as being <u>rarely consumed raw</u> are not subject to the rule - these items are typically consumed after being cooked, which significantly reduces the levels of harmful microorganisms that may be present in the food.<sup>4</sup>

FDA List of Produce Rarely Consumed Raw:

asparagus; black beans, great Northern beans, kidney beans, lima beans, navy beans, and pinto beans; garden beets (roots and tops) and sugar beets; cashews; sour cherries; chickpeas; cocoa beans; coffee beans; collards; sweet corn; cranberries; dates; dill (seeds and weed); eggplant; figs; ginger; hazelnuts; horseradish; lentils; okra; peanuts; pecans; peppermint; potatoes; pumpkins; winter squash; sweet potatoes; and water chestnuts

The PSR also applies to most farms that grow, harvest, and pack produce in one general location and under one general management. The business category of covered farms and their PSR compliance dates are based on the farm size and the farm's annual average produce sales of the previous 3-year period. Visit the <u>FDA webpage</u> for more information about applicable PSR compliance dates and other key requirements.<sup>2</sup>

Keep in mind, however, that there are some farms and businesses that may be eligible for exemptions. This <u>FDA flowchart</u> can help you learn more about your farm's status, including if the PSR is applicable or if your farm may be eligible for a full or qualified exemption.<sup>5</sup>

PSR exemptions that may apply to a farm business are generally based on:

- The type of food grown
- Total annual sales of the food (adjusted each year to <u>account for inflation</u>)<sup>6</sup>
- Where the food is sold
- To whom the food is sold





The following types of produce are typically not covered by the PSR:

- Produce that is rarely consumed raw<sup>4</sup>
- Produce for personal or on-farm consumption
- Produce intended for commercial processing (e.g., cooking), which is covered by a <u>different FSMA rule</u><sup>7</sup>
- Produce from farms with full exemptions or qualified exemptions

**Full exemption**: Farms with annual average produce sales of \$25,000 or less (adjusted for inflation) during the previous 3-year period are not covered by the PSR. These farms should keep records showing their sales information.

**Qualified exemption**: To be eligible for a qualified exemption, there are two requirements for farms.

 The farm must have food sales averaging less than \$500,000 per year (adjusted for inflation) during the previous 3-year period – these sales include all food for humans and animals, not just fruits and vegetables.

School nutrition programs are considered retail food establishments and are qualified end-users under the PSR.

During the 3-year period, farm sales to **qualified end-users** must be more than the combined sales to all other users (21 CFR 112.5). A qualified end-user is either (a) the consumer of the food or (b) a restaurant or retail food establishment that is located in the same State or Indian reservation as the farm, or not more than 275 miles away (21 CFR 112.3).

 A farm with a qualified exemption must still meet some modified requirements, including disclosing the name and the complete business address of the farm where the produce was grown either on the label of the produce or at the point of purchase. These farms are also required to keep certain records.

As a producer, the PSR should not impact your ability to sell to child nutrition programs. There is no Federal requirement for child nutrition programs to buy from farms that are covered by the PSR. Farms should always follow good food safety practices, whether covered by the PSR or a food safety certification, such as **Good Agricultural Practices (GAP)**.

Federal law does not require schools to purchase from farms with a Good Agricultural Practices (GAP) certification or other third-party food safety certification.

In their solicitations, schools must ensure that vendors comply with all applicable Federal, State, Tribal, and local regulations. Be prepared to provide information about your farm's food safety practices that will help your child nutrition partners ensure that their school receives food that is safe.



#### References

- (1) Full Text of the Food Safety Modernization Act (FSMA) www.fda.gov/food/food-safety-modernization-act-fsma/full-text-food-safety-modernization-act-fsma
- (2) FSMA Final Rule on Produce Safety www.fda.gov/food/food-safety-modernization-act-fsma/fsma-final-rule-produce-safety
- (3) CDC Attribution of Foodborne Illness: Findings www.cdc.gov/foodborneburden/attribution/attribution-1998-2008.html
- (4) FSMA Produce Safety Rule: "Rarely Consumed Raw" Produce www.fda.gov/media/107445/download
- (5) Standards for Produce Safety: Coverage and Exemptions Exclusions for 21 Part 112 www.fda.gov/media/94332/download
- (6) FSMA Inflation Adjusted Cut Offs www.fda.gov/food/food-safety-modernization-act-fsma/fsma-inflation-adjusted-cut-offs
- (7) FSMA Final Rule on Preventive Controls for Human Food www.fda.gov/food/food-safety-modernization-act-fsma/fsma-final-rule-preventive-controls-human-food
- (8) FSMA Produce Safety Rule (Final Rule): Which farms are eligible for a qualified exemption and associated modified requirements based on average monetary value of all food sold and direct farm marketing?

  www.ecfr.gov/current/title-21/chapter-I/subchapter-B/part-112/subpart-A/section-112.5
- (9) FSMA Produce Safety Rule (Final Rule): What definitions apply to this part?
  www.ecfr.gov/current/title-21/chapter-I/subchapter-B/part-112/subpart-A/section-112.3



#### FOOD SAFETY FREQUENTLY ASKED QUESTIONS:

### THE FOOD SAFETY MODERNIZATION ACT AND ITS IMPACT ON FARM TO SCHOOL ACTIVITIES

Child nutrition program operators may purchase fruits and vegetables from a variety of sources, including local produce growers and suppliers. All farms should follow good food safety practices and it is important to be aware of food safety requirements and regulations that help keep fresh produce safe, such as the <u>Food Safety Modernization Act [FSMA]</u>. Understanding produce safety best practices and requirements will help keep meals served in child nutrition programs safe.

#### What is FSMA and the Produce Safety Rule?

**FSMA** was signed into law in 2011 and is implemented by the **U.S. Food and Drug Administration (FDA)**. FSMA protects public health by taking a proactive approach to strengthening the nation's food safety system. It allows the FDA to focus on reducing and preventing food safety problems at each point of the supply chain, rather than responding after they occur.

FSMA has seven rules, including science-based Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption, which is widely known as the <u>Produce Safety Rule (PSR)</u><sup>2</sup>. The rule went into effect in January 2016 and aims to reduce foodborne illness associated with consuming contaminated produce which, according to research by the U.S. Centers for Disease Control and Prevention (CDC), accounted for nearly half of all foodborne illnesses from 1998 to 2008<sup>3</sup>.

#### Does the FSMA Produce Safety Rule apply to all fruits and vegetables?

Produce that the FDA has identified as being <u>rarely consumed</u> <u>raw</u> is not subject to the PSR <sup>2,4</sup>. These items are typically consumed after being cooked, which significantly reduces the levels of harmful microorganisms that may be present in the food.

FDA List of Produce Rarely Consumed Raw:
asparagus; black beans, great Northern beans,
kidney beans, lima beans, navy beans, and pinto
beans; garden beets (roots and tops) and sugar beets;
cashews; sour cherries; chickpeas; cocoa beans;
coffee beans; collards; sweet corn; cranberries;
dates; dill (seeds and weed); eggplant; figs; ginger;
hazelnuts; horseradish; lentils; okra; peanuts; pecans;
peppermint; potatoes; pumpkins; winter squash;
sweet potatoes; and water chestnuts

#### When does the FSMA Produce Safety Rule apply to a farm business?

The PSR applies to commercial growers, harvesters, and packers of produce that the FDA has deemed likely to be eaten raw, and that is grown on farms with greater than \$25,000 in average annual produce sales. The PSR also applies to most farms that grow, harvest, and pack produce in one general location and under one general management.

The business category of covered farms and their PSR compliance dates are based on the farm size and the farm's annual average produce sales of the previous 3-year period. Visit the <u>FDA webpage</u> for more information about applicable PSR compliance dates and other key requirements<sup>2</sup>.



Child nutrition professionals should keep in mind that produce growers and suppliers who sell to schools may fall into different categories and may be eligible for exemptions. The criteria information provided in this section and the <u>FDA flowchart</u> can help child nutrition professionals understand whether the PSR is applicable to a farm, or if a farm may be partially or fully exempt from the PSR<sup>5</sup>.

PSR exemptions are generally based on:

- The type of food grown
- Total annual sales of the food (adjusted each year to <u>account for inflation</u>)<sup>6</sup>
- Where the food is sold
- To whom the food is sold

The following types of produce are typically not covered by the PSR:

- Produce that is rarely consumed raw<sup>2, 4</sup>
- Produce for personal or on-farm consumption
- Produce intended for commercial processing (e.g., cooking) which is covered by a <u>different FSMA rule</u><sup>7</sup>
- Produce from farms with full exemptions or qualified exemptions

**Full exemption:** Farms with annual average produce sales of \$25,000 or less (adjusted for inflation) during the previous 3-year period are not covered by the PSR. These farms should keep records showing their sales information.

**Qualified exemption:** To be eligible for a qualified exemption, there are two requirements for farms.

- The farm must have food sales averaging less than \$500,000 per year (adjusted for inflation) during the previous 3-year period these sales include all food for humans and animals, not just fruits and vegetables.
- During the 3-year period, farm sales to **qualified end-users** must be more than the combined sales to all other users (21 CFR 112.5)<sup>8</sup>. A qualified end-user is either (a) the consumer of the food or (b) a restaurant or retail food establishment that is located in the same State or Indian reservation as the farm, or not more than 275 miles away (21 CFR 112.3)<sup>9</sup>.

School nutrition programs are considered retail food establishments and are qualified end-users under the PSR.

A farm with a qualified exemption must still meet some modified requirements, including disclosing the name and the complete business address of the farm where the produce was grown either on the label of the produce, or at the point of purchase. These farms are also required to keep certain records.



#### Does the FSMA Produce Safety Rule impact procurement practices and farm to school activities in child nutrition programs?

The PSR should not impact a child nutrition program's ability to buy local food or a farmer's ability to sell to child nutrition programs. It is not a Federal requirement to buy from farms that are covered by the PSR. All Federal child nutrition procurement rules remain the same.

When buying directly from farms, you should ask your farm partners if they are covered under the PSR; don't assume that they may be exempt. There is no certificate of compliance from the FDA and there is no list of farms that are compliant with the PSR.

If your program or state law requires a food safety certification, there are several private options, as well as the Good Agricultural Practices (GAP) certification from the United States Department of Agriculture (USDA) Agricultural Marketing Service (AMS), which is aligned with the FDA's FSMA rules.

Federal law does not require schools to purchase from farms with a Good Agricultural Practices (GAP) certification or other third-party food safety certification.

Farms should always follow good food safety practices, whether covered by the PSR or a food safety certification such as GAP. It is your responsibility to ask questions about the farm's food safety practices to ensure that your school receives food that is safe.

In solicitations, schools must ensure that vendors comply with all applicable Federal, state, tribal, and local regulations. Review the *Verifying On-Farm Food Safety* fact sheet for more information on how to address and verify on-farm food safety of food sourced from local producers<sup>10</sup>.

#### Does the FSMA Produce Safety Rule impact school gardens?

Many school gardens fall below the \$25,000 threshold of annual average produce sales – the PSR does not apply to these gardens. Donated garden produce does not count toward the total sales revenue.

Many school nutrition programs use most of the produce grown in their school gardens; since school nutrition programs fall into the **qualified end-user** category, the PSR would not apply to these school gardens. Even if the PSR does not apply to your school garden, schools should implement good food safety practices for all gardens. Review the <u>School Gardens Fact Sheet</u> for more information<sup>11</sup>.



#### References

- (1) Full Text of the Food Safety Modernization Act (FSMA) www.fda.gov/food/food-safety-modernization-act-fsma/full-text-food-safety-modernization-act-fsma
- (2) FSMA Final Rule on Produce Safety www.fda.gov/food/food-safety-modernization-act-fsma/fsma-final-rule-produce-safety
- (3) CDC Attribution of Foodborne Illness: Findings www.cdc.gov/foodborneburden/attribution/attribution-1998-2008.html
- (4) FSMA Produce Safety Rule: "Rarely Consumed Raw" Products www.fda.gov/media/107445/download
- (5) FSMA Produce Safety Rule: Coverage and Exemptions/Exclusions www.fda.gov/media/94332/download
- (6) FSMA Inflation Adjusted Cut Offs www.fda.gov/food/food-safety-modernization-act-fsma/fsma-inflation-adjusted-cut-offs
- (7) FSMA Final Rule on Preventive Controls for Human Food www.fda.gov/food/food-safety-modernization-act-fsma/fsma-final-rule-preventive-controls-human-food
- (8) FSMA Produce Safety Rule (Final Rule): Which farms are eligible for a qualified exemption and associated modified requirements based on average monetary value of all food sold and direct farm marketing?

  www.ecfr.gov/current/title-21/chapter-I/subchapter-B/part-112/subpart-A/section-112.5
- (9) FSMA Produce Safety Rule (Final Rule): What definitions apply to this part? www.ecfr.gov/current/title-21/chapter-I/subchapter-B/part-112/subpart-A/section-112.3
- (10) USDA FNS Food Safety: Verifying On-Farm Food Safety Fact Sheet www.fns.usda.gov/fs/verifying-farm-food-safety
- [11] USDA FNS Farm to School Program: School Gardens Fact Sheet www.fns.usda.gov/f2s/school-gardens



For more information and to sign up for The Dirt, the e-newsletter from the Patrick Leahy Farm to School Program, visit

www.fns.usda.gov/f2s/e-letter-archive

Questions? Email us at SM.FN.FarmToSchool@usda.gov.



### AN OVERVIEW OF GOOD AGRICULTURAL PRACTICES (GAPs)

\* \* \* \*

In the food supply chain, there can be contamination risks at every step from farm to fork. Preventing microbial contamination is particularly important for fresh produce because there is no heat treatment or "kill step" before it is consumed. When purchasing fresh produce, child nutrition professionals should be aware of key food safety practices that all fruit and vegetable producers should follow. Producers should be aware of key food safety practices that all produce growers should follow.

#### What are Good Agricutural Practices (GAPs)?

Good Agricultural Practices, or GAPs, are voluntary science-based guidelines that help to reduce the risk of microbial contamination during growing, harvesting, and packing of fresh fruits and vegetables. The guidelines are based on the U.S. Food and Drug Administration (FDA)'s <u>Guide</u> to <u>Minimizing Microbial Food Safety Hazards for Fresh Produce</u>. GAPs help to identify and control potential risks that affect the safety of produce on the farm and in the packinghouse.<sup>1</sup>

The main principles of GAPs focus on water, manure and municipal biosolids, worker health and hygiene, sanitary facilities, field sanitation, packing facility sanitation, transportation, and traceback and recordkeeping. On a farm, the main sources of contamination are humans, animals, water, and soil. GAPs address how to control these contamination risks. For example, GAPs identify how to:

- Reduce the potential transfer of microbial contaminants from the soil to the crop.
- Ensure water used in various phases of crop production is not a source of contamination.
- Help workers to practice good personal hygiene and ensure that clean facilities are provided for workers and visitors.
- Ensure that there is good sanitation, including surfaces, storage areas, equipment, and transportation vehicles that are properly cleaned and maintained on a regular basis.

There is no Federal requirement for schools to purchase food from farms that have a GAP certification or other third-party food safety certification.

It is recommended that a farm implement GAPs in its food safety plan to ensure the safety of produce grown and harvested during each phase of production. Keep in mind that farms can follow GAPs and have a food safety plan in place without having a formal GAP certification. Schools may purchase food directly from any farm that meets the applicable food safety requirements defined by the school and any existing Federal, State, Tribal, and local regulations. Review the *Verifying On-Farm Food Safety* fact sheet for more information on how to address and verify on-farm food safety of food sourced from local producers.<sup>2</sup>

The United States Department of Agriculture (USDA) has specific food safety requirements for food supplied through USDA Foods and the USDA Department of Defense (DoD) Fresh Fruit and Vegetable Program (FFVP). All fresh fruit and vegetables purchased directly by the USDA must come from a vendor that has passed a food safety audit, such as a USDA GAP audit. The USDA Agricultural Marketing Service (AMS) maintains a database of farms and companies that meet GAP criteria. For more information, or to view the database, visit the AMS GAP Audits webpage.<sup>3</sup>



You can find more information about GAPs and your produce supply chain partners by visiting the National Good Agricultural Practices (GAPs) Program webpage and contacting your local and State Cooperative Extension office. 4,5 Information and resources about farm to school activities can be found on the USDA Food and Nutrition Service's (FNS) Farm to School Program webpage. 6 For information about local foods or school gardens, contact your USDA FNS Farm to School Regional Specialist or email us at SM.FN.FarmToSchool@usda.gov.7 Visit the USDA Farm to School e-letter webpage and sign up to receive The Dirt, which provides information about a variety of farm to school activities including webinars, relevant news, success stories, resource highlights, and Farm to School Census facts.8 For information about food safety in the Child Nutrition Programs, visit the USDA FNS Food Safety webpage.9



#### References

- (1) Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables
  www.fda.gov/regulatory-information/search-fdaguidance-documents/guidance-industry-guideminimize-microbial-food-safety-hazards-fresh-fruitsand-vegetables
- (2) USDA FNS Food Safety: Verifying On-Farm Food Safety www.fns.usda.gov/ofs/produce-safety-fact-sheets
- (3) USDA AMS: Good Agricultural Practices (GAP) Audits www.ams.usda.gov/services/auditing/gap-ghp
- (4) National Good Agricultural Practices Program cals.cornell.edu/national-good-agricultural-practices-program
- (5) USDA National Institute of Food and Agriculture:
  College Partners Directory
  nifa.usda.gov/land-grant-colleges-and-universitiespartner-website-directory
- (6) USDA Food and Nutrition Service (FNS) Farm to School Webpage www.fns.usda.qov/f2s/farm-to-school
- (7) USDA FNS Farm to School Program Staff www.fns.usda.gov/f2s/usda-farm-school-staff
- (8) Farm to School Census farmtoschoolcensus.fns.usda.gov/
- (9) USDA FNS Food Safety: Food Safety at FNS www.fns.usda.gov/fs/food-safety

For more information and to sign up for The Dirt, the e-newsletter from the Patrick Leahy Farm to School Program, visit <a href="https://www.fns.usda.gov/f2s/e-letter-archive">www.fns.usda.gov/f2s/e-letter-archive</a>.

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## OVERVIEW: HAZARD ANALYSIS RISK-BASED PREVENTIVE CONTROL FOOD SAFETY PLAN (HARPC) AND HAZARD ANALYSIS CRITICAL CONTROL POINT PLAN (HACCP)

The <u>Food Safety Modernization Act (FSMA)</u> protects public health by taking a proactive approach to strengthening the nation's food safety system. The FSMA was signed into law in 2011 and is implemented by the **U.S. Food and Drug Administration** (FDA). It allows the FDA to focus on reducing and preventing food safety problems at each point of the supply chain, rather than responding after they happen.

The FSMA has seven rules including Current Good Manufacturing Practice, Hazard Analysis, and Risk-Based Preventive Controls for Human Food, which is widely known as the <u>Preventive Controls for Human Food Rule (PCHF)</u>. This rule became effective in November 2015 and requires food facilities to have a written Hazard Analysis Risk-Based Preventive Control (HARPC) food safety plan in place that includes preventive controls to minimize or prevent identified hazards from occurring.

The requirements within the PCHF apply to commercial food operations that manufacture, process, pack, or hold human food for consumption in the United States that are already required to register with FDA under section 415 of the **Food, Drug, and Cosmetic Act (FD&C Act)**. The rule also applies to businesses in other countries that export food to the United States. Operations defined as farms, retail food establishments, and restaurants are some of the businesses that are not subject to the PCHF requirements because they are not required to register with the FDA under this Act.

There are several exemptions or modified requirements that may apply even if some food products are covered under the PCHF, including:

- Qualified facilities (very small businesses)
- Food businesses subject to low-acid canned food regulations
- Foods subject to the Hazard Analysis Critical Control Point (HACCP) regulation (such as seafood and juice)
- Dietary supplements
- Alcoholic beverages
- Certain low-risk manufacturing/processing, packing, and holding activities conducted by small/very small businesses
  on farms for specific foods (e.g., making jams, jellies, and preserves from acidic fruit and extracting oils from grains)





Visit the <u>FDA webpage</u> for more information about key requirements, including applicable PCHF compliance dates.<sup>2</sup>

HACCP is an internationally recognized and universally accepted risk-based system, which addresses food safety through the analysis and control of biological, chemical, and physical hazards. HACCP is used in many segments of the food industry and encompasses seven principles to identify and assess the risk of hazards, and control the identified hazards. HACCP systems have been mandated by U.S. Federal regulations issued by the FDA for seafood and juice, and by the USDA Food Safety and Inspection Service (FSIS) for meat and poultry.

#### The Seven HACCP Principles

- 1: Conduct a Hazard Analysis
- 2: Determine Critical Control Points (CCPs)
  - 3: Establish Critical Limits
  - 4: Establish Monitoring Procedures
    - 5: Establish Corrective Actions
  - 6: Establish Verification Procedures
- 7: Establish Record-Keeping and Documentation Procedures

A HARPC food safety plan is developed using HACCP principles, but all components are not identical. Based on scientific data, both plans use a proactive approach to identify and assess process-specific food safety hazards and to utilize appropriate, effective, and verifiable control measures. In HACCP plans, critical control points (CCPs) are steps where a control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level. CCPs are measurable and include critical limits, which specify a maximum and/or minimum value, or combination of values.

In HACCP plans, controls are applied at critical control points (CCPs), whereas the HARPC food safety plans may include preventive controls at CCPs, along with controls at other steps, to ensure food safety. In HARPC food safety plans, there are five main preventive controls, which include Process Controls, Food Allergen Controls, Sanitation Controls, Supply Chain Controls, Other Controls, and Recall Plan. The majority of CCPs in a HACCP plan fall under the Process Controls section in a HARPC food safety plan.

A preventive controls qualified individual (PCQI) must develop or oversee the development of the written HARPC food safety plan [21 CFR 117.126[a]]. A PCQI is a person with the education, training, or experience (or a combination of these) to develop and apply a food safety system. A PCQI can be qualified through job experience or by completing training equivalent to the standardized curriculum recognized as adequate by the FDA and does not need to be an employee of the facility [21 CFR 117.3].

#### Components of HARPC

- 1: Hazard Analysis (Risk Assessment)
- 2: Risk-based Preventive Controls
  - 3: Effectiveness Monitoring
    - 4: Corrective Actions
  - 5: Compliance Verification
- 6: Recordkeeping and Documentation
  - 7: Reanalysis

For Receiving Facilities: Supply-Chain Program

For All Facilities: Recall Plan



A HARPC food safety plan must be reanalyzed at least every three years. The reanalysis may focus on an applicable portion of the plan when there are changes to a system or equipment, when there is new information available about potential hazards associated with the food or facility, when there is an unanticipated food safety problem, or when a preventive control, a combination of preventive controls, or the food safety plan is ineffective. The following records must be kept to comply with the PCHF:<sup>5</sup>

- The hazard analysis
- Preventive controls for each identified hazard and verification that they effectively control the hazards
- Monitoring records to ensure preventive controls are consistently performed
- Documentation of any corrective actions taken
- The supplier approval and verification program
- The recall plan
- All testing and auditing results
- The results of the food safety plan reanalysis

As a producer, understanding differences and similarities between HARPC food safety plans and HACCP plans can help you to determine which elements of each plan may apply to your business and what requirements you need to follow. The FDA has a free <u>Food Safety Plan Builder (FSPB)</u> software program to assist owners/operators of food facilities with the development of food safety plans that are specific to their facilities and meet the requirements of the PCHF.<sup>6</sup>



## References

- (1) Full Text of the Food Safety Modernization Act (FSMA) www.fda.gov/food/food-safety-modernization-act-fsma/full-text-food-safety-modernization-act-fsma
- (2) FSMA Final Rule on Preventive Controls for Human Food www.fda.gov/food/food-safety-modernization-act-fsma/fsma-final-rule-preventive-controls-human-food
- (3) Code of Federal Regulations 21 CFR 117.126: Hazard Analysis and Risk-Based Preventive Controls, Food Safety Plan www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfCFR/CFRSearch.cfm?fr=117.126
- (4) Code of Federal Regulations 21 CFR 117.3: Definitions
  www.ecfr.gov/current/title-21/chapter-I/subchapter-B/part-117/subpart-A/section-117.3
- (5) Penn State University (PSU): Understanding FSMA: HACCP, HARPC and the Preventive Controls for Human Food Rule extension.psu.edu/understanding-fsma-haccp-harpc-and-the-preventive-controls-for-human-food-rule
- (6) FDA Food Safety Plan Builder (FSPB) www.fda.gov/food/food-safety-modernization-act-fsma/food-safety-plan-builder



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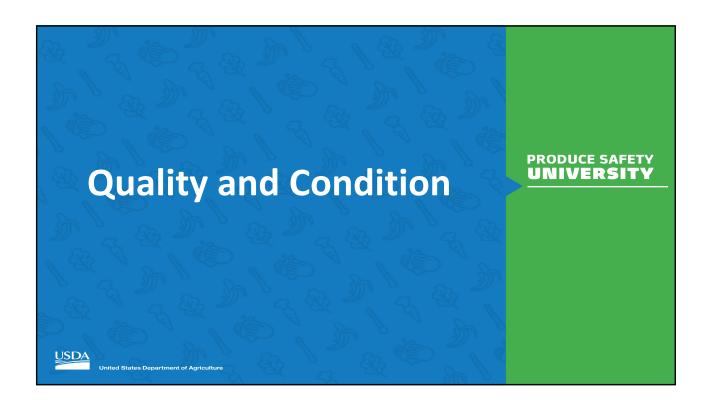
www.fns.usda.gov/f2s/e-letter-archive.

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# **Objectives**

PRODUCE SAFETY



Define and explain the difference between quality and condition defects.



Understand the relationship between defects/grade and cost.





Differentiate between cosmetic defects, defects that impact taste, and defects that are food safety concerns.

## **Key Points to Consider**

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# Key Points

#### **What**

- Quality describes the degree of excellence of produce based on its attributes or characteristics, including defects, shape, scars, coloration, and size.
- Condition describes the soundness or preservation of produce, and includes bruising, discoloration, shriveling, discoloration, decay, and firmness.

## **Key Points to Consider Continued...**

PRODUCE SAFETY

# **Key Points**

## Why

 Knowledge of appropriate quality and condition of produce, per U.S. grade standards, and their accurate communication to vendors, can help maximize cost savings and shelf life, minimize food safety concerns, and reduce food waste.

#### **How**

 Resource for Implementation: <u>U.S. Grade Standards</u> (<u>https://www.ams.usda.gov/grades-standards</u>)

## Why Defects and Grades?

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## Communication

At the farmers' market or grocery store you can select the exact piece of produce you plan to buy, decide if it meets your standards, and if you are willing to pay the price charged.

Purchasing in bulk and making advance orders, you will **NOT** see the produce before you decide to buy.

Clearly defined "terms" allow you to know what you are buying without seeing the product.



## Quality

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# **Quality Defects**

## What does quality mean?

The standard of something as measured against other things of a similar kind; the degree of excellence of something; a distinctive attribute or characteristic possessed by someone or something.

- Reputable symbols of the quality and integrity of American agricultural products.
- Common language.
- Official grade standards and processed product standards are developed, maintained and interpreted by USDA's Agricultural Marketing Service.

## Communication

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## Communication

# Clearly defined "terms" allow you to know what you are buying without seeing the product.

- At the farmers' market or grocery store you can select the exact piece of produce you plan to buy, decide if it meets your standards, and if you are willing to pay the price charged.
- Purchasing in bulk and making advance orders, you will **NOT** see the produce before you decide to buy.
- Quality standards allow you to communicate directly with industry using common language that is "standard" throughout the produce life cycle.

## **Defects**

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Quality defects are permanent factors that affect produce that will not change.

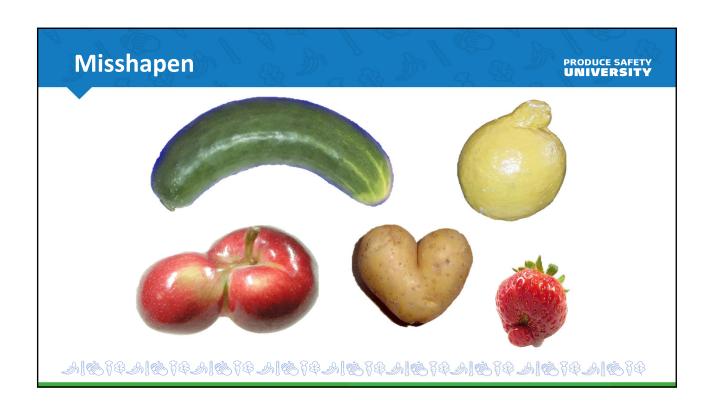


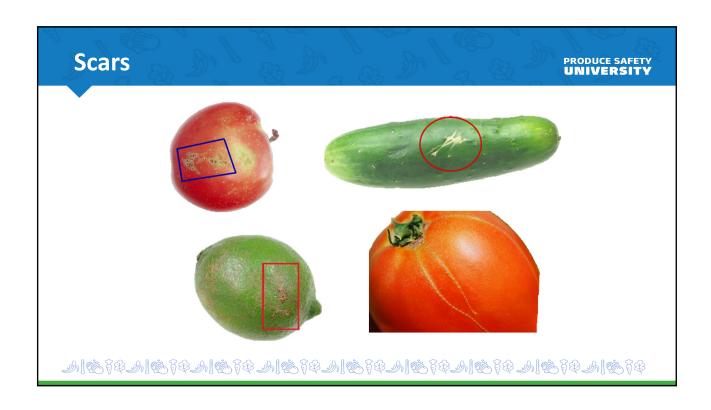
Commonly referred to as "Grade" defects.

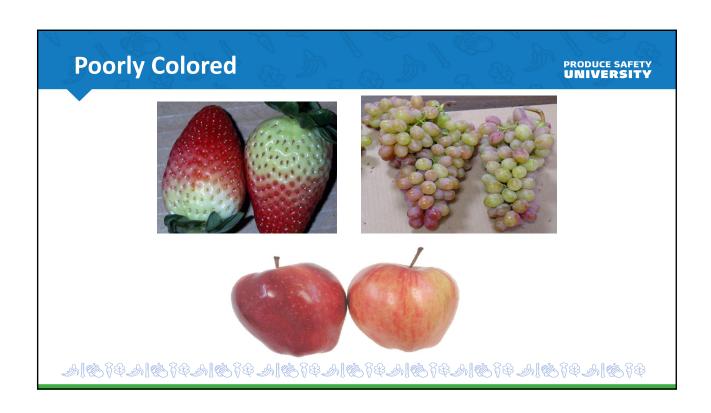
Directly determine the "U.S. grade designated".

**Examples:** Scars, misshapen, undersize.









Size

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## Many products have a minimum/maximum size

| Russet Burbank or Norkotah | Minimum | Maximum |
|----------------------------|---------|---------|
| SIZES                      | OUNCES  | OUNCES  |
| Under 50                   | 15      |         |
| 50 count                   | 12      | 19      |
| 60 count                   | 10      | 16      |
| 70 count                   | 9       | 15      |
| 80 count                   | 8       | 13      |
| 90 count                   | 7       | 12      |
| 100 count                  | 6       | 10      |
| 110 count                  | 5       | 9       |
| 120 and over               | 4       | 8       |





# Plant Diseases Affecting "Quality"

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## **Citrus Greening - 2005**

- Asian citrus psyllid feeds on the leaves and stems
- It is a bacterial disease that has wiped out much of Florida's citrus industry in the past decade.
- Fruit is green, misshapen, has a bitter taste and is not suitable for human consumption.

## Plant Diseases Affecting "Quality"

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## **Fusarium Wilt Bananas**

 A bacterial plant disease wiped out the Gros Michel variety.

 Cavendish variety now being affected.



## **Insects Affecting "Quality"**

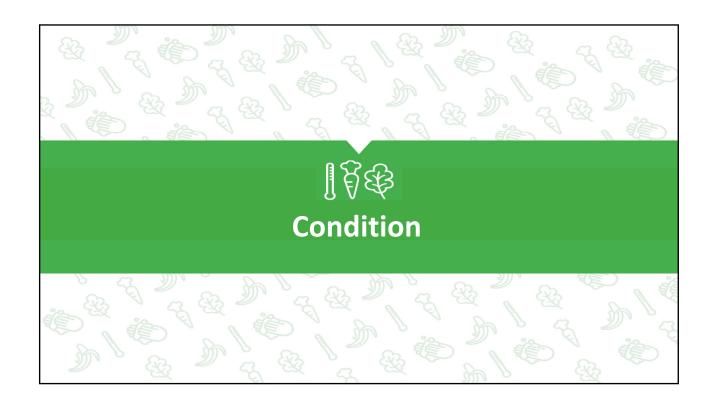
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## **Brown Marmorated Stink Bug**

- Injury not immediately noticed at harvest.
- Insect sting at indentation site.
- Underlying flesh appears as brown corked areas.
- Affects price of unaffected apples.







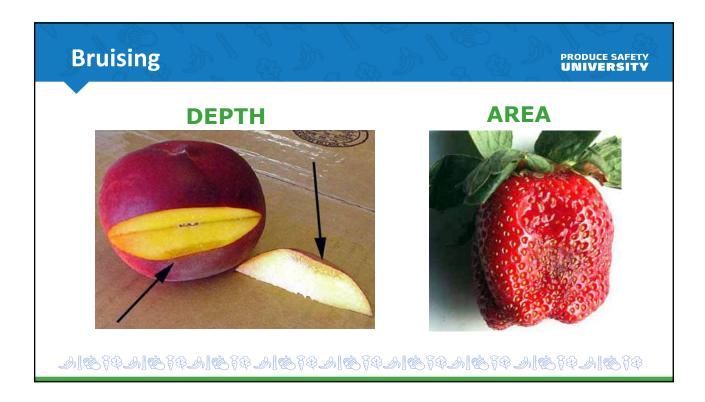
## **What is a Condition Defect?**

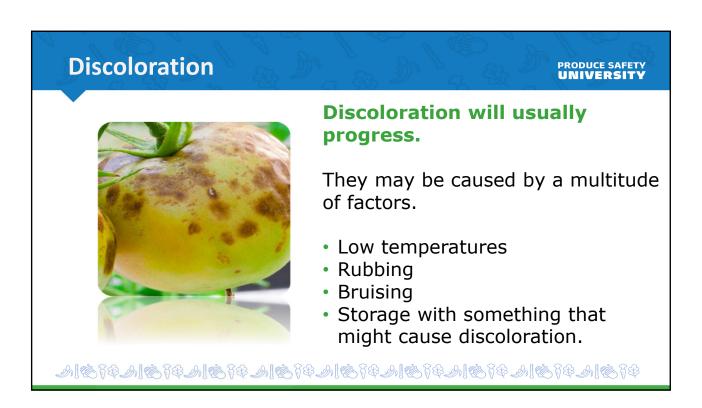
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# Condition Defects

Condition is the relative degree of soundness or preservation of a product and includes, but is not necessarily limited to, its firmness, or stages of:

- ripeness,
- decay,
- · shriveling,
- or any other progressive factor which affects its marketability.

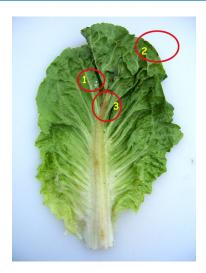




## **Discoloration**

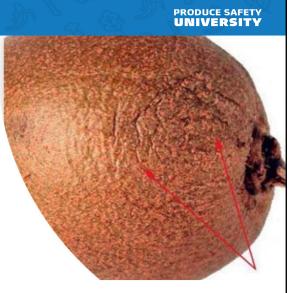
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# **Shriveling**

- Shriveling, another condition factor is caused by loss of moisture.
- The longer produce is held in storage, it loses moisture causing it to shrivel.
- Products become flabby or wilted as a result of shriveling.
- Exposure to cold temperature can also cause some products to shrivel.



## **Russet Spotting**

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This occurs over time, especially when ettuce is stored with fruits that generate athylene, a natural ripening agent.

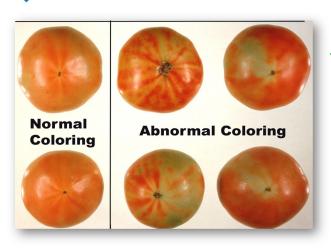
Two well known ethylene emitters are apples and bananas.

Don't store lettuce in the same refrigeration unit as either of these, as Russet Spotting will result.

PIROLETINE AL BIRDIE AL BIRDIE AL CONTRA CON

## **Abnormal Color**

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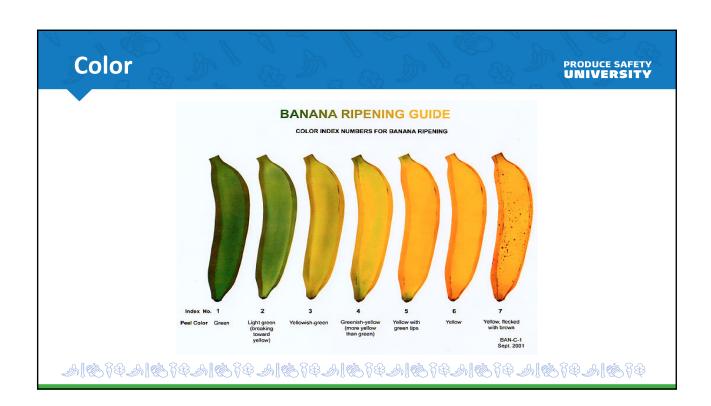
- During the ripening process tomatoes will typically begin to ripen from the blossom end first, and progress to the walls and shoulders.
- Abnormal color differs from well colored requirements of the grade.
- Abnormal color typically has no impact on food safety. It will affect the taste and texture of the fruit.

## **Decay**

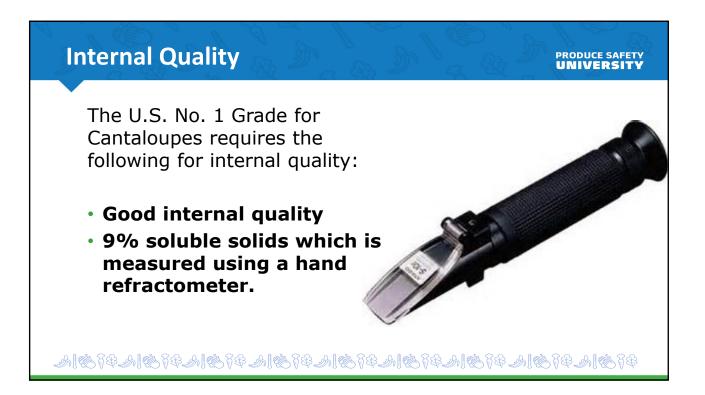
PRODUCE SAFETY UNIVERSITY

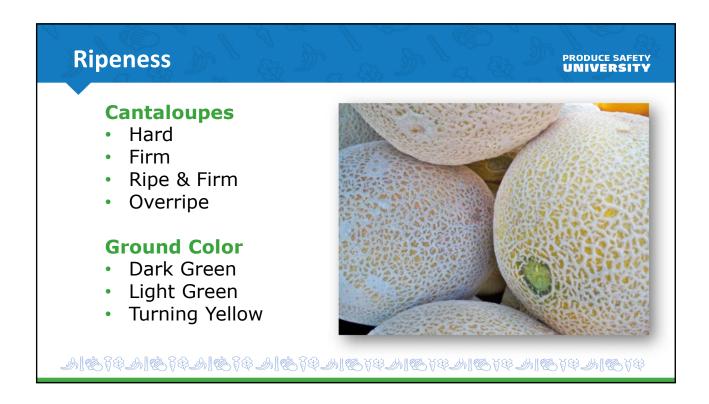
- **Early** approximately 10% or less of the surface or specimens affected.
- Moderate approximately 11 to 25% of the surface or specimen affected.
- Advanced approximately 26% or more of the surface or specimen affected.

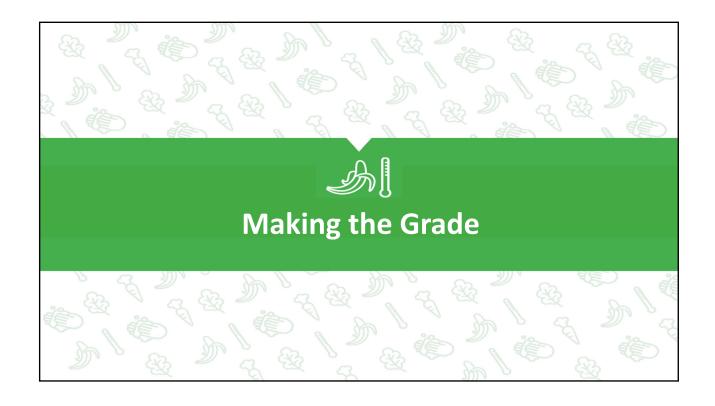




# Apples • Firm • Firm ripe • Ripe • Over-ripe Determine firmness: • Chewing Test • Cutting • Pressure Test











## **Grade Standards**

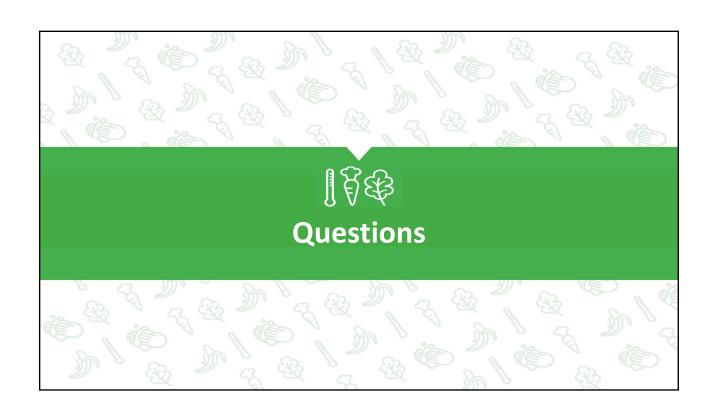
PRODUCE SAFETY

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# **U.S. Grade Standards for Fruit, Vegetable, and Specialty Crops**

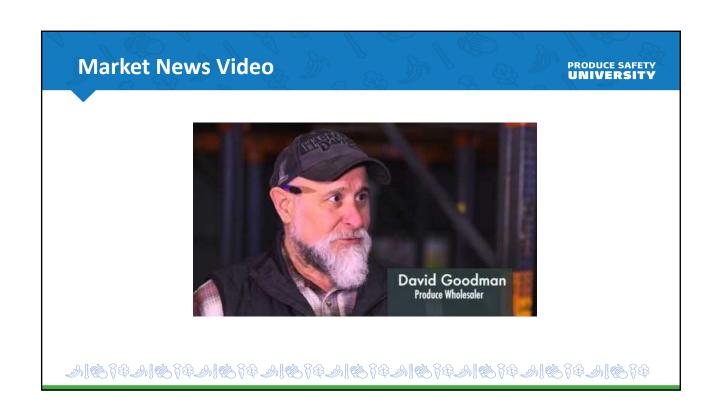
Now we will take a quick look at the USDA Grades and Standards website so you can see just how much information is available to you.











## **Objectives**

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Identify information in AMS Market News reports to aid in child nutrition procurement decisions, including Buy American.



Use AMS Market News to determine the market value of produce and factors that impact cost.





Use AMS Market News to check for seasonal availability and associated costs.

## **Key Points to Consider**

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# **Key Points**

## <u>What</u>

- The AMS Market News portal serves as a tool to assess the market value of produce and cost factors. It can also be used to check produce availability.
- A live demonstration will show how to use Market News reports to improve produce procurement decisions

#### <u>Why</u>

 Comparing prices using Market News allows SNPs to minimize cost, determine the most appropriate specifications for their needs, and plan menus based on seasonality, price, and more.

#### How

- Resource for Implementation: <u>USDA Market News</u> (https://www.ams.usda.gov/market-news)
- Resource for Training: <u>My Market News Fact Sheet</u> (https://www.ams.usda.gov/sites/default/files/media/MARSFactsheet.pdf)

## **Poll Question**

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## How many of you have used AMS Market News Fresh Fruit and Vegetable information to make purchasing decisions?

- 1. Yes
- 2. No
- 3. Never heard of AMS Market News

## **Benefits of Market News**

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## You can use Market News to:

<u>Identify</u> and compare current market to verify:

- Bid price
- Vendor adherence to bid terms and conditions
- Justify exemptions to Buy American Provisions





How do you know if you are getting the right price? Check the true price from Market News!

## **Structure of F&V Market News**

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## **Levels of Market Coverage**

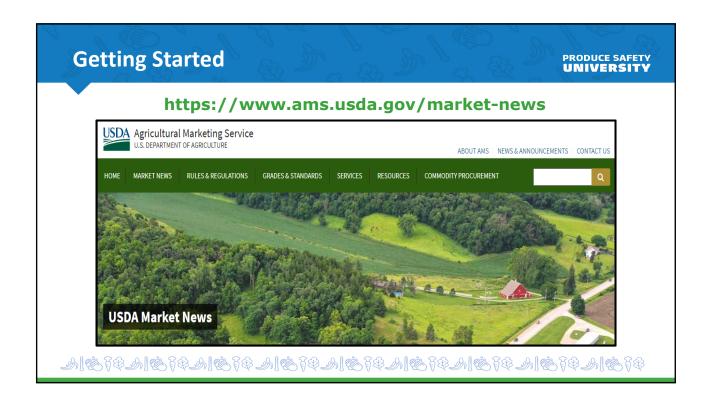
- Shipping Point
- Wholesale or Terminal Markets
- Retail

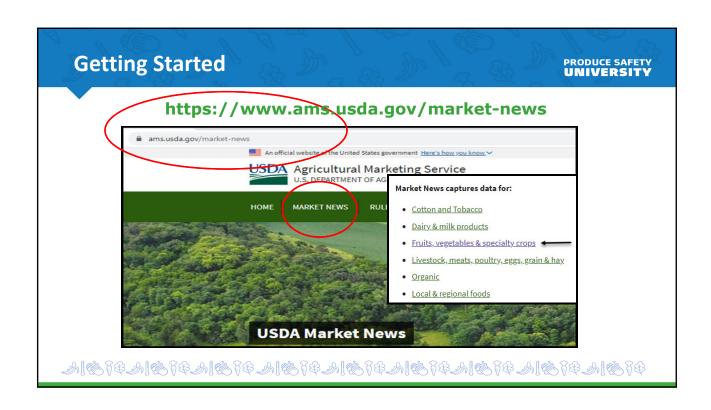


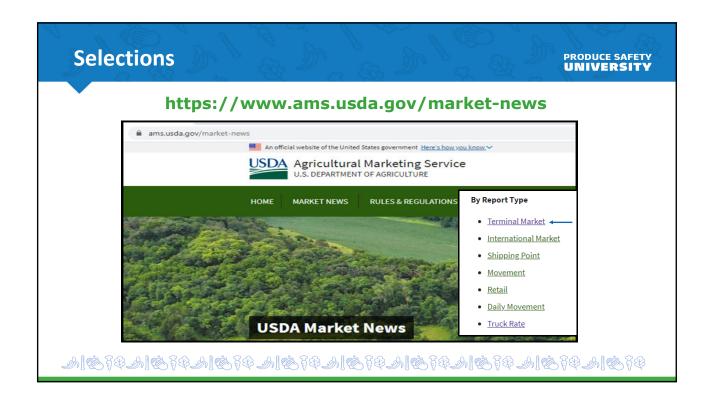


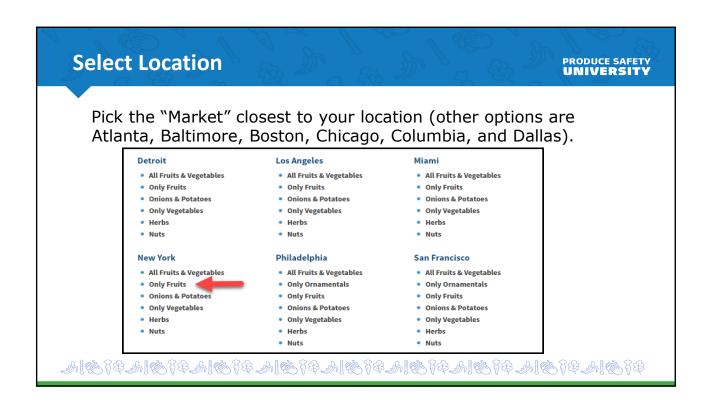


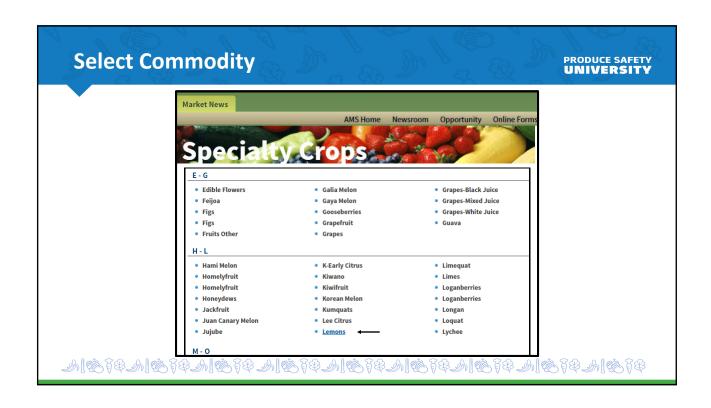


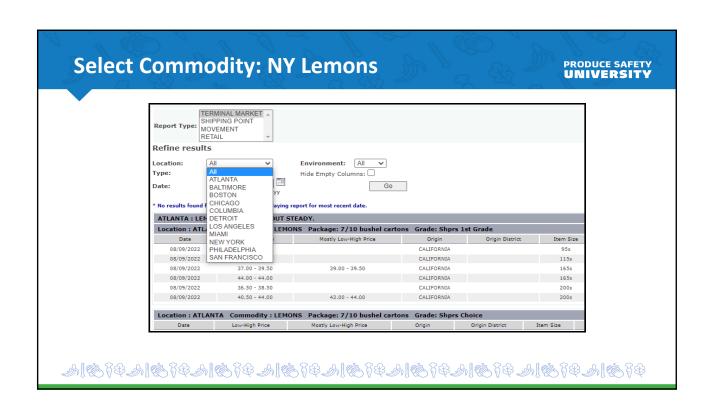




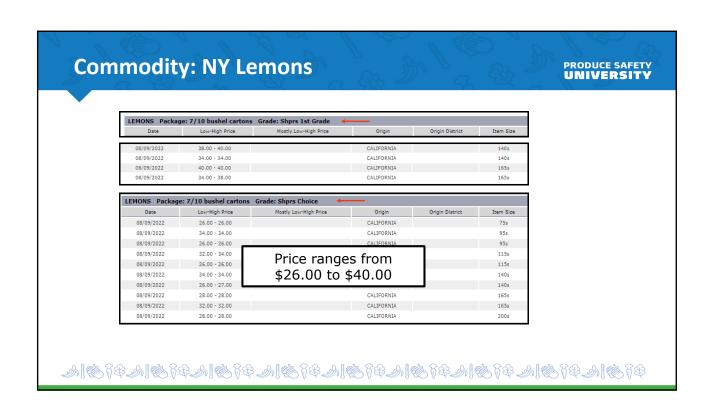


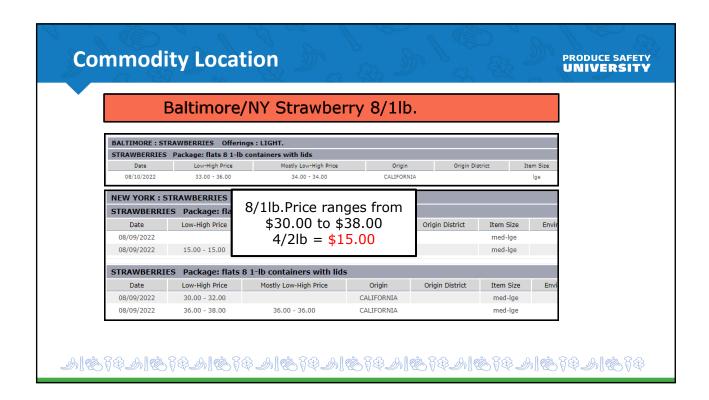


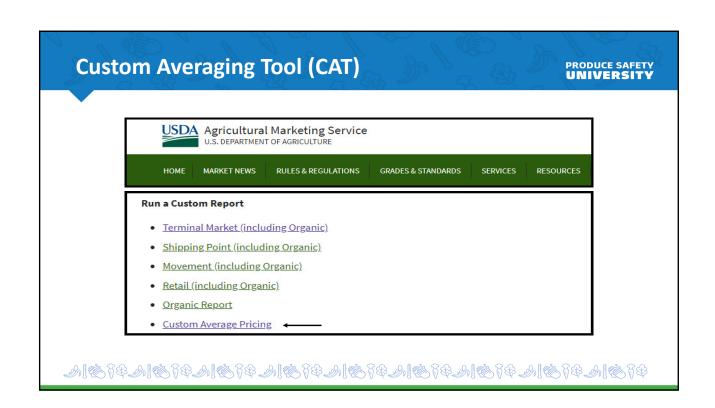


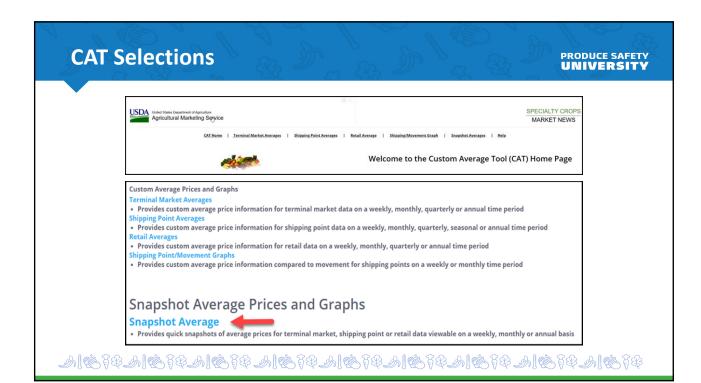


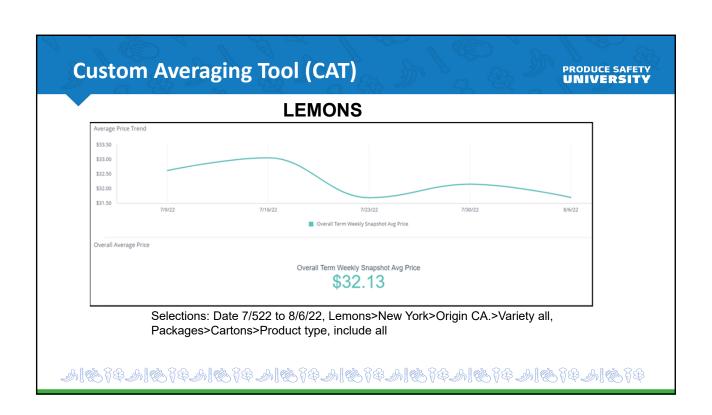
#### **Commodity: NY Lemons** PRODUCE SAFETY UNIVERSITY NEW YORK : LEMONS Market : ABOUT STEADY. LEMONS Package: 15 kg cartons Grade: No Grade Marked Low-High Price Origin 08/09/2022 22.00 - 24.00 URUGUAY 100s 08/09/2022 22.00 - 24.00 URUGUAY 113s 22.00 - 24.00 LEMONS Package: 17 kg conta Date Low-High Item Si Price ranges from 08/09/2022 18.00 - 20 115s \$18.00 to \$32.00 08/09/2022 18.00 - 20 140s LEMONS Package: 17 kg cartons Grade: Marked Fancy Date Low-High Price Mostly Low-High Price Origin Origin District Item Size 08/09/2022 26.00 - 26.00 CHILE 08/09/2022 26.00 - 26.00 CHILE 115s 08/09/2022 30.00 - 32.00 CHILE 140s



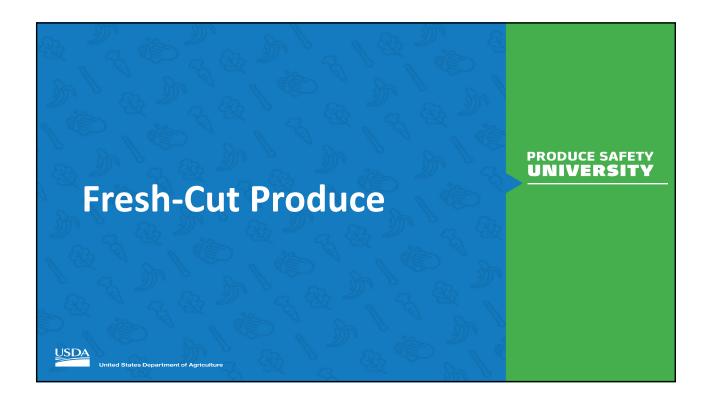












# **Objectives**

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Learn about regulations and best practices of the commercial fresh-cut industry and what to look for at your processor.



Identify food safety practices and the importance of mitigating microbial hazards in fresh-cut produce operations.





Learn about information to consider for fresh-cut produce specifications.

## **Key Points to Consider**

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## Key Points

#### **What**

- Food safety risks associated with fresh-cut produce can be mitigated using Hazard Analysis and Critical Control Point (HACCP) principles and Current Good Manufacturing Practices (cGMPs).
- HAACP programs rely on identifying and monitoring hazards and applying preventative controls at critical processing points.
- Current GMPs include sanitation, inspection, training, equipment monitoring and water treatment and monitoring to help prevent food safety hazards.

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## **Key Points to Consider Continued...**

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## Key Points

## <u>Why</u>

- Purchasing fresh cut produce adds value and reduces labor costs but bears inherent food safety risks. With no kill step to eliminate microbiological hazards, industry guidance and regulations are crucial.
- Understanding what to look for at your fresh cut processor can help mitigate food safety risks that are unique to these processors.

#### **How**

 Resource for Implementation: <u>Food Safety Practices to</u> <u>Expect from Your Fresh-Cut Produce Processor</u> (https://www.fns.usda.gov/psu/graduates)



# What is Fresh-Cut Produce and What Makes It Different?

## What is Fresh-Cut Produce?

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- Any fresh fruit or vegetable or combination that has been physically altered from its whole state after being harvested from the field without additional processing
- Does not include produce that has been processed via blanching, cooking, freezing, canning, packing in juice/syrup, or dressing
- May also be referred to as "ready to use", "pre-cut", or "value-added" produce

## **How is Your Fresh Produce Received?**

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# How is your fresh produce received? (Select all that apply)

- A. Mostly whole produce that is processed in-house
- B. Mostly fresh-cut produce
- C. About half of each
- D. It often varies based on different factors
- E. Not applicable I'm not involved in receiving produce

## **Pre-Washed Fresh-Cut Produce**

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- Pre-washed produce in sealed bags can be used without further washing.
- Produce is washed and ready-to-eat.
- Rewashing may result in contamination.

## **Fresh-Cut Produce Concerns**

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- There is an increased risk of contamination due to the natural exterior barrier of the fresh fruits and vegetables being broken to create fresh-cut products.
- The FDA Food Code identifies certain fresh-cut products as time/temperature control for safety (TCS) foods including cut melons, cut leafy greens, cut tomatoes, and certain mixtures of cut tomatoes.







## **Outbreaks Linked to Fresh-Cut Produce**

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Based on data reported by the FDA:

- Between 1996 and 2010, fresh-cut fruits and vegetables accounted for 16.8% of the total produce-related outbreaks.
- From 2002 to 2017, there were 39 outbreaks linked to the consumption of fresh-cut produce.

https://www.fda.gov/media/117526/download

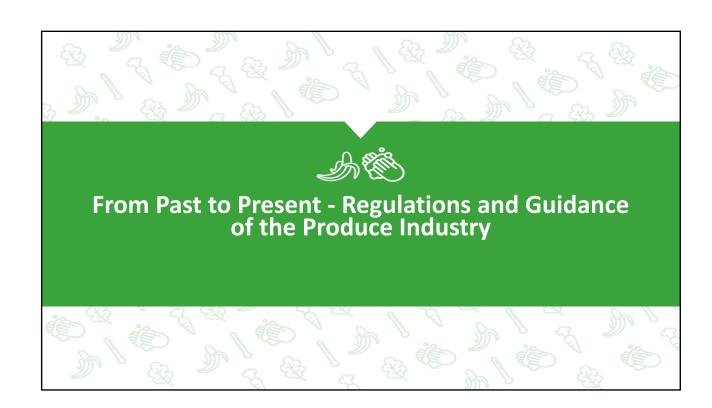
# **Fresh Cut Produce Operation**

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#### **Fresh-Cut Produce Processor**







## Federal Regulation vs Guidance

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#### Regulations

- are rules based on laws passed by Congress
- · change less frequently

#### **Guidance**

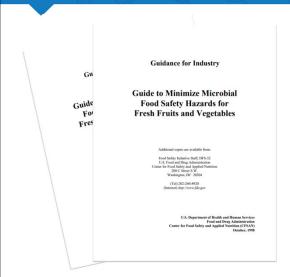
- is an agency's policy, thinking, or method to enforce a regulation
- can change frequently

The **FDA** is responsible for produce safety regulations



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# From Past to Present – Produce Regulations & Guidance PRODUCE SAFETY UNIVERSITY



- In 1997, President Clinton announced the "Fresh Produce Safety Initiative"
- In response to numerous high profile produce outbreaks
- Led to development of the "Guide to Minimize Microbial Food Safety Hazards of Fresh-Cut Fruits and Vegetables" which was released 1998

# From Past to Present – Produce Regulations & Guidance

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- In 2002, the USDA established the Good Agricultural Practices and Good Handling Program audit verification program (GAPs)
- Voluntary program to verify efforts to minimize risks of contamination of fresh fruits and vegetables and nuts



# From Past to Present – Produce Regulations & Guidance

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- In 2000, the Global Food Safety Initiative (GFSI) was formed
- Hundreds of major global retailers and producers sought to address major food safety incidents and drop in consumer confidence in the food supply

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# From Past to Present – Produce Regulations & Guidance

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Between 1998 and 2010, several major outbreaks occurred:

- 2004 Salmonella in tomatoes
- 2006 *E. coli* O157:H7 in spinach
- 2008 *Salmonella* in tomatoes and peppers
- 2008 Salmonella in peanut butter
- 2011 *Listeria monocytogenes* in cantaloupe

Food safety laws were highly influenced by the impacts of these outbreaks



# From Past to Present – Produce Regulations & Guidance

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In response to major foodborne outbreaks, congress passed the Food Safety Modernization Act (FSMA) in 2011



- New regulations affecting the entire food industry, including produce
- e The **Produce Safety Rule**established, science-based standards
  for safe growing, harvesting,
  packing, & holding of fruits and
  vegetables grown for human
  consumption (effective 2016)

## **FSMA Highlights and Basics for Produce**

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It's important to note that many exemptions to FSMA rules exist:

- Farms producing <\$25k/yr</li>
- Food grains
- Personal consumption produce
- Produce that is not a raw agricultural commodity (RAC) (e.g., corn, potatoes, asparagus, sour cherries)
- Other "qualified exemptions"



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## **FSMA Highlights and Basics for Produce**

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FSMA requires certain entities (farm operations, processors, etc.) to follow and develop:

- Current Good Manufacturing Practices (cGMPs)
- A Food Safety Plan that includes Hazard Analysis and Risk-Based Preventive Controls (HARPC) for Human Food

# HACCP vs Preventative Control Plan (HARPC)

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HACCP:
Eliminate, Prevent

& Reduce Food

Safety Hazards



A **critical control point** is a **step** at which control can be applied and is essential to eliminating/reducing a hazard

A preventive control is a reasonably appropriate procedure, practice, or process employed to significantly minimize/prevent hazards



## **FSMA Highlights and Basics for Produce**

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# The Produce Safety Rule focuses on:

- Agricultural water
- Biological soil amendments
- Sprouts
- Animal control
- Worker training and hygiene
- Equipment, tools, and buildings
- Required records

# From Past to Present – Produce Regulations & Guidance

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- In 2008 and 2018, the FDA updated the Guide to Minimize Microbial Food Safety Hazards of Fresh-Cut Fruits and Vegetables
- The 2018 guidance was provided by FDA to help farmers comply with obligations under FSMA



## **Verification By Schools**

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#### What do I need to know as a School Lunch Professional?

Verify your supplier's food safety compliance:

- FSMA
  - CGMPs
  - Preventative Controls
  - Produce Safety Rule
- GAPs
- Other industry standards (GFSI)



#### **Verification By Schools**

PRODUCE SAFETY UNIVERSITY

#### **Document, Document!**

Don't be afraid to request documentation as further verification of compliance with regulations and guidance:

- · Employee training
- Equipment calibration
- Water quality
- Sanitation records
- Corrective action records
- Pest control reports
- Inspection reports



# **Considerations When Purchasing Fresh Cut Produce**

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#### **Shelf Life**

Best practice for fresh-cut is 14-21 days from date of packaging

#### **Packaging Dates**

- "Sell-By" (how long to display product for sale)
- "Best if Used By" (date recommended for best flavor or quality)
- "Use-By" (last date recommended for the use of the product while at peak quality)





# Requirements for FNS School Meal Programs

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FNS school meal programs have been required to have a food safety program based on HACCP since 2004



The Healthy, Hunger-Free Kids Act of 2010 (the Act) strengthened the existing food safety requirements for FNS programs in schools

Amendments of the National School Lunch
Act required the school food safety program
based on HACCP principles be applied to any
facility or to any facility, or part of it, where food
is stored, prepared, or served for FNS programs
in schools

# A School Food Safety Program Based on HACCP Principles

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#### A school food safety program must include:

- Standard operating procedures (SOPs)
- A written plan at each site for applying HACCP principles using the Process Approach

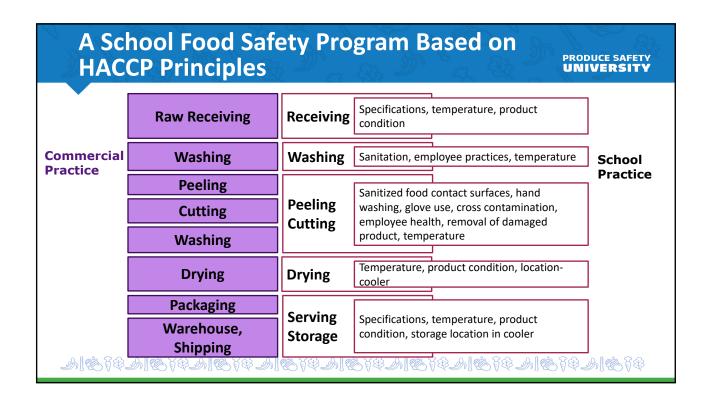
# **Using HACCP Principles for Produce**

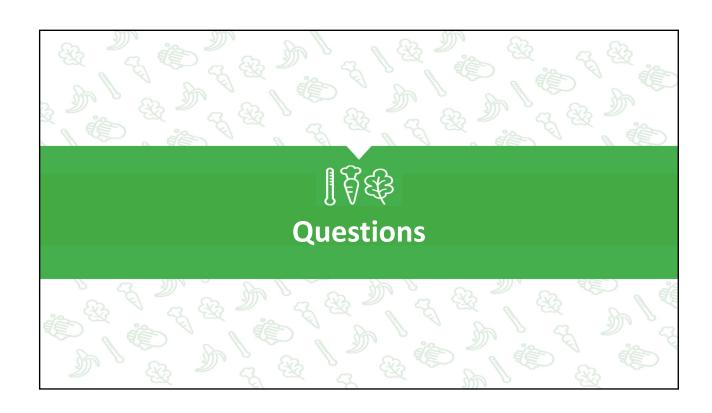
PRODUCE SAFETY UNIVERSITY

**Use HACCP principles** to minimize microbial food safety hazards associated with fresh cut produce

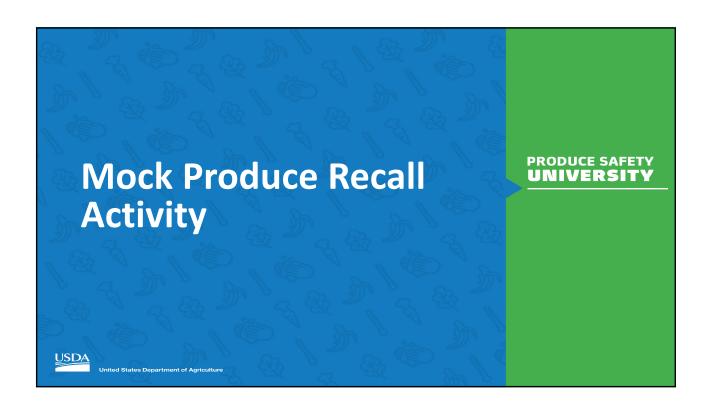
Personnel Health and Hygiene
Training
Building and Equipment
Sanitation

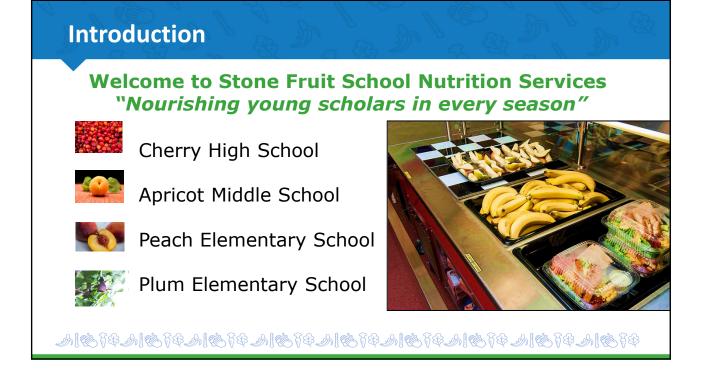












## **Objectives**

- Determine the efficacy of the Mock Recall Activity conducted by Stone Fruit School District.
- Identify the impact of site characteristics and challenges.
- Develop Corrective Action Plan for the areas of improvement.



#### Let's Hear it for the Cherries!



#### **How Effective is Your Recall?**

Cherry High School (Formula only)

\_\_Amt. in Inventory

+ Amt. in Food Production

+ Amt. Served/Consumed

= \_\_\_\_ Cases Found ÷ Amt. Delivered

= \_\_\_\_\_ X 100 = \_\_\_\_\_% Effectiveness

#### What's Your Plan of Action?

Based on site characteristics and challenge(s) develop a Corrective Action Plan.



# Let's Hear it for the Apricots!



#### **How Effective is Your Recall?**

#### **Apricot Middle School (Formula only)**

```
-___Amt. in Inventory
+ ____Amt. in Food Production
+ ___Amt. Served/Consumed
= ____Cases Found ÷ Amt. Delivered
= ____X 100 = ____% Effectiveness
```

#### What's Your Plan of Action?

Based on site characteristics and challenge(s) develop a Corrective Action Plan.



#### Let's Hear it for the Plums!



#### **How Effective is Your Recall?**

Plum Elementary School (Formula only)

\_\_\_\_Amt. in Inventory

+ \_\_\_\_\_Amt. in Food Production

+ \_\_\_\_\_Amt. Served/Consumed

= \_\_\_\_\_ Cases Found ÷ Amt. Delivered

= \_\_\_\_\_ X 100 = \_\_\_\_\_% Effectiveness

#### What's Your Plan of Action?

Based on site characteristics and challenge(s) develop a Corrective Action Plan.



## Let's Hear it for the Peaches!



#### **How Effective is Your Recall?**

#### **Peach Elementary School**

-\_\_\_Amt. in Inventory
+ \_\_\_\_Amt. in Food Production
+ \_\_\_\_Amt. Served/Consumed
= \_\_\_\_Cases Found ÷ Amt. Delivered
= \_\_\_\_X 100 = \_\_\_\_% Effectiveness

#### What's Your Plan of Action?

Based on site characteristics and challenge(s) develop a Corrective Action Plan.



#### **By Show of Hands**

Do you plan to conduct a mock produce recall in your school district?

- 1. Yes
- 2. No
- 3. Uncertain
- 4. Recently conducted a mock recall
- 5. Do not work in a school district



# **Key Takeaways**

- Test crisis response plans before you need them!
- · Use mock recalls to identify:
  - Food safety risks
  - Inventory mismanagement
  - Storage needs
  - Poor recordkeeping practices



#### Mock Recall of Fresh Produce - Virtual Activity

**Instructions:** Instructor will read the Stone Fruit School Nutrition Program Description and activity objectives. Participants will automatically be assigned one of the four district sites and placed into Zoom Rooms. Participants will: 1) read the site scenario and answer questions 1-4; 2) determine the efficacy of the recall; 3) identify the impact of site characteristics and challenges; and 4) develop a corrective action plan for any areas needing improvement.

#### **Stone Fruit School Nutrition Program Description**

The nutrition program is planning a district-wide mock produce recall activity. The district consists of four schools: Cherry High School, Apricot Middle School, Peach Elementary School, and Plum Elementary School. Each school receives produce deliveries, prepares and serves all meals on-site. Some of the challenges that the district has been experiencing include high staff turnover, inexperienced staff, inventory mismanagement/excessive inventory, and logistical challenges with limited cold storage.

This is the first time that Stone Fruit School District has conducted a mock produce recall. Due to the prevalence of food recalls in the U.S., the Nutrition Director has decided that this is an essential activity to determine their weaknesses and areas for improvement to enhance their food safety program and keep all their customers safe. During the managers' meeting last month, the Nutrition Director discussed the procedures for handling a food recall and collected updated contact list information. To accurately evaluate the program strengths and weaknesses, the Director decided not to alert the school nutrition staff that the recall is a mock recall.

The Nutrition Director worked with the fresh produce vendor to select fresh spinach as the mock recall product. The batch/lot numbers in the recall are: 18494 and 18513. The recall will take place Thursday morning. The Nutrition Director will call each school manager to start the traceback using the batch/lot numbers. The vendor will ship 50 cases in total to the four sites – Cherry HS (20 cs.), Apricot MS (15 cs.), Plum ES (8 cs), and Peach ES (7 cs.).

#### **Site Challenges:**

#### Cherry High School

• New manager at high school with previous restaurant experience

#### Apricot Middle School

 Produce taken out of original packaging and discarded due to storage constraints; poor record keeping

#### Peach Elementary School

• Seasoned manager with fear of running out of food; inventory extremely high

#### Plum Elementary School

• Understaffed, frequent substitute staff



#### **Cherry High School**

When the staff receives the call from the Nutrition Director, they immediately jump into action. They locate all the spinach in inventory, 7 cases, and then match the lot numbers provided by the Nutrition Director. Strawberry-Spinach Salad is on the menu today, so they check today's Food Production Records to determine how many cases have been prepared for the day—5 cs. Luckily, the first class has not come through the line, so no salad has been served yet. Twenty cases were delivered on Tuesday, but they cannot account for the other 8 cases that are missing. The only other recipe on the menu that includes spinach was Cheesy Spinach, but it calls for frozen spinach. The manager calls the Director and provides as much of the requested information as she can.

**Instructions:** As a group, fill out the Recall Report, and answer questions 2 and 3. Select a spokesperson to report back to class at the designated time.

Recall Report from Cherry High

1. Fill out the recall report based on findings from the above scenario:

|  | A   | Amount delivered                                     |  |                               |  |
|--|---|--|--|-------------------------------|--|
|  | В   | Amount in inventory                                  |  |                               |  |
|  | C   | Amount in food production                            |  |                               |  |
|  | D   | Amount served or consumed                            |  |                               |  |
| 2.   | 2. Using the formula below, what is the Percent Effectiveness of Cherry High? |  |  |                               |  |
|  | 9/  | % Mock Recall Effectiveness: B+C+<br>A               | $\underline{\mathbf{D}} \times 100 = \mathbf{Perco}$ | ent Effectiveness             |  |
|  |   | ounts stated in the above Recall Report Cherry High. | ort in the formu                                     | la below to calculate percent |  |
| Amt. in Inventory +Amt. in Food Production +Amt. Served/Consumed |   |  |  |                               |  |
| =  | ÷_  | Amt. Delivered =X                                    | X 100 =  | % Effectiveness               |  |





# **Cherry High School**

3. Based on site characteristics and challenge(s), develop a Corrective Action Plan. Use the following table as a guide. Site may <u>not</u> have challenges in all areas.

| Challenge(s) | Area of<br>Improvement  | Corrective Action Plan |
|--------------|-------------------------|------------------------|
|              | Receiving               |                        |
|              | Inventory<br>Management |                        |
|              | Food<br>Production      |                        |
|              | Recordkeeping           |                        |
|              | Serving                 |                        |
|              | Staffing                |                        |
|              | Training                |                        |
|              | Food Safety             |                        |
|              | Other                   |                        |





#### **Apricot Middle School**

This campus has very limited cold storage space and the staff has gotten creative with storage solutions. When the staff received the 15 cases of spinach on Tuesday, they unpacked the spinach, put away the bags, and tossed the empty boxes to make space in the cooler.

When the Director called, the manager shared the practice of removing the cases to maximize storage space. The director was surprised by the news. Unfortunately, they don't have the tracking information for the spinach, and they are unsure as to whether the spinach in inventory is part of the recall. The staff provides the inventory report based on what they have at this time, which is 6 cases. On the day of the recall, the staff prepared Strawberry-Spinach Salads and more Cheesy Spinach than what was listed on the Food Production Record, because the students prefer it over the salads, and they were afraid of running out. It is common that the Food Production Record forecasting figures are not accurate. They used fresh spinach instead of frozen because the manager forgot to order frozen spinach. 10 cases are currently in food production and 2 cases of Strawberry Spinach Salad have already been served.

**Instructions:** As a group, fill out the Recall Report, and answer questions 2 and 3. Select a spokesperson to report back to class at the designated time.

Recall Report from Apricot Middle

1. Fill out the recall report based on findings from the above scenario:

|    | A       | Amount delivered                               |  |
|----|---------|--|--|
|    | В       | Amount in inventory                            |  |
|    | C       | Amount in food production                      |  |
|    | D       | Amount served or consumed                      |  |
| 2. | Using 1 | the formula below, what is the Percen          | t Effectiveness of Apricot Middle?                                 |
|    | 0       | % Mock Recall Effectiveness: $\frac{B+C+1}{A}$ | $\underline{\mathbf{D}} \times 100 = \text{Percent Effectiveness}$ |
|    |         |  | ort in the formula below to calculate percent                      |
|    | Amt.    | in Inventory +Amt. in Food                     | Production +Amt. Served/Consumed                                   |
| =  | ÷ _     | Amt. Delivered =X                              | 100 =% Effectiveness   |
|    |         |  |  |



# **Apricot Middle School**

3. Based on site characteristics and challenges, develop a Corrective Action Plan. Use the following table as a guide. Site may <u>not</u> have challenges in all areas.

| Challenge(s) | Area of Improvement     | Corrective Action Plan |
|--------------|-------------------------|------------------------|
|              | Receiving               |                        |
|              | Inventory<br>Management |                        |
|              | Food<br>Production      |                        |
|              | Recordkeeping           |                        |
|              | Serving                 |                        |
|              | Staffing                |                        |
|              | Training                |                        |
|              | Food Safety             |                        |
|              | Other                   |                        |





#### **Peach Elementary School**

The staff receives the call from the Director as they are finishing serving 2<sup>nd</sup> and 3<sup>rd</sup> grade lunch. Two staff go into the walk-in to take inventory of the spinach. According to the invoice, they received 7 cases with Tuesday's delivery. The manager reviews the Food Production Records and sees that the staff has prepared 2 cases of spinach for the Strawberry Spinach Salad. Since two classes have already eaten lunch, she determines that one of those cases has already been served. Meanwhile, the two staff in the walk-in are having a lot of difficulty locating the spinach because there is just so much inventory. They can locate two cases, hidden behind cases of baby carrots and on top of a case of ground beef. They eventually get frustrated and cold and give up. They report to the manager that there were 2 cases that matched the lot numbers in the cooler.

**Instructions:** As a group, fill out the Recall Report, and answer questions 2 and 3. Select a spokesperson to report back to class at the designated time.

Recall Report from Peach Elementary

1. Fill out the recall report based on findings from the above scenario:

|   | A  | Amount delivered          |   |  |  |
|---|--|---------------------------|---|--|--|
|   | В  | Amount in inventory       |   |  |  |
|   | C  | Amount in food production |   |  |  |
|   | D  | Amount served or consumed |   |  |  |
| 2.  | 2. Using the formula below, what is the Percent Effectiveness of Peach Elementary? |                           |   |  |  |
| % Mock Recall Effectiveness: $\underline{B+C+D} \times 100 = Percent Effectiveness$ |  |                           |   |  |  |
|   |  | <del></del>               | ort in the formula below to calculate percent |  |  |
| Amt. in Inventory +Amt. in Food Production +Amt. Served/Consumed                    |  |                           |   |  |  |
| =   | ÷_   | Amt. Delivered =X         | X 100 =% Effectiveness                        |  |  |





# **Peach Elementary School**

3. Based on site characteristics and challenges, develop a Corrective Action Plan. Use the following table as a guide. Site may <u>not</u> have challenges in all areas.

| Challenge(s) | Area of<br>Improvement  | Corrective Action Plan |
|--------------|-------------------------|------------------------|
|              | Receiving               |                        |
|              | Inventory<br>Management |                        |
|              | Food<br>Production      |                        |
|              | Recordkeeping           |                        |
|              | Serving                 |                        |
|              | Staffing                |                        |
|              | Training                |                        |
|              | Food Safety             |                        |
|              | Other                   |                        |





#### **Plum Elementary School**

It has been a challenging school year so far due to being short-staffed. The manager spends most of her day in the kitchen helping with production. When the Director begins the mock recall, she tries to reach someone at Plum Elementary for over an hour before she finally speaks with someone. The staff begin looking in the cooler at the cases of spinach in inventory to match with the lot numbers that the Director provided. There are 5 cases in inventory, and in looking at the invoice, 8 cases were received on Tuesday morning. Strawberry Spinach Salad is on the menu today, so they check the Food Production Records to determine how many cases were prepared. They see that it is 2 ½ cases. Two classes have already gone through for lunch, so they count how many salads were already served. One case makes ~120 salads and they determine that ½ case has already been served. The manager returns the phone call to the Director to report that all cases have been accounted for.

**Instructions:** As a group, fill out the Recall Report, and answer questions 2 and 3. Select a spokesperson to report back to class at the designated time.

Recall Report from Plum Elementary

1. Fill out the recall report based on findings from the above scenario:

|    | A   | Amount delivered                               |   |  |
|----|---|--|---|--|
|    | В   | Amount in inventory                            |   |  |
|    | C   | Amount in food production                      |   |  |
|    | D   | Amount served or consumed                      |   |  |
| 2. | 2. Using the formula below, what is the Percent Effectiveness of Plum Elementary? |  |   |  |
|    | 0   | % Mock Recall Effectiveness: $\frac{B+C+I}{A}$ | $\underline{O} \times 100 = \text{Percent Effectiveness}$ |  |
|    |   |  | rt in the formula below to calculate percent              |  |
|    | Amt.  | in Inventory +Amt. in Food                     | Production +Amt. Served/Consumed                          |  |
| =  | ÷_  | Amt. Delivered =X                              | 100 =% Effectiveness                                      |  |





# **Plum Elementary School**

3. Based on site characteristics and challenges, develop a Corrective Action Plan. Use the following table as a guide. Site may <u>not</u> have challenges in all areas.

| Challenge(s) | Area of<br>Improvement  | Corrective Action Plan |
|--------------|-------------------------|------------------------|
|              | Receiving               |                        |
|              | Inventory<br>Management |                        |
|              | Food<br>Production      |                        |
|              | Recordkeeping           |                        |
|              | Serving                 |                        |
|              | Staffing                |                        |
|              | Training                |                        |
|              | Food Safety             |                        |
|              | Other                   |                        |







## **Objectives**

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Inspecting and verifying quality and condition upon receipt ensure that product that was paid for is what was received.





Understand the impact of storage conditions such as temperature, humidity, and ethylene on produce safety and freshness.



#### **Key Points to Consider**

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## Key Points

#### **What**

- When receiving produce, it is important to check temperature, quality, condition, and ensure that the produce meets the purchase specifications
- Proper storage is crucial to keep produce fresh; separate ethylene sensitive items from ethylene producers and ensure proper temperatures for cold and dry storage.

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#### **Key Points to Consider Continued...**

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#### Why

 Properly verifying, inspecting, receiving and storing produce ensures food safety, maximizes cost savings and optimizes produce shelf life

#### How

Resource for Implementation: <u>U.S. Grade</u>
 Standards

(https://www.ams.usda.gov/grades-standards)

 Resource for Training Others: Optimum Produce Storage Guide (located in PSU Binder)



# Receiving: Produce Check produce BEFORE the truck leaves Verify quantity Check temperature Evaluate quality & condition Cut for internal defects & ripeness Check dates of fresh-cut products Check marked weights Check all sections of containers

## **Receiving: Produce**

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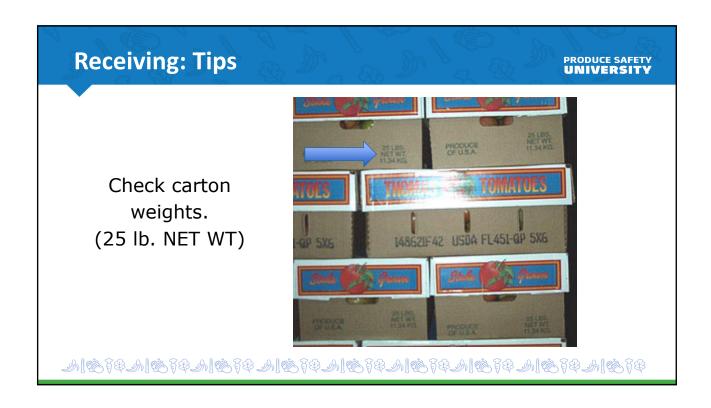
- Take action if produce does not meet specifications.
- Train staff to receive and store your specified produce.
- Do not accept poor quality fresh fruits and vegetables.

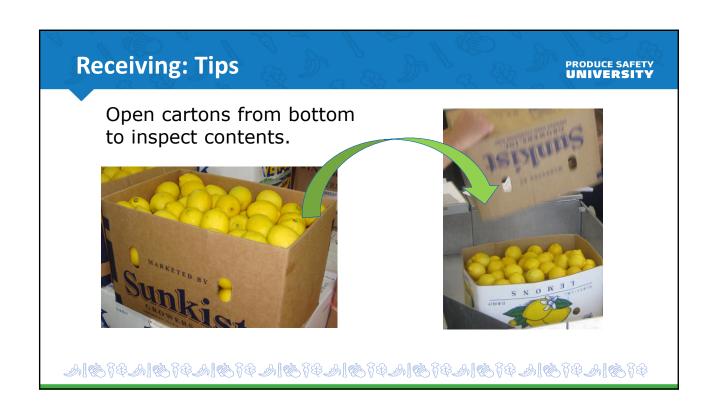
# **Receiving: Temperature**

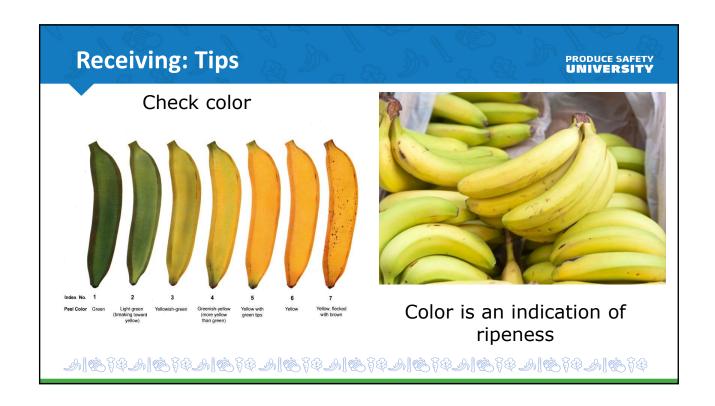
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Infrared temperature readings may only register **surface** temperature.











| Receivin | g: Tibs  |                    |                   |            |            |            |            |            |          | PRODUCE SAF |
|----------|--|--------------------|-------------------|------------|------------|------------|------------|------------|----------|-------------|
|          |  | JULIAN DAT<br>PERP | E CALEND<br>ETUAL | AR         |            |            |            |            |          |             |
|          |  | Jun                | Jul               | Aug        | Sep        | Oct        | Nov        | Dec        | Day      |             |
|          | l Julian Calendar                              | 152<br>153         | 182<br>183        | 213<br>214 | 244<br>245 | 274<br>275 | 305<br>306 | 335<br>336 | 2        |             |
|          |  | 154                | 184               | 215        | 246        | 276        | 307        | 337        | 3        |             |
|          | Date:  | 155                | 185               | 216        | 247        | 277        | 308        | 338        | 4        |             |
|          |  | 156<br>157         | 186<br>187        | 217<br>218 | 248<br>249 | 278<br>279 | 309<br>310 | 339<br>340 | 5<br>6   |             |
|          | Mark Cartons                                   | 158                | 188               | 219        | 250        | 280        | 311        | 341        | 7        |             |
|          | 004 1 4 1                                      | 159                | 189               | 220        | 251        | 281        | 312        | 342        | 8        |             |
|          | 001 = Jan 1st                                  | 160<br>161         | 190<br>191        | 221<br>222 | 252<br>253 | 282<br>283 | 313<br>314 | 343<br>344 | 9        |             |
|          |  | 162                | 192               | 223        | 253        | 284        | 315        | 345        | 11       |             |
|          | 12 012 043 071 102 13                          |                    | 193               | 224        | 255        | 285        | 316        | 346        | 12       |             |
|          | 13 013 044 072 103 13<br>14 014 045 073 104 13 |                    | 194<br>195        | 225<br>226 | 256<br>257 | 286<br>287 | 317<br>318 | 347<br>348 | 13<br>14 |             |
|          | 15 015 046 074 105 13                          |                    | 196               | 227        | 258        | 288        | 319        | 349        | 15       |             |
|          | 16 016 047 075 106 13                          |                    | 197               | 228        | 259        | 289        | 320        | 350        | 16       |             |
|          | 17 017 048 076 107 13<br>18 018 049 077 108 13 |                    | 198<br>199        | 229<br>230 | 260<br>261 | 290<br>291 | 321<br>322 | 351<br>352 | 17<br>18 |             |
|          | 19 019 050 078 109 13                          |                    | 200               | 231        | 262        | 292        | 323        | 353        | 19       |             |
|          | 20 020 051 079 110 14                          |                    | 201               | 232        | 263        | 293        | 324        | 354        | 20       |             |
|          | 21 021 052 080 111 14<br>22 022 053 081 112 14 |                    | 202<br>203        | 233<br>234 | 264<br>265 | 294<br>295 | 325<br>326 | 355<br>356 | 21<br>22 |             |
|          | 23 023 054 082 113 14                          |                    | 204               | 235        | 266        | 296        | 327        | 357        | 23       |             |
|          | 24 024 055 083 114 14                          |                    | 205               | 236        | 267        | 297        | 328        | 358        | 24       |             |
|          | 25 025 056 084 115 14<br>26 026 057 085 116 14 |                    | 206<br>207        | 237<br>238 | 268<br>269 | 298<br>299 | 329<br>330 | 359<br>360 | 25<br>26 |             |
|          | 27 027 058 086 117 14                          |                    | 208               | 239        | 270        | 300        | 331        | 361        | 27       |             |
|          | 28 028 059 087 118 14                          |                    | 209               | 240        | 271        | 301        | 332        | 362        | 28       |             |
|          | 29 029 088 119 14<br>30 030 089 120 15         |                    | 210<br>211        | 241<br>242 | 272<br>273 | 302<br>303 | 333<br>334 | 363<br>364 | 29<br>30 |             |
|          | 30 030 089 120 15<br>31 031 090 15             |                    | 212               | 242        | 213        | 304        | 334        | 365        | 31       |             |



Storage Produce Safety University

Does produce need to be refrigerated? At what temperature? Ethylene producer or ethylene sensitive?







The best way to improve shelf life of produce is to receive in good condition and store properly.

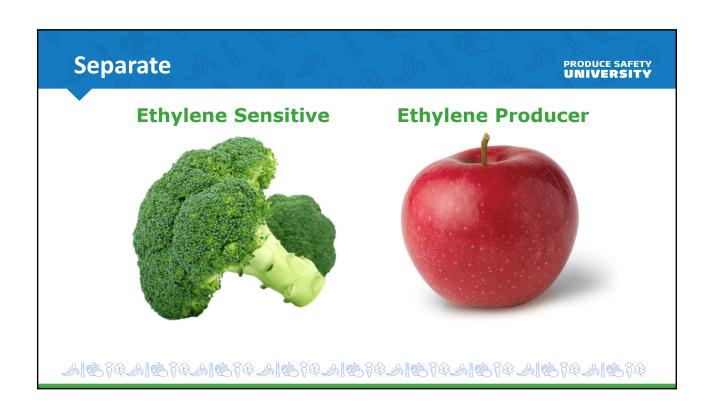
# **Ethylene / Ripeness**

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Ethylene is "introduced" to ensure "uniform" ripening of:

- Avocados
- Bananas
- Mangoes
- Tomatoes



| lene Sensitivity  |            | 33 Jr \ 4 & 20 Jr  | PRODUCE SA<br>UNIVERS |
|-------------------|------------|--------------------|-----------------------|
| Ethylene Sensitiv | e <b>l</b> | Ethylene Producers |                       |
| Broccoli          |            | Apples             |                       |
| Cabbage           |            | Avocados           |                       |
| Cauliflower       |            | Bananas            |                       |
| Leafy Greens      |            | Melons             |                       |
| Lettuce           |            | Pears              |                       |
|                   |            | Stone Fruits       |                       |
|                   |            | Tomatoes           |                       |
|                   |            | Squash             |                       |

# Refrigerate

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| Apples        | Broccoli     |
|---------------|--------------|
| Cabbage       | Carrots      |
| Cauliflower   | Celery       |
| Corn          | Cucumbers *  |
| Fresh-cut     | Grapes       |
| Green Beans * | Lettuce      |
| Oranges *     | Peppers *    |
| Spinach       | Strawberries |

<sup>\*</sup> Ideal to store at 45-50°F

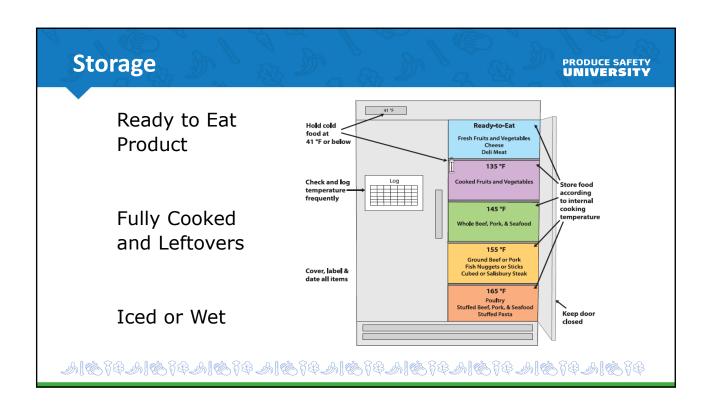
# Refrigerate

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| High Humidity (a.k.a. Vegetable<br>Drawer) | Low Humidity (a.k.a. Fruit<br>Drawer) |
|--|---------------------------------------|
| Asparagus                                  | Apples                                |
| Broccoli                                   | Avocados                              |
| Carrots                                    | Berries                               |
| Cauliflower                                | Citrus                                |
| Cucumbers                                  | Grapes                                |
| Green beans                                | Green onions                          |
| _eafy greens                               | Kiwi                                  |
| ettuce                                     | Melons                                |
| Peas                                       | Mushrooms                             |
| Peppers                                    | Nectarines and peaches                |
| Spinach                                    | Okra                                  |
| Summer squash                              | Pears                                 |
| Zucchini                                   | Plums                                 |

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| Dry Stora |                |             | UNIVERSITY |
|-----------|----------------|-------------|------------|
| •         | Store a        | t 55-65°F   |            |
|           | Bananas        | Garlic      |            |
|           | Onions         | Potatoes    |            |
|           | Pumpkins       | Tomatoes    |            |
|           | Sweet Potatoes | Watermelons |            |
|           | Winter Squash  |             |            |

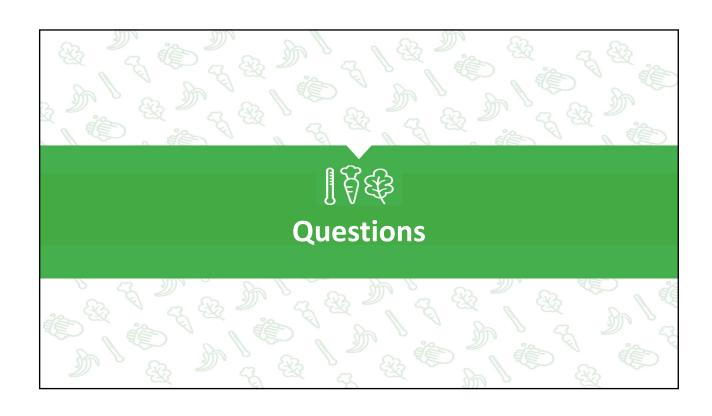












| Product                  | Optimal Storage<br>Temperature | Storage<br>ture | Chill | Point         | Chill Point Point | Optimal<br>Humidit <u>y</u> | Top Ice<br>Accepted | Top Ice Sprinkle Accepted Accepted | Ethylene<br>Production | Sensitive<br>to | Water Sprinkle Ethylene to to a Storage Life | Comments                                       |
|--------------------------|--------------------------------|-----------------|-------|---------------|-------------------|-----------------------------|---------------------|------------------------------------|------------------------|-----------------|--|--|
|                          | (°F)                           | (°C)            | (°F)  | ( <i>GC</i> ) | (°F)              | %                           | î                   | 2)                                 |                        | Etnylene 🦑      |  |  |
| Apples                   | 30-40                          | -1-4            |       |               | 29.3              | 90-95                       | NO                  | NO<br>No                           | High                   | Yes             | 1-12 months                                  | Chill sensitive stored at 35-40 F (2-4 C)      |
| Apricots                 | 31-32                          | -1-0            |       |               | 30.1              | 90-95                       | No                  | No                                 | High                   | Yes             | 1-3 weeks                                    |  |
| Artichokes               | 32-35                          | 0-2             |       |               |                   | 90-95                       | Yes                 | Yes                                | No                     | No              |  |  |
| Artichokes,<br>Jerusalem | 31-32                          | 0-2             |       |               | 28.0              | 90-95                       | ON<br>No            | ON.                                | 0 2                    | ON.             | 4-5 months                                   |  |
| Asparagus                | 32-35                          |                 |       |               | 30.9              | 95-100                      | ON<br>ON            | Yes                                | No                     | Yes             | 2-3 weeks                                    |  |
| Avocados, ripe           | 38-45                          | 3-7             | 36    | 2             |                   | 85-95                       | No                  | No                                 | High                   | Yes             |  |  |
| Avocados,<br>unripe      | 45-50                          | 7-10            | 45    | 7             |                   | 85-95                       | ON.                 | ON<br>O                            | Low                    | Yes, Very       |  | Keep away from<br>ethylene producing<br>fruits |
| Bananas, green 62-70     | 62-70                          | 17-21           | 26    | 13            |                   | 85-95                       | No                  | ON<br>N                            | Low                    | Yes             |  |  |
| Bananas, ripe            | 26-60                          | 13-16           | 54    | 12            |                   | 85-95                       | No                  | No                                 | Medium                 | o <sub>N</sub>  |  |  |
| Basil                    | 52-59                          | 11-15           | 20    | 10            |                   | 90-95                       | No                  | Yes                                | No                     | Yes             |  |  |
| Beans, dry               | 40-50                          |                 |       |               |                   | 40-50                       |                     |                                    |                        |                 | 6-10 months                                  |  |
| Beans, green<br>or snap  | 40-45                          |                 |       |               | 30.7              | 95                          |                     |                                    |                        |                 | 7-10 days                                    |  |
| Beans, sprouts           | 32                             | 0               |       |               |                   | 95-100                      |                     |                                    |                        |                 | 7-9 days                                     |  |

| C   | Sensitive Approximate  |
|---|--|
| 31.0 95<br>31.0 95<br>31.3 98-100<br>30.3 98-100<br>30.5 90-95 No<br>90-95 No<br>30.9 95-100 Yes<br>30.5 90-95 Yes<br>30.5 90-95 Yes<br>90-95 Yes | Accepted Production Ethylene 3) Storage Life                                     |
| 95<br>90-95<br>98-100<br>90-95<br>90-95<br>90-95<br>90-95<br>Yes<br>90-95<br>Yes<br>90-95<br>Yes<br>90-95<br>Yes                                  | בנוליכוכ   |
| 90-95 Yes 98-100 98-100 90-95 No 90-95 No 90-95 Yes 90-95 Yes 90-95 Yes   | 5-7 days   |
| 30.3 98-100 30.3 98-100 30.5 90-95 NO 90-95 NO 30.9 95-100 Yes 30.5 90-95 Yes 90-95 Yes 30.4 98-100 Yes   | Yes No Yes   |
| 30.3 98-100 30.5 90-95 No 90-95 No 30.9 95-100 Yes 30.5 90-95 Yes 90-95 Yes 30.4 98-100 Yes   | 10-14 days   |
| 30.5 90-95 No<br>90-95 No<br>30.9 95-100 Yes<br>30.5 90-95 Yes<br>90-95 Yes<br>95-100 No  | 4-6 months   |
| 30.9 90-95 No<br>30.9 95-100 Yes<br>30.5 90-95 Yes<br>90-95 Yes<br>95-100 No  | No Very Low No 2-3 days  |
| 30.9 95-100 Yes<br>30.5 90-95 Yes<br>90-95 Yes<br>90-95 Yes<br>30.4 98-100 No   | No Very Low No   |
| 90-95 Yes<br>90-95 Yes<br>90-95 Yes<br>95-100 No  | Yes No Yes   |
| 90-95 Yes<br>90-95 Yes<br>95-100 No   | Yes No Yes 10-14 days  |
| 90-95 Yes<br>95-100 No  | Yes No Yes 3-5 weeks   |
| 95-100 No<br>98-100 Yes   | Yes No Yes Beets, Chard, Green Onions, Mustard, Parsley, Radish, Spinach, Turnip |
| 98-100 Yes  | No No Yes 2-3 months   |
|   | Yes No Yes 3-6 weeks   |
| 30.4 98-100   | 5-6 months   |

| Product              | Optimal Storage<br>Temperature | ge   | Chill | Point | Chill Point Freezing Optimal Point Point | ~1     | Top Ice Sprinkle Accepted Accepted | Water<br>Sprinkle<br>Accepted | Ethylene<br>Production | Sensitive  | Water Sprinkle Ethylene to to Accepted Production to Storage Life | Comments                              |
|----------------------|--------------------------------|------|-------|-------|--|--------|------------------------------------|-------------------------------|------------------------|------------|---|---------------------------------------|
|                      | (°F)                           | (°C) | (°F)  | (°C)  | (°F)                                     | %      | (i                                 | 2)                            |                        | Ethylene 🦖 |   |                                       |
| Cantaloupe           | 36-38                          | 2-3  | 34    | Н     |  | 90-95  | No                                 | ON<br>O                       | Medium                 | Yes        |   |                                       |
| Carrots,<br>bunched  | 32                             | 0    |       |       |  | 95-100 | Yes                                | Yes                           | ON.                    | Yes        | 2 weeks   | Ethylene may cause a<br>bitter flavor |
| Carrots,<br>immature | 32                             | 0    |       |       | 29.5                                     | 98-100 |                                    |                               |                        |            | 4-6 weeks   |                                       |
| Carrots,<br>mature   | 32                             | 0    |       |       | 29.5                                     | 98-100 |                                    |                               |                        |            | 7-9 months  |                                       |
| Cauliflower          | 32                             | 0    |       |       | 30.6                                     | 95-98  |                                    |                               |                        |            | 3-4 weeks   |                                       |
| Cauliflower          | 32-35                          | 0-2  |       |       |  | 90-95  | No                                 | No<br>No                      | ON.                    | Yes        |   |                                       |
| Celery               | 32                             | 0    |       |       | 31.1                                     | 98-100 | Yes                                | Yes                           | No                     | Yes        | 2-3 months  |                                       |
| Celeriac             | 32                             | 0    |       |       | 30.3                                     | 97-99  |                                    |                               |                        |            | 6-8 months  |                                       |
| Chard                | 32                             | 0    |       |       |  | 95-100 |                                    |                               |                        |            | 10-14 days  |                                       |
| Cherries             | 32-35                          | 0-2  |       |       |  | 90-95  | No                                 | ON<br>O                       | Very Low               | No         |   |                                       |
| Cherries, sour       | 32                             | 0    |       |       | 29.0                                     | 90-95  |                                    |                               |                        |            | 3-7 days  |                                       |
| Cherries,<br>sweet   | 30-31                          |      |       |       | 28.8                                     | 90-95  |                                    |                               |                        |            | 2-3 weeks   |                                       |
| Chicory              | 32-35                          | 0-5  |       |       |  | 90-95  | Yes                                | Yes                           | No                     | No         |   |                                       |

|  |              |                     |                     | e 32-                                |            |             |                |            |           |          |              |                |          |           |        |
|--|--------------|---------------------|---------------------|--------------------------------------|------------|-------------|----------------|------------|-----------|----------|--------------|----------------|----------|-----------|--------|
| Comments   |              |                     |                     | Extended storage 32-<br>35 F (0-2 C) |            |             |                |            |           |          |              |                |          |           |        |
| Sprinkle Ethylene to Approximate Accepted Production to Storage Life |              | 2-4 weeks           |                     |                                      | 10-14 days | 5-8 days    |                | 10-14 days | 1-4 weeks | 1 week   | 1-2 weeks    | 2-3 weeks      |          | 2-3 weeks |        |
| Sensitive to   | Ethylene 🦪   |                     | N<br>0              | N<br>O                               |            | No          | N <sub>O</sub> | Yes        |           | Yes      |              | N <sub>O</sub> | No       |           | No     |
| Ethylene<br>Production   |              |                     | O<br>N              | 0                                    |            | No<br>No    | No<br>No       | Very Low   |           | No       |              | No<br>No       | No       |           | Low    |
| Top Ice Sprinkle Accepted Accepted                                   | 2)           |                     | 0 2                 | 0 2                                  |            | Yes         | 0<br>N         | o<br>N     |           | 9<br>8   |              | Yes            | Yes      |           | 0<br>2 |
| Top Ice<br>Accepted  | î            |                     | NO<br>N             | N<br>0                               |            | Yes         | Yes            | 0<br>2     |           | 9<br>2   |              | Yes            | Yes      |           | 0<br>2 |
| Optimal<br><u>Humidity</u>   | %            | 95-100              | 90-95               | 80-85                                | 95-100     | 95-98       | 90-95          | 95         | 90-95     | 90-95    | 90-95        | 95-100         | 90-95    | 95-100    | 90-95  |
| Chill Point Point  | (°F)         |                     |                     |                                      | 30.6       | 30.9        |                | 31.1       | 30.2      | 30.6     |              | 31.9           |          | 31.9      |        |
| Point  | (°C)         |                     |                     |                                      |            |             | 2              | 4          |           | 7        |              |                |          |           |        |
|  | (°F)         |                     |                     |                                      |            |             | 36             | 40         |           | 45       |              |                |          |           |        |
| Optimal Storage<br>Temperature                                       | ( <i>C</i> ) | 0                   | 0-5                 | 13-16                                | 0          | 0           | 3-6            |            |           |          |              | 0              | 0-2      | 0         | 0-5    |
| Optimal Stora<br>Temperature   | (°F)         | 32                  | 32-35               | 25-60                                | 32         | 32          | 38-42          | 50-55      | 31-32     | 46-54    | 31-32        | 32             | 32-35    | 32        | 32-35  |
| Product  |              | Chicory,<br>witloof | Chinese Pea<br>Pods | Coconuts                             | Collards   | Corn, sweet | Cranberries    | Cucumbers  | Currants  | Eggplant | Elderberries | Endive         | Escarole | Escarole  | Figs   |

| Product       | Optimal Storage<br>Temperature | Storage<br>Iture | Chill | Point             | Chill Point Point | Optimal<br><u>Humidity</u> | Top Ice        | Water<br>Sprinkle<br>Accepted | Ethylene<br>Production | Sensitive<br>to | Water Sprinkle Ethylene to to to Accepted Production relationships | Comments   |
|---------------|--------------------------------|------------------|-------|-------------------|-------------------|----------------------------|----------------|-------------------------------|------------------------|-----------------|--|--|
|               | (°F)                           | ( <i>C</i> )     | (°F)  | ( <sub>0</sub> C) | (°F)              | %                          | ì              | 2)                            |                        | ruyiene         |  |  |
| Garlic        | 32                             | 0                |       |                   | 30.5              | 65-70                      | ON.            | ON.                           | O<br>Z                 | O<br>Z          | 6-7 months   | May be stored at 55-70<br>F (13-21 C) for shorter<br>periods |
| Ginger Root   | 9-09                           | 16-18            | 55    | 13                |                   | 65-70                      | 0              | No                            | ON<br>O                | No<br>No        |  |  |
| Gooseberries  | 31-32                          |                  |       |                   | 30.0              | 90-95                      |                |                               |                        |                 | 3-4 weeks  |  |
| Grapefruit    | 25-60                          | 13-16            | 20    | 10                |                   | 90-95                      | N <sub>O</sub> | No                            | Very Low               | o<br>N          |  |  |
| Grapes        | 31-32                          |                  |       |                   | 29.7              | 85                         | No             | No                            | Very Low               | Yes             | 2-8 weeks  |  |
| Green Beans   | 40-45                          | 4-7              | 38    | m                 |                   | 90-95                      | No             | No                            | o<br>N                 | Yes             |  |  |
| Green Peas    | 32-35                          | 0-2              |       |                   |                   | 90-95                      | No             | No                            | ON.                    | Yes             |  |  |
| Greens, leafy | 32                             | 0                |       |                   |                   | 95-100                     |                |                               |                        |                 | 10-14 days   |  |
| Guavas        | 45-50                          | 7-10             | 40    | 4                 |                   | 90-95                      | N <sub>O</sub> | No                            | Medium                 | Yes             |  |  |
| Herbs         | 32-35                          | 0-2              |       |                   |                   | 90-95                      | N <sub>O</sub> | Yes                           | 0<br>2                 | Yes             |  |  |
| Horseradish   | 30-32                          |                  |       |                   | 28.7              | 98-100                     |                |                               |                        |                 | 10-12 months   |  |
| Jicama        | 55-65                          |                  |       |                   |                   | 65-70                      |                |                               |                        |                 | 1-2 months   |  |
| Kale          | 32                             |                  |       |                   | 31.1              | 95-100                     |                |                               |                        |                 | 2-3 weeks  |  |
| Kiwi, ripe    | 32-35                          | 0-2              |       |                   |                   | 90-95                      | o<br>N         | No                            | High                   | Yes             |  |  |
| Kiwi, unripe  | 32-35                          | 0-5              |       |                   |                   | 90-95                      | a<br>S         | O Z                           | Low                    | Yes, Very       |  |  |

|                            | Optimal Storage | Storage      | Chill | Point | Chill Point Point | Optimal  | Top Ice        | Water<br>Sprinkle | Ethylene   | Sensitive                    | Approximate                                  |  |
|----------------------------|-----------------|--------------|-------|-------|-------------------|----------|----------------|-------------------|------------|------------------------------|--|--|
| Product                    |                 | )            |       |       |                   | Humidity | Accepted       | Accepted Accepted | Production | to<br>E+bylone <sup>3)</sup> | Accepted Production Ethylong 3) Storage Life | Comments   |
|                            | (°F)            | ( <i>C</i> ) | (°F)  | (°C)  | (°F)              | %        |                | 2)                |            | רנוואופוופ                   |  |  |
| Kohlrabi                   | 32              | 0            |       |       | 30.2              | 98-100   | Yes            | Yes               | No         | ON<br>ON                     | 2-3 months                                   |  |
| Leeks                      | 32              | 0            |       |       | 30.7              | 95-100   | Yes            | Yes               | ON.        | Yes                          | 2-3 months                                   |  |
| Lemons                     | 52-55           | 11-13        | 20    | 10    |                   | 90-95    | o <sub>N</sub> | ON<br>ON          | Very Low   | o<br>N                       |  |  |
| Lettuce                    | 32              | 0            |       |       | 31.7              | 98-100   | 0<br>N         | Yes               | ON.        | Yes                          | 2-3 weeks                                    |  |
| Limes                      | 48-55           | 9-13         | 45    | 7     |                   | 90-95    | 0<br>N         | ON<br>ON          | Very Low   | No                           |  |  |
| Lychees                    | 40-45           | 4-7          | 36    | 2     |                   | 90-95    | 0<br>N         | No<br>No          | Very Low   | 0<br>N                       |  |  |
| Mangos                     | 50-55           | 10-13        | 20    | 10    |                   | 85-95    | No             | No                | Medium     | Yes                          |  |  |
| Melons,<br>Casaba/Persian  | 50-55           | 10-13        | 45    |       |                   | 85-95    | ON.            | 0 2               | Very Low   | Yes                          |  | Riper melons may be<br>stored at 45-50 F (7-10<br>C) |
| Melons,<br>Crenshaw        | 50-55           | 10-13        | 45    |       |                   | 85-95    | ON.            | O.                | Low        | Yes                          |  | Riper melons may be<br>stored at 45-50 F (7-10<br>C) |
| Melons, Honey 50-55<br>Dew | 50-55           | 10-13        | 41    | 2     |                   | 85-95    | O <sub>N</sub> | O.                | Medium     | Yes                          |  | Riper melons may be<br>stored at 45-50 F (7-10<br>C) |
| Mushrooms                  | 32              | 0            |       |       | 30.4              | 95       | No             | Yes               | No         | Yes                          | 3-4 days                                     |  |
| Napa                       | 32-35           | 0-2          |       |       |                   | 90-95    | o <sub>N</sub> | No                | ON.        | Yes                          |  |  |
| Nectarines                 | 31-32           |              |       |       | 30.4              | 90-95    | No             | No                | High       | No                           | 2-4 weeks                                    |  |

| Product               | Optimal Storage<br>Temperature | Storage       | Chill | Point             | Chill Point Point | Optimal<br><u>Humidity</u> | Top Ice Accepted | Water<br>Sprinkle<br>Accepted | Ethylene<br>Production | Sensitive to | Sprinkle Ethylene to Accepted Production (12,000,000) | Comments  |
|-----------------------|--------------------------------|---------------|-------|-------------------|-------------------|----------------------------|------------------|-------------------------------|------------------------|--------------|---|---|
|                       | (°F)                           | ( <i>GC</i> ) | (°F)  | ( <sub>0</sub> C) | (°F)              | %                          | î                | 2)                            |                        | Etnylene 🦪   |   |   |
| Okra                  | 45-50                          |               | 45    | 7                 | 28.7              | 90-95                      | N <sub>O</sub>   | 0<br>N                        | Very Low               | Yes          | 7-10 days   |   |
| Onions                | 32-35                          | 0-2           |       |                   |                   | 65-75                      | O <sub>N</sub>   | ON.                           | O<br>Z                 | ON.          |   | May be stored at 55-70<br>F (13-21 C) for shorter<br>period |
| Oranges               | 40-45                          | 4-7           | 38    | m                 |                   | 90-95                      | No               | 0 0                           | Very Low               | No           |   |   |
| Papayas               | 50-55                          | 10-13         | 45    | 7                 |                   | 85-95                      | No               | o <sub>N</sub>                | Medium                 | Yes          |   |   |
| Parsley               | 32                             | 0             |       |                   | 30.0              | 95-100                     |                  |                               |                        |              | 2-3 months  |   |
| Parsnips              | 32                             | 0             |       |                   | 30.4              | 98-100                     | Yes              | Yes                           | No                     | Yes          | 4-6 months  |   |
| Peaches               | 31-32                          |               |       |                   | 30.3              | 90-95                      | No               | No                            | High                   | Yes          | 2-4 weeks   |   |
| Pears                 | 29-31                          |               |       |                   | 29.2              | 90-95                      | No               | No                            | High                   | Yes          | 2-7 months  |   |
| Peas, green           | 32                             | 0             |       |                   | 30.9              | 95-98                      |                  |                               |                        |              | 1-2 weeks   |   |
| Peas, southern 40-41  | 40-41                          |               |       |                   |                   | 95                         |                  |                               |                        |              | 6-8 days  |   |
| Peppers, hot<br>chili | 32-50                          |               |       |                   |                   | 02-09                      | ON<br>ON         | ON<br>O                       | ON<br>N                | Yes          | 6 months  |   |
| Peppers, sweet 45-55  | 45-55                          | 7-10          | 42    | 9                 | 30.7              | 90-95                      | No               | N <sub>O</sub>                | No                     | ON<br>ON     | 2-3 weeks   |   |
| Persimmons            | 32-35                          | 0-2           |       |                   |                   | 90-95                      | No               | o<br>N                        | No                     | Yes, Very    |   |   |
| Pineapples            | 50-55                          | 10-13         | 45    | 7                 |                   | 85-95                      | ON<br>O          | ON                            | Very Low               | ON<br>N      |   | Odor may influence<br>avocados                              |

| Chill Point Freezing Optimal Tr. Point Humidity A | Optimal<br>Humidity | K     | řΥa | Top Ice<br>Accepted | Top Ice Sprinkle E Accepted Accepted F | Ethylene<br>Production | Sensitive<br>to | Water Sprinkle Ethylene to to to Storage Life | Comments |
|---|---------------------|-------|-----|---------------------|--|------------------------|-----------------|---|----------|
| % (?e) (%) %                                      |                     | %     |     |                     | 2)                                     |                        | ינואופוופ       |   |          |
| 30.5 90-95  |                     | 90-95 |     | ON                  | oN<br>N                                | High                   | Yes             | 2-5 weeks                                     |          |
| 41 5 90-95  | 90-95               | 90-95 |     | No<br>ON            | o <sub>N</sub>                         | ON                     | No              |   |          |
| 38 3 90-95  | 6-06                | 6-06  | 2   | No                  | o <sub>N</sub>                         | No                     | Yes             |   |          |
| 90-95   | 6-06                | 6-06  |     | No                  | ON                                     | Low                    | ON<br>O         |   |          |
| 90-95   | 6-06                | ì6-06 |     | ON<br>ON            | ON<br>ON                               | ON<br>ON               | Yes             |   |          |
| 30.5 90-95  |                     | 36-06 |     | No                  | ON<br>ON                               | High                   | Yes             | 2-5 weeks                                     |          |
| 50 10 30.5 65-70                                  |                     | 65-70 |     | No                  | o <sub>N</sub>                         | No                     | Yes             | 2-3 months                                    |          |
| 28.4 90   |                     | 06    |     |                     |  |                        |                 | 2-3 months                                    |          |
| 90-95   | 90-95               | 90-95 |     | ON<br>ON            | 9<br>9                                 | High                   | Yes             |   |          |
| 30.7 95-100                                       |                     | 95-1( |     | Yes                 | Yes                                    | ON                     | Yes             | 3-4 weeks                                     |          |
| 95-100  | 95-1                | 95-1  | 00  |                     |  |                        |                 | 2-4 months                                    |          |
| 30.0 90-95  |                     | 6-06  |     | ON                  | ON                                     | Very Low               | o <sub>N</sub>  | 2-3 days                                      |          |
| 30.3 95-100                                       |                     | 95-1  |     | No                  | Yes                                    | ON                     | No              | 2-4 weeks                                     |          |
| 30.0 98-100                                       |                     | 98-1  |     | Yes                 | Yes                                    | No                     | Yes             | 4-6 months                                    |          |
| 90-95   | 36-06               | 36-06 |     | ,<br>ON             | Yes                                    | No                     | Yes             |   |          |

| Product                   | Optimal Storage<br>Temperature | itorage<br>ture | Chill | Point | Chill Point Point | Optimal Humidity | Top Ice | Water<br>Sprinkle<br>Accepted | Ethylene<br>Production | Sensitive<br>to | Water Sprinkle Ethylene to 3 Storage Life | Comments  |
|---------------------------|--------------------------------|-----------------|-------|-------|-------------------|------------------|---------|-------------------------------|------------------------|-----------------|---|---|
|                           | (°F)                           | (°C)            | (°F)  | (°C)  | (°F)              | %                | (1      | . (2                          |                        | etnylene 🦄      |   |   |
|                           | 32                             |                 |       |       | 30.0              | 95-98            |         |                               |                        |                 | 2-4 months                                |   |
| Spinach                   | 32                             |                 |       |       | 31.5              | 95-100           |         |                               |                        |                 | 10-14 days                                |   |
| Sprouts                   | 32-35                          | 0-2             |       |       |                   | 90-95            | No      | No                            | No                     | Yes             |   |   |
| Squashes,<br>summer       | 41-50                          |                 | 40    | 4     | 31.1              | 95               | ON.     | ON.                           | 0 2                    | Yes             | 1-2 weeks                                 |   |
| Squashes,<br>winter       | 50                             |                 |       |       | 30.5              | 50-70            | ON.     | ON.                           | ON.                    | Yes             | 1-6 months                                |   |
| Strawberries              | 32                             | 0               |       |       | 30.6              | 90-95            | No      | ON                            | Very Low               | No              | 3-7 days                                  |   |
| Sweet<br>Potatoes         | 55-60                          |                 | 54    | 12    | 29.7              | 85-90            | ON.     | ON.                           | 0                      | Yes             | 4-7 months                                |   |
| Tangerines                | 32-35                          | 0-2             |       |       |                   | 90-95            | No      | ON                            | Very Low               | o <sub>N</sub>  |   |   |
| Tangerines                | 40-45                          | 4-7             | 38    | e     |                   | 90-95            | No      | ON                            | Very Low               | O Z             |   |   |
| Tomatoes,<br>mature green | 55-70                          |                 |       |       | 31.0              | 90-95            | O Z     | O<br>Z                        | Low                    | Yes             | 1-3 weeks                                 | Ripening can be<br>delayed by storing at<br>55-60 F (13-16 C) |
| Tomatoes, ripe 55-70      | 55-70                          |                 |       |       | 31.1              | 90-95            | No      | No                            | Medium                 | 0<br>N          | 4-7 days                                  |   |
| Turnip greens             | 32                             |                 |       |       | 31.7              | 95-100           |         |                               |                        |                 | 10-14 days                                |   |
| Turnips                   | 32                             | 0               |       |       | 30.1              | , 36             | Yes     | Yes                           | No                     | Yes             | 4-5 months                                |   |

| Chill                        | Point | Freezing | Chill Point Point Point Humidity | Top Ice<br>Accepted | Water<br>Sprinkle B<br>Accepted B | Ethylene | Sensitive to Ethylene 3) | Top Ice Sprinkle Ethylene to Accepted Accepted Production Ethylene 3) Storage Life | Comments                                       |
|------------------------------|-------|----------|----------------------------------|---------------------|-----------------------------------|----------|--------------------------|--|--|
| (°C) (°F) (°F)               | 0     |          | %                                |                     | 7)                                |          |                          |  |  |
| 31.4                         | 31.   |          | 95-100                           |                     |                                   |          |                          | 2-3 weeks  |  |
| Watermelon 55-70 13-21 50 10 |       |          | 85-95                            | O <sub>N</sub>      | O<br>N                            | 0        | Yes, Very                |  | Keep away from<br>ethylene producing<br>fruits |

<sup>1)</sup> Top icing the products may be very effective keeping the temperature low and the product surface close to 100% humidity.

Proper storage conditions - temperature and humidity - are required to maximize storage life and maintain quality of harvested fruits and vegetables.

Fresh fruits need low temperatures and high relative humidity to reduce respiration and slow down metabolic processes. The table below indicates optimal temperatures and moisture conditions for some common fruits and vegetables.

From: The Engineering ToolBox

Fruit and Vegetable Storage

<sup>&</sup>lt;sup>2)</sup> Spraying with water may be effective by keeping the temperature low and the surface 100% humid.

<sup>3)</sup> Products sensitive to ethylene should not be stored together with products producing ethylene. Exposure to ethylene may soften the flesh, adding bitter taste to the product or/and accelerate ripening





# **Objectives**

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Understand how to interpret and use US grade standards when writing specifications.



Learn how to communicate with vendors to ensure seasonal availability of produce for your school.



Understand the consequences of poorly written specifications, and how to write clear specifications that encourage competition.

# **Key Points to Consider**

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# Key Points

## **What**

 Confidently writing produce specifications for your school nutrition operation that communicate the quality, condition and quantity of the desired produce will help your vendors efficiently provide produce that meets your needs.

# **Key Points to Consider Continued...**

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# Key Points

## Why

 Clearly written specifications improve vendor relations and reduce product delivery delays, increased food cost, food waste and potential food safety hazards

## <u>How</u>

Resources for Implementation:

- <u>USDA AMS Grade Standards</u>
   (https://www.ams.usda.gov/grades-standards)
- USDA FNS Fruits & Vegetables Galore
   (https://www.fns.usda.gov/tn/fruits-vegetables-galore-helping-kids-eat-more)
- USDA FNS Produce Information Sheets
   (https://www.fns.usda.gov/psu/graduates)
- USDA AMS Commercial Item Descriptions (CIDs)
   (https://www.ams.usda.gov/grades-standards/cids)

Al&fedicated

# Right Product, Right Price

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## **Four-Step Process**

- 1. Create the cycle menu (e.g., menu item, Menu Ingredient Approach (MIA) & portion size)

  Consider customer preferences, local availability swaps, nutrition requirements, available equipment, staffing, food safety, storage space, and more
- 2. Determine product availability
- 3. Write product specifications and conduct competitive procurement
- 4. Receive the specified product



# **Menu Ingredient Approach (MIA)**

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Photo credit: Chef Cyndie & the K-12 Team

# Menu Ingredient Approach (MIA)

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Photo credit: Chef Cyndie & the K-12 Team

# Menu Ingredient Approach (MIA)

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Photo credit: Chef Cyndie & the K-12 Team

# Menu Ingredient Approach (MIA)

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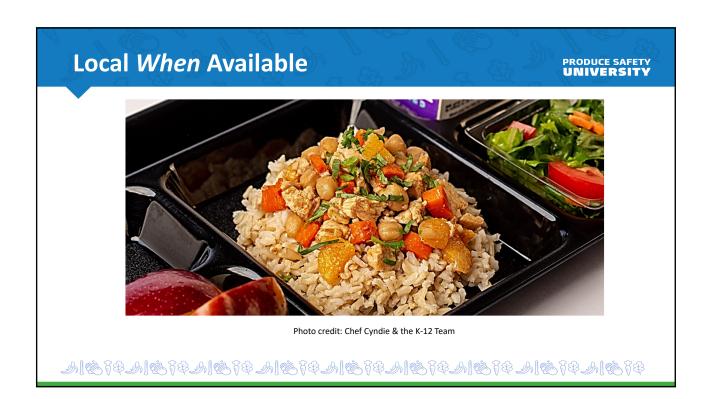
Photo credit: Chef Cyndie & the K-12 Team

# Menu Ingredient Approach (MIA)

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Photo credit: Chef Cyndie & the K-12 Team





# **Staffing Considerations: Meals Per Labor Hour**

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| Description        | Conversion Factor                      | Meal Equivalents (ME) |
|--------------------|--|-----------------------|
| Lunches            | No conversion                          | 1 ME                  |
| Breakfasts         | ÷ 3                                    | 1 ME                  |
| Afterschool snacks | ÷ 4                                    | 1 ME                  |
| A la carte sales   | \$0.00 ÷ Value of<br>Reimbursable Meal | 1 ME                  |
| TOTAL              |  |                       |

\_\_\_\_\_ME ÷ \_\_\_\_\_Total labor hours = \_\_\_\_\_MPLH



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## **U.S. Grade Standards**

United States Department of Agriculture



U.S. GRADE STANDARDS for Fruits, Vegetables, Nuts, and Other Specialty Products

# **Specification Resources**

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USDA AMS
Commercial Item
Descriptions
(CIDs)



Source: https://www.ams.usda.gov/grades-standards/cids

# USDA Commercial Item Descriptions (CIDs)

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- Available, free, for use as purchase specifications.
- Contain product information: packaging, labeling, size, grade, temperature, etc.



- Include requirements for: cGMP, GAP, food defense/security plan, analytical and microbiological testing, defects
- Over 180 available, including fresh-cut items!

# **Sample CIDs Specification: Broccoli Florets**

PRODUCE SAFETY

## Fresh Broccoli Florets - EXAMPLE

- Size A, 3/4 to 2 ¾" diameter at the widest part of the crown with 10 % or less over 2 ¾" and no more than 10% less than 3/4" and a length of ¾ to 2 ¾" with 10% or less with length over 2 3/4".
- Ready-to-eat, grown, harvested, packed, micro tested and transported according to FDA's Guidance for Industry, FSMA, cGMP, & HARPC food safety requirements.

# Sample CIDs Specification: Broccoli Florets

PRODUCE SAFETY



Photo credit: Chef Cyndie & the K-12 Team

# Fresh Broccoli Florets – EXAMPLE

- Compact, fresh, firm to touch; no open flowering bead, stems shall not be excessively elongated, tough, fibrous, slimy or mushy and free from tough core and foreign material.
- Bright, distinct dark green to blue-green in color.
- Kept under refrigeration during preparation, storage and delivery; temps between 32 and 41°F.

# **Sample CIDs Specification: Broccoli Florets**

PRODUCE SAFETY

# Fresh Broccoli Florets – EXAMPLE

- Shelf life from time of processing must not be less than 14 days.
- School nutrition operators should expect
   5-7 days of shelf life upon receiving.
- MAP or vacuum pack may be used to retain quality; package not to be bloated or on verge of rupturing.
- Must contain traceability code.



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### Variety/Type Descriptions

neburn – Solid red to red with some enish-gold; sweet-tart flavor. Good eating out of hand and salads.

## **Ordering Specifications**

Common packaging: 3-, 5-, 8-, 10-lb. bags in boxes 40- to 50-lb. crates, cartons, and bushel



### Equivalents

### **Receiving and Inspecting**

Good quality apples should be crisp, flavorful, and well-colored with firm smooth skins. Crispness may be determined by measuring flesh firmness with fruit penetrometer. Avoid fruit with bruises, broken skin, or internal browning

### Storing and Handling

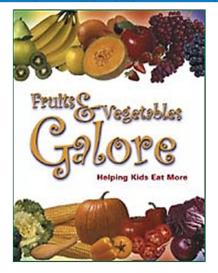


## **Produce Marketing Association**

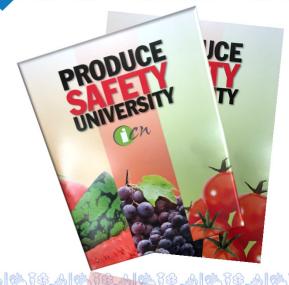
**Fresh Produce Manual** Free online!

# **Specification Resources**

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## The Rainbow Book!

USDA FNS Food Safety
Branch and the Institute of
Child Nutrition

**Produce Information Sheets** 

# **Specification Resources**

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# **Industry**

- Distributors
- Manufacturers
- Fresh Cut
   Processors







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## **Higher Education & Partnerships**

- UC Davis Postharvest Center
- Extension offices (Iowa State, Penn State)
- North Carolina Center for Environmental Farming Systems (CEFS)









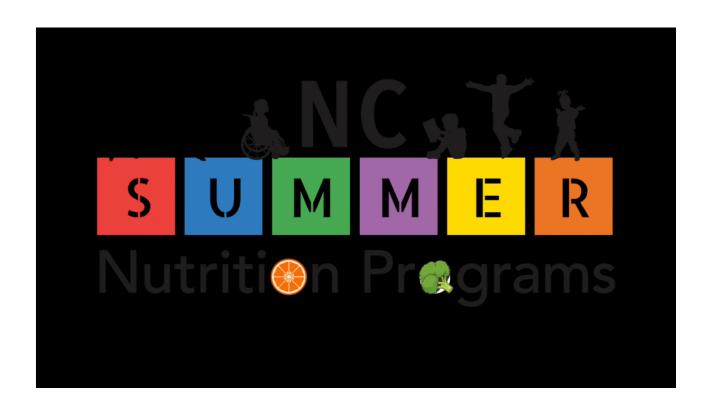


# What's in Your Spec?

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- Variety, if applicable
- Size
- Color requirement, if applicable
- Shape
- U.S. Grade (quality and condition)
  - Shipping or destination point





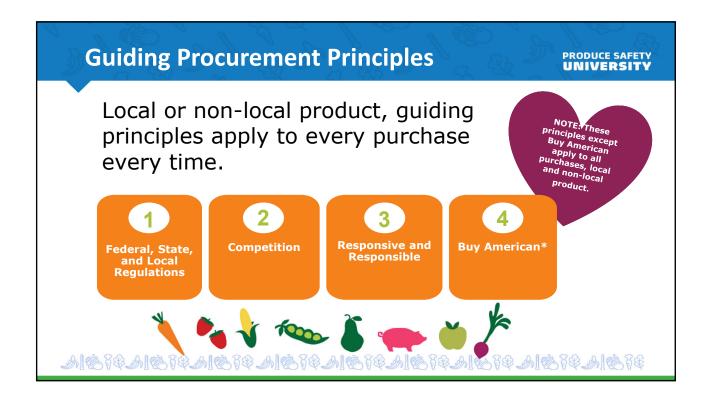
# What's in Your Spec? Other requirements: Temperature Packaging Type Weight Count Origin labeling Menu item

# What Else?

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What would you add to your specification?



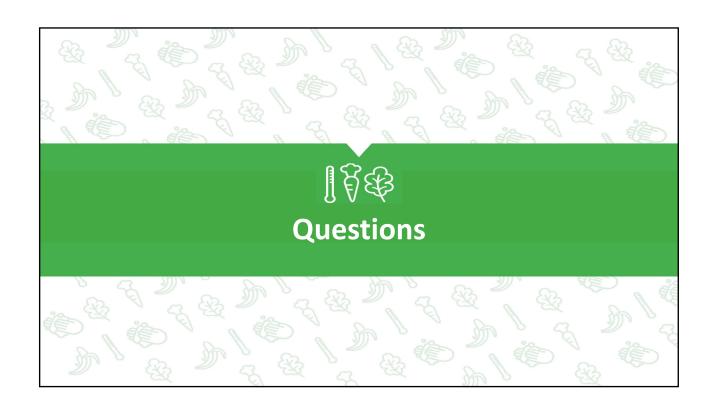


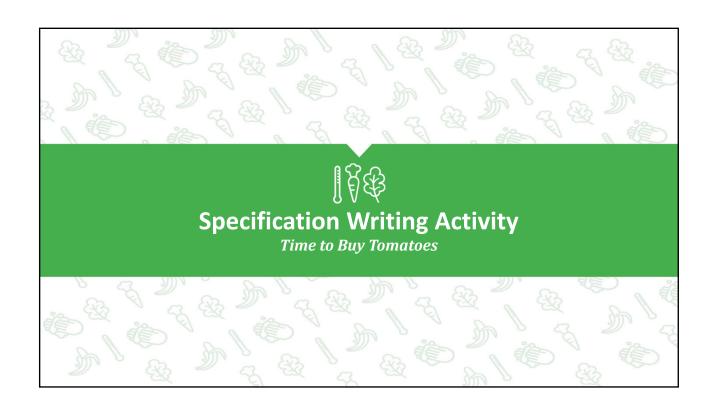
# **Poll Question**

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# Describe the current condition of your fresh fruit and vegetable specifications and revisions needed after PSU?

- · Excellent no need for revisions
- Good not many revisions needed
- Fair need to make a lot of revisions
- · Poor all specifications need to be revised
- I didn't know I needed fresh produce specifications





# **Specification Writing Activity**

(all may not apply)

| Name of product:                            |
|---|
| Menu item:                                  |
| Variety, if applicable:                     |
| Bid period:                                 |
| Quantity to be purchased during bid period: |
| Bid unit:                                   |
| Type of packaging:                          |
| Size of container:                          |
| Weight of container:                        |
| Size of product:                            |
| Weight of product:                          |
| Shape of product:                           |
| Color requirement:                          |
| Quality:                                    |
|   |
|   |





Condition:

Degree of ripeness: (maximum and minimum\*)

Shipping temperature:

GAP certification or other food safety documentation required (local):

\*If you don't plan to use all your tomatoes at once, you might want to specify that a certain amount be riper than others, so they don't all peak at the same time.

\*All ingredients and finished product shall be clean, sound, wholesome, and free from any foreign material including, but not limited to soil, sand, grit, metal, glass, wood, paint, and evidence of insect or rodent infestation.





# Writing Specifications for a Local Farmer PRODUCE SAFETY

# Together we will:

- Review the handout: *United States Standard for* Grades of Fresh Tomatoes.
- Using the template below, we will draft a sample specification for the item assigned.
- Think of USDA grade and defects allowed at shipping point for quality and condition as described in the grade standard.

# **Example One (With Instructor)**

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## **Specification (all may not apply)**

Name of product:

Menu item:

Variety, if applicable:

Bid period:

Quantity to be purchased during bid period:

Bid unit:

Type of packaging:

Size of container:

Weight of container:

# **Example One (With Instructor)**

PRODUCE SAFETY UNIVERSITY

Size of product:

Shape of product:

Color requirement:

Quality:

Condition:

Degree of ripeness: (maximum and minimum\*):

Shipping temperature:

\*If you don't plan to use all your tomatoes at once, you might want to specify that a certain amount be riper than others, so they don't all peak at the same time.



# **Example Two (PSU Cohort)**

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## Specification (all may not apply)

Name of product:

Menu item:

Variety, if applicable:

Bid period:

Quantity to be purchased during bid period:

Bid unit:

Type of packaging:

Size of container:

Weight of container:

# **Example Two (PSU Cohort)**

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Size of product:

Shape of product:

Color requirement:

Quality:

Condition:

Degree of ripeness: (maximum and minimum\*):

Shipping temperature:

\* If you don't plan to use all your tomatoes at once, you might want to specify that a certain amount be riper than others, so they don't all peak at the same time.



United States
Department of
Agriculture

Agricultural Marketing Service

Fruit and Vegetable Division

Fresh Products Branch

# United States Standards for Grades of Fresh Tomatoes

Effective October 1, 1991 (Reprinted - January 1997)

## United States Standards for Grades of Fresh Tomatoes 1

## **Grades**

51.1855 U.S. No. 1.

51.1856 U.S. Combination.

51.1857 U.S. No. 2.

51.1858 U.S. No. 3.

#### Size

51.1859 Size.

## **Color Classification**

51.1860 Color classification.

#### **Tolerances**

51.1861 Tolerances.

## **Application of Tolerances**

51.1862 Application of tolerances.

## **Standard Weight**

51.1863 Standard weight.

#### **Definitions**

- 51.1864 Similar varietal characteristics.
- 51.1865 Mature.
- 51.1866 Soft.
- 51.1867 Clean.
- 51.1868 Well developed.
- 51.1869 Fairly well formed.
- 51.1870 Fairly smooth.
- 51.1871 Damage.
- 51.1872 Reasonably well formed.
- 51.1873 Slightly rough.
- 51.1874 Serious damage.
- 51.1875 Misshapen.
- 51.1876 Very serious damage.
- 51.1877 Classification of defects.

#### Grades

## §51.1855 U.S. No. 1.

- "U.S. No. 1" consists of tomatoes which meet the following requirements:
- (a) Basic requirements:
- (1) Similar varietal characteristics;

<sup>&</sup>lt;sup>1</sup>Compliance with the provisions of these standards shall not excuse failure to comply with the provisions of the Federal Food, Drug and Cosmetic Act, or with applicable State laws and regulations.

- (2) Mature;
- (3) Not overripe or soft;
- (4) Clean;
- (5) Well developed;
- (6) Fairly well formed; and,
- (7) Fairly smooth.
- (b) Free from:
- (1) Decay;
- (2) Freezing injury; and
- (3) Sunscald.
- (c) Not damaged by any other cause.
- (d) For tolerances see §51.1861.

## §51.1856 U.S. Combination.

"U.S. Combination" consists of a combination of U.S. No. 1 and U.S. No. 2 tomatoes: **Provided**, That at least 60 percent, by count, meet the requirements of U.S. No. 1 grade.

(a) For tolerances see §51.1861.

## §51.1857 U.S. No. 2.

"U.S. No. 2" consists of tomatoes which meet the following requirements:

- (a) Basic requirements:
- (1) Similar varietal characteristics;
- (2) Mature;
- (3) Not overripe or soft;
- (4) Clean;
- (5) Well developed;
- (6) Reasonably well formed; and,
- (7) Not more than slightly rough.
- (b) Free from:
- (1) Decay;
- (2) Freezing injury; and,
- (3) Sunscald.
- (c) Not seriously damaged by any other cause.
- (d) For tolerances see §51.1861.

## §51.1858 U.S. No. 3.

"U.S. No. 3" consists of tomatoes which meet the following requirements:

- (a) Basic requirements:
- (1) Similar varietal characteristics;
- (2) Mature;
- (3) Not overripe or soft;
- (4) Clean;
- (5) Well developed; and,
- (6) May be misshapen.
- (b) Free from:
- (1) Decay; and,

- (2) Freezing injury.
- (c) Not seriously damaged by:
- (1) Sunscald.
- (d) Not very seriously damaged by any other cause.
- (e) For tolerances see §51.1861.

### **Size**

## §51.1859 Size.

- (a) The size of tomatoes packed in any standard type shipping container shall be specified and marked according to one of the size designations set forth in Table I. Individual containers shall not be marked with more than one size designation. Consumer packages and their master container are exempt; however, if they are marked, the same requirements would apply.
- (1) When containers are marked in accordance with Table I, the markings on at least 85 percent of the containers in a lot must be legible.
- (2) In determining compliance with the size designations, the measurement for minimum diameter shall be the largest diameter of the tomato measured at right angles to a line from the stem end to the blossom end. The measurement for maximum diameter shall be the smallest dimension of the tomato determined by passing the tomato through a round opening in any position.
- (b) In lieu of marking containers in accordance with (a) above or specifying size in accordance with the dimensions defined in Table I, for Cerasiforme type tomatoes commonly referred to as cherry tomatoes and Pyriforme type tomatoes commonly referred to as pear shaped tomatoes, and other similar types, size may be specified in terms of minimum diameter or minimum and maximum diameter expressed in whole inches, and not less than thirty-second inch fractions thereof, or millimeters in accordance with the facts.
- (1) Tomatoes of these types are exempt from marking requirements. However, when marked to a minimum or minimum and maximum diameter, the markings on at least 85 percent of the containers in a lot must be legible.
- (c) For tolerances see §51.1861.

Table I

| Size         | Inches                           |                                  |  |
|--------------|----------------------------------|----------------------------------|--|
| Designations | Minimum<br>Diameter <sup>1</sup> | Maximum<br>Diameter <sup>2</sup> |  |
| Small        | 2-4/32                           | 2-9/32                           |  |
| Medium       | 2-8/32                           | 2-17/32                          |  |
| Large        | 2-16/32                          | 2-25/32                          |  |
| Extra Large  | 2-24/32                          |                                  |  |

<sup>&</sup>lt;sup>1</sup>Will not pass through a round opening of the designated diameter when tomato is placed with the greatest transverse diameter across the opening.

<sup>&</sup>lt;sup>2</sup>Will pass through a round opening of the designated diameter in any position.

#### **Color Classification**

## §51.1860 Color classification.

- (a) The following terms may be used, when specified in connection with the grade statement, in describing the color as an indication of the stage of ripeness of any lot of mature tomatoes of a red fleshed variety:
- (1) **Green**. "Green" means that the surface of the tomato is completely green in color. The shade of green color may vary from light to dark;
- (2) **Breakers**. "Breakers" means that there is a definite break in color from green to tannish-yellow, pink or red on not more than 10 percent of the surface;
- (3) **Turning**. "Turning" means that more than 10 percent but not more than 30 percent of the surface, in the aggregate, shows a definite change in color from green to tannish-yellow, pink, red, or a combination thereof;
- (4) **Pink**. "Pink" means that more than 30 percent but not more than 60 percent of the surface, in the aggregate, shows pink or red color;
- (5) **Light red**. "Light red" means that more than 60 percent of the surface, in the aggregate, shows pinkish-red or red: **Provided**, That not more than 90 percent of the surface is red color; and.
- (6) **Red**. "Red" means that more than 90 percent of the surface, in the aggregate, shows red color.
- (b) Any lot of tomatoes which does not meet the requirements of any of the above color designations may be designated as "Mixed Color".
- (c) For tolerances see §51.1861.
- (d) Tomato color standards U.S.D.A. Visual Aid TM- L-1 consists of a chart containing twelve color photographs illustrating the color classification requirements, as set forth in this section. This visual aid may be examined in the Fruit and Vegetable Division, AMS, U.S. Department of Agriculture, South Building, Washington, D.C. 20250; in any field office of the Fresh Fruit and Vegetable Inspection Service; or upon request of any authorized inspector of such Service. Duplicates of this visual aid may be purchased from The John Henry Co., Post Office Box 1410, Lansing, Michigan 48904.

## **Tolerances**

## §51.1861 Tolerances.

In order to allow for variations incident to proper grading and handling in each of the foregoing grades, the following tolerances, by count, are provided as specified:

- (a) U.S. No. 1 (1) For defects at shipping point.<sup>2</sup> Ten percent for tomatoes in any lot which fail to meet the requirements for this grade: **Provided**, That not more than one-half of this tolerance, or 5 percent, shall be allowed for defects causing very serious damage, including therein not more than 1 percent for tomatoes which are soft or affected by decay; and,
- (2) For defects en route or at destination. Fifteen percent for tomatoes in any lot which fail to meet the requirements for this grade: **Provided**, That included in this amount not more than the following percentages shall be allowed for defects listed:

<sup>&</sup>lt;sup>2</sup>Shipping point, as used in these standards, means the point of origin of the shipment in producing area or at port of loading for ship stores or overseas shipment, or in the case of shipments from outside the continental United States, the port of entry into the United States.

- (i) Five percent for tomatoes which are soft or affected by decay;
- (ii) Ten percent for tomatoes which are damaged by shoulder bruises or by discolored or sunken scars on any parts of the tomatoes; and,
- (iii) Ten percent for tomatoes which are otherwise defective: **And provided further,** That not more than 5 percent shall be allowed for tomatoes which are very seriously damaged by any cause, exclusive of soft or decayed tomatoes.
- (b) U.S. Combination (1) For defects at shipping point.<sup>2</sup> Ten percent for tomatoes in any lot which fail to meet the requirements of the U.S. No. 2 grade: **Provided**, That not more than one-half of this tolerance, or 5 percent, shall be allowed for defects causing very serious damage, including 1 percent for tomatoes which are soft or affected by decay; and,
- (2) For defects en route or at destination. Fifteen percent for tomatoes in any lot which fail to meet the requirements of the U.S. No. 2 grade: **Provided**, That included in this amount not more than the following percentages shall be allowed for defects listed:
- (i) Five percent for tomatoes which are soft or affected by decay;
- (ii) Ten percent for tomatoes which are seriously damaged by shoulder bruises or by discolored or sunken scars on any parts of the tomatoes; and,
- (iii) Ten percent for tomatoes which are otherwise defective: **And provided further,** That not more than 5 percent shall be allowed for tomatoes which are very seriously damaged by any cause, exclusive of soft or decayed tomatoes.
- (c) U.S. No. 2 (1) For defects at shipping point.<sup>2</sup> Ten percent for tomatoes in any lot which fail to meet the requirements of this grade: **Provided**, That not more than one-half of this tolerance, or 5 percent, shall be allowed for defects causing very serious damage, including therein not more than 1 percent for tomatoes which are soft or affected by decay; and,
- (2) For defects en route or at destination. Fifteen percent for tomatoes in any lot which fail to meet the requirements for this grade: **Provided**, That included in this amount not more than the following percentages shall be allowed for defects listed:
- (i) Five percent for tomatoes which are soft or affected by decay;
- (ii) Ten percent for tomatoes which are seriously damaged by shoulder bruises or by discolored or sunken scars on any parts of the tomatoes; and,
- (iii) Ten percent for tomatoes which are otherwise defective: **And provided further,** That not more than 5 percent shall be allowed for tomatoes which are very seriously damaged by any cause, exclusive of soft or decayed tomatoes.
- (d) **U.S. No. 3** (1) **For defects at shipping point.**<sup>2</sup> Ten percent for tomatoes in any lot which fail to meet the requirements of this grade: **Provided**, That not more than one-half of this tolerance, or 5 percent, shall be allowed for tomatoes which are very seriously damaged by insects and not more than one-tenth of the tolerance, or 1 percent, for tomatoes which are soft or affected by decay; and,
- (2) For defects en route or at destination. Fifteen percent for tomatoes in any lot which fail to meet the requirements for this grade: **Provided**, That included in this amount not more than the

<sup>&</sup>lt;sup>2</sup>Shipping point, as used in these standards, means the point of origin of the shipment in producing area or at port of loading for ship stores or overseas shipment, or in the case of shipments from outside the continental United States, the port of entry into the United States.

following percentages shall be allowed for defects listed:

- (i) Five percent for tomatoes which are soft or affected by decay;
- (ii) Ten percent for tomatoes which are very seriously damaged by shoulder bruises or by discolored or sunken scars on any parts of the tomatoes; and,
- (iii) Ten percent for tomatoes which are otherwise defective: **And provided further**, That not more than 5 percent shall be allowed for tomatoes which are very seriously damaged by insects.
- (e) **For off-size.** Ten percent for tomatoes in any lot which are smaller than the specified minimum diameter, or larger than the specified maximum diameter.
- (f) **For off color.** Ten percent for tomatoes in any lot which fail to meet the color specified, including therein not more than 5 percent for tomatoes which are green in color, when any term other than "Green" is specified.

## **Application of Tolerances**

## §51.1862 Application of tolerances.

The contents of individual packages in the lot, based on sample inspection, are subject to the following limitations:

- (a) For packages which contain more than 5 pounds (2.27 kg), and a tolerance of 10 percent or more is provided, individual packages shall have not more than 1-1/2 times the tolerance specified, and for a tolerance of less than 10 percent individual packages shall have not more than double the tolerance specified, except that at least one defective and one off-size specimen may be allowed in any package: **Provided**, That the averages for the entire lot are within the tolerances specified for the grade; and,
- (b) For packages which contain 5 pounds (2.27 kg) or less individual packages shall have not more than 4 times the tolerance specified, except that at least one tomato which is soft, or affected by decay, and one off-size specimen may be permitted in any package: **Provided**, That the averages for the entire lot are within the tolerances specified for the grade.

## **Standard Weight**

## §51.1863 Standard weight.

- (a) When packages are marked to a net weight of 15 pounds (6.80 kg) or more, the net weight of the contents shall not be less than the designated net weight and shall not exceed the designated weight by more than 2 pounds (0.91 kg).
- (b) In order to allow for variations incident to proper sizing, not more than 15 percent, by count, of the packages in any lot may fail to meet the requirements for standard weight.

## **Definitions**

## §51.1864 Similar varietal characteristics.

"Similar varietal characteristics" means that the tomatoes are alike as to firmness of flesh and shade of color (for example, soft-fleshed, early maturing varieties are not mixed with firmfleshed, midseason or late varieties, or bright red varieties mixed with varieties having a purplish tinge).

## §51.1865 Mature.

"Mature" means that the tomato has reached the stage of development which will insure a proper completion of the ripening process, and that the contents of two or more seed cavities have developed a jelly-like consistency and the seeds are well developed.

## §51.1866 Soft.

"Soft" means that the tomato yields readily to slight pressure.

## §51.1867 Clean.

"Clean" means that the tomato is practically free from dirt or other foreign material.

## §51.1868 Well developed.

"Well developed" means that the tomato shows normal growth. Tomatoes which are ridged and peaked at the stem end, contain dry tissue, and usually contain open spaces below the level of the stem scar, are not considered well developed.

## §51.1869 Fairly well formed.

"Fairly well formed" means that the tomato is not more than moderately kidney-shaped, lop-sided, elongated, angular, or otherwise moderately deformed.

## §51.1870 Fairly smooth.

"Fairly smooth" means that the tomato is not conspicuously ridged or rough.

## §51.1871 Damage.

"Damage" means any specific defect described in §51.1877, Table II; or an equally objectionable variation of any one of these defects, any other defect, or any combination of defects, which materially detracts from the appearance, or the edible or marketing quality of the tomato.

## §51.1872 Reasonably well formed.

"Reasonably well formed" means that the tomato is not decidedly kidney-shaped, lop-sided, elongated, angular, or otherwise decidedly deformed.

## §51.1873 Slightly rough.

"Slightly rough" means that the tomato is not decidedly ridged or grooved.

## §51.1874 Serious damage.

"Serious damage" means any specific defect described in §51.1877, Table II; or an equally objectionable variation of any one of these defects, any other defect, or any combination of defects, which seriously detracts from the appearance, or the edible or marketing quality of the tomato.

## §51.1875 Misshapen.

"Misshapen" means that the tomato is decidedly kidney-shaped, lop-sided, elongated, angular or otherwise decidedly deformed: **Provided**, That the shape is not affected to an extent that the appearance or the edible quality of the tomato is very seriously affected.

## §51.1876 Very serious damage.

"Very serious damage" means any specific defect described in §51.1877, Table II; or an equally objectionable variation of any one of these defects, any other defect, or any combination of defects, which very seriously detracts from the appearance, or the edible or marketing quality of the tomato.

# §51.1877 Classification of defects. Table II

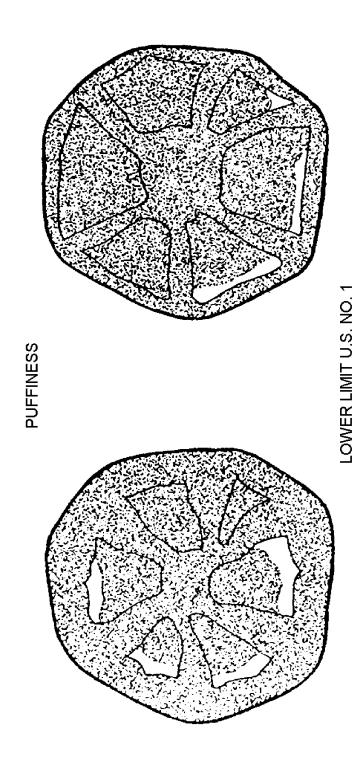
References to Area, Aggregate Area, Length or Aggregate Length are based on a tomato having a diameter of 2-1/2 inches (64 mm)<sup>1</sup>

| Factor                       | Damage   | Serious Damage   | Very serious damage   |
|------------------------------|--|--|---|
| Cuts and broken skins        | Not shallow or not well healed, or shallow, well healed cut more than 1/2 inch (13 mm) in length, or other shallow, well healed skin breaks aggregating more than a circle 3/8 inch (10 mm) in diameter. | Not shallow or not well<br>healed, or shallow, well<br>healed cut more than 1/2<br>inch (13 mm) in length,<br>or other shallow, well<br>healed skin breaks<br>aggregating more than a<br>circle 1/2 inch (13 mm)<br>in diameter. | Fresh or healed and extending through the tomato wall.  |
| Puffiness                    | Open space in 1 or more locules materially detracts from appearance of tomato cut through center at right angles to a line from stem to blossom end.   | Open space in 1 or more locules seriously detracts from appearance of tomato cut through center at right angles to a line from stem to blossom end.  | Open space in 2 or more locules very seriously detracts from appearance of tomato cut through center at right angles to a line from stem to blossom end.  |
| Catfaces                     | Scars are rough or deep, channels are very deep or wide, channels extend into a locule, or a fairly smooth catface aggregating more than a circle 1/2 inch (13 mm) in diameter.                          | Scars are rough or deep, channels are very deep or wide, channels extend into a locule, or a fairly smooth catface aggregating more than a circle 3/4 inch (19 mm) in diameter.  | Channels extend into the locule, wall has been weakened to the extent that slight pressure will cause a tomato to leak, or a fairly smooth catface aggregating more than a circle 1 inch (25 mm) in diameter. |
| Scars (other than catfaces). | No depth and aggregating more than a circle 3/8 (10 mm) in diameter.   | No depth and aggregating more than a circle 5/8 (16 mm) in diameter.   | No depth and aggregating more than a circle 1 inch (25 mm) in diameter.   |

<sup>&</sup>lt;sup>1</sup>Conversion to metric equivalent, made to nearest whole millimeter.

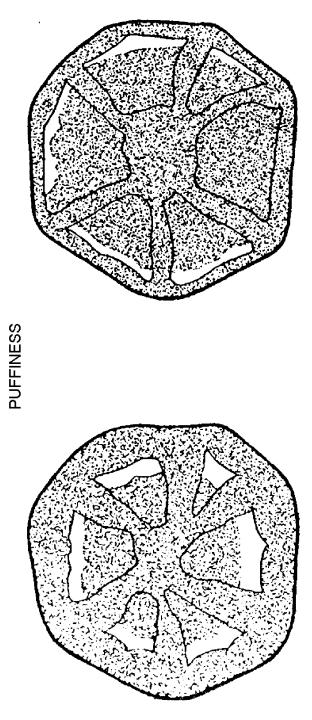
| Growth cracks (radiating from or concentric to stem scar). | Not well healed, more than 1/8 inch (3 mm) in depth, individual radial cracks more than 1/2 inch (13 mm) in length, aggregate length of all radial cracks more than 1 inch (25 mm) measured from edge of stem scar. Any lot of tomatoes which are at least turning may have cracks which are not well healed provided they are not leaking. | Not well healed, more than 1/8 inch (3 mm) in depth, individual radial cracks more than 3/4 inch (19 mm) in length, aggregate length of all radial cracks more than 1-3/4 inch (44 mm) measured from edge of stem scar. Any lot of tomatoes which are at least turning may have cracks which are not well healed provided they are not leaking. | Not well healed, more than 1/4 inch (6 mm) in depth, individual radial cracks more than 1 inch (25 mm) in length, aggregate length of all radial cracks more than 2-7/8 inches (73 mm) measured from edge of stem scar. Any lot of tomatoes which are at least turning may have cracks which are not well healed provided they are not leaking, not more than 1/8 inch (3 mm) in depth, individual radial cracks are not more than 3/4 inch (19 mm) in length. |
|--|---|---|--|
| Hail   | Deep, rough, not well healed<br>and corked over, or fairly<br>smooth, shallow hail marks<br>aggregating more than a<br>circle 3/8 inch (10 mm) in<br>diameter.  | Deep, rough, not well<br>healed and corked over,<br>or fairly smooth,<br>shallow hail marks<br>aggregating more than a<br>circle 5/8 inch (16 mm)<br>in diameter.   | Fresh, very deep or fairly smooth, shallow hail marks aggregating more than a circle 1 inch (25 mm) in diameter.   |
| Insect Injury  | Materially detracts from the appearance or any insect is present in the fruit.  | Seriously detracts from<br>the appearance or any<br>insect is present in the<br>fruit.  | Very seriously detracts<br>from the appearance or<br>any insect is present in the<br>fruit.  |

<sup>&</sup>lt;sup>1</sup>Conversion to metric equivalent, made to nearest whole millimeter.



The proportion of open space permitted is dependent upon the thickness of walls. Tomatoes with thicker walls than those in the above illustrations may have proportionately greater amounts of open space. Tomatoes with thinner walls than illustrated shall have proportionately lesser amounts of open space.

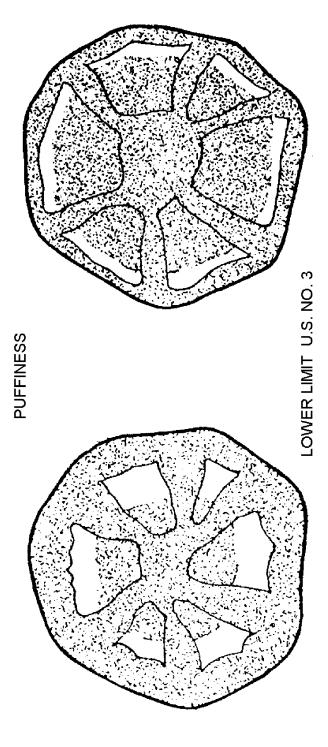
Illustration TOMFR 1



LOWER LIMIT U.S. NO. 2

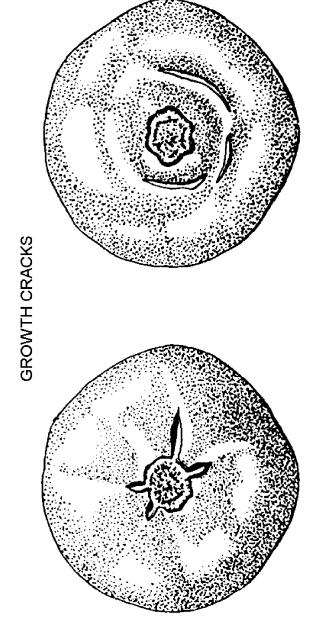
The proportion of open space permitted is dependent upon the thickness of walls. Tomatoes with thicker walls than those in the above illustrations may have proportionately greater amounts of open space. Tomatoes with thinner walls than illustrated shall have proportionately lesser amounts of open space.

Illustration TOMFR 2



The proportion of open space permitted is dependent upon the thickness of walls. Tomatoes with thicker walls than those in the above illustrations may have proportionately greater amounts of open space. Tomatoes with thinner walls than illustrated shall have proportionately lesser amounts of open space.

Illustration TOMFR 3



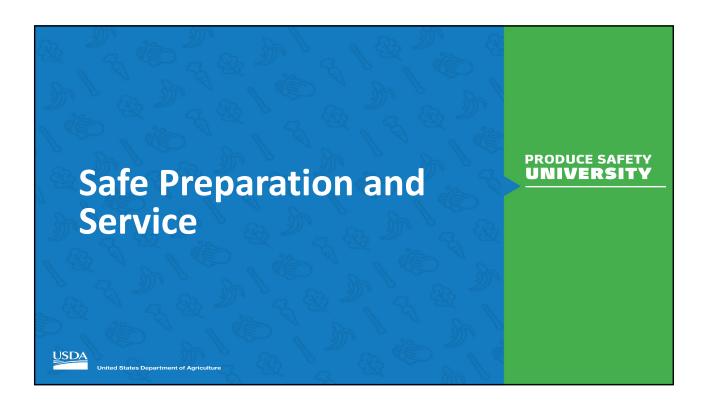
Maximum aggregate length of radial growth cracks permitted on 2 1/2 inch tomato in U.S. No. 1 grade.

Concentric growth cracks which affect appearance to same extent as maximum aggregate length of radial growth cracks permitted in U.S. No. 1 grade.

The above limitations apply to all stages of maturity.

Illustration TOMFR 4





# **Objectives**

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Categorize fruit and vegetable cycle menu items into HACCP processes.



Identify food safety practices in the preparation and service of fresh produce in child nutrition programs.



Apply effective culinary methods and marketing strategies to increase student consumption of fruits and vegetables.

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# **Key Points to Consider**

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# Key Points

## **What**

- The Process Approach to HACCP defines the Temperature Danger Zone (TDZ) and categorizes food preparation processes by the number of trips through the TDZ.
- Reduce food safety risks by storing produce properly, practicing hand hygiene, avoiding bare-hand contact (by using gloves), washing fresh produce when appropriate, holding and serving at appropriate times and temperatures

## **Key Points to Consider Continued...**

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# Key Points

#### Why

- Reducing food contamination through safe produce preparation ensures that school meals are safe for student consumption.
- Identifying food production methods and merchandizing strategies that produce eye appealing foods help school nutrition staff encourage student acceptance.

#### How

- Resources for Implementation: <u>ICN Food Safety Standard</u>
   <u>Operating Procedures</u> (<a href="https://theicn.org/icn-resources-a-z/standard-operating-procedures/">https://theicn.org/icn-resources-a-z/standard-operating-procedures/</a>)
- Resource for Training Others: <u>Tips for Marketing Your School</u> <u>Nutrition Program</u> (<a href="https://theicn.org/icn-resources-a-z/marketing-your-SNP">https://theicn.org/icn-resources-a-z/marketing-your-SNP</a>)

# **HACCP Menu Category**

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## **Process 1: Ready-to-Eat (RTE)**



CONTROL STEPS
Receiving, Storing,
Preparing, Holding, Serving

Fruit, Precut, Bagged\*

Leafy Greens, All varieties

Melons, Fresh, Cut, All varieties

Tomatoes, Fresh, Cut

\*Receive and hold at or below 41°F, based on package label.

Vegetables, Precut, Bagged\*

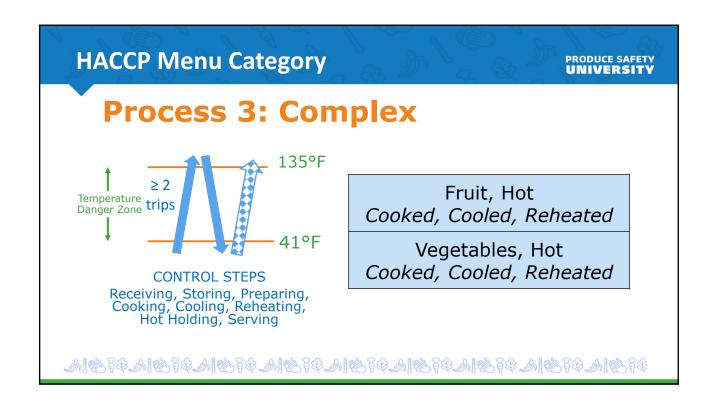
# **Process 1: Non-TCS Examples**

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| Fruit, Canned                                     |  |
|---|--|
| Fruit, Dried                                      |  |
| Fruit, Fresh (except cut melons)                  |  |
| Fruit Cups, Canned                                |  |
| Fruit Cups, Frozen                                |  |
| Fruit, Juice, Shelf Stable                        |  |
| Vegetables, Fresh (except leafy greens and sliced |  |
| tomatoes)   |  |

Follow manufacturer's instructions.
Best practice is to always use temperature control.

# Process 2: Same Day Service 135°F Temperature trip Danger Zone 41°F CONTROL STEPS Receiving, Storing, Preparing, Cooking/Reheating for Hot Holding, Serving Produce SAFETY UNIVERSITY Fruit, Hot Vegetables, Hot





# Reduce the Risks - Storing

PRODUCE SAFETY

- Monitor refrigerated storage at least daily
- Date mark and rotate stock
  - First In; First Out (FIFO)
  - First Expired; First Out (FEFO)
- Ensure traceability system is up-to-date
- Prevent cross contamination
  - Store ready to eat above raw meats, poultry, and shell eggs
  - Keep foods covered
  - Repair leaks

Photo credit: Chef Cyndie & the K-12 Team

# **Reduce the Risks – Food Preparation**

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UNIVERSITY

## **WASH YOUR HANDS!**





Source: Iowa State University Extension Service

Al@fesicates

# **Handwashing Study**

# PRODUCE SAFETY UNIVERSITY

# **Fast Food and Full-Service Restaurants Comparison Study**

- Are hands washed properly?
- Are hands washed when required?
- Are handwashing facilities conveniently located?
- Are supplies available?

Source: Boyer, M., Williams, L. Otto, J., Lando, A., Dawood, N., & Liggans, G. (2021). Handwashing Observations In Fast-Food and Full-Service Restaurants . *Journal of Food Protection*, Vol 84, No. 6, 1016-1022



Photo credit: Chef Cyndie & the K-12 Team

# **Handwashing Study - Findings**

PRODUCE SAFETY UNIVERSITY

# **Fast Food and Full-Service Restaurants Comparison Study**

| Observation                                 | Fast-Food<br>(n=425) | Full-Service<br>(n=396) |
|---|----------------------|-------------------------|
| Hands washed properly                       | 55%                  | 43%                     |
| Hands wash when required                    | 57%                  | 78%                     |
| Conveniently located handwashing facilities | 80%                  | 70%                     |
| Are supplies available?                     | 88.7%                | 78.5%                   |

Al@fesicates

# **Reduce the Risks – Food Preparation**

PRODUCE SAFETY UNIVERSITY



Source: Ford, E.W., Boyer, B.T., Menachemi, N. & Huerta T.R. (2014). Increasing hand washing with a simple visual cue. *American Journal of Public Health*, 10, 1851 – 1856



# Simple cues may increase handwashing

- Control group: Towel not presented
- Intervention group: Towel presented

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# **Reduce the Risks – Food Preparation**

PRODUCE SAFETY UNIVERSITY



Photo credit: Chef Cyndie & the K-12 Team

Avoid bare-hand contact by:

- Properly wearing single-use gloves
- Using utensils & deli paper
- · Dispensing equipment

# **Reduce the Risks – Food Preparation**

PRODUCE SAFETY
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16%

Foodborne outbreaks (2006 – 2016) implicated contaminated gloves or glove cross contamination.



## Reduce the Risks – Food Preparation

PRODUCE SAFETY UNIVERSITY

# Handling fresh produce

- Wash under running water before cutting, peeling, eating or cooking
- Scrub using a vegetable brush - Melons, potatoes, etc.
- Identify designated produce sink
- Do NOT wash ready-to-eat produce
- Never use unapproved chemicals
- Commercial produce wash is not required



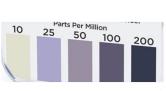
# Reduce the Risks - Commercial Produce **Anti-microbial Wash**

**PRODUCE SAFETY** UNIVERSIT

## **Commercial produce wash** examples

- Mechanical produce wash with anti-microbial chemicals
- Ozonated water systems
- Electrolyzed Oxidizing Water (EOW)
  - Hypochlorous acid mixture (200 ppm)
  - No rinse, non-irritating
  - USDA Organic designation







A|&|\$4A|&|\$4A|&|\$4A|&|\$4A|&|\$4A|&|\$4A|&|\$4A|&|\$

# **Poll Question**

PRODUCE SAFETY UNIVERSITY

## Does your school district use any of the following as a produce wash? (Select All That Apply)

- Apple cider vinegar
- Baking soda
- Bleach
- · Lemon juice
- Salt
- White vinegar
- Not applicable Do not work in a school district

# Reduce the Risks – Food Preparation Equipment

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# **Use Approved Equipment**

- Cutting boards, knifes
- Food storage containers
- Food processors/blenders
  - Manual
  - Mechanical



Photo credit: Chef Cyndie & the K-12 Team

# Reduce the Risks - Holding and Serving

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- Monitor time and temperature during holding and serving.
- Maintain chopped and/or RTE leafy greens, cut melons and cut tomatoes at or below 41°F.
- Practice good personal hygiene & prevent cross contamination.



# Food Safety Behavioral Intentions Research - Child Nutrition Employees

PRODUCE SAFETY
UNIVERSITY

School nutrition staff (n=408) attitudinal survey: cleaning and sanitizing food contact surfaces, handwashing, and using thermometers to take food temperatures outcomes:

## Respondents felt:

- 1. A very positive food safety attitude
- 2. Social pressure to practice proper food safety (supervisor, students, parents, health inspector)
- 3. Not in control (i.e., lack of supplies and equipment)

Source: Roberts, K., Sauer, K., Paez, P., & Alcorn, M. (2020). Use of Theory of Planned Behavior to Determine Food Safety Behavioral Intentions among Child Nutrition Employees. Food Protection Trends, 40(6), 424-434.

# Food Safety Behavioral Intentions Research – Child Nutrition Employees

PRODUCE SAFETY UNIVERSITY

## Recommendations from authors:

- 1. Incorporate motivational training strategies using emotional stories and personal examples
- 2. Provide staff with access to adequate supplies and equipment to increase control beliefs

Source: Roberts, K., Sauer, K., Paez, P., & Alcorn, M. (2020). Use of Theory of Planned Behavior to Determine Food Safety Behavioral Intentions among Child Nutrition Employees. *Food Protection Trends*, 40(6), 424-434.



# **Merchandize – Entrée Salads**

PRODUCE SAFETY UNIVERSITY





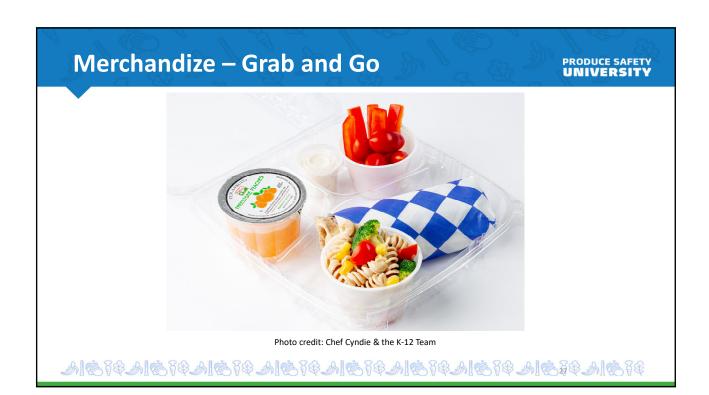
Photo credit: Chef Cyndie & the K-12 Team

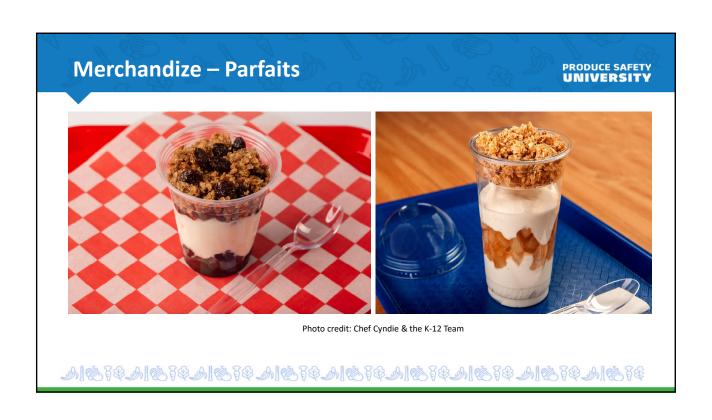
# **Merchandize – Entrée Salads**

PRODUCE SAFETY UNIVERSITY

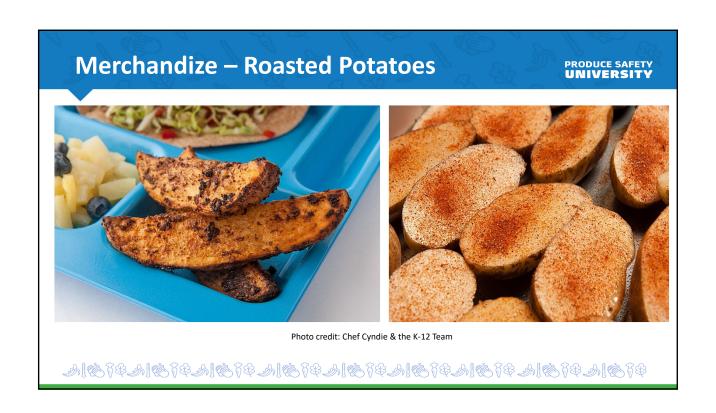


Photo credit: Chef Cyndie & the K-12 Team









# Merchandize – Entrees (Beef and Sweetpotato Chili)

PRODUCE SAFETY
UNIVERSITY



Photo credit: Chef Cyndie & the K-12 Team

# **Merchandize – Entrees (Teriyaki Noodles)**

PRODUCE SAFETY UNIVERSITY



Photo credit: Chef Cyndie & the K-12 Team

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# Merchandize – Improve Appeal

PRODUCE SAFETY UNIVERSITY

Trim Celery: 15 minutes to process 5 lb bag: 32 ½ c servings





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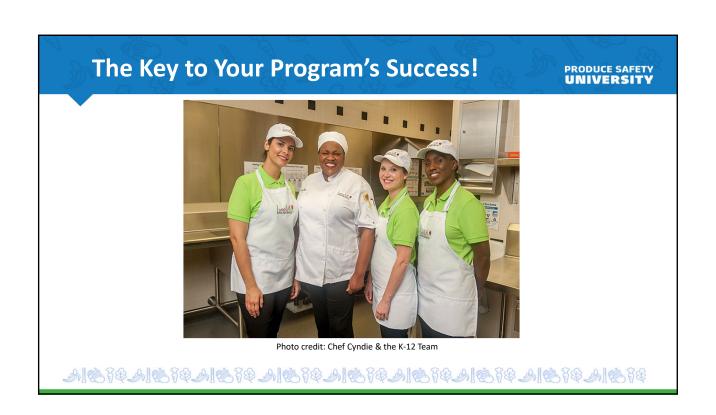
# Merchandize – Improve Appeal

PRODUCE SAFETY UNIVERSITY



Photo credit: Chef Cyndie & the K-12 Team







# USING USDA DOD FRESH TO PURCHASE LOCAL PRODUCE



THE USDA DEPARTMENT OF DEFENSE Fresh Fruit and Vegetable Program (USDA DoD Fresh) is available to schools in 48 States, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands. More than 22,000 schools receive fresh fruits and vegetables from this program. Schools interested in participating in the USDA DoD Fresh program should reach out to the State Distributing Agency.

#### **How Does It Work?**

USDA DoD Fresh is a partnership between USDA and the Department of Defense (DoD) Defense Logistics Agency (DLA). This program leverages DoD's procurement system to provide a variety of nutritious U.S.-grown fresh fruits and vegetables to schools. Schools receive two types of support from the USDA. The majority of the support is provided in the form of cash reimbursement for the meals served, and the second form of support is the ability to order foods that USDA purchases ("USDA Foods") which can make up about 15-20% of the value of the food served in the National School Lunch Program. USDA DoD Fresh is one option that schools can use to spend their entitlement.

# What are the Advantages of DoD Fresh?

- \* Flexibility: USDA DoD Fresh is another choice in a request-driven system to help States and school districts manage and utilize USDA Foods entitlement more effectively.
- \* Consistency: USDA DoD Fresh vendors update the catalog weekly and schools can receive deliveries as frequently as every week, making orders timely, fresh, and responsive to market fluctuations.

- \* High quality: DoD maintains high quality standards through Produce Quality Audits, requires vendors to follow Good Agricultural Practices (GAP) and Good Handling Practices (GHP), and requires that pre-cut produce is sourced from approved suppliers.
- \* Variety: USDA DoD Fresh offers many different types and varieties of produce, all grown in the United States. School districts can choose between different package sizes, whole or pre-cut options, and can select locally grown produce when in season.
- \* Easy ordering and funds tracking: Schools place orders via the web-based Fresh Fruit and Vegetable Order/
  Receipt System (FFAVORS). The prices listed in the FFAVORS catalog reflect the prices that schools will be billed for the product. FFAVORS tracks schools' entitlement fund balances and total order costs. DoD manages vendor payment and reconciliation.

OFFICE of COMMUNITY FOOD SYSTEMS

| CASE<br>QUANTITY | ITEM CODE | DESCRIPTION                            | STATE OF<br>ORIGIN                            | CASE<br>CONTENTS | CASE PRICE |         |
|------------------|-----------|--|---|------------------|------------|---------|
|                  | 14M10     | APPLES R/D 125-138 CT 40 LBS CS        |   | MI, PA,<br>WA    | 40 LB      | \$25.98 |
|                  | 14M33     | CARROTS WHL 5 LB BG                    | GA  | 5 LB             | \$5.20     |         |
|                  | 15A85     | PEPPERS SWT CHL GRN DICE 5 LB BG       | PEPPERS SWT CHL GRN DICE 5 LB BG *Local Grown |                  |            |         |
|                  | 15M94     | ORANGES CHIL 50/4.7 OZ CO              |   | CA               | 15 LB      | \$30.45 |
|                  | 15Q29     | KALE GREEN 1/20 LB CS                  | *Local Grown                                  | GA,SC            | 20 LB      | \$17.95 |
|                  | 18B17     | TOMATOES FRESH 5X6 5 LB CS             | *Local Grown                                  | FL               | 5 LB       | \$7.56  |
|                  | 18A54     | BLUEBERRIES FRESH 12/6 OZ EA 4.5 LB CS | *Local Grown                                  | CA, NC           | 5 LB       | \$19.40 |

The FFAVORS catalog indicates which foods are grown locally.

# **Local Produce through USDA DoD Fresh**

All produce is required to be grown in the United States. Vendors provide the state of origin for each product. Local produce is defined as produce from within the state or adjacent states. Vendors are encouraged to provide local products in season. Local produce must meet contract requirements for quality and food safety and be priced competitively.

# What Should States and School Districts Do if They Want to Source Local Foods Through USDA DoD Fresh?

States and schools that want to purchase local foods through USDA DoD Fresh should start by looking for products already marked with the state or origin in the FFAVORS catalog.

States and schools can also contact their USDA DoD Fresh produce vendor to find out which local products the vendor expects to carry throughout the year, or to make their interest in local produce known to the USDA DoD Fresh vendor.

# **How is the Program Funded?**

States work with schools to manage how much USDA Foods entitlement to allocate to USDA DoD Fresh and to ensure entitlement is fully utilized.

### **Learn More**

The **Defense Logistics Agency website** provides background information about DoD and links to each vendor's contract.

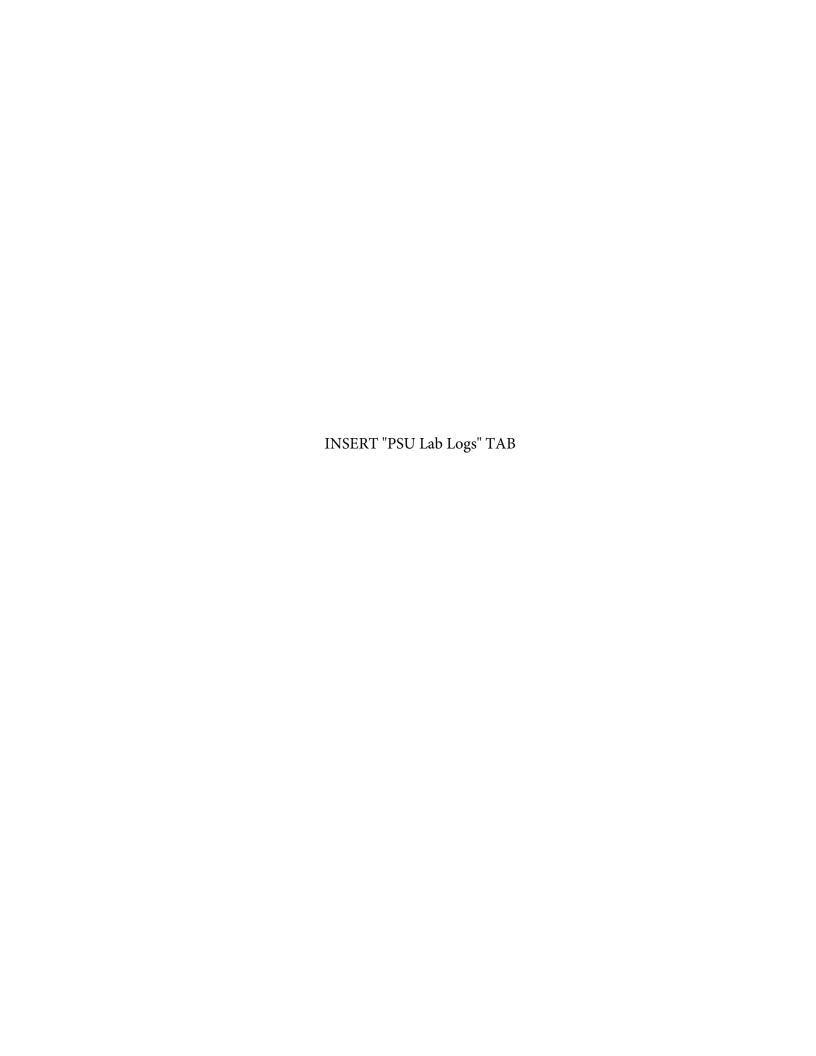
The **Food and Nutrition Service website** provides contact information for farm to school personnel in your area, and a helpful history of the DoD Fresh program.

For more information, and to sign up for the bi-weekly e-letter from the Food and Nutrition Service's Office of Community Food Systems, please visit www.fns.usda.gov/farmtoschool.

Questions? Email us at farmtoschool@fns.usda.gov.

USDA is an equal opportunity provider and employer. Updated August 2017.

OFFICE of
COMMUNITY
FOOD SYSTEMS



# PRODUCE SAFETY UNIVERSITY

**Lab Logs** 



#### **PSU Lab Log Guidance**

#### Samples by count:

- ✓ For individual commodities like watermelons the sample size will be the individual melon.
- ✓ For packaged commodities like strawberries, potatoes, and cases of oranges, the sample size will be a count of the number of individual produce items. For example, a clamshell of strawberries may have a sample size of 25 berries.
- ✓ Record the sample number in the designated column.

#### Size Diameter:

✓ Using the provided grading inspection sizing tools: measure and record the diameter of the smallest and largest piece of produce in the sample. Record the diameter average in the designated column.

#### Defects:

- ✓ Record the number of quality defects in each sample into the defects column.
- ✓ Record a description of the specific quality defects found in the notes section.
- ✓ Record the number of other defects listed in the appropriate row and column.
- ✓ Record additional defects not listed in the table in the notes section.

#### Percent:

- ✓ Calculate the percentage of defects for each sample using the formula: Defects ÷ number in sample = %
- ✓ Record the calculated percentages in the appropriate row and column.
- ✓ Calculate the total percentage of each type of defect by adding the percentages from each sample.

| Samp               | le Size     |          |          |          |           |
|--------------------|-------------|----------|----------|----------|-----------|
| Sample 1           | Sam         | ple 2    |          |          |           |
| 11                 | 1           | 0        |          |          |           |
|                    | Smallest    |          | Lar      | gest     | Average   |
| Size Diameter (in) | 2 in.       |          | 4:       | in.      | 3 in.     |
|                    | Defects (#) |          | Percen   | ıt (%)*  | Total (%) |
|                    | Sample 1    | Sample 2 | Sample 1 | Sample 2 |           |
| Quality            | 2           | 0        | 18%      | 0        | 18%       |
| Bruises (C)        | 1           | 1        | 9%       | 10%      | 19%       |
| Soft/Overripe (C)  | 0           | 0        | 0        | 0        |           |

#### **Notes:**

Quality defects: Excessive surface scars (detracts from appearance) and Insect damage (detracts from appearance and possible vector for decay and produce safety issues).

Next to each defect you will see a (Q) or (C), these indicate which are quality defects and which are condition defects.

For in-depth descriptions of defects and full inspection procedures please reference the inspection instructions available on the USDA Agriculture Marketing Service grades and standards website at: https://www.ams.usda.gov/grades-standards.

You will find direct links on the bottom of each commodity log sheet.

# Apples, Whole



| Sample             | Size (#) |        |         |        |         |           |
|--------------------|----------|--------|---------|--------|---------|-----------|
| Sample 1           | Sample 2 |        |         |        |         |           |
| _                  | _        | Defe   | cts (#) | Percer | ıt (%)* |           |
|                    |          | Sample | Sample  | Sample | Sample  | Total (%) |
|                    |          | 1      | 2       | 1      | 2       |           |
| Quality            |          |        |         |        |         |           |
| Bitter Pit (C)     |          |        |         |        |         |           |
| Bruises (C)        |          |        |         |        |         |           |
| Shape (WF/FWF) (Q) |          |        |         |        |         |           |
| Firmness (C)       |          |        |         |        |         |           |
| Decay (C)          |          |        |         |        |         |           |

<sup>\*</sup>number of defects  $\div$  number in sample = \%

WF=Well Formed

FWF= Fairly Well Formed

#### **Helpful hints:**

**Hard:** means apples with a tenacious flesh and starchy flavor. **Firm:** means apples with a tenacious flesh but which are crisp.

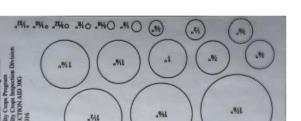
Firm ripe: means apples with crisp flesh. Ripe: means apples with mealy flesh.

- ✓ Quality defects include cleanness, color, hail marks, insects, shape, stem punctures, and watercore.
- ✓ Total allowable defects: 10% which includes 5% for serious damage and 1% for decay/internal breakdown.
- ✓ Fairly well formed means that the apple may be slightly abnormal in shape but not to an extent which detracts materially from its appearance.
- ✓ Bitter Pit- when the apple is peeled, a small round or oval mass of dry, brown spongy tissue is found below each surface pit.
- ✓ There is no grade standard for sliced apples but you can use the terms provided in the standards to describe the quality and condition of bagged apples.

# **Culinary tips:**

• A combination of lemon juice and the juice from canned pineapple tidbits makes for a great antioxidant to prevent apples from browning.

#### Area Gauge, IA #30G

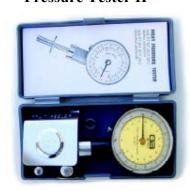


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#### **Knife**



**Pressure Tester II** 



#### **Resources:**

#### **Inspection Instructions**

https://www.ams.usda.gov/sites/default/files/media/Apple Inspection Instructions%5B1%5D.pdf

#### **Visual Aid Online**

https://www.ams.usda.gov/sites/default/files/media/Apple Visual Aid%5B1%5D.pdf

#### **Catalogs**

Equipment:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Fresh\%20and\%20Processed\%20FV\%20}{Products\%20Inspections.pdf}$ 

Official Visual Aids Index:

https://www.ams.usda.gov/sites/default/files/media/Official%20Inventory%20of%20FV%20 Inspection%20Aids.pdf

Order Form:



# **Bananas**

| Count                     |       |         |                    |
|---------------------------|-------|---------|--------------------|
| Firmness relates to color | Hard  | Firm    | Ripe/Soft/Overripe |
|                           |       |         |                    |
| Color                     | Green | Turning | Yellow             |

**Helpful hints:** Bananas *do not* have a corresponding U.S. grade standard.

Why are Bananas sweeter when they are riper?

An unripe banana is full of complex carbohydrates, but as it ripens, these are broken down into simple sugars which is why riper bananas are or become sweeter. The lower starch content and higher sugar content also means that the banana is digested more quickly.

- ✓ Both green and yellow bananas are rich sources of potassium, vitamin B6, fiber, and vitamin C, and particularly low in sugar.
- ✓ Quality defects can include shape, cuts and/or mechanical damage.
- ✓ Decay can affect the crown or the individual finger.
- ✓ There are no "bunches" only hands (8 or more fingers), cluster (2 to 7 fingers), and individual fingers.
- ✓ Size is measured by the *outer* curve of the finger.
- ✓ Ethylene gas is introduced to green bananas to promote *uniform* ripening.

# **Culinary tips:**

Write messages to your students on the skin of a banana using a food safe marker!



## **Broccoli Florets**



| # of Florets      | Defec    | ts (#)   | Percen   | ıt (%)*  |            |
|-------------------|----------|----------|----------|----------|------------|
|                   | Sample 1 | Sample 2 | Sample 1 | Sample 2 | Totals (%) |
| Quality           |          |          |          |          |            |
| Discoloration (C) |          |          |          |          |            |
| Freshness (C)     |          |          |          |          |            |
| Decay (C)         |          |          |          |          |            |

<sup>\*#</sup> of Defects ÷ number in sample = %

#### **Helpful hints:**

| Diameter                | Minimum                    | Maximum                    |
|-------------------------|----------------------------|----------------------------|
| Not less than 1 inch or | 1-1/2 inches               | 4-1/2 inches               |
| more than 4 inches      | Unless otherwise specified | Unless otherwise specified |

- ✓ Broccoli florets are a fresh-cut product which is covered by a U.S. grade standard. When solely packaged as broccoli florets, refer to the Broccoli Inspection Instructions. When broccoli florets are packaged in a mix with other fresh-cut commodities (such as cauliflower, carrots, etc.), inspect using the Fresh-Cut Produce Inspection Instructions.
- ✓ Total allowable defects: 10% which includes 2% decay.
- ✓ If bud clusters are yellowish, brownish, or reddish in color, this is a sign of age.
- ✓ To determine if free or excessive water is present, tilt the package so that a corner is pointing down, but keep the product from filling the corner of the package. Any amount of free or excessive water is objectionable.

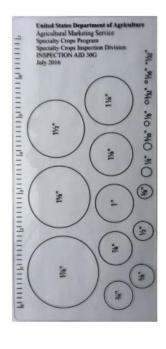
## **Culinary tips:**

- Include desired number of days until expiration in specification; 7 days is typical in retail.
- Typically packed in 3 and 5 lb. bags
- How many pounds of broccoli florets may be steamed in each 2 inch perforated steamtable pan?
- List at least two advantages of blanching broccoli florets:\_\_\_\_\_\_and
  .

Area Gauge, IA #30G

**General Purpose Sizer** 

**Knife** 







#### **Resources:**

#### **Inspection Instructions**

Fresh-Cut Produce:

https://www.ams.usda.gov/sites/default/files/media/FreshCutProduceInstructions.pdf

Broccoli:

https://www.ams.usda.gov/sites/default/files/media/Broccoli\_Inspection\_Instructions%5B1%5D.pdf

#### **Catalogs**

Equipment:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Fresh\%20and\%20Processed\%20FV\%20}{Products\%20Inspections.pdf}$ 

Official Visual Aids Index:

https://www.ams.usda.gov/sites/default/files/media/Broccoli\_Visual\_Aid%5B1%5D.pdf

Order Form:

# **Cantaloupe**



| Weight     |          |       |       |         |       |     |         |        |       |         | 3/10     |
|------------|----------|-------|-------|---------|-------|-----|---------|--------|-------|---------|----------|
| Sample 1   | Sample 2 |       |       |         |       |     |         |        |       |         |          |
|            |          |       | На    | ırd     |       | R   | lipe an | ıd Fir | m     | Overrij | e/Wilted |
| Firmness   |          |       |       |         |       |     |         |        |       |         |          |
|            |          |       | Gr    | een     |       |     | Tur     | ning   |       | Yellow  |          |
| Ground C   | olor     |       |       |         |       |     |         |        |       |         |          |
|            |          | Count |       | Percent |       |     |         | *T     | otals |         |          |
|            |          | Sam   | ple 1 | Sam     | ple 2 | Sam | ple 1   | Sam    | ple 2 |         |          |
| Quality    |          |       |       |         |       |     |         |        |       |         |          |
| Bruises (C | C)       |       |       |         |       |     |         |        |       |         |          |
| Decay (C)  |          |       |       |         |       |     |         |        |       |         |          |
| Soluble So | 11.1 (0) |       |       |         |       | 1   |         | 1      |       | ·       | ·        |

 $<sup>\</sup>overline{D}$  = damage;  $\overline{SD}$  = serious damage \*Defects ÷ weight = %

#### **Helpful hints:**

- ✓ Frequently, mold growth is seen only in stem scars; these scars being moist. Do not score as decay unless actual breakdown of tissue is present and sloughs out under finger pressure. The presence of mold in stem scars without resulting decay should not be reported as a defect.
- ✓ Total defects: 12% which includes 8% quality, 6% serious damage, 10% serious damage by permanent defects and 2% decay.
- ✓ "Good internal quality" means that the combined juice from the edible portion of a sample of cantaloupes selected at random contains not less than 9 percent soluble solids as determined by an approved hand refractometer.
- ✓ Quality defects include cleanness, netting, maturity and sunburn.
- ✓ Decay is not scored if only affecting the stem.

#### **Culinary tips:**

• For faster fabrication, cut away the stem and blossom ends, stand on end, peel and then cut in half and remove seeds.





Refractometer Knife Garlic Press







#### Resources

**Inspection Instructions:** 

https://www.ams.usda.gov/sites/default/files/media/Cantaloup Inspection Instructions%5B1%5D.pdf

Visual Aid Online:

https://www.ams.usda.gov/sites/default/files/media/Cantaloup Visual Aids%5B1%5D.pdf

#### Catalogs:

**Equipment** 

 $\underline{https://www.ams.usda.gov/sites/default/files/media/Fresh\%20 and \%20 Processed \%20 FV \%20 Products \%20 Inspections.pdf}$ 

Official Visual Aids Index:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Official\%20Inventory\%20of\%20FV\%20Inspection}{\%20Aids.pdf}$ 

Order form:

# **Cucumbers**



| Sample Size |             |          |            |           |            |           |
|-------------|-------------|----------|------------|-----------|------------|-----------|
| Sample 1    | Sample 2    |          |            |           |            |           |
|             |             | Well F   | ormed      | Fairly We | ell Formed |           |
| Shape (✓1)  |             |          |            |           |            |           |
|             |             |          | Smallest   |           | gest       | Average   |
| Diameter/   | Length (in) |          |            |           |            |           |
|             |             |          | Defect (#) |           | nt (%)*    | Total (%) |
|             |             | Sample 1 | Sample 2   | Sample 1  | Sample 2   |           |
| Quality     |             |          |            |           |            |           |
| Bruises (C) | )           |          |            |           |            |           |
| Shriveled I | Ends (C)    |          |            |           |            |           |
| Decay (C)   |             |          |            |           |            |           |

<sup>\*</sup>number of defects ÷ number in sample = %

#### **Helpful hints:**

- ✓ Size requirement for U.S. No. 1 is maximum diameter of 2-3/8 inches and minimum length of 6 inches unless otherwise specified.
- ✓ Quality defects include size, shape, color, scars and dirt.
- ✓ Total allowable defects: 10% which includes 1% decay and for off-size 10% including 5% min diameter and 5% max diameter.
- ✓ Measurements for scars based on 6 in. cucumber.

#### **Culinary tips:**

- Use a channel knife to garnish cucumbers prior to slicing.
- Local cucumbers may be available unwaxed, but shelf life will be shortened, so use immediately.

#### Area Gauge, IA #30G

# United States Department of Agriculture United States Department of Agriculture A

#### **Knife**



#### **General Purpose Sizer**



#### **Resources:**

#### **Inspection Instructions**

https://www.ams.usda.gov/sites/default/files/media/CucumberInspectionInstructions.pdf

#### **Visual Aid Online**

https://www.ams.usda.gov/sites/default/files/media/CucumberVisualAids.pdf

#### **Catalogs**

Equipment:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Fresh\%20and\%20Processed\%20FV\%20}{Products\%20Inspections.pdf}$ 

Official Visual Aids Index:

https://www.ams.usda.gov/sites/default/files/media/Official%20Inventory%20of%20FV%20 Inspection%20Aids.pdf

Order Form:

# Grapes

|                      |          |          |          | . (0/)   |  |  |
|----------------------|----------|----------|----------|----------|--|--|
|                      | Defec    | ets (#)  | Percen   | ıt (%)*  |  |  |
| Berries              | Sample 1 | Sample 2 | Sample 1 | Sample 2 |  |  |
| Shriveled at capstem |          |          |          |          |  |  |
| Firm                 |          |          |          |          |  |  |
| Decay                |          |          |          |          |  |  |
| Bunches              |          |          |          |          |  |  |
| Fairly Well Filled   |          |          |          |          |  |  |
| Stems                |          |          |          |          |  |  |
| Mold/Decay           |          |          |          |          |  |  |

<sup>\*#</sup> of Defects ÷ number in sample = %

#### **Helpful hints:**

- ✓ U.S. No. 1 Table consists of bunches of well developed grapes of one variety, except when designated as assorted varieties, which are at least fairly well colored, and uniform in appearance
- ✓ When individual damaged berries are present in quantities sufficient to materially affect the appearance of the bunch, the entire bunch is considered "damaged." Weigh the entire bunch on a scale to determine the actual weight and apply that weight to the defect total.
- ✓ The color terms "well colored," "reasonably well colored," and "fairly well colored" are defined in the following chart.

| Color Term   | Black Varieties  | Red Varieties  | White Varieties |
|--|--|--|-----------------|
| Well Colored:<br>U.S. Extra Fancy Table<br>U.S. Extra Fancy Export   | Each bunch will<br>have at least 95%,<br>by count, of berries<br>showing good<br>characteristic color <sup>1</sup> | Each bunch will have at least 75%, by count, of berries showing good characteristic color.1  | No requirement  |
| Reasonably Well<br>Colored:<br>U.S. Fancy Table<br>U.S. Fancy Export | Each bunch will have at least 85%, by count, of berries showing good characteristic color.1                        | Each bunch will have at least 66-2/3%, by count, of berries showing good characteristic color, 1 except the Tokay and Cardinal varieties will have at least 75%, by count, of berries showing characteristic color.2 | No requirement  |
| Fairly Well Colored:<br>U.S. No. 1 Table<br>U.S. No 1 Institutional  | Each bunch will<br>have at least 75%,<br>by count, of berries<br>showing<br>characteristic color. <sup>2</sup>     | Each bunch will have at least 60%, by count, of berries showing characteristic color. <sup>2</sup>   | No requirement  |

#### **Electronic Digital Scale**

#### **USDA Grape Sizer**

**Knife** 







#### **Resources:**

#### **Inspection Instructions**

https://www.ams.usda.gov/sites/default/files/media/Grapes Inspection Instructions%5B1%5D.pdf

#### **Catalogs**

*Equipment:* 

https://www.ams.usda.gov/sites/default/files/media/Fresh%20and%20Processed%20FV%20Products%20Inspections.pdf

Official Visual Aids Index:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Official\%20Inventory\%20of\%20FV\%20}{Inspection\%20Aids.pdf}$ 

Order Form:

# **Oranges**

| Samp               |             |          |          |          |           |
|--------------------|-------------|----------|----------|----------|-----------|
| Sample 1           | Sample 2    |          |          |          |           |
|                    |             |          |          |          |           |
|                    | Sma         | allest   | Lar      | gest     | Average   |
| Size Diameter (in) |             |          |          |          |           |
|                    | Defects (#) |          | Percer   | ıt (%)*  | Total (%) |
|                    | Sample 1    | Sample 2 | Sample 1 | Sample 2 |           |
| Quality            |             |          |          |          |           |
| Skin Breakdown (C) |             |          |          |          |           |
| Color (Q)          |             |          |          |          |           |
| Decay (C)          |             |          |          |          |           |

<sup>\*</sup>number of defects ÷ number in sample = %

WC=Well Colored

NWC=Not Well Colored

#### **Helpful hints:**

- ✓ Well colored means that the fruit is at least light orange in color, with not more than a trace of green at the stem end, and not more than 15% of the remainder of the surface of the fruit shows green color.
- ✓ Quality defects include maturity, oil spots, size, shape, scale, tree dryness and dirt.
- ✓ Total allowable defects: 12% failing color (separate tolerance), 10% which includes, 7% permanent defects, 5% serious damage 5% serious damage caused by permanent defects and 3% decay. (Based on 25 count individual sample)
- ✓ Juice sacs of granulated fruit remain swollen and do not separate from each other or the segment walls. In such cases, the juice is displaced by yellow to grayish-white solid matter. Affected fruit will generally feel firm, but very light in weight (quality defect).
- ✓ The most common symptom of oil spots is irregularly-shaped yellow, light green or brown spots where the oil glands are conspicuous (quality defect).

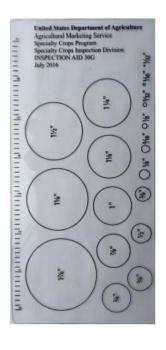
## **Culinary tips:**

- USDA Choice oranges are not ideal for school meal programs due to poor appearance.
- Valencia oranges are difficult for students to peel. Serve cut wedges to improve acceptance.

#### Area Gauge, IA #30G

#### **General Purpose Sizer**

#### Knife







#### **Resources:**

#### **Inspection Instructions**

https://www.ams.usda.gov/sites/default/files/media/Citrus\_CA\_and\_AZ\_Inspection\_Instructions %5B1%5D.pdf

#### **Visual Aid Online**

https://www.ams.usda.gov/sites/default/files/media/OrangesCAAZVisualAids.pdf

#### **Catalogs**

Equipment:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Fresh\%20and\%20Processed\%20FV\%20}{Products\%20Inspections.pdf}$ 

Official Visual Aids Index:

https://www.ams.usda.gov/sites/default/files/media/Official%20Inventory%20of%20FV%20 Inspection%20Aids.pdf

Order Form:

# **Pears**

| Sample Sample               | ple 2             |          |          | 2        |           |
|-----------------------------|-------------------|----------|----------|----------|-----------|
| Sumpre 1                    | Sample 1 Sample 2 |          |          |          |           |
|                             | Defe              | ets (#)  | Percen   | ıt (%)*  | Total (%) |
|                             | Sample 1          | Sample 2 | Sample 1 | Sample 2 |           |
| Quality                     |                   |          |          |          |           |
| Bruising                    |                   |          |          |          |           |
| Firmness (H/F/FR)           |                   |          |          |          |           |
| Internal Breakdown          |                   |          |          |          |           |
| Decay                       |                   |          |          |          |           |
| *number of defects ÷ number | er in sample = %  | 6 H=1    | Hard F=F | Firm FR= | Firm Ripe |

#### **Helpful hints:**

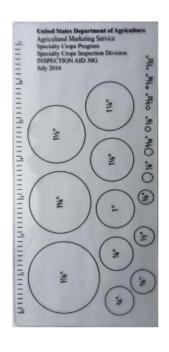
- ✓ Quality defects include maturity, cork spot, greening, black end, insect injury, cleanness, hail marks or scars, russeting, and they must be one variety.
- ✓ Internal discoloration is generally caused by low temperatures. The flesh of affected fruit may become translucent.
- ✓ Total allowable defects: 10% which includes 5% serious damage by insects and 1% for decay or internal breakdown.
- ✓ Score any soft bruise over 3/16 inch in depth, any bruise over 7/8 inch in diameter, or any combination of lesser bruises which detracts from the appearance, edible or marketing quality of the pear to an extent greater than any one bruise described above.
- ✓ Blush as used in the description of pears, refers to the red color usually occurring over the sun-exposed cheeks. There are no blush or color requirements in any of the grades.

# **Culinary tips:**

- Plan ahead; avoid serving hard, unripe pears. It may take over a week at room temperature to ripen the fruit.
- If PLU stickers are on the fruit, remove prior to ripening to prevent skin damage and bruising during preparation.

#### Area Gauge, IA #30G

#### **Knife**





#### **Resources:**

#### **Inspection Instructions**

https://www.ams.usda.gov/sites/default/files/media/Pear\_%28including\_Summer%2C\_Fall\_and Winter types%29 Inspection Instructions%5B1%5D.pdf

#### **Visual Aid Online**

https://www.ams.usda.gov/sites/default/files/media/Pear Visual Aid%5B1%5D.pdf

#### **Catalogs**

Equipment:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Fresh\%20and\%20Processed\%20FV\%20}{Products\%20Inspections.pdf}$ 

Official Visual Aids Index:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Official\%20Inventory\%20of\%20FV\%20}{Inspection\%20Aids.pdf}$ 

Order Form:

# **Romaine**

| SIM |
|-----|
|     |
|     |

| Sample         | Size (#)  |        |         |        |         |           |
|----------------|-----------|--------|---------|--------|---------|-----------|
| Sample 1       | Sample 2  |        |         |        |         |           |
|                |           | Defe   | cts (#) | Percer | nt (%)* |           |
|                |           | Sample | Sample  | Sample | Sample  | Total (%) |
|                |           | 1      | 2       | 1      | 2       |           |
| Quality        |           |        |         |        |         |           |
| Russet Spot (0 | C)        |        |         |        |         |           |
| Discolored (C  | )         |        |         |        |         |           |
| Downey Mild    | ew (C)    |        |         |        |         |           |
| Peeling/Feath  | ering (C) |        |         |        |         |           |
| Decay (C)      |           |        |         |        |         |           |

<sup>\*</sup>number of defects - number in sample = %

#### **Helpful hints:**

| Small  | Less than 8 inches in length  |
|--------|-------------------------------|
| Medium | 8 to 12 inches in length      |
| Large  | More than 12 inches in length |

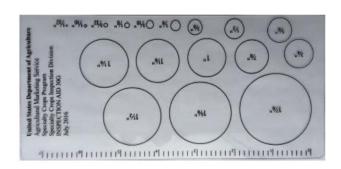
- ✓ Quality defects include development (twisted or corkscrew), mechanical damage, seedstems, and dirt.
- ✓ Russet spotting is scored as damage when present in any degree on more than 2 leaves.
- ✓ Total allowable defects: 10% which includes 5% for serious damage and 2% for decay.

# **Culinary tips:**

- Cut leafy greens are considered a TCS Food and must be stored at 41°F or below.
- If you don't have a salad spinner, what is another way to remove moisture from chopped romaine?

#### Area Gauge, IA #30G







#### **Resources:**

#### **Inspection Instructions**

 $\underline{https://www.ams.usda.gov/sites/default/files/media/Lettuce\_Inspection\_Instructions\%5B1\%5D.pdf}$ 

#### **Visual Aid Online**

https://www.ams.usda.gov/sites/default/files/media/Lettuce\_Inspection\_Instructions%5B1%5D.pdf

#### **Catalogs**

Equipment:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Fresh\%20and\%20Processed\%20FV\%20}{Products\%20Inspections.pdf}$ 

Official Visual Aids Index:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Official\%20Inventory\%20of\%20FV\%20}{Inspection\%20Aids.pdf}$ 

Order Form:

# **Strawberries**



| Sample Size (#     | nell)       |          |              | CO.      |           |
|--------------------|-------------|----------|--------------|----------|-----------|
| Sample 1           | Sample 2    |          |              |          |           |
|                    |             |          |              |          |           |
|                    | Smallest    |          | Largest      |          | Average   |
| Size Diameter (in) | (in)        |          |              |          |           |
|                    | Defects (#) |          | Percent (%)* |          | Total (%) |
|                    | Sample 1    | Sample 2 | Sample 1     | Sample 2 |           |
| Quality            |             |          |              |          |           |
| Bruises (C)        |             |          |              |          |           |
| Soft/Overripe (C)  |             |          |              |          |           |
| Mold (C)           |             |          |              |          |           |
| Decay (C)          | . 1 0       |          |              |          |           |

<sup>\*</sup>number of defects ÷ number in sample = %

#### **Helpful hints:**

- ✓ Minimum size is 3/4-inch in diameter.
- ✓ Quality defects include size, shape, color, and dirt.
- ✓ Areas are based on a strawberry of 1-1/2 inches in diameter.
- ✓ Total allowable defects: 10% which includes 5% serious damage and 2% decay.
- ✓ Area allowed for flattened discolored bruises (aggregate area) damage 1/2 inch, serious damage 3/4 inch.

### **Culinary tips:**

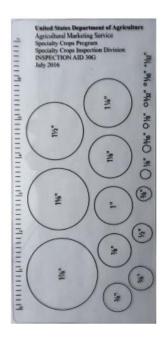
- Strawberries are very perishable and should be used within 2 to 3 days of receiving.
- When buying local strawberries, talk to the farmer about providing in bulk containers, such as 10 lb. flats, to save money on packaging.

| • | Don't soak strawberries in water because: |
|---|---|
|   |   |
| • | A tomato shark/scoop may be used to:      |

#### Area Gauge, IA #30G

#### **General Purpose Sizer**

#### Knife







#### **Resources:**

#### **Inspection Instructions**

https://www.ams.usda.gov/sites/default/files/media/Fresh\_Strawberry%2C\_Raspberry%2C\_Blackberry-Dewberry Inspection Instructions%5B1%5D.pdf

#### **Visual Aid Online**

https://www.ams.usda.gov/sites/default/files/media/Strawberries Visual Aid%5B1%5D.pdf

#### **Catalogs**

Equipment:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Fresh\%20and\%20Processed\%20FV\%20}{Products\%20Inspections.pdf}$ 

Official Visual Aids Index:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Official\%20Inventory\%20of\%20FV\%20}{Inspection\%20Aids.pdf}$ 

Order Form:

# **Sweet Peppers**

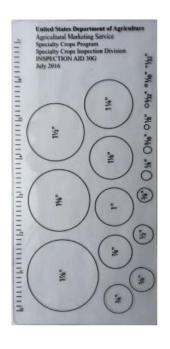
| Sample                      |                   |       |              |          |           |  |
|-----------------------------|-------------------|-------|--------------|----------|-----------|--|
| Sample 1                    | Sample 2          |       |              |          |           |  |
|                             | Defects (#)       |       | Percent (%)* |          | Total (%) |  |
|                             | Sample 1 Sample 2 |       | Sample 1     | Sample 2 |           |  |
| Quality                     |                   |       |              |          |           |  |
| Bruising                    |                   |       |              |          |           |  |
| Firmness (Shriveling)       |                   |       |              |          |           |  |
| Decay Affecting Walls/Calyx |                   |       |              |          |           |  |
| Decay Affecting Stems       |                   |       |              |          |           |  |
| *number of defects ÷ number | in sample = %     | 6 H=I | Hard F=F     | irm FR=  | Firm Ripe |  |

# **Helpful hints:**

- ✓ Quality defects include decay affecting calyxes and/or walls, decay affecting stems, and from injury caused by scars, hail, sunburn, disease, insects, and mechanical.
- ✓ Shriveling is a common condition factor at destination. It is often caused from injury to the skin, which results in moisture loss. Aging and exposure to warm, dry atmosphere may also cause shriveling.
- ✓ The diameter of a U.S. No. 1 Sweet Pepper is 2-1/2" by 2-1/2" (Length and Diameter)
- ✓ Do not combine (add together) stem decay and decay affecting walls and/or calyxes. When both stem decay and decay affecting walls and/or calyxes are present, report them separately.

#### Area Gauge, IA #30G

#### **Knife**





#### **Resources:**

#### **Inspection Instructions**

https://www.ams.usda.gov/sites/default/files/media/ Pepper including Sweet and Other than Sweet types Inspection Instructions.pdf

#### Catalogs

*Equipment:* 

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Fresh\%20and\%20Processed\%20FV\%}{20Products\%20Inspections.pdf}$ 

Official Visual Aids Index:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Official\%20Inventory\%20of\%20FV\%}{20\ Inspection\%20Aids.pdf}$ 

Order Form:

#### **Tomato**

|                 |             | 101      | <u>nato</u>  |            |           |
|-----------------|-------------|----------|--------------|------------|-----------|
| Sample Size (#) | ]           |          |              |            |           |
|                 | Well F      | Formed   | Fairly We    | ell Formed |           |
| Shape (#)       |             |          |              |            |           |
|                 | Sma         | allest   | Lar          | gest       | Average   |
| Size (in)       |             |          |              |            |           |
|                 | Defects (#) |          | Percent (%)* |            | Total (%) |
|                 | Sample 1    | Sample 2 | Sample 1     | Sample 2   |           |
| Quality         |             |          |              |            |           |
| Bruises (C)     |             |          |              |            |           |
| SDA (C)         |             |          |              |            |           |
| Decay (C)       |             |          |              |            |           |

<sup>\*</sup>number of defects ÷ number in sample = %

## **Helpful hints:**

- ✓ Quality defects include puffy, size, shape, color, s cars and dirt.
- ✓ Total allowable defects: 15% which includes 10% shoulder bruises/discolored/sunken scars, 10% other defects and 5% decay. 10% for off-size and 10% for off color and 5% for green when any color other than "green" is specified.
- ✓ Containers must be marked to size.

| Florida | Minimum | Maximum | Other Size   | Minimum | Maximum |
|---------|---------|---------|--------------|---------|---------|
| Sizes   | (in)    | (in)    | Designations | (in)    | (in)    |
|         |         |         | Small        | 2-4/32  | 2-9/32  |
| 6 X 7   | 2-9/32  | 2-19/32 | Medium       | 2-8/32  | 2-17/32 |
| 6 X 6   | 2-17/32 | 2-29/32 | Large        | 2-16/32 | 2-25/32 |
| 5 X 6   | 2-25/32 |         | Extra Large  | 2-24/32 |         |

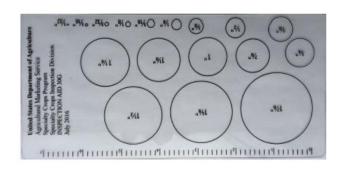
# **Culinary tips:**

| • | List three ways in which cherry tomatoes may be prepared and served: |
|---|--|
|   | , and  |
|   |  |
| • | A 1/2 cup serving of cherry tomatoes weighs:                         |
|   |  |
| • | A kitchen hack used to cut cherry tomatoes in half is:               |

SDA=Sunken Discolored Areas

#### Area Gauge, IA #30G



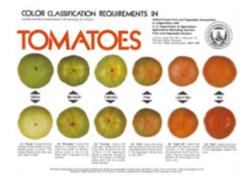




#### **Tomato Color Chart**

#### **USDA Tomato Sizer**

Florida Tomato Sizer







#### **Resources:**

#### **Inspection Instructions**

 $\underline{https://www.ams.usda.gov/sites/default/files/media/Tomato\_Inspection\_Instructions\%5B1\%5D.}\\ \underline{pdf}$ 

#### **Visual Aid Online**

https://www.ams.usda.gov/sites/default/files/media/Tomato Visual Aids%5B1%5D.pdf

#### **Catalogs**

Equipment:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Fresh\%20and\%20Processed\%20FV\%20}{Products\%20Inspections.pdf}$ 

Official Visual Aids Index:

https://www.ams.usda.gov/sites/default/files/media/Official%20Inventory%20of%20FV%20Inspection%20Aids.pdf

Order Form:

# Watermelon



| Sample Size                |             |                    |                 |
|----------------------------|-------------|--------------------|-----------------|
|                            | Well Formed | Fairly Well Formed | Not Well Formed |
| <b>Shape</b> ( <b>√</b> 1) |             | V                  |                 |
|                            | Defects (#) | Percent (%)*       | Total (%)       |
| Quality                    |             |                    |                 |
| Bruises (C)                |             |                    |                 |
| Decay (C)                  |             |                    |                 |

<sup>\*</sup>number of defects ÷ number in sample = %

#### **Helpful hints:**

- ✓ The flesh color of mature "red-flesh" watermelons must be at least pale red.
- ✓ Total allowable defects: 12% which includes 10% quality, with 5% serious damage and 10% condition, with 5% serious damage and 2% decay.
- ✓ External indications of a mature melon include creamy or yellow ground color and a filled out appearance.
- ✓ Bruises: (C)
  - o Side bruises are scored as damage when over 3 in. diameter and serious damage when over 5 in.
  - o End bruises are scored as damage when over 2 in. diameter and serious damage when over 2 in. of underlying flesh is water soaked.
- ✓ Hollow heart: (Q) (score based on 25 lb. melon)
  - O Long type: Damage is scored when the aggregate width of the crack exceeds 1-1/4 in, serious damage when exceeding 1-1/2 in.
  - o Round type: Damage is scored when the aggregate width of the crack exceeds 2 in, serious damage when exceeding 2-1/2 in.
- ✓ Seedless means there are not more than 10 mature seeds.

#### **Culinary tips:**

• To create diced melon: cut in half, remove the peel, then slice and dice the heart of the melon.





#### **Resources:**

#### **Inspection Instructions**

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Watermelon\_Inspection\_Instructions\%5B1\%5D.pdf$ 

#### **Visual Aid Online**

https://www.ams.usda.gov/sites/default/files/media/Watermelon Visual Aid%5B1%5D.pdf

#### **Catalogs**

Equipment:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Fresh\%20and\%20Processed\%20FV\%20}{Products\%20Inspections.pdf}$ 

#### Official Visual Aids Index:

 $\frac{https://www.ams.usda.gov/sites/default/files/media/Official\%20Inventory\%20of\%20FV\%20}{Inspection\%20Aids.pdf}$ 

#### Order Form:





# **Earth: The Apple of Our Eye**

**Concept:** A visual demonstration of the limited sources of food available from land and water.

**Materials:** An apple, a knife, and a paper towel

**Procedure:** Slice the apple according to the instructions, narrating as you go. Use the Discussion

Questions to encourage critical thinking in discussion of these facts.

# **Part I: Farmland**

| <u>Apple</u>   | Planet Earth  | <u>Narrative</u>  |  |  |
|----------------|---|---|--|--|
| Whole<br>Apple | Planet Earth  | Hold the apple out so the class can see it.     "This apple represents our planet."   |  |  |
| 3/4            | ' Water   | 2. Cut the apple into quarters. Hold out 3/4 in one hand. Ask the class: "What do these 3/4 represent?" (Water.)  |  |  |
| 1/4            | Land  | 3. Set the three "water" sections aside and hold out the remaining quarter.  Ask the class: "What fraction of the apple remains?" (1/4.) This 1/4 represents the total land surface."   |  |  |
| 1/8            | Uninhabitable<br>, & Non-Arable<br>Land               | 4. Slice the land (the remaining 1/4) in half, lengthwise. Hold out one of the pieces. Ask the class: "What fraction of the apple is this?" (1/8.) This 1/8 represents the half of the Earth's surface that is inhospitable to people and to crops: the polar regions, deserts, swamps, and high or rocky mountains."   |  |  |
| 1/8            | 'Habitable Land                                       | 5. Set that 1/8 aside and hold out the other.  "This 1/8 represents the other half of the Earth's surface. These are the areas on which people can live, but cannot necessarily grow food."   |  |  |
| 3/3 <b>2</b>   | '<br>Habitable<br>'Land, but Non-<br>Arable Land<br>' | 6. Slice this 1/8 crosswise into four equal pieces. Hold out 3/32 in one hand.  "These 3/32 represent land on which people can live, but cannot grow food.  Some of it was never arable because it's too rocky, wet, cold, steep or has soil too poor to produce food. Some of it used to be arable but isn't any longer because it's been developed—turned into cities, suburbs, highways, etc., so it can no longer be farmed. Governments have earmarked other areas, such as parks, nature preserves and other public lands to remain undeveloped forever." |  |  |
| 1/32           | · Arable Land   | 7. Set 3/32 aside and hold out 1/32.  "So, only 1/32 of the Earth's surface has the potential to grow the food needed to feed of the people on Earth."  |  |  |
| 1/32<br>Peel   | Topsoil   | 8. Carefully peel the 1/32 slice of Earth. 9. Hold up the peel. "This tiny bit of peel represents the topsoil, the dark, nutrient-rich soil that holds mois ture and it is a significant our course. Currently, 90% of U.S. coupling lose soil above the sustainable rate.1"  |  |  |

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| LK<br>R, in plastic,<br>2 weeks.  | Onions CDV, unwrapped, 2 months (2 weeks for Mawis, Vidalia, etc.).  | Scallions<br>R, in plastic,<br>5 days.   | Shallots CDV, unwrapped, 1 month.   |   |
|---|--|--|---|---|
|   | Fennel<br>R. in plastic, 5 days.   | Garlic CDV, unwrapped, 2 months for whole bulbs, 10 days for doves.  | Ginger R. wrapped in dry paper towel, in plastic, 2 to 3 weeks.                               | H Herbs (leafy) R, wrapped in just-damp paper towel, in plastic, 3 to 7 days.                 |
|   | Sqs<br>Squash<br>(summer)<br>R, in plastic,<br>5 days.   | Sqw Squash (winter) CDV, unwrapped, 1 month.   | Sweet Sweet potatoes CDV, unwrapped, 1 to 4 weeks.  | Sc<br>Swiss chard/<br>kale/collard<br>greens<br>R, in plastic,<br>5 days.                     |
|   | Potatoes CDV, in open paper bag or basket (not with onions), 1 to 2 months.  | Radishes Radishes R, greens removed, in plastic, 2 weeks.  | Rutabagas<br>Rutabagas<br>R, greens<br>removed, in<br>plastic,<br>2 weeks.                    | Sp<br>Spinach<br>R, wrapped in<br>dry paper towel,<br>in plastic,<br>7 days.                  |
|   | Mushrooms R, in paper bag or on baking sheet covered with just-damp towel, 3 days.   | Pa<br>Parsnips<br>R, greens<br>Romoved, in<br>plastic,<br>2 weeks.   | Peas (English,<br>a.k.a. garden)<br>R, unsheled, in<br>plastic, 2 days.                       | Ps<br>Peas (sugar<br>snap or snow)<br>R, in plastic,<br>7 days.                               |
| = Fruits = Vegetables = Vegetables = Herbs and spices R = Store in refrigerator CDV = Store in a cool dry, well ventilated place RT = Store at room temperature |  | Jicama Jicama 8, in plastic, 3 weeks. Cut: R, tightly wrapped in plastic, 1 week.                          | Lettuce (prewashed) R, in plastic bag with dry paper towel, 3 days.                           | Lettuce (whole head) R, in plastic bag with dry paper towel, 1 week.                          |
|   |  | Cucumbers R. in plastic, 1 week.   | Eggplant R (no colder R than 40° F), in vented plastic or paper bag, 5 days.                  | Gb<br>Green beans<br>R, in plastic bag<br>with dry paper<br>towel, 7 days.                    |
|   |  | Celery R (no colder tho colder tho colder vented plastic bag, 2 weeks.                                     | Chiles R. wrapped in ddry paper towel, in plastic, 2 weeks.                                   | Cr<br>Corn (on cob)<br>R, husks intact,<br>in plastic,<br>2 days.                             |
| = Fruits = Vegetable = Herbs and  | = Fruits = Vegetables = Herbs and spices R = Store in refrigerator DV = Store in a cool dry, well ven RT = Store at room temperature |  | Carrots R. greens Promoved, in plastic, 3 weeks.  | Cf<br>Cauliflower<br>R, in plastic,<br>1 week.  |
|   |  | Bk<br>Bok choy<br>R, in plastic,<br>4 days.  | Broccoli<br>R, in plastic,<br>5 days.   | BS<br>Brussels<br>sprouts<br>R, in plastic,<br>5 days, Flavor<br>gets stronger<br>over time.) |
|   | Ar<br>Artichokes<br>R. in plastic,<br>1 to 2 weeks.  | As<br>Asparagus<br>R. in plastic,<br>4 days.   | Bt<br>Beets<br>R. greens<br>removed, in<br>plastic,<br>2 weeks.                               | Bp<br>Bell peppers<br>R (no colder than<br>40° F), in plastic,<br>1 week.                     |
|   | Plums Ripen at RT, unwrapped; then R, 4 days.  | Strawberries R, in vented container, 3 days.   | To<br>Tomatoes<br>RT, unwrapped,<br>5 days.   | Watermelon RT unwrapped, 4 days; or R, 2 weeks, Cut: R, in plastic, 3 days.                   |
|   | Pp<br>Papayas<br>Ripen at RT,<br>unwrapped;<br>then R, 1 week.   | Pc<br>Peaches/<br>Nectarines<br>Ripen at RT,<br>unwrapped;<br>then R, in<br>vented plastic<br>bag, 4 days. | Pr<br>Pears<br>Ripen at RT,<br>unwrapped; then<br>R, 4 days.                                  | Pineapple Runwapped, S days. Cut: R, tightly wrapped in plastic, 3 days.                      |
|   | Lemons/<br>Limes<br>RT, unwrapped,<br>1 week; or R,<br>2 weeks.  | Mangoes Ripen at RT, unwrapped; then R, 1 week.  | Melons Ripen at RT, unwrapped; tnen R, 5 days. Cut: R, in plastic, 3 days.                    | Or oranges RT, unwrrapped, 1 week; or R, 2 weeks.   |
| Ch<br>Cherries<br>R. in plastic,<br>5 days.   | Coconut RT or R, unwrapped, 1 month. Cut. R, in coconut juice or water, 1 week.  | Gf<br>Grapefruit<br>RT, unwrapped,<br>1 week; or<br>R, 2 weeks.  | Grapes<br>Grapes<br>R, in vented<br>plastic bag,<br>1 week.                                   | Kiwis Ripen at RT, unwrapped; then R, 4 days.   |
| Apples Apples R, unwrapped, 3 weeks.  Avcados Ripen at RT, unwrapped; then R, 4 days.   |  | Bananas<br>Bananas<br>Ripen at RT,<br>unwrapped;<br>if overripe,<br>R, 2 days (skin<br>will blacken).      | Berries<br>Berries,<br>Inasperies,<br>boysenberries,<br>R. in vented<br>container,<br>3 days. | Blueberries<br>Blueberries<br>R, in vented<br>container,<br>6 days.                           |

# few useful things to know about produce storage and this chart:

- For best results, start by choosing produce that is plump, colorful, and free of blemishes.
- The table shows the average maximum shelf life. Food may be edible after this time, but it's taste, texture, and nutritional value may be compromised. (Note: The chemicals and pesticides used in conventional agriculture can slow the decay of produce;
- Unless otherwise indicated, produce should be stored unwashed and untrimmed. But with root vegetables, leafy tops can steal moisture from the roots, so if the vegetables won't be used within 3 or 4 days, all but 1 to 2 inches of stem should be removed. organic produce tends to have a slightly shorter shelf life.)
  - Wohere "plastic" is indicated, plastic bags (tightly sealed) or airtight containers may be used. "Vented bags" refers to the perforated bag some produce comes in, a bag open at the top, or a plastic bag poked with about 20 holes. • A paper towel inside a container can help control moisture. Use a dry one to absorb water or a damp one to add it.
    - المرابع والمرابع والمرابع والمرابع المرابع المرابع المرابع والمرابع والمراب
- Keep fruits and vegetables in separate drawers. Many fruits emit ethylene, which can accelerate ripening.
- Items stored at room temperature should be kept out of direct sunlight.
- Promptly discard any rotten or moldy produce; it can contaminate the good stuff.

# **Know Your Commodity**

# **COMPATIBILITY, TEMPERATURE GUIDELINES & ETHYLENE SENSITIVITY**

## COMPATIBILITY, TEMPERATURE GUIDELINES

Source: United States Department of Agriculture (USDA)

# Load Compatibility Groups<sup>1</sup>

## Group 1

Grapes<sup>2</sup> (see groups 2 and 6a) **Apples** 

Apricots Peaches Berries (except cranberries) Pears Persimmons Cherries Figs (not with apples, danger of Plums and prunes odor transfer to figs; also see group Pomegranates 6a) Quinces

#### Recommended Transit Conditions:

 Temperature: 32° to 34°F (0° to 1.5°C)

· Relative humidity: 90 to 95 percent

· Atmosphere:

Normally used on berries and cherries only 10 to 20 percent CO2

Ice:

Never in contact with commodity.

Note: Most members of this group are not compatible with group 6a or 6b because ethylene production by group 1 can be high, and thus harmful to members of group 6a or 6b.

<sup>1</sup> Taken from USDA Marketing Research Report No. 1070, Compatibility of Fruits and Vegetables During Transport in Mixed Loads, by W.J. Lipton and J.M. Harvey, 1977

<sup>2</sup> Grapes: Compatible with other commodities only if the grapes are not fumigated with sulfur dioxide (SO2) in vehicle and if no chemicals that release SO2 are included in packages.

#### **Group 2**

Avocados Honey Dew Persian Bananas Eggplants (also see group 5) Olives, fresh

Grapefruit3 **Papayas** Guava Pineapples (not with avocados, danger of avocados odor Limes

absorption) Mangoes Tomatoes, green Muskmelons, other than

Tomatoes, pink (also see group 4) cantaloupes Watermelons (also see groups Casaba

4 and 5) Crenshaw

#### Recommended Transit Conditions:

· Temperature: 55° to 65°F (13° to 18°C)

· Relative humidity: 85 to 95 percent

Never in contact with commodity

#### **Group 3**

Cantaloupes Cranberries

Lemons (adjust temperature to other commodity)

Lychees (also see group 4)

Oranges **Tangerines** 

#### Recommended Transit Conditions:

 Temperature: 36° to 41°F (2.5° to 5.0°C)

• Relative humidity: 90 to 95 percent; cantaloupes about 95 percent

In contact only with cantaloupes

#### **Group 4**

Beans, snap

Lychees (also see group 3)

Okra

Peppers, green (not with beans)

Peppers, red (if with green peppers, temperature adjusted toward top of range)

Squash, summer

Tomatoes, pink (also see group 2)

Watermelons (also see groups 2 and 5)

#### Recommended Transit Conditions:

· Temperature: 40° to 45°F (4.5° to 7.5°C)

· Relative humidity: About 95 percent

Never in contact with commodity

## **Group 5**

Cucumbers

Eggplants (also see group 2)

Ginger (not with eggplants, also see group 7) Grapefruit, Florida (after January 1), and Texas

Potatoes (late crop)

Pumpkin and squashes, winter

Watermelons (temperature adjusted for other members of groups; also see groups 2 and 4)

#### Recommended Transit Conditions:

Temperature:

40° to 55°F (4.4° to 13°C); ginger not below 55°F

· Relative humidity: 85 to 90 percent

Never in contact with commodity

<sup>3</sup> Citrus Fruits: Oranges and tangerinesócompatibility depends on source. Florida or Texas grown oranges are shipped at 32° to 34°F (0.0° to 1.1°C), but oranges grown in California and Arizona are shipped at 38° to 48°F (3.3° to 8.8° C).

# **COMPATIBILITY, TEMPERATURE GUIDELINES**

Source: United States Department of Agriculture (USDA)

## Group 6a

Artichokes Mushrooms Asparagus Parsley Beets, red **Parsnips** Carrots Peas Endive and escarole Rhubarb Figs (also see group 1) Salsify Grapes (also see group 1) Spinach Greens Sweet corn Leeks (not with figs or grapes) Watercress

Lettuce

This group, except for figs, grapes, and mushrooms, is compatible with group 6b.

#### Recommended Transit Conditions:

- Temperature: 32° to 34°F (0° to 1.1°C)
- Relative humidity: 95 to 100 percent
- · Ice:

Never in contact with asparagus, figs, grapes, or mushrooms

#### **Group 6b**

Broccoli

Brussels sprouts

Cabbage

Cauliflower

Celeriac

Horseradish

Kohlrabi

Onions, green (not with rhubarb, figs, grapes, mushrooms, or sweet corn)

Radishes

Rutabagas

**Turnips** 

This group is compatible with group 6a, except for figs, grapes, and mushrooms.

#### Recommended Transit Conditions:

- Temperature:
- 32° to 34°F (0° to 1.1°C)
- Relative humidity:
  95 to 100 percent
- · Ice:

Contact acceptable for all

## Group 7

Ginger (also see group 5)

Potatoes, early crop (temperatures adjusted for others)

Sweet potatoes

#### **Recommended Transit Conditions:**

- Temperature:
- 55° to 65°F (13° to 18°C)
- Relative humidity:85 to 90 percent
- · Ice:

Never in contact with commodity

#### Group 8

Garlic

Onions, dry

#### **Recommended Transit Conditions:**

- Temperature:
   32° to 34°F (0° to 1.5°C)
- Relative humidity:65 to 75 percent
- · Ice:

Never in contact with commodity

Know Your Commodity — Page 2 of 3 Published by Blue Book Services

## **ETHYLENE SENSITIVITY**

Compatibility Chart for Fruits & Vegetables Source: University of California — Davis

Compatible produce for long distance transport. Produce in the same temperature section can be mixed safely. Ethylene-sensitive vegetables should not be mixed with ethylene-producing fruits and vegetables. Dry vegetables can be mixed with other fruits and vegetables on trips lasting less than about one week.

#### **Ethylene-sensitive vegetables**

#### (32-36° F)

arugula herbs asparagus leek<sup>8</sup> Belgian/endive lettuce

broccoli mustard greens

Brussels sprouts parsley
cabbage<sup>1</sup> snow peas
carrot<sup>1,3</sup> spinach
cauliflower
celery<sup>1,3,9</sup> turnip greens
collard mustard greens
parsley
snow peas
spinach
sweet peas
turnip greens

escarole green onion<sup>9</sup>

#### (45-50° F)

chayote cucumber eggplant<sup>5</sup> okra

squash, summer

#### (55-65° F)

squash: pumpkin, sweet potato

winter, yam

# Not sensitive to ethylene vegetables (55-65° F)

dry onion<sup>9</sup> ginger<sup>5</sup> jicama melon: bitter potato tomato

# Ethylene-producing (very low) fruits and melons (32-36° F)

apple1,3,9 grape<sup>6,7,8</sup> loquat apricot nectarine avocado (ripe) peach berries pear<sup>1,9</sup> cantaloupe plum cherry coconut plumcot pomegranate currant date prune fig1,7,8 quince

## Ethylene-sensitive fruits (45-50°F)

grapefruit<sup>4,9</sup> lemon<sup>4,9</sup>

#### Notes:

- Odors from apples and pears are absorbed by cabbage, carrots, celery, figs, onions, and potatoes.
- <sup>2</sup> Avocado odor is absorbed by pineapple.
- <sup>3</sup> Celery absorbs odor from onion, apple, and carrot.
- <sup>4</sup> Citrus absorbs odor from strongly scented fruits and vegetables.
- <sup>5</sup> Ginger odor is absorbed by eggplant.

#### Not sensitive to ethylene vegetables

#### (32-36° F)

alfalfa sprouts mint amaranth mushroom<sup>7</sup> anise parsnip radicchio artichoke radish beans: fava, lima rhubarb<sup>7</sup> bean sprouts beet rutbaga bok choy shallot garlic sweet corn<sup>7</sup> horseradish water chestnut

(45-50° F)

kale

basil beans: green, snap<sup>10</sup> cowpea pepper: bell, chili<sup>10</sup>

tomatillo

#### Not sensitive to ethylene fruits

#### (45-50° F)

avocado (unripe) orange<sup>4,9</sup> cactus pear<sup>1,9</sup> passion fruit cranberry pineapple<sup>2,10</sup> guava tamarillo kumquat tamadarin<sup>4,9</sup> olive watermelon

#### (55-65° F)

banana breadfruit jackfruit mango melon: casaba, papaya crenshaw, honeydew rambutan

Persian plantain soursop

<sup>&</sup>lt;sup>6</sup> Sulfur dioxide released from pads used with table grapes will damage other produce.

<sup>&</sup>lt;sup>7</sup> Green onion odor is absorbed by fig, grape, mushroom, rhubarb, and corn.

<sup>&</sup>lt;sup>8</sup> Leek odor is absorbed by fig and grape.

<sup>&</sup>lt;sup>9</sup> Onion odor is absorbed by apple, celery, pear, and citrus.

<sup>&</sup>lt;sup>10</sup> Pepper odor is absorbed by beans, pineapple, and avocado.

# **Know Your Commodity**

# **COMMON SHIPPING CONTAINERS BY COMMODITY**

| APPLES   | 24-lb. cartons, containing                               |
|--|--|
| 45-lb. 1 1/8 bushel cartons, loose                                 | 24 1-lb. bags  |
| 40- to 45-lb. cartons, tray-pack                                   | 15-lb. cartons, containing                               |
| 40-lb. bushel cartons, tray- or cell-pack                          | 20 12-oz. bags   |
| 40-lb. bushel cartons, loose                                       | Bunched  |
| 40-lb. cartons, 10 4-lb.bags                                       | 26-lb. cartons/crates, 24s                               |
| 40-lb. cartons, 8 5-lb. bags                                       | Baby whole<br>24-lb. cartons, containing                 |
| 40-lb. cartons, 16 8-count trays,                                  | 24 1-lb. film bags                                       |
| over wrapped<br>38- to 42-lb. cartons, loose                       | 20-lb. cartons, containing                               |
| 37- to 43-lb. cartons, roose                                       | 20 1-lb. bags  |
| 36-lb. cartons, 12 3-lb. bags                                      | 15-lb. cartons, containing                               |
| 20-lb. half-bushel cartons, loose                                  | 20 12-oz. bags   |
| ASPARAGUS  | CANTALOUPE   |
| 30-lb. pyramid cartons/crates, bunched or loose                    | 1,000-lb. pallet bins                                    |
| 28-lb. cartons/crates, bunched                                     | 800-lb. pallet bins                                      |
| 25-lb. lugs/cartons, loose   | 80-lb. jumbo crates                                      |
| 24-lb. cartons, 16 11/2 lb. packages                               | 60-lb. 13/4 bushel cartons                               |
| 21-lb. lugs/cartons, loose   | 54-lb. cartons   |
| 20-lb. pyramid cartons/crates                                      | 45- to 50-lb. wirebound crates                           |
| 20-lb. cartons, bunched  | 40-lb. cartons/crates                                    |
| 15- to 17-lb. pyramid cartons/crates, bunched or loose             | 40-lb. 1 <sup>1/9</sup> bushel                           |
| 14-lb. cartons, loose  | cartons/crates   |
| 12-lb. cartons, loose  | CAULIFLOWER  |
| 12- to 13-lb. cartons/crates, bunched                              | 60-lb. wirebound crates                                  |
| 11-lb. cartons/crates, loose                                       | 50-lb. cartons/crates                                    |
| BLUEBERRIES  | (Long Island Type)                                       |
| 11-lb. flats, 12 1-pint cups                                       | 25- to 30-lb. cartons, 12s and                           |
| 9-lb. flats, 12 250-gram cups                                      | 16s film-wrapped and trimmed                             |
| 5-lb. flats, 12 8-oz. baskets                                      | CODI   |
|  | CORN   |
| BROCCOLI   | 50-lb. cartons/crates/bags<br>42-lb. cartons/crates/bags |
| Bunched  | 37-lb. mesh bags   |
| 21-lb. cartons/crates, 14s and 18s                                 | 37 Ib. Mesh bags   |
| Crown-Cut 20-lb. cartons, loose                                    | CUCUMBERS  |
| Florets  | Pickling   |
| 10-lb. film bags   | 55-lb. 11/9 bushel cartons/crates                        |
| 5-lb. film bags  | Slicers  |
|  | 50-lb. bushel cartons/crates                             |
| BRUSSELS SPROUTS   | 30-lb. cartons, 48s                                      |
| 25-lb. cartons, loose  | 28-lb. 5/9 bushel cartons/crates                         |
| 10-lb. flats/cartons   | 24-lb. cartons, 36s and 42s                              |
|  | 22-lb. cartons, 24s                                      |
| CABBAGE  | Greenhouse   |
| Green and Red  | 16-lb. cartons, loose, film-wrapped                      |
| 2,000-lb. bulk bins  | 12-lb. flats/cartons, loose, film-wrapped                |
| 1,000-lb. bulk bins  | ECCDI ANT  |
| 50- to 60-lb. flat crates  | EGGPLANT  33-lb. bushels or 11/9 bushel                  |
| 50-lb. 13/4 bushel crates/   | cartons/crates/baskets                                   |
| cartons/bags   | 26- to 28-lb. cartons/crates/lugs                        |
| 45-lb. cartons   | 25-lb. cartons   |
| 40-lb. cartons/bags  | 22-lb. lugs/cartons, 18s and 24s                         |
| Savoy  | 17-lb. 1/2 bushel lugs                                   |
| 40-lb. 13/4 bushel crates  | Chinese  |
| Chinese<br>80- to 85-lb, crates                                    | 26-lb. lugs  |
| 80- to 85-1b. crates<br>45- to 54-lb. crates                       | 25-lb. cartons   |
| 45- to 54-1b. crates<br>50- to 53-lb. cartons                      | 15-lb. <sup>1/2</sup> bushel cartons/crates<br>Italian   |
| 50- to 53-10. Cartons  | 26-lb. lugs  |
| CARROTS  | 15-lb. 1/2 bushel cartons/crates                         |
| Topped   | Japanese   |
| 50-lb. cartons/bags, loose   | 15-lb. 1/2 bushel cartons/crates                         |
| 50-lb. cartons, 10 5-lb. bags                                      |  |
| 48-lb. master bags, containing 48 1-lb., 24 2-lb. or 16 3-lb. bags | GRAPES   |

26-lb. cartons, bunched

25-lb. bags, loose

Bunch 24-lb. crates, 8

2-quart baskets

| 21-lb. lugs   | 100-lb. bags   |
|---|--|
| 20-lb. 12-quart baskets   | 50-lb. cartons/bags                                  |
| 16-lb. lugs, 16-lb. bagged/wrapped  | 50-lb. cartons, containing 5 10-lb. or 10 5-lb. bags |
| Muscadines  | DIMADVING  |
| 12-lb. flats, 12 1-pint cups  | PUMPKINS   |
|   | 1,000-lb. bins                                       |
| LETTUCE   | 50-lb. cartons/crates/bags                           |
| Iceberg   | 25-lb. 1/2-bushel cartons/crates                     |
| 50-lb. cartons, 30s, 24s, 18s   | RADISHES   |
| 30-lb. cartons  |  |
| 20-lb. cartons  | Topped   |
| Bibb  | 40-lb. bags, loose                                   |
| 10-lb. flat cartons/crates  | 25-lb. bags, loose                                   |
| 5-lb. 12-quart baskets/cartons  | 14-1 lb. bags  |
| 5-lb. baskets, greenhouse  Looseleaf  | 14 1-lb. bags  |
| 25-lb. cartons/crates   | 12-lb. baskets/cartons, containing 30 6-oz. bags     |
| 20-lb. <sup>4/5</sup> -bushel crates  | Bunched  |
| 14-lb. 11/9-bushel crates   | 35-lb. cartons/crates, 48s, 24s                      |
| 10-lb. baskets/cartons  | 30-lb. <sup>4/5</sup> -bushel cartons/lugs           |
|   | 20-lb. cartons/crates,                               |
| Romaine   | containing 24 bunches                                |
| 40-lb. 2/3 cartons/crates   | 15-lb. cartons/crates, 24s                           |
| 28-lb. 11/3-bushel cartons  |  |
| 22-lb. 11/9-bushel cartons/crates   | SPINACH  |
| 22-lb. cartons, 24s   | 32-lb. 12/3-bushel cartons/crates                    |
|   | 25-lb. bushel carton/crates                          |
| ONIONS, BULB  | 20-lb. cartons, 24s                                  |
| 50-lb cartons/bags/crates, loose  | 12-lb. bags  |
| 50-lb cartons, containing 10 5-lb bags  | 10-lb. 24-quart baskets                              |
| 48-lb cartons, containing 16 3-lb bags or 24 2-lb bags  | 8-lb. cartons, 12 10-oz. bags                        |
| 45-lb cartons, containing 15 3-lb bags  | Ŭ  |
| 40-lb cartons, containing 20 2-lb bags<br>40-lb cartons, loose 36-lb cartons, containing 12 3-lb bags | SQUASH   |
| 32-lb cartons, 16 2-lb bags   | Summer   |
| 25-lb bags/cartons, loose   | 42-lb. bushel and 11/9-bushel                        |
| 24-lb cartons, containing 12 2-lb bags  | cartons  |
| 10-lb bags, loose   | 35-lb. cartons/crates                                |
| 0 /   | 30-lb. 3/4 bushel cartons/crates                     |
| ONIONS, GREEN   | 26-lb. cartons/lugs                                  |
| 28-lb cartons, bunched 12s, bulb-type   | 21-lb. 1/2 or 5/9-bushel baskets/                    |
| 20-lb cartons/crates, bunched 24s, bulb-type  | cartons/crates                                       |
| 13-lb cartons, bunched 48s  | 10-lb. 8-quart baskets/cartons                       |
| 11-lb cartons, bunched 36s  | Winter   |
|   | 50-lb. 11/9-bushel cartons/crates                    |
| PEACHES   | 40-lb. cartons/crates                                |
| 38-lb. 3/4 bushel cartons/crates  | 35-lb. cartons/crates                                |
| 35-lb. cartons  | 12-lb. flats, 6 quarts                               |
| 26-lb. cartons  | ·  |
| 25-lb. 1/2 bushel cartons/crates  | SWEET POTATOES                                       |
| 22-lb. 2-layer cartons  | 800-lb. bulk bins                                    |
| 11-lb. crates/flats, 1 layer tray pack  | 40-lb. cartons/crates                                |
| 10-lb. cartons  | 40-lb. cartons, containing                           |
| 9-lb. cartons, 1-layer  | eight 5-lb. bags                                     |
|   | 20-lb. boxes   |
| PEAS  | 10-lb. boxes   |
| Green   | 5-lb. cartons/bags                                   |
| 30-lb. bushel baskets/crates/hampers  |  |
| 30-lb. 11/9 -bushel crates/cartons  | TOMATOES   |
| Snow, China, Sugar, Sugar Snap  | 28-lb 1/2 or 4/7-bushel cartons                      |
| 10-lb. cartons  | 25-lb cartons, loose                                 |
|   | 20-lb cartons/flats, loose or layerd                 |
| Southern  | Cherry   |
| 25-lb. bushel hampers   | 15-lb flats, containing 12 1-pint cups               |
|   | 5-lb cartons, containing 9 250-gram cups             |
| PEPPERS   | Mature Green<br>25-lb cartons, loose                 |
| Bells   | 20-lb cartons, loose or layered                      |
| 35-lb. 11/4 -bushel cartons   | 10-lb cartons, loose                                 |
| 30-lb. cartons/crate  | Greenhouse   |
| 28-lb. bushel and   | 15-lb flats, 1-layer                                 |
| 11/9 bushel-cartons/crates  | Plum or Roma   |
| 25-lb. cartons  | 25-lb cartons, loose                                 |
| 14- to 15-lb. half-bushel cartons   | , -  |
| 11-lb. flat cartons   | WATERMELON   |
| Jalapeños and Chilies   | 1,000-lb. pallet bins                                |
| 16- to 25-lb. half- and   | 100-lb. cartons                                      |
| 5/9-bushel cartons/crates, loose  | 85-lb. cartons                                       |
| 20-lb. cartons, loose   | 40-lb. cartons                                       |
| 10-lb. cartons, retail packs  | 35-lb. cartons                                       |
|   |  |

**POTATOES** 

22- to 23-lb. cartons/lugs



# Index

**Audit** 48, 54, 55, 64, 65, 68, 73, 83, 130, 140, 183, 293

**Bacteria** 28-30, 79, 119, 153, 154

**Best practices** 4, 116, 127, 136, 176, 188, 189, 277

**Biological** 20, 26, 28-31, 61, 78, 80, 82, 83, 117, 143, 186

**Buy American** 86, 87, 94, 95, 108, 109, 112, 166, 167, 252

Campylobacter 29, 41

**CDC** 22, 34, 35, 129, 133, 135, 136, 139

**Chemical** 20, 26, 27, 61, 74, 78-80, 83, 117, 143, 283, 327, 328

Condition 20, 78-80, 99, 112, 122, 127, 147, 148, 155, 157, 167, 191, 212-214, 219, 235, 238, 250, 252, 255-257, 259, 297-298, 317, 321, 328-329

Contamination 20, 29, 31, 45, 48, 49, 53, 55, 57-64, 69, 74, 76, 77-83, 91, 103-105, 140, 179, 180, 183, 191, 276, 279, 282, 285

**Cost** 86, 95, 100, 102-105, 108, 147, 148, 162, 166, 213, 238

Cyclospora 30

**Distributor** 15, 63, 64, 82, 87-89, 115, 130, 248

**E. coli** 29, 32, 41, 74, 75, 79, 80, 184

Farm to School 108, 111-114, 117, 125, 127, 129, 131, 132, 136, 138, 139, 141, 145, 294

**FDA** 22, 24, 25, 31, 34, 77-84, 90, 130, 131, 133, 136, 138, 140, 142-144, 180, 182, 187

**Hazard** 20, 23, 80, 81, 142-145, 177, 185, 186

Fresh-cut 31, 82, 176-182, 187, 188, 214, 245, 301, 302

**FSMA** 47, 48, 51, 58, 64, 67, 73, 77, 78-84, 86, 87, 89, 130, 131-139, 142, 145, 184-187, 245

**GAPs** 48, 54, 56, 64-66, 71, 73, 92, 130, 134, 138, 140, 141, 245, 255, 293

**Garden** 43, 89, 112, 116, 118, 127, 129, 133, 136, 138, 327

**Grade** 27, 43, 74, 119, 127, 147-151, 158, 160-163, 207, 213, 237, 238, 244, 245, 250, 256, 260-266, 297-301, 311

**HACCP** 20, 23, 142-145, 177, 186, 189-191, 27-278

Handwashing 35, 45, 75, 78, 280, 281, 285

**Hygiene** 29, 34, 35, 45, 49, 56, 60, 70, 75, 78, 82, 127, 140, 186, 190, 276, 285

Illness 20, 26, 27, 29, 32-34, 38-45, 47, 48, 60, 67, 77, 80, 82, 102-105, 136

Listeria 29, 50, 80, 184

Local 4, 24, 25, 43, 66, 68, 73, 77, 87, 88, 105-107, 108, 111-117, 121-124, 129, 130, 131, 134, 136, 138, 140, 141, 239, 242, 252, 255, 256, 293, 294, 305, 315

Norovirus 29, 32, 34, 35, 41

Organic 73, 74, 80, 117, 283, 327

Outbreak 33, 38-43, 45, 102-104

**Physical** 20, 26, 27, 61, 76, 80, 83, 143

Processing 6, 17, 29, 31, 77, 78, 81-84, 102, 134, 137, 142, 177, 178, 246

**Procurement** 86, 95, 106, 107, 108, 109, 112, 123, 124, 138, 162, 166, 239, 252, 293

**Producer** 25, 65, 73, 115, 134, 144, 219, 220

**Production** 7-9, 56, 70, 73, 77, 78, 93, 100, 102, 107, 127, 140, 195, 197-200, 203-210, 226-235, 276, 328

Public Health 24, 84, 133, 136, 142, 281

Quality 25, 58, 79, 83, 87, 95, 101, 108, 109, 129, 147-154, 160, 162, 188, 212-215, 235, 238, 246, 250, 254, 256-259, 267, 293, 294, 297-305, 309, 311, 313, 315, 317, 319, 321

**Recall** 50, 51, 87, 90, 93, 102-105, 143, 144, 193-195, 197, 198, 200-209

Receiving 87, 96, 143, 179, 191, 204, 206, 208, 210, 212-218, 246, 277, 278, 299-322

**Regulation** 21, 24, 77-84, 129, 142, 182

**Rule** 48, 51-53, 58, 73, 77-84, 91, 95, 102, 130- 139, 142, 145, 184, 186, 187

**Salmonella** 29, 32, 41, 45, 50, 80, 184

**Specification** 4, 95, 106, 107, 108, 111, 112, 121-124, 166, 176, 191, 213, 215, 237-239, 243-254, 256-258, 301

**State** 24, 25, 73, 76, 77-84, 87, 102, 103, 105, 107, 109, 114, 117, 121, 123, 127, 129-145, 178, 249, 252, 293, 294

**Standard** 74, 75, 102, 150, 190, 256, 261, 263, 266, 276, 298, 300, 301

**Storage** 43, 63, 75, 76, 81, 83, 117, 119, 127, 129, 140, 156, 157, 191, 201, 202, 205, 212, 213, 218, 219, 222-224, 226-235, 239, 246, 279, 284, 327

**Supply Chain** 90, 111, 112, 130, 133, 136, 140, 141, 142, 143

**Soil** 49, 55, 60, 61, 74, 75, 78, 80, 82, 83, 112, 117-120, 127, 140, 186, 255

TCS 31, 180, 277, 313

Temperature 30, 31, 34, 39, 41-44, 76, 80, 83, 157, 180, 191, 212-215, 219, 226-235, 245, 251, 255, 257, 259, 276, 277, 278, 285, 311, 327-330

**Time** 30, 31, 34, 39, 41-45, 77, 79, 82, 83, 158, 180, 202-209, 246, 252, 253, 255, 257, 259, 285, 327

**Traceability** 56, 64, 86, 87, 89, 90, 93, 246, 279

Toxin 27, 29, 31, 127

Virus 28, 29, 32, 34, 35, 41

**Yield** 87, 96, 97, 99, 100, 103

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