Committee Name: 2018 Produce Wash Committee - Council 3

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CFP Produce Wash Committee White Paper

The white paper was prepared to summarize the findings of the committee and to make it available to food safety professionals by placing it on the CFP website.

Executive Summary

The 2016-2018 CFP Produce Wash Committee was charged with the following:

1. *Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;*
2. *Identify conditions of use, including types of RACs and RTE fruits and vegetables, and methods for assuring efficacy of use;*
3. *Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.*
4. *Consult with appropriate professional produce trade organizations; and*
5. *Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection.*

The Committee reviewed over 40 published articles, manuscripts and guidance documents; evaluated CDC and other public health data; conducted a survey of food establishments to assess washing and crisping practices; reviewed relevant FDA Food Code sections and related Annexes; reviewed selected Federal and State regulations and requirements; and sought input from a variety of produce and academic experts.

The CFP Committee reached several conclusions that are detailed later in this paper. In general, the Committee found that using an antimicrobial treatment in washing or crisping water in food establishments can reduce the risk of pathogen cross-contamination from water when produce is submerged in water. However, the Committee concluded that the use of antimicrobial treatments should be optional to allow food establishments the opportunity to assess their individual risks and use preventive steps most appropriate for their processes. Such an approach is consistent with other FDA preventive controls (e.g., Food Safety Modernization Act).

Further, the Committee recommends that a guidance document be developed to aide food establishments in assessing their risks and implementing effective procedures for washing and crisping in their operations. It is also recommended by the Committee that the term “crisping” be defined in the Food Code and the term be added to Food Code section 3-302.15(B).

Food Code Sections Reviewed by the Committee

3-302.15 Washing Fruits and Vegetables.

(A) *Except as specified in ¶ (B) of this section and except for whole,* raw *fruits and vegetables that are intended for washing by the CONSUMER before consumption,* raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY-TO-EAT form.

(B) *Fruits and vegetables may be washed by using chemicals as specified under § 7-204.12.*

(C) Devices used for on-site generation of chemicals meeting the requirements specified in 21 CFR 173.315, Chemicals used in the washing or to assist in the peeling of fruits and vegetables, for the washing of raw, whole fruits and vegetables shall be used in accordance with the manufacturer's instructions. [Pf]

7-204.12 Chemicals for Washing, Treatment, Storage and Processing Fruits and Vegetables, Criteria.

(A) Chemicals, including those generated on-site, used to wash or peel raw, whole fruits and vegetables shall:

(1) Be an approved food additive listed for this intended use in 21 CFR 173, [P] or

(2) Be generally recognized as safe (GRAS) for this intended use, [P] or

(3) Be the subject of an effective food contact notification for this intended use (only effective for the manufacturer or supplier identified in the notification), [P] and

(4) Meet the requirements in 40 CFR 156 Labeling Requirements for Pesticide and Devices. [P]

(B) Ozone as an antimicrobial agent used in the treatment, storage, and processing of fruits and vegetables in a FOOD ESTABLISHMENT shall meet the requirements specified in 21 CFR 173.368 Ozone[P].

Introduction

At the 2016 Conference for Food Protection (CFP) biennial meeting, an Issue was submitted (# 2016-III-026) recommending that whenever fresh produce is submerged in water for either washing or crisping such that microbial cross-contamination via the water could occur, the water *shall* (i.e., must) be treated with an antimicrobial to reduce pathogens in the water. Although such treatments may also reduce pathogens on the produce surface, the intent was to consider measures that could reduce the risk of cross-contamination from the water.
In order to address the questions raised by the 2016 council during deliberations, the PWWC was formed. The materials created by the committee, including this white paper, summarize the PWWC findings and will be presented during the 2018 biennial meeting.

In accordance with the FDA 2013 Food Code section *3-302.15 Washing Fruits and Vegetables* (see above) raw fruits and vegetables shall be thoroughly washed in water to remove soil and

other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form.

Washing may be accomplished either under running water or by submersion in water such as in a sink filled with water. In addition to washing, some types of produce may also be submerged in water to improve quality. This process is commonly known as crisping.

Discussion

Whole or fresh-cut produce may contain pathogenic microorganisms and at times have been associated with foodborne illness and outbreaks. Efforts have been undertaken by the produce industry and regulators (e.g., FSMA and the Produce Safety Rule) to minimize the risk of contamination of fresh produce. However, without a "kill step" a potential risk remains. In the event that contaminated product is received into a food establishment, washing and crisping practices introduce an additional risk. In food establishments, produce is washed before being cut, etc. as per the recommendation of the FDA Food Code, but it should be noted that washing has a limited effect on removing pathogens from the produce surface. When produce items are submerged in water the chance for cross-contamination presents a public health risk. Further, the practice of crisping could introduce an additional risk since contaminated water may internalize pathogens during the crisping process. When other procedures such as washing/sanitizing the sink before use are not followed, food contact surfaces can also contribute to cross-contamination. Taken together, these practices demonstrate the need to consider additional or alternative efforts to reduce the risks associated with fresh produce handling practices at food establishments.
There are various treatments available to treat water used for washing and/or crisping. The antimicrobial efficacy of these treatments varies, with some being little or no different than using water alone while others have a significant impact on the reduction of pathogens in the water. In practice, the differences in treatments are not always understood or well differentiated.

Conclusions

The CFP Committee reached the following conclusions:

- Fresh produce can be a source of foodborne illness and outbreaks.
- The risk associated with fresh produce varies depending on source, type of product, growing conditions and other factors.
- Produce washing practices vary among food establishments and uniform guidance is not available.
- Washing produce by submersion in water can increase the risk of cross-contamination and pathogen internalization.
- Produce crisping practices vary among food establishments and uniform guidance is not available.
- Crisping produce by submersion in water can increase the risk of cross-contamination and pathogen internalization.
- Produce may be washed or crisped by using chemicals as specified in 2013 Food Code, section 7-204.12.
- Chemicals registered by EPA shall be used in accordance with the EPA registered label use instructions.

Recommendations

The Committee believes that food establishments would benefit from guidance on how to assess risk and implement preventive controls when washing and/or crisping produce by submersion in water. A guidance document could include: methods for assessing risks; preventive control strategies; and the use of antimicrobials to prevent cross-contamination.

The CFP Committee proposes two recommendations that should be addressed separately.

Recommendation #1:

That the Produce Wash Committee be re-formed with the charge to develop a Guidance Document for washing and crisping produce in food establishments.

Recommendation #2:

That the FDA add the following definition to Food Code section 1-201.10 Statement of Application and Listing of Terms:
***"Crisping"** means the practice of exposing fresh produce to water for the purpose of improving quality. Crisping can be accomplished by holding fresh produce under running water or by immersion in water for a time sufficient to allow for rehydration. In addition, crisping may include a method for chilling such as submersion in ice water or refrigeration after submersion.*
And that FDA revise the Food Code as follows:
(Recommended additions are underlined; deletions indicated with strikethrough)

3-302.15 Washing <u>and Crisping</u> Fruits and Vegetables.

(A) Except as specified in ¶ (B) of this section and except for whole, raw fruits and vegetables that are intended for washing by the CONSUMER before consumption, raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY-TO- EAT form.

(B) Fruits and vegetables may be washed <u>or CRISPED</u> ~~by~~ using chemicals as specified under § 7-204.12.

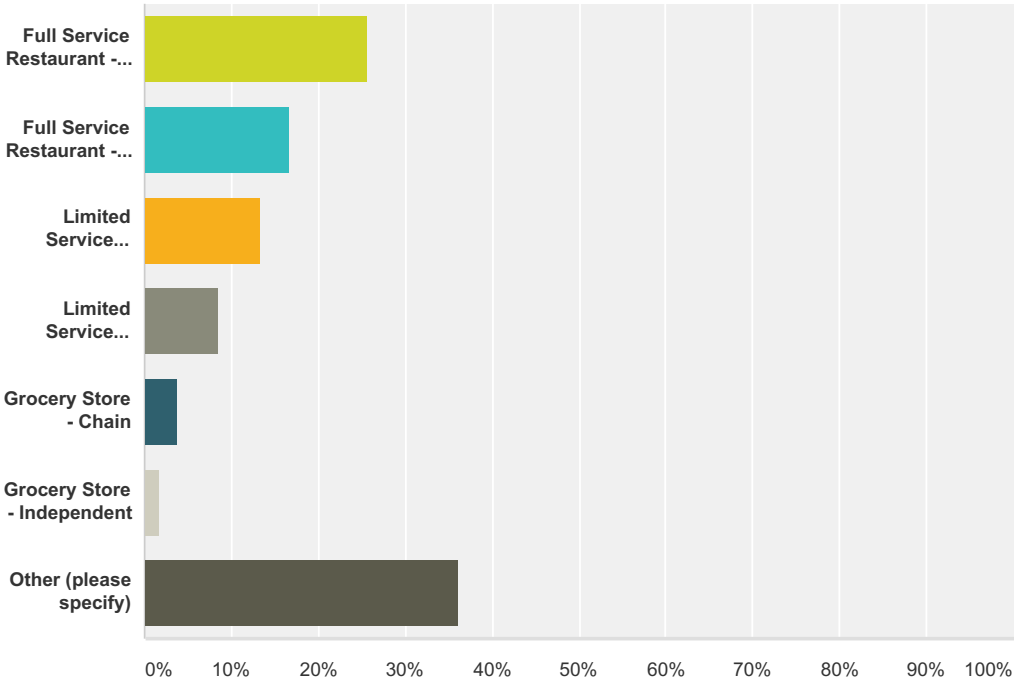
(C) Devices used for on-site generation of chemicals meeting the requirements specified in 21 CFR 173.315, Chemicals used in the washing <u>or CRISPING</u> or to assist in the peeling of fruits and vegetables, for the washing *or CRISPING* of raw, whole fruits and vegetables shall be used in accordance with the manufacturer's instructions.

CFP Produce Committee Survey

7/13/2017

Q1 Please describe your primary type of facility:

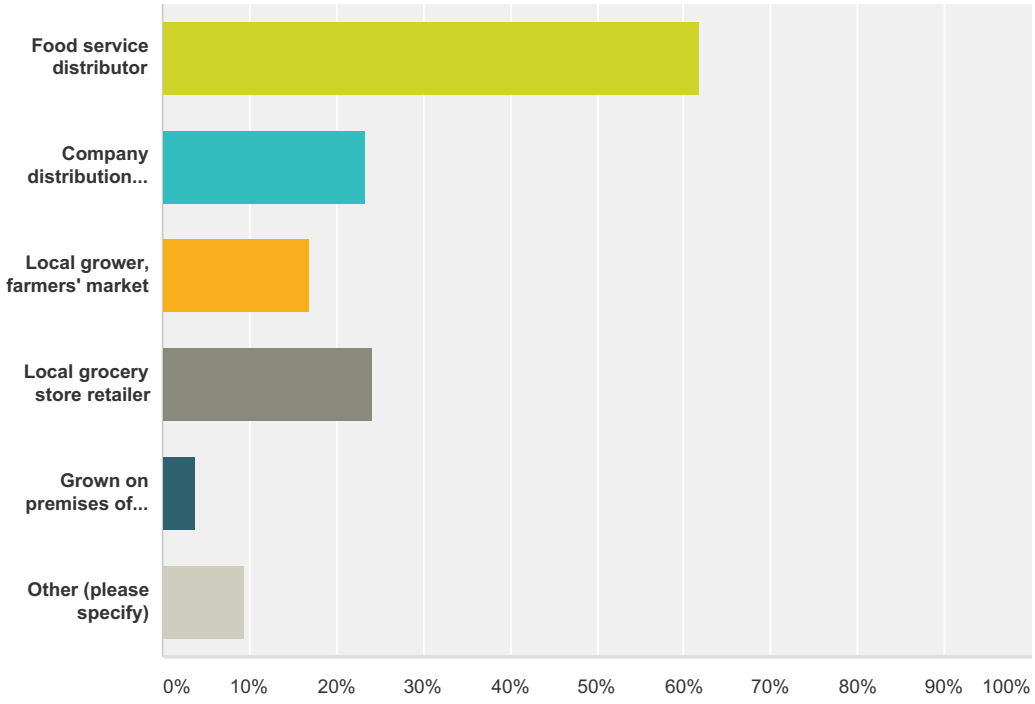
Answered: 3,895 Skipped: 15



Answer Choices	Responses	
Full Service Restaurant - Chain	**25.78%**	1,004
Full Service Restaurant - Independent	**16.66%**	649
Limited Service Restaurant (fast casual or QSR) - Chain	**13.32%**	519
Limited Service Restaurant (fast casual or QSR) - Independent	**8.47%**	330
Grocery Store - Chain	**3.72%**	145
Grocery Store - Independent	**1.69%**	66
Other (please specify)	**36.07%**	1,405
Total Respondents: 3,895		

Q2 How do you receive your fresh produce? For Food Service: Please select all that apply

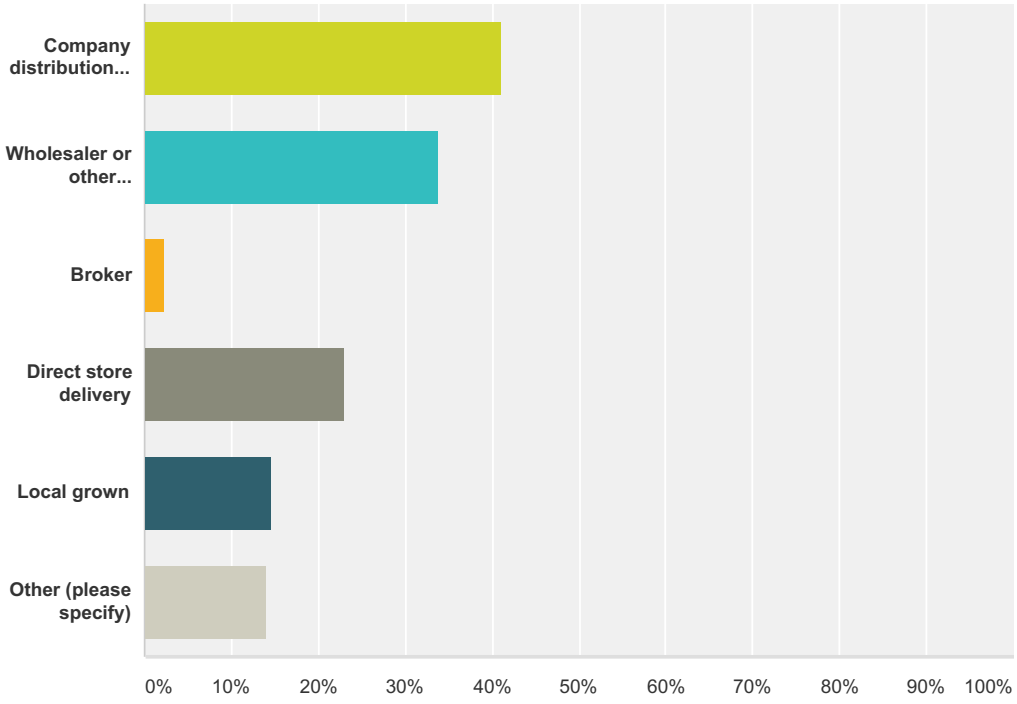
Answered: 2,517 Skipped: 1,393



Answer Choices	Responses	
Food service distributor	**61.82%**	1,556
Company distribution center	**23.36%**	588
Local grower, farmers' market	**17.00%**	428
Local grocery store retailer	**24.16%**	608
Grown on premises of food establishment	**3.77%**	95
Other (please specify)	**9.34%**	235
Total Respondents: 2,517		

Q3 How do you receive your fresh produce? For retail/grocery store: please select all that apply

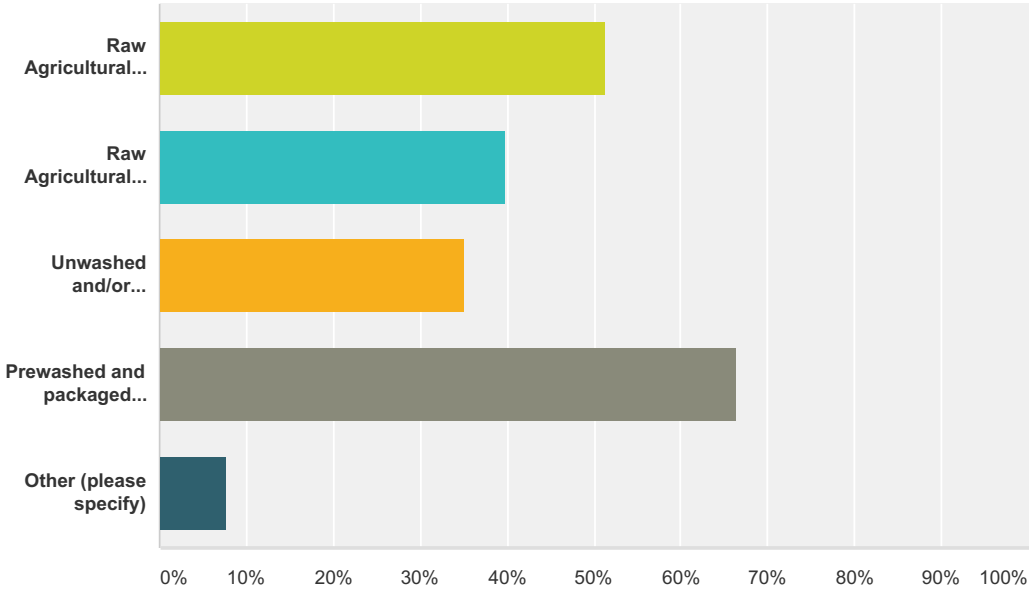
Answered: 1,967 Skipped: 1,943



Answer Choices	Responses	
Company distribution center	**41.08%**	808
Wholesaler or other distributor	**33.86%**	666
Broker	**2.34%**	46
Direct store delivery	**22.98%**	452
Local grown	**14.54%**	286
Other (please specify)	**13.98%**	275
Total Respondents: 1,967		

Q4 Please select all forms of produce you receive (RTE = ready to eat):

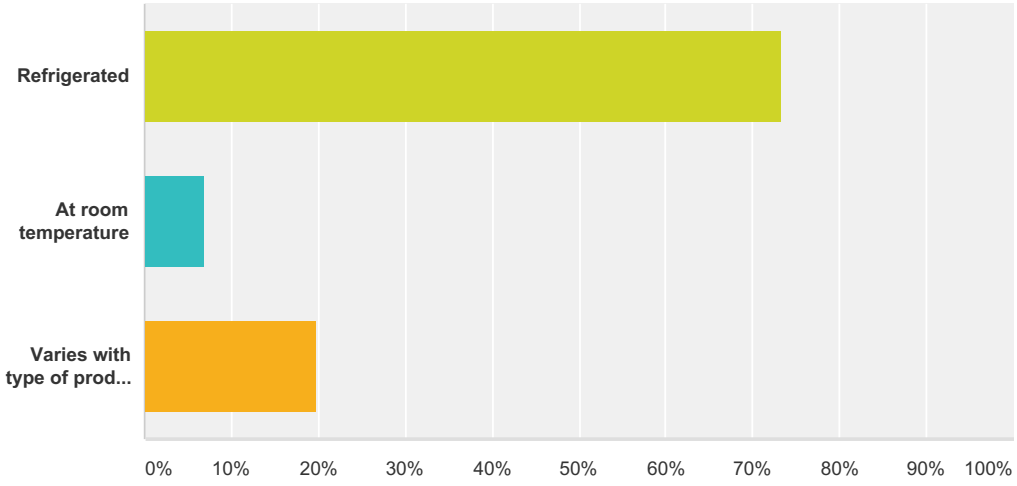
Answered: 2,464 Skipped: 1,446



Answer Choices	Responses	
Raw Agricultural Commodity, whole produce that may or may not be RTE	**51.42%**	1,267
Raw Agricultural Commodities that are not RTE (such as potatoes)	**39.81%**	981
Unwashed and/or unprocessed produce (such as locally grown items)	**35.15%**	866
Prewashed and packaged produce, such as ready-to-eat salad mixes, considered RTE	**66.36%**	1,635
Other (please specify)	**7.63%**	188
Total Respondents: 2,464		

Q5 How do you store produce (not TCS) after receiving it, before use?

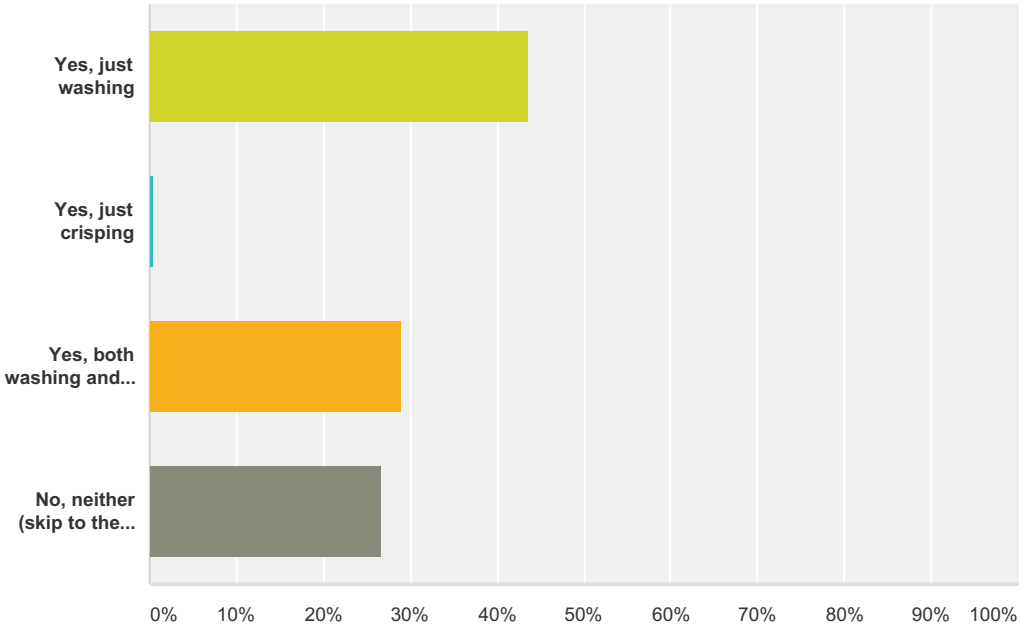
Answered: 2,504 Skipped: 1,406



Answer Choices	Responses	
Refrigerated	**73.32%**	1,836
At room temperature	**6.91%**	173
Varies with type of produce (please comment)	**19.77%**	495
Total		**2,504**

Q6 Do you wash or crisp produce in your facilities?

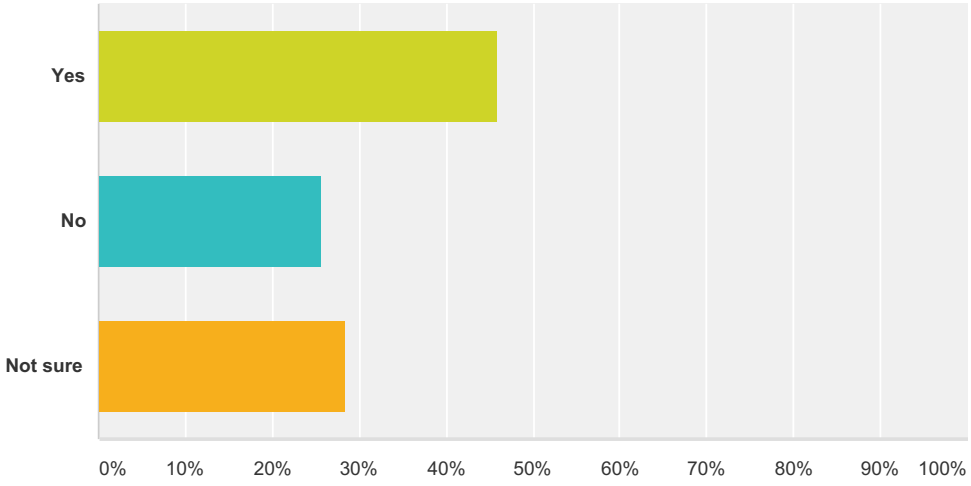
Answered: 2,195 Skipped: 1,715



Answer Choices	Responses	
Yes, just washing	**43.69%**	959
Yes, just crisping	**0.50%**	11
Yes, both washing and crisping	**29.02%**	637
No, neither (skip to the last question)	**26.79%**	588
Total		**2,195**

Q7 Do you have a written SOP for washing / crisping produce?

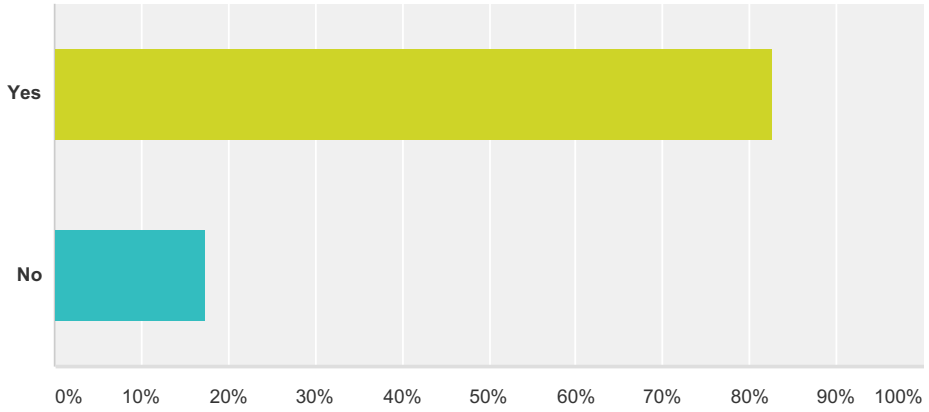
Answered: 1,779 Skipped: 2,131



Answer Choices	Responses	
Yes	**45.98%**	818
No	**25.69%**	457
Not sure	**28.33%**	504
Total		**1,779**

Q8 Do you use a designated sink for washing / crisping produce?

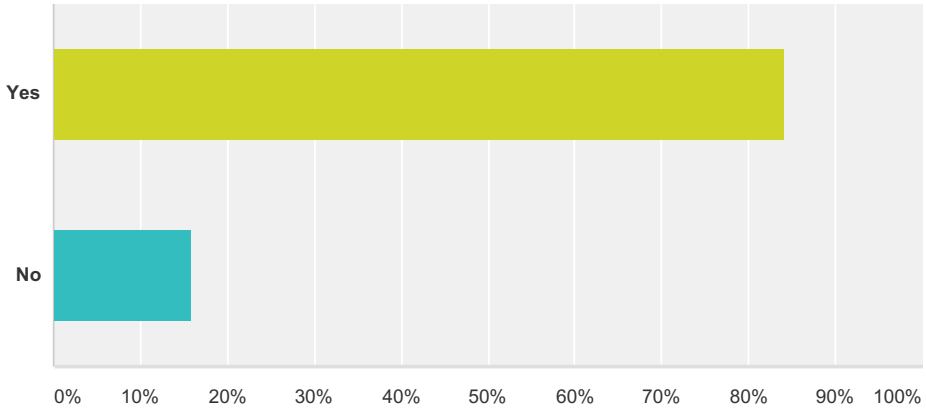
Answered: 1,767 Skipped: 2,143



Answer Choices	Responses	
Yes	**82.68%**	1,461
No	**17.32%**	306
Total		**1,767**

Q9 Do you always sanitize your sinks before filling it with water prior to washing / crisping?

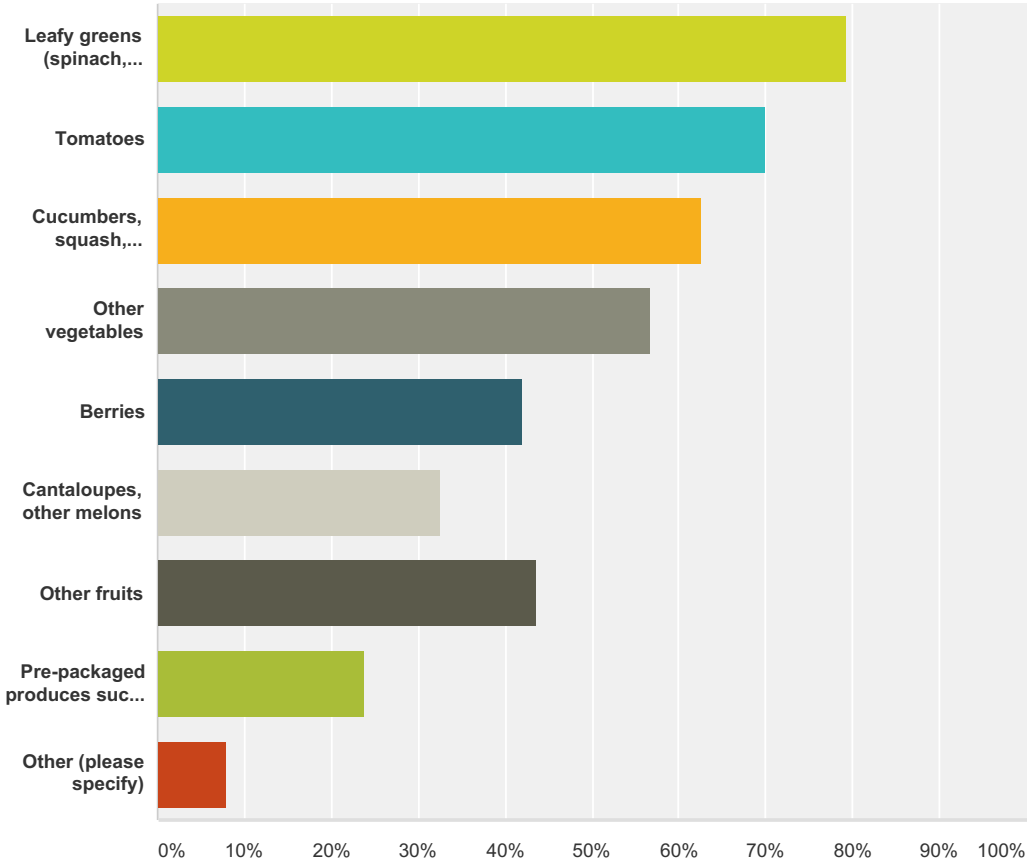
Answered: 1,766 Skipped: 2,144



Answer Choices	Responses	
Yes	**84.09%**	1,485
No	**15.91%**	281
Total		**1,766**

Q10 Which of the following produce types do you wash / crisp? (Mark all that apply)

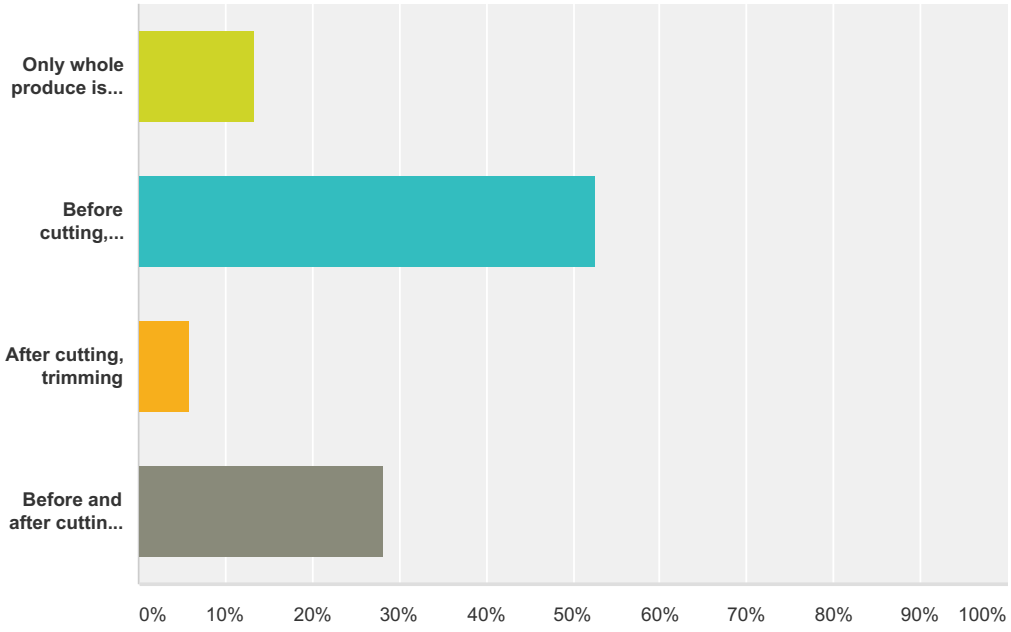
Answered: 1,751 Skipped: 2,159



Answer Choices	Responses	
Leafy greens (spinach, lettuces, cabbage, etc)	**79.38%**	1,390
Tomatoes	**70.02%**	1,226
Cucumbers, squash, zucchini	**62.54%**	1,095
Other vegetables	**56.77%**	994
Berries	**41.98%**	735
Cantaloupes, other melons	**32.50%**	569
Other fruits	**43.58%**	763
Pre-packaged produces such as shredded lettuce, lettuce mixes	**23.87%**	418
Other (please specify)	**7.88%**	138
Total Respondents: 1,751		

Q11 When do you wash produce prior to use or display?

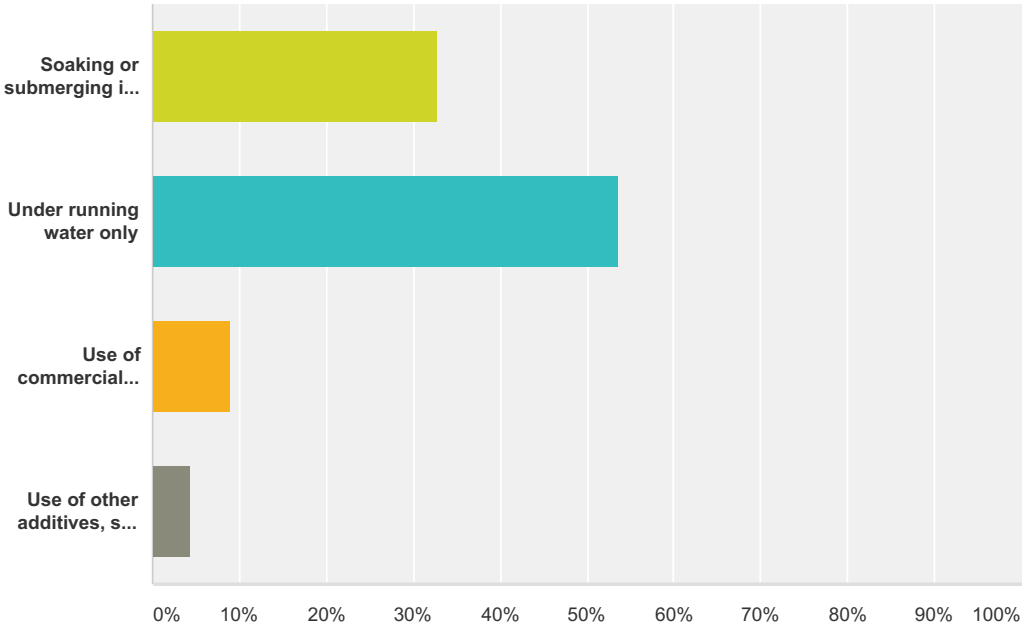
Answered: 1,708 Skipped: 2,202



Answer Choices	Responses	
Only whole produce is washed / crisped	**13.41%**	229
Before cutting, trimming	**52.69%**	900
After cutting, trimming	**5.80%**	99
Before and after cutting, trimming	**28.10%**	480
Total		**1,708**

Q12 Which procedure(s) do you use for washing / crisping produce?

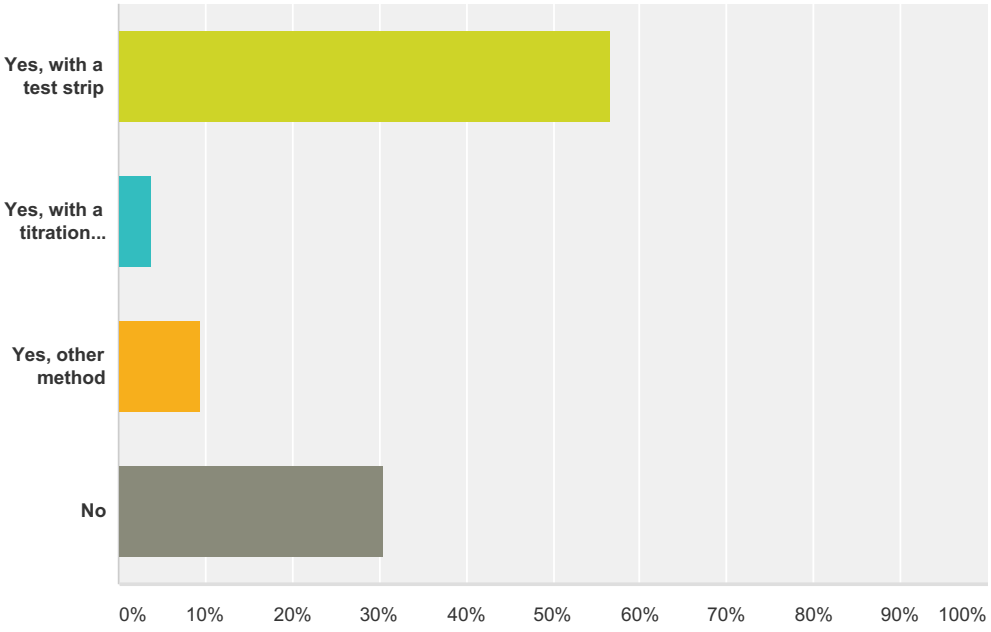
Answered: 1,708 Skipped: 2,202



Answer Choices	Responses	
Soaking or submerging in water	**32.79%**	560
Under running water only	**53.69%**	917
Use of commercial chemicals (antimicrobial treatments/additives) in the water	**9.07%**	155
Use of other additives, such as vinegar, citric acid, etc	**4.45%**	76
Total		**1,708**

Q13 If chemicals are added to the water, do you monitor the concentration?

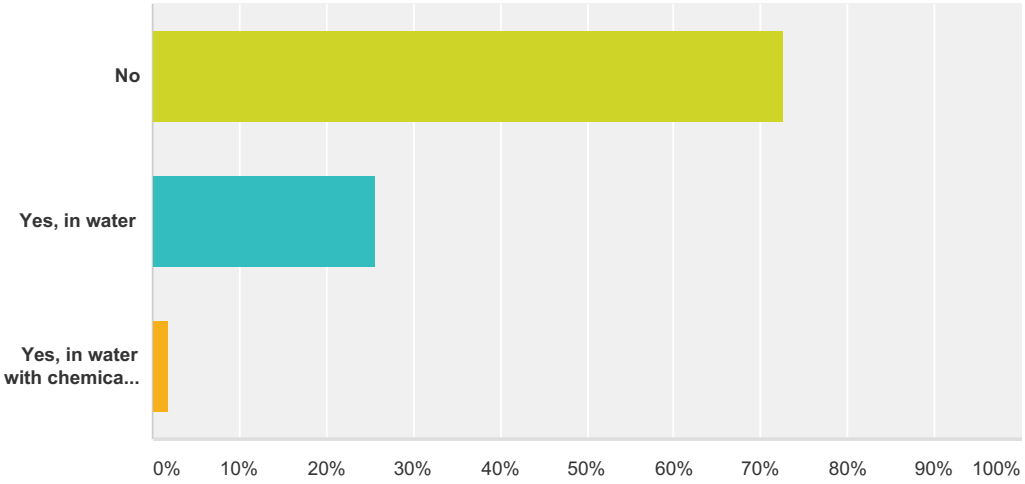
Answered: 1,550 Skipped: 2,360



Answer Choices	Responses	
Yes, with a test strip	**56.52%**	876
Yes, with a titration method	**3.74%**	58
Yes, other method	**9.35%**	145
No	**30.39%**	471
Total		**1,550**

Q14 Do you store or cut or whole produce (like asparagus, Romaine lettuce, etc) in water after preparation or while on display?

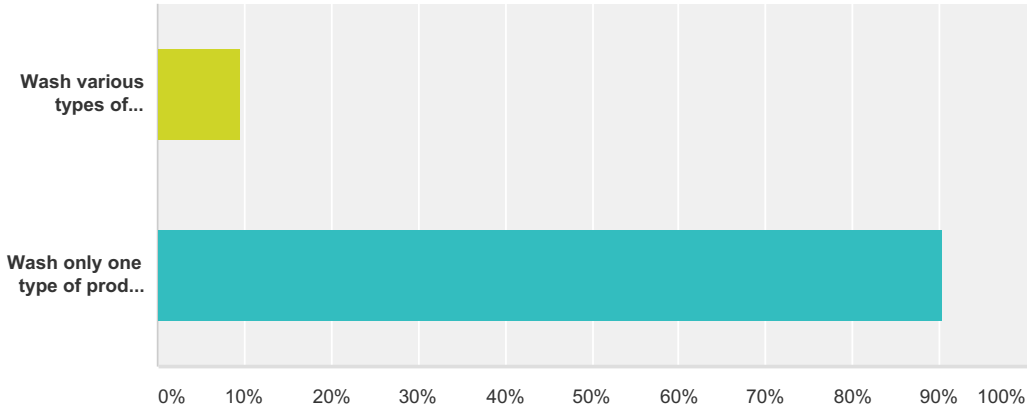
Answered: 1,938 Skipped: 1,972



Answer Choices	Responses	
No	**72.55%**	1,406
Yes, in water	**25.59%**	496
Yes, in water with chemical additive	**1.86%**	36
Total		**1,938**

Q15 When washing / crisping produce, do you:

Answered: 1,785 Skipped: 2,125



Answer Choices	Responses	
Wash various types of produce together in one sink	**9.64%**	172
Wash only one type of produce at a time	**90.36%**	1,613
Total		**1,785**

Comparison of state regulations with 2013 FDA Food Code

STATES:

Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming

Modifications to 3-302.15 (A) Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY-TOEAT form.

None

18AAC31.222(7) except for whole, raw fruits and vegetables that are intended for washing by the consumer before consumption, wash raw fruits and vegetables thoroughly with potable water to remove soil and other contamination before those fruits and vegetables are cut, combined with other ingredients, cooked, served, or offered for human consumption in a ready-to-eat form;

Same as Food Code

(A) Except as specified in (B) of this section and except for whole, raw fruits and vegetables that are intended for washing by the CONSUMER before consumption, raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY- TO-EAT form

113992. (a) Produce shall be thoroughly washed in **potable** water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form, except as specified in subdivision (b) and except when intended for washing by the consumer before consumption. (b) Chemicals used to wash or peel produce shall meet the requirements specified in 21 C.F.R. 173.315.

3-408 raw fruits and vegetables shall be thoroughly washed in **running drinking** water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form. **Commercially, prewashed raw fruits and vegetables that are prepackaged to prevent contamination do not require further washing prior to use.**

(o)(1) Raw fruits and vegetables shall be washed before use.

Same as Food Code

64E-11.004 (5) Raw, unprocessed fruits and vegetables shall be thoroughly washed in **potable** water to remove any existing contaminants before being cut, combined with other ingredients, cooked, or served.

511-6-04 (4)(g) 1. Except as specified in paragraphs (g)2 and 3 of this subsection and except for whole, raw fruits and vegetables that are intended for washing by the consumer before

consumption, raw fruits and vegetables shall be thoroughly washed in water, **in a sink designated for that purpose only**, to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form.
Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form.
Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form except as specified in ¶ (B) of this section and except that whole, raw fruits and vegetables that are intended for washing by the CONSUMER before consumption need not be washed before they are sold.

Section is currently marked (Repealed)
410 IAC 7-24-175 (a) Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form,
Adopt Food Code by reference, no modification to 3-302.15
(A) Except as specified in ¶ (B) of this section and except for whole, raw fruits and vegetables that are intended for washing by the CONSUMER before consumption, raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY- TO-EAT form.
2005 Model Food Code, with no language modifications of 3-205.15
1701.A. Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served or offered for human consumption in ready to eat form.
Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in Ready-to-Eat form.
(6) Washing raw fruits and vegetables thoroughly to remove soil and other contaminants before cutting, cooking, or serving, with:
(a) Water; or
(b) Chemicals intended specifically for washing or peeling whole fruits and vegetables as specified in 21 CFR §173.315.

No modification of 1999 Food Code
Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY-TO-EAT form.
4626.0255 Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form except that whole, raw fruits and

vegetables that are intended for washing by the consumer before consumption need not be washed before they are sold.
Adoption of 2013 Food Code with no modifications to 3-302.15
Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form.
Adoption of 2013 Food Code with no modifications to 3-302.15
Adoption of 2013 Food Code with no modifications to 3-302.15

NAC 446.142 raw fruits and vegetables must be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served or offered for human consumption in ready-to-eat form.
2. Fruits and vegetables may be washed by using chemicals: (a) Which are generally recognized as safe for the washing of food; or (b) As approved by the health authority.
Adoption of 2009 Food Code with no modifications to 3-302.15
(g) Requirements for washing fruits and vegetables shall include the following:
1. Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form, except as specified in (g)2 below and except that whole, raw fruits and vegetables that are intended for washing by the consumer before consumption need not be washed before they are sold.
2. Fruits and vegetables may be washed by using chemicals as specified under N.J.A.C. 8:24-7.2(g).
7. All raw fruits and vegetables shall be washed thoroughly before being cooked or served
14-1.81 Raw fruits and raw vegetables are to be thoroughly washed with potable water before serving.
Adoption of 2009 Food Code with no modifications to 3-302.15
Raw fruits and vegetables must be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form except as specified in subsection 2 and except that whole, raw fruits and vegetables that are intended for washing by the consumer before consumption need not be washed before they are sold.
2. Fruits and vegetables may be washed and treated by using chemicals and ozone as specified in subsections 5 and 6 of section 33-33-04-108.
Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form except:

310:257-5-27. (a) raw fruits and vegetables that are intended for washing by the consumer before consumption, raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form.
No Modification of 2009 Food Code No Modification of 2013 Food Code No Modification of 2005 Food Code No Modification of 2013 Food Code.

44:02:07:34. Washing fruits and vegetables. Raw fruits and vegetables must be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form. Fruits and vegetables may be washed by using chemicals as specified in 21 C.F.R. 173.315, April 1, 1996. Any sink used to wash, prepare, store, or soak food must be indirectly connected to the sewer through an airbreak.

Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form.
Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form.
No Modification of 2013 Food Code
Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form except as specified in ¶ 2 of this section and except that whole, raw fruits and vegetables that are intended for washing by the consumer before consumption need not be washed before they are sold.
A. Except as specified in subsection B of this section and except for whole, raw fruits and vegetables that are intended for washing by the consumer before consumption, raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form.

Except as specified in subsection (2) of this section, and except for whole, raw fruits and vegetables that are intended for washing by the CONSUMER before consumption, raw fruits and vegetables must be thoroughly rinsed under running water to remove soil and other contaminants after any soaking and before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY-TO-EAT form. (2) Raw fruits and vegetables may be washed by using chemicals as specified under
07225.
(3) For the purposes of this section, raw vegetables include fresh herbs and sprouts.
No Modification of 2005 Food Code
(A) Except as specified in ¶ (B) of this section and except for whole, raw fruits and vegetables that are intended for washing by the CONSUMER before consumption, raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY−TO−EAT form.

Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form except as specified in Chapter 3, Section 40(b),

and except that whole, raw fruits and vegetables that are intended for washing by the consumer before consumption need not be washed before they are sold.

Comparison of state regulations with 2013 FDA Food Code

Link	Crisp or Soak (for produce)?
Chapter 430-3-22 For Food Establishment Sanitation	No matches
Alaska Food Code 18 AAC 31	Requires dedicated food prep sink if soaking is involved
Recreational, and Institutional Sanitation	No matches
Arkansas State Board of Health Rules and Regulations Pertaining to Retail Food Establishments	No matches
California Retail Food Code 2016	Requires dedicated food prep sink if soaking is involved
Colorado Retail Food Establishment Rules and Regulations 6 CCR 1010-2	No matches
19-13-B42 Sanitation of places dispensing foods or beverages	No matches
State of Deleware Food Code 2014	Visual--No Matches
Florida Administrative Code Chapter 64E-11 Food Hygiene	No matches
Georgia Department of Public Health Rules and Regulations Food Service Chapter 511-6-1	No matches
Chapter 11-50 Hawaii Administrative Rules, Food Safety Code	No matches

Comparison of state regulations with 2013 FDA Food Code

Idaho Food Code	No matches
Illinois Administrative Code Title 77 Chapter I Subchapter m Part 750 Food Service Sanitation Code	N/A
Indiana Retail Food Establishment Sanitation Requirements Title 410 IAC 7-24	No matches
Iowa Chapter 137F Food Establishments and Food Processing Plants	No matches
Kansas Food Code 2012	No matches
902 KAR 45:005. Kentucky Food Code	No matches
Title 51 Part XXIII: Louisiana Public Health Sanitary Code, Retail Food Establishments	No matches
State of Maine Food Code 2013 (10-144 CMR 200)	No matches
Title 10.15.03.09 Food Preparation (Department of Health and Mental Hygiene Food Service Facilities)	No matches
Massachusetts State Sanitary Code Chapter X: Minimum Sanitation Standards for Food Establishments	No matches
Michigan Modified Food Code	No matches
Minnesota Food Code	No matches
Mississippi Food Code	No matches
Missouri Food Code for the Food Establishments of the State of Missouri	No matches
Montana Administrative Rule for Retail Food Establishments	No matches
Nebraska Food Code	No matches

Comparison of state regulations with 2013 FDA Food Code

Nevada Administrative Code Chapter 446--Food Establishments	No matches
New Hampshire Chapter HE-P 2300 Sanitary Production and Distribution of Food	No matches
New Jersey Administrative Code Chapter 24: Sanitation in Retail Food Establishments and Food and Beverage Vending Machines	No matches
New Mexico Retail Food Protection Requirements	No matches
New York State Sanitary Code, Part 14-1 Food Service Establishments	No matches
North Carolina Food Code Manual	No matches
North Dakota Food Code Chapter 33-33-04-10	No matches
Ohio Uniform Food Safety Code	No matches
Title 310. Oklahoma State Department of Health Chapter 257. Food Service Establishments	No matches
Oregon Department of Human Services Food Sanitation Rules	No matches
Pennsylvania Food Code, Title 7, Chapter 46	No matches
Rhode Island Food Code	No matches
South Carolina Retail Food Establishments Regulation 61-25	No matches
South Dakota Food Service Code Chapter 44:02:07	Requires indirectly-drained sink for soaked food.

Comparison of state regulations with 2013 FDA Food Code

Tennessee Department of Health Bureau of Health Services Chapter 1200-21-01 Food Service Establishment	(website down)
Texas Administrative Code Title 25 Part 1 Chapter 228 Retail Food	No matches
Utah Administrative Code R 392-100 Food Service Sanitation	No matches
Vermont Health Regulations for Food Service Establishments	No matches
Virginia Administrative Code Chapter 585 Retail Food Establishment Regulations	No matches
Washington State Retail Food Code Chapter 246-215 WAC	Requires a dedicated, indirectly-drained prep sink for produce wash.
West Virginia Title 64 Series 17: Food Establishments	No matches
Wisconsin Food Code	No matches
Wyoming Food Rule	No matches

Terminology, Jurisdictions, and Definitions

Available definitions were researched in order to facilitate the effective discussion during the committee work and to introduce new terminology if needed
The document to be posted on CFP website.

Terminology	Definition	Reference	Comments
Washing	To cleanse, using water or other liquid, usually with soap or detergents by immersing, dipping, or scrubbing.	Free Dictionary online	
	N/A	EPA	EPA does not define washing
	3-302.15 Washing Fruits and Vegetables- To remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY-TOEAT form.	2013 FDA Food Code 3-302.15	Actual definition of washing (or cleaning) does not exist in 2013 food code. See Annex attachment for further information.
Rinsing	To thoroughly remove debris or residues with potable water	Google	Rinsing not defined in 2013 food code or EPA.
Antimicrobial pesticide	Intended to disinfect, sanitize, reduce, or mitigate growth or development of microbiological organisms or protect inanimate objects, industrial processes or systems, surfaces, water, or other chemical substances from contamination, fouling, or deterioration caused by bacteria, viruses, fungi, protozoa, algae, or slime.	EPA Guidance and FIFRA	https://www.epa.gov/pesticide-registration/antimicrobial-pesticide-registration#what https://www.epa.gov/pesticide-registration/what-are-antimicrobial-pesticides https://www.gpo.gov/fdsys/pkg/USCODE-2013-title7/html/USCODE-2013-title7-chap6-subchapII-sec136.htm
Sanitize	To control or reduce micro-organisms from inanimate surfaces	EPA	https://www.epa.gov/pesticide-registration/what-are-antimicrobial-pesticides
Sanitizer	Agent that reduces the number of bacterial contaminants to safe levels as judged by public health requirements. Commonly used with substances applied to inanimate objects. According to the protocol for the official	CDC	~~https://www.cdc.gov/hicpac/Disinfection_Sterilization/19_00glossary.html~~ https://www.cdc.gov/infectioncontrol/guidelines/Disinfection/index.html

Terminology, Jurisdictions, and Definitions

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Terminology	Definition	Reference	Comments
	sanitizer test, a sanitizer is a chemical that kills 99.999% of the specific test bacteria in 30 seconds under the conditions of the test.		
Sanitization	Application of cumulative heat or chemicals on cleaned FOOD-CONTACT SURFACES that, when evaluated for efficacy, is sufficient to yield a reduction of 5 logs, which is equal to a 99.999% reduction, of representative disease microorganisms of public health importance.	2013 FDA Food Code 1-201.10	Note: Non-food contact = 3 logs (EPA)
Disinfection	To destroy or irreversible inactivate fungi or bacteria	EPA	https://www.epa.gov/pesticide-registration/what-are-antimicrobial-pesticides
RAC - Raw Agricultural Commodity	Raw agricultural commodities include, among other things, fresh fruits, whether or not they have been washed and colored or otherwise treated in their unpeeled natural form; vegetables in their raw or natural state, whether or not they have been stripped of their outer leaves, waxed, prepared into fresh green salads, etc.; grains, nuts, eggs, raw milk, meats, and similar agricultural produce. It does not include foods that have been processed, fabricated, or manufactured by cooking, freezing, dehydrating, or milling.	EPA	40 CFR 180.1
	Any food in its raw or natural state, including all fruits that are washed, colored, or otherwise treated in their unpeeled natural form prior to marketing.	FD&C Act Section 201(r)	
Ready to Eat (RTE)	Food that is in edible form without further preparation.	2013 Food Code (1 201.10 a-i)	See attachment.
Food Processing Facility/ Plant	Facilities where processing of food occurs.	FDA guidance	http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/IngredientsAdditivesGRASPackaging/ucm077256.htm

Terminology, Jurisdictions, and Definitions

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Terminology	Definition	Reference	Comments
	A commercial operation that manufactures, packages, labels, or stores FOOD for human consumption, and provides FOOD for sale or distribution to other business entities such as FOOD PROCESSING PLANTS or FOOD ESTABLISHMENTS.	2013 Food Code	2013 Food Code also defines food processing plant and exempts food retail establishments.
Processed Food	Food subject to the activities of canning, freezing, cooking, pasteurization or homogenization, irradiation, milling, grinding, chopping, slicing, cutting or peeling.	FDA Guidance	The following activities do not constitute the processing of food: **Washing**, waxing, coloring, hydro-cooling, refrigeration, shelling of nuts, ginning of cotton, and the removal of leaves, stems, and husks. http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/IngredientsAdditivesGRASPackaging/ucm077256.htm
	any food other than a raw agricultural commodity and includes any raw agricultural commodity that has been subject to processing, such as canning, cooking, freezing, dehydration, or milling.	FD&C Act Section 201 (gg)	
Crisping	FDA does not have definition PW industry doesn't like the term "crisping", prefers "re-crisping" to ensure portrayal that leafy greens are crisp initially.		
Re-crisping	FDA does not have definition		Commodity Specific Guidance for Leafy Greens discusses best practices for "re-crisping"* http://www.fda.gov/downloads/food/guidanceregulation/ucm169008.pdf *Not a FDA document
Drinking Water	(1) "Drinking water" means water that meets	2013 FDA Food	

Terminology, Jurisdictions, and Definitions

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Terminology	Definition	Reference	Comments
	criteria as specified in 40 CFR 141 National Primary Drinking Water Regulations. (2) "Drinking water" is traditionally known as "potable water." (3) "Drinking water" includes the term "water" except where the term used connotes that the water is not potable, such as "boiler water," "mop water," "rainwater," "wastewater," and "nondrinking" water.	Code 1-201.10	
Food Contact Surface	**"Food-contact surface"** means: (1) A surface of EQUIPMENT or a UTENSIL with which FOOD normally comes into contact; or (2) A surface of EQUIPMENT or a UTENSIL from which FOOD may drain, drip, or splash: (a) Into a FOOD, or (b) Onto a surface normally in contact with FOOD.	2013 FDA Food Code 1-201.10	Also referred to as “hard food contact surfaces”. EPA regulated application.
Food Contact Surface Sanitizer	An antimicrobial/sanitizer used on a hard food contact surface.		
Food Contact Substance	A food contact substance is any substance intended for use as a component of materials used in manufacturing, packing, packaging, transporting, or holding food, if such use is not intended to have any technical effect on such food	FDA Guidance	http://www.fda.gov/RegulatoryInformation/Guidances/ucm077256.htm (FFDCA § 409(h)(6))
Food Contact	A food contact substance, as above, used as	FDA Guidance	Excluded from the definition of "pesticide

Terminology, Jurisdictions, and Definitions

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Terminology	Definition	Reference	Comments
Substance Antimicrobial	a sanitizer/antimicrobial directly in/on food.		chemical" under 201(q)(1)(B)(i) of the FFDCA, as amended by ARTCA, are antimicrobial substances applied on food, or added to water that comes into contact with the food in the preparing, packing, or holding of food for commercial purposes.

Terminology, Jurisdictions, and Definitions

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EPA/FDA Jurisdiction Table Antimicrobials Treatments (Food Use)

Category	Jurisdiction	Comments
Treatment of RAC's except in a food processing facility	EPA	
Treatment of RAC's during transportation to or in a food processing facility	EPA/FDA	
Consumer treatment of RAC's	EPA	
Post-harvest (in the field) treatment of RAC's	EPA	
Treatment of process water in food processing facility	EPA/FDA	
Treatment of processed food	FDA	
Crisping	?	Depends on product use/claims/intent.
On site generation of chemicals	EPA	EPA regulates device

FOOD CODE

Regulation	Code Reference	Comments
(A) Except as specified in ¶ (B) of this section and except for whole, raw fruits and vegetables that are intended for washing by the CONSUMER before consumption, raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY-TOEAT form. (B) Fruits and vegetables may be washed by using chemicals as specified under § 7-204.12. (C) Devices used for on-site generation of chemicals meeting the requirements specified in 21 CFR 173.315, Chemicals used in the washing or to assist in the peeling of fruits and vegetables,	§ 3-302.15	

Terminology, Jurisdictions, and Definitions

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for the washing of raw, whole fruits and vegetables shall be used in accordance with the manufacturer's instructions.		
See also Annex listing below.		
Chemicals for Washing, Treatment, Storage and Processing Fruits and Vegetables, Criteria.	§ 7-204.12; § 7-204.12 Annex 2 – References	(A) Chemicals, including those generated on-site, used to wash or peel raw, whole fruits and vegetables shall: (1) Be an approved food additive listed for this intended use in 21 CFR 173, P or (2) Be generally recognized as safe (GRAS) for this intended use, P or (3) Be the subject of an effective food contact notification for this intended use (only effective for the manufacturer or supplier identified in the notification), P and (4) Meet the requirements in 40 CFR 156 Labeling Requirements for Pesticide and Devices. P (B) Ozone as an antimicrobial agent used in the treatment, storage, and processing of fruits and vegetables in a FOOD ESTABLISHMENT shall meet the requirements specified in 21 CFR 173.368 Ozone.

Terminology, Jurisdictions, and Definitions

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		Annex 2 – References 2. Code of Federal Regulations, Title 21, Part 173.405, Secondary Direct Food Additives Permitted in Food for Human Consumption; Sodium Dodecylbenzenesulfonate.
See also Annex listing below.		

Annex 3

3-302.15 Washing Fruits and Vegetables.

Pathogenic microorganisms, such as Salmonella spp., and chemicals such as pesticides, may be present on the exterior surfaces of raw fruits and vegetables. It has been assumed that washing removes the majority of organisms and/or chemicals present; however, more recent studies have demonstrated washing to fall short of their complete removal. Biofilm development by Salmonella allows bacterial cells to survive under adverse environmental conditions and also reduces the ability to remove pathogens by washing, even with antimicrobial agents. All fresh produce, except commercially washed, pre-cut, and bagged produce, must be thoroughly washed under running, potable water or with chemicals as specified in Section 7-204.12, or both, before eating, cutting or cooking. Even if you plan to peel or otherwise alter the form of the produce, it is still important to remove soil and debris first.

Infiltration of microorganisms can occur through stem scars, cracks, cuts or bruises in certain fruits and vegetables during washing. Once internalized, bacterial pathogens cannot be removed by further washing or the use of sanitizing solutions. To reduce the likelihood of infiltration, wash water temperature should be maintained at 10°F warmer than the pulp temperature of any produce being washed. Because certain fruits and vegetables are susceptible to infiltration of microorganisms during soaking or submersion, it is recommended that soaking or submerging produce during cleaning be avoided. It is important to follow practices that minimize pathogens in the water or on the surface of produce. It is important that proper handwashing procedures are followed, in accordance with Section 2-301.12 Cleaning Procedure, before and after handling fresh produce.

Scrubbing with a clean brush is only recommended for produce with a tough rind or peel, such as carrots, cucumbers or citrus fruits that will not be bruised easily or penetrated by brush bristles. Scrubbing firm produce with a clean produce brush and drying with a clean cloth towel or fresh disposable towel can further reduce bacteria that may be present. Washing fresh fruits and vegetables with soap, detergent or other surfactants should be avoided as they facilitate infiltration and may not be approved for use on food. Toxic or undesirable residues could be present in or on the food if chemicals used for washing purposes are unapproved or applied in excessive concentrations. Unless otherwise stipulated in 21 CFR 173.315, chemicals used to wash or peel fruits and vegetables should not exceed the minimum amount required to accomplish the intended effect, need to be accurately tested for proper concentration, and must adhere to any indications as dictated on the product label.

Terminology, Jurisdictions, and Definitions

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Many pre-cut, bagged produce items are pre-washed. If so, these products will be identified as such on the package label, and can be used as ready-to-eat without further washing. The label should also state if further washing is recommended or necessary. Precut or prewashed produce in open bags should not be washed before use. After being cut, certain produce such as melons, leafy greens and tomatoes are considered time/temperature control for safety food (TCS) requiring time/temperature control for safety and should be refrigerated at 41°F or lower to prevent any pathogens that may be present from multiplying. For more retail food guidance on the storage and handling of tomatoes, leafy greens, and other produce, you may consult the FDA Program Information Manual, Retail Food Protection Storage and Handling of Tomatoes, dated October 5, 2007, available at
http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/IndustryandRegulatoryAssistanceandTrainingResources/ucm113843.htm, the document, Time as a Public Health Control for Cut Tomatoes, dated June 8, 2010 available at
http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/IndustryandRegulatoryAssistanceandTrainingResources/ucm215053.htm
and the FDA Program Information Manual, Recommendations for the Temperature Control of Cut Leafy Greens during Storage and Display in Retail Food Establishments dated July 7, 2010 available at
http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/IndustryandRegulatoryAssistanceandTrainingResources/ucm218750.htm
On October 26, 1998 a voluntary guidance document for the produce industry which addresses microbial hazards and good agricultural and management practices commonly used by fresh fruit and vegetable producers was issued jointly by FDA, USDA, and CDC. This voluntary guidance contains useful information related to washing fruits and vegetables as well as the application of antimicrobial agents and was updated on August 19, 2003. This “Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables”, October 26, 1998, is available from FDA’s Food Safety Initiative staff and also on the Internet at
http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ProducePlantProducts/ucm064574.htm.
Additionally, in February 2008, the FDA Center for Food Safety and Applied Nutrition (CFSAN) issued “Guidance for Industry, Guide to Minimize Microbial Food Safety Hazards of Fresh-cut Fruits and Vegetables,” which covers fresh-cut fruits and vegetables that have been minimally processed (e.g. no kill step) and altered in form, by peeling, slicing, chopping, shredding, coring, or trimming with or without washing or other treatment, prior to being packaged for use by the consumer or a retail establishment. This guide is available at:
http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ProducePlantProducts/ucm064458.htm.
On January 11, 2006 FDA/CFSAN published additional safe handling advice on the purchase, storage, and preparation of fresh produce, as well as Q & A’s for consumers on their website at: http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm114299.htm. This document is available in PDF (3.5 MB) format (also available in Spanish) and provides additional information on the cleaning of fresh produce.

Annex 3

Terminology, Jurisdictions, and Definitions

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7-204.12 Chemicals for Washing Fruits and Vegetables

If the chemical wash, boiler water additive, or drying agent used is not made up of components that are approved as food additives or generally recognized as safe, illness may result. This could be due to residues that may remain from the use of compounds such as unrecognized drying agents. This is why only those chemicals that are approved food additives or food-contact substances, generally recognized as safe, prior sanctioned or exempted by the threshold of regulation process can be used. Information regarding food contact substances notification may be found on the FDA website under the Food Topic in Ingredients and Packaging section at:
http://www.fda.gov/Food/IngredientsPackagingLabeling/PackagingFCS/default.htm
Chemicals that are not generally recognized as safe, or not authorized by FDA for these uses may be submitted for review by filing a Food Additive Petition, a Food Contact Notification (FCN), or a request for exemption under the Threshold of Regulation. Wash chemicals, boiler water additives, and drying agents are classified as food additives because of the possibility that they may end up in food. Therefore, they are subject to review before being used or listed in the CFR. If the chemicals are hard food-contact sanitizers, or washes for raw agricultural commodities (RACs) that are used on a farm or in a packing house, then this is under the jurisdiction of the EPA.
21 CFR 173 Secondary Direct Food Additives Permitted in Food for Human Consumption includes a number of regulations permitting certain food additives to be used for washing fruits and vegetables. In an effort to be consistent with federal law a change was made in Section 7-204.12 Chemicals for Washing, Treatment, Storage and Processing Fruits and Vegetables, Criteria to include all of 21 CFR 173 so as not to exclude the use of other permitted food additives. There is also another mechanism for approval of antimicrobial agents for washing fruits and vegetables (i.e., the food contact notification program) as well as GRAS ingredients permitted as antimicrobials or for general food use. This revision allows for the use of ingredients that are GRAS for this use and food contact substances which were the subject of an effective food contact notification for this use. 21 CFR 173 includes permitted food additives such as those listed in 21 CFR 173.315 Chemicals used in the washing or to assist in the peeling of fruits and vegetables. This section specifically identifies some of the chemicals that may be used in washing fruits and vegetables, regardless of whether the chemicals are commercially produced or generated on site. Sodium hypochlorite is listed in 21 CFR 173.315 for use in washing fruits and vegetables at levels not exceeding the minimum amount required to accomplish the intended technical effect. FDA has no objection to the use of calcium hypochlorite in the place of sodium hypochlorite under 21 CFR 173.315.
On December 4, 2012, the FDA amended the food additive regulations to provide for the safe use of sodium dodecylbenzenesulfonate (SDBS) (CAS No. 25155-30-0) as an antimicrobial agent for use in wash water for fruits and vegetables without the requirement of a potable water rinse. 21 CFR Section 173.405 specifically identifies this additive as an antimicrobial agent used in wash water for fruits and vegetables. The additive may be used at a level not to exceed 111 milligrams per kilogram in the wash water. Fruits and vegetables treated by the additive do not require a potable water rinse. Use of this additive is limited to use in commissaries, cafeterias, restaurants, retail food establishments, nonprofit food establishments and other food service operations in which food is prepared for or served directly to the consumer. To ensure safe use of the additive, refer to the label or labeling of the additive and/or antimicrobial pesticide container for adequate

directions. Information on the label is required in accordance to provisions within 21 CFR 173.405 and the Federal Food, Drug and Cosmetic Act. Although the petitioned use of SDBS is regulated under Section 409 of the FD & C Act as a food additive, this intended use of SDBS may nevertheless be subject to regulation as a pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). EPA requirements pertain to EPA registered pesticide products that have uses subject to EPA or both FDA and EPA regulations. Therefore, manufacturers intending to use this food additive for this intended use should contact the Environmental Protection Agency to determine whether this use requires a pesticide registration under FIFRA.
Boiler water additives that may be safely used in the preparation of steam that may contact food, and their condition of use, are identified in 21 CFR 173.310 Boiler Water Additives.

Additional resources:

1. https://www.khlaw.com/701
2. Determining Regulatory Authority for Antimicrobial Substances. Decision Tree for Determining whether any Particular Antimicrobial Intervention for Food is Regulated by the Environmental Protection Agency or the Food and Drug Administration https://www.fda.gov/Food/IngredientsPackagingLabeling/PackagingFCS/RegulatoryAuthorityAntimicrobialSubstances/default.htm

Excerpt of the 2013 FDA Food Code for provisions 3-302.15 and 7-204.12 with corresponding public health reasons from Annex 3

3-302.15 Washing Fruits and Vegetables.

(A) *Except as specified in ¶ (B) of this section and except for whole,* raw *fruits and vegetables that are intended for washing by the* CONSUMER *before consumption,* raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY-TO-EAT form.

(B) *Fruits and vegetables may be washed by using chemicals as specified under § 7-204.12.*

(C) Devices used for on-site generation of chemicals meeting the requirements specified in 21 CFR 173.315, Chemicals used in the washing or to assist in the peeling of fruits and vegetables, for the washing of raw, whole fruits and vegetables shall be used in accordance with the manufacturer's instructions. [Pf]

Annex 3

3-302.15 Washing Fruits and Vegetables.

Pathogenic microorganisms, such as *Salmonella* spp., and chemicals such as pesticides, may be present on the exterior surfaces of raw fruits and vegetables. It has been assumed that washing removes the majority of organisms and/or chemicals present; however, more recent studies have demonstrated washing to fall short of their complete removal. Biofilm development by *Salmonella* allows bacterial cells to survive under adverse environmental conditions and also reduces the ability to remove pathogens by washing, even with antimicrobial agents. All fresh produce, except commercially washed, pre-cut, and bagged produce, must be thoroughly washed under running, potable water or with chemicals as specified in Section 7-204.12, or both, before eating, cutting or cooking. Even if you plan to peel or otherwise alter the form of the produce, it is still important to remove soil and debris first.

Infiltration of microorganisms can occur through stem scars, cracks, cuts or bruises in certain fruits and vegetables during washing. Once internalized, bacterial pathogens cannot be removed by further washing or the use of sanitizing solutions. To reduce the likelihood of infiltration, wash water temperature should be maintained at 10°F warmer than the pulp temperature of any produce being washed. Because certain fruits and vegetables are susceptible to infiltration of microorganisms during soaking or submersion, it is recommended that soaking or submerging produce during cleaning be avoided. It is important to follow practices that minimize pathogens in the water or on the surface of produce. It is important that proper handwashing procedures are followed, in accordance with Section 2-301.12 Cleaning Procedure, before and after handling fresh produce.

Scrubbing with a clean brush is only recommended for produce with a tough rind or peel, such as carrots, cucumbers or citrus fruits that will not be bruised easily or penetrated by brush bristles. Scrubbing firm produce with a clean produce brush and drying with a clean cloth towel or fresh disposable towel can further reduce bacteria that may be present. Washing fresh fruits and vegetables with soap, detergent or other surfactants should be avoided as they facilitate infiltration and may not be approved for use on food. Toxic or undesirable residues could be present in or on the food if chemicals used for washing purposes are unapproved or applied in excessive concentrations. Unless otherwise stipulated in 21 CFR 173.315, chemicals used to wash or peel fruits and vegetables should not exceed the minimum amount required to accomplish the intended effect, need to be accurately tested for proper concentration, and must adhere to any indications as dictated on the product label.

Many pre-cut, bagged produce items are pre-washed. If so, these products will be identified as such on the package label, and can be used as ready-to-eat without further washing. The label should also state if further washing is recommended or necessary. Precut or prewashed produce in open bags should not be washed before use. After being cut, certain produce such as melons, leafy greens and tomatoes are considered time/temperature control for safety food (TCS) requiring time/temperature control for safety and should be refrigerated at 41°F or lower to prevent any pathogens that may be present from multiplying. For more retail food guidance on the storage and handling of tomatoes, leafy greens, and other produce, you may consult the FDA Program Information Manual, Retail Food Protection Storage and Handling of Tomatoes, dated October 5, 2007, available at http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/IndustryandRegulatoryAssistanceandTrainingResources/ucm113843.htm, the document, Time as a Public Health Control for Cut Tomatoes, dated June 8, 2010 available at http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/IndustryandRegulatoryAssistanceandTrainingResources/ucm215053.htm
and the FDA Program Information Manual, Recommendations for the Temperature Control of Cut Leafy Greens during Storage and Display in Retail Food Establishments dated July 7, 2010 available at http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/IndustryandRegulatoryAssistanceandTrainingResources/ucm218750.htm

On October 26, 1998 a voluntary guidance document for the produce industry which addresses microbial hazards and good agricultural and management practices commonly used by fresh fruit and vegetable producers was issued jointly by FDA, USDA, and CDC. This voluntary guidance contains useful information related to washing fruits and vegetables as well as the application of antimicrobial agents and was updated on August 19, 2003. This "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables", October 26, 1998, is available from FDA's Food Safety Initiative staff and also on the Internet at http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ProducePlantProducts/ucm064574.htm.

Additionally, in February 2008, the FDA Center for Food Safety and Applied Nutrition (CFSAN) issued "Guidance for Industry, Guide to Minimize Microbial Food Safety Hazards of Fresh-cut Fruits and Vegetables," which covers fresh-cut fruits and vegetables that have been minimally processed (e.g. no kill step) and altered in form, by peeling, slicing, chopping, shredding, coring, or trimming with or without washing or other treatment, prior to being packaged for use by the consumer or a retail establishment. This guide is available at: http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ProducePlantProducts/ucm064458.htm.

On January 11, 2006 FDA/CFSAN published additional safe handling advice on the purchase, storage, and preparation of fresh produce, as well as Q & A's for consumers on their website at: http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm114299.htm. This document is available in PDF (3.5 MB) format (also available in Spanish) and provides additional information on the cleaning of fresh produce.

7-204.12 Chemicals for Washing, Treatment, Storage and Processing Fruits and Vegetables, Criteria.

(A) Chemicals, including those generated on-site, used to wash or peel raw, whole fruits and vegetables shall:

(1) Be an approved food additive listed for this intended use in 21 CFR 173, [P] or

(2) Be generally recognized as safe (GRAS) for this intended use, [P] or

(3) Be the subject of an effective food contact notification for this intended use (only effective for the manufacturer or supplier identified in the notification), [P] and

(4) Meet the requirements in 40 CFR 156 Labeling Requirements for Pesticide and Devices. [P]

(B) Ozone as an antimicrobial agent used in the treatment, storage, and processing of fruits and vegetables in a FOOD ESTABLISHMENT shall meet the requirements specified in 21 CFR 173.368 Ozone.[P]

Annex 3

7-204.12 Chemicals for Washing Fruits and Vegetables, Criteria.
7-204.13 Boiler Water Additives, Criteria.
7-204.14 Drying Agents, Criteria.

If the chemical wash, boiler water additive, or drying agent used is not made up of components that are approved as food additives or generally recognized as safe, illness may result. This could be due to residues that may remain from the use of compounds such as unrecognized drying agents. This is why only those chemicals that are approved food additives or food-contact substances, generally recognized as safe, prior sanctioned or exempted by the threshold of regulation process can be used. Information regarding food contact substances notification may be found on the FDA website under the Food Topic in Ingredients and Packaging section at: http://www.fda.gov/Food/IngredientsPackagingLabeling/PackagingFCS/default.htm

Chemicals that are not generally recognized as safe, or not authorized by FDA for these uses may be submitted for review by filing a Food Additive Petition, a Food Contact Notification (FCN), or a request for exemption under the Threshold of Regulation. Wash chemicals, boiler water additives, and drying agents are classified as food additives because of the possibility that they may end up in food. Therefore, they are subject to review before being used or listed in the CFR. If the chemicals are hard food-contact sanitizers, or washes for raw agricultural commodities (RACs) that are used on a farm or in a packing house, then this is under the jurisdiction of the EPA.

21 CFR 173 Secondary Direct Food Additives Permitted in Food for Human Consumption includes a number of regulations permitting certain food additives to be used for washing fruits and vegetables. In an effort to be consistent with federal law a change was made in Section 7-204.12 Chemicals for Washing, Treatment, Storage and Processing Fruits and Vegetables, Criteria to include all of 21 CFR 173 so as not to exclude the use of other permitted food additives. There is also another mechanism for approval of antimicrobial agents for washing fruits and vegetables (i.e., the food contact notification program) as well as GRAS ingredients permitted as antimicrobials or for general food use. This revision allows for the use of ingredients that are GRAS for this use and food contact substances which were the subject of an effective food contact notification for this use. 21 CFR 173 includes permitted food additives such as those listed in 21 CFR 173.315 Chemicals used in the washing or to assist in the peeling of fruits and vegetables. This section specifically identifies some of the chemicals that may be used in washing fruits and vegetables, regardless of whether the chemicals are

commercially produced or generated on site. Sodium hypochlorite is listed in 21 CFR 173.315 for use in washing fruits and vegetables at levels not exceeding the minimum amount required to accomplish the intended technical effect. FDA has no objection to the use of calcium hypochlorite in the place of sodium hypochlorite under 21 CFR 173.315.

On December 4, 2012, the FDA amended the food additive regulations to provide for the safe use of sodium dodecylbenzenesulfonate (SDBS) (CAS No. 25155-30-0) as an antimicrobial agent for use in wash water for fruits and vegetables without the requirement of a potable water rinse. 21 CFR Section 173.405 specifically identifies this additive as an antimicrobial agent used in wash water for fruits and vegetables. The additive may be used at a level not to exceed 111 milligrams per kilogram in the wash water. Fruits and vegetables treated by the additive do not require a potable water rinse. Use of this additive is limited to use in commissaries, cafeterias, restaurants, retail food establishments, nonprofit food establishments and other food service operations in which food is prepared for or served directly to the consumer. To ensure safe use of the additive, refer to the label or labeling of the additive and/or antimicrobial pesticide container for adequate directions. Information on the label is required in accordance to provisions within 21 CFR 173.405 and the Federal Food, Drug and Cosmetic Act. Although the petitioned use of SDBS is regulated under Section 409 of the FD & C Act as a food additive, this intended use of SDBS may nevertheless be subject to regulation as a pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). EPA requirements pertain to EPA registered pesticide products that have uses subject to EPA or both FDA and EPA regulations. Therefore, manufacturers intending to use this food additive for this intended use should contact the Environmental Protection Agency to determine whether this use requires a pesticide registration under FIFRA.

Boiler water additives that may be safely used in the preparation of steam that may contact food, and their condition of use, are identified in 21 CFR 173.310 Boiler Water Additives.

Conference for Food Protection – Committee FINAL Report

Template approved: 04/20/2016

Committee Final Reports are considered DRAFT until acknowledged by Council or accepted by the Executive Board

COMMITTEE NAME: **Produce Wash Water Committee (PWWC)**

DATE OF FINAL REPORT: *11/30/2017*

COMMITTEE ASSIGNMENT: ☐ ***Council I*** ☐ ***Council II*** ☒ ***Council III*** ☐ ***Executive Board***

REPORT SUBMITTED BY: Anna Starobin and Karl Mathews

COMMITTEE CHARGE(S):

Issue # 2016-III-026 Chemical treatment of water used to wash or crisp raw fruits and vegetables

1. *Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;*
2. *Identify conditions of use, including types of RACs and RTE fruits and vegetables, and methods for assuring efficacy of use;*
3. *Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.*
4. *Consult with appropriate professional produce trade organizations; and*
5. *Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection.*

COMMITTEE WORK PLAN AND TIMELINE:

1. Create 2 sub-committees
    a. Group 1 addressed Charge #1 – completed
    b. Group 2 addressed Charge #3 – completed

Charge #2: Create and distribute a survey to gather information from retail/restaurants – completed

Charge #3: Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.- completed

Charge #4: Contact Produce Manufacturing Association (PMA) and United Fresh for feedback; reach out to academic experts – completed

2. Periodic reports submitted to Council Chair by July 1, 2017.
    a. Summarize all documents, surveys, references and input. Completed September 1, 2017.
    b. Write draft report. Completed September 1, 2017.
    c. Develop recommendations based on findings. Completed by September 1, 2017.
    d. Wrote final report and submitted to Council Chair by November 1, 2017.

COMMITTEE ACTIVITIES:

1. ***Dates of committee meetings or conference calls***:

Full Committee	8/31/16	9/29/16	10/27/16	1/26/17	2/23/17	3/23/17	4/27/17	5/25/17	7/27/17	10/26/17
Literature review sub-committee	9/27/16	10/12/16	11/9/16	1/11/17	2/8/17	6/19/17	9/12/17			
Regulatory review sub-committee	9/21/16	10/19/16								

2. ***Overview of committee activities:***

a. White paper summarizing the outcome of the work done by the committee with recommendations drafted.
The first draft was prepared by the assigned small working group (Karl Mathews, Jill Hollingsworth Reed, and Anna Starobin) and reviewed by the voting members. Provided feedback was incorporated into the document and was discussed further during the call on July 17th. When the majority of the voting members approve the document, it was sent to the committee at large for additional comments.

- Charge #1 – literature review subcommittee calls. Created a document-sharing mechanism (using FoodShield) to share and review scientific publications.
- 40 publications have been reviewed (Reference list III-26) and critiqued against a set of developed questionnaire with criteria for relevance to the charge.
- Evaluated Center for Disease Control (CDC) and other public health data; conducted a survey of food establishments to assess washing and crisping practices; reviewed relevant FDA Food Code sections and related Annexes; reviewed selected Federal and State regulations and requirements; and sought input from a variety of produce and academic experts (Dr. Suslov, Dr. Ryser, Dr. Matthews, Dr. Gorny, Dr. McEntire, Dan Dahlman, Kris Zetterlund). A list of the materials reviewed by the Committee, the industry survey and the presentations are available as attachments to this report.

b. Charge #2 - The development of the survey was a part of literature review sub-team, since the group felt that the literature search criteria could be affected by the results of the survey. Initiated discussion of survey at October 12, 2016 meeting of Group 1 and during full committee meeting October 26, 2016.

- Developed and distributed a survey to retailers and restaurants. The survey was sent to the committee members and was distributed to the membership of Food Marketing Institute (FMI), National Restaurant Association (NRA) and National Grocery Association (NGA). As of 6/12/2017 received 3,910 responses.

c. Charge #3 - regulatory subcommittee calls (9/21/16; 10/19/16).

- Completed review and comparison of various state regulations and FDA Food Code.
- Developed a chart of terminology & definitions as a reference document.
- Summarized current Food Code chapters addressing produce related regulations.

- Reviewed a chart showing FDA and EPA areas of responsibilities, and decision tree for produce antimicrobials.

d. Charge #4: Contacted PMA and United Fresh for feedback; reached out to academic experts.

- Obtained feedback and comments from several experts (example: University of California, Davis, Michigan State University) and arranged several presentations:
  - Dr. Matthews, Rutgers University, "Sanitizers efficacy in preventing cross-contamination of heads of lettuce during retail crisping" 3/23/17
  - Kris Zetterlund, Darden Restaurants, shared with the group on the produce washing practices used by Darden - 4/27/17
  - Dr. McEntire, United Fresh e "Produce Crisping Risks and Mitigations" - 5/25/17
  - Dan Dahlman, Ecolab "Common regulatory questions/concerns related to produce washes & treatments"

    -5/25/17
  - Dr. Gorny, PMA "Safe washing & crisping of produce" 5/25/17

e. Charge #5: Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection

3. Charges COMPLETED and the rationale for each specific recommendation:

A.a. *Charge #1 Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;*

Findings and Recommendation Rationale:

The Committee reviewed over 40 published articles, manuscripts and guidance documents; evaluated CDC and other public health data; conducted a survey of food establishments to assess washing and crisping practices; reviewed relevant FDA Food Code sections and related Annexes; reviewed selected Federal and State regulations and requirements; and sought input from a variety of produce and academic experts. A list of the materials reviewed by the Committee, the industry survey and the presentations are available as attachments to this report (Reference list III-26).

The Committee, based on the review of the literature, found that using an antimicrobial treatment in washing or crisping water in food establishments can reduce the risk of pathogen cross-contamination from water when produce is submerged in water. The Committee found that scientific data supports the hypothesis that adding an antimicrobial treatment to the washing or crisping water in food establishments can reduce and, in some cases, prevent the risk of pathogen cross-contamination from water when produce is submerged in water. The scientific review also showed that using an antimicrobial treatment can reduce pathogens on the surface of produce although this impact varies based on several factors such as type of chemical treatment, type of produce, size of batch, etc. A multiple-step approach from farm to consumer has the greatest risk-reduction potential and public health impact since there is no "kill step" for fresh produce.

However, the Committee concluded that the use of antimicrobial treatments should be optional to allow food establishments the opportunity to assess their individual risks and use preventive steps most appropriate for their processes. Such an approach is consistent with other FDA preventive controls (i.e., Food Safety Modernization Act - FSMA).

The Committee concluded that food establishments would benefit from guidance on how to assess risk and implement preventive controls to address washing, crisping and the use of antimicrobial water treatments in food establishments, and recommends a CFP Committee be charged with developing a Produce Guidance Document for this purpose (PWWC 4 - Re-Create – Produce Wash Water Committee).

A.b. *Charge #2.Identify conditions of use, including types of RACs and RTE fruits and vegetables, and methods for assuring efficacy of use;*

Findings and Recommendation Rationale:

A survey created by the committee and distributed to and completed by food establishment representatives (3,895 participants) suggests that a majority of food establishments wash, crisp, or perform both practices on produce. A variety of RACs and RTE fruits and vegetables (leafy greens, tomatoes, cantaloupes, cucumbers, etc.) are subjected to these practices. Typically only one type of produce is washed at a time, but some of the operators mix the produce items, whether under running water or submerging. A quarter of the responders reported that they store produce in water. When chemicals are added to process waters a third of the operators do not monitor concentration as a means of assuring efficacy; 17% out of 1,767 responded to this question do not have a designated sink for produce washing and 16% of 1,766 operations responded to this question, do not always sanitize the sink prior to washing the produce. Standard operating practices were not used by all establishments. Due to the variety of produce handling practices used by the food establishments while washing or crisping produce it would be beneficial to develop a guidance document covering produce washing best practices. Detailed information of the survey results with the numbers of responders to individual questions could be found in the content documents attached (CFP Produce Committee survey).

The Committee recommends developing a Produce Guidance Document to address washing, crisping and the use of antimicrobial water treatments in food establishments.

c. *Charge #3. Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.*

Findings and Recommendation Rationale:

FDA and Environmental Protection Agency (EPA) are the agencies regulating the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables. These regulations are complicated and difficult to interpret by the FDA Food Code users. There are some discrepancies in terminology and definitions used by the agencies. Crisping, a common practice used in food establishments, is not defined in the Food Code. This Committee addressed some of the challenges mentioned by reviewing various regulations and creating the following documents:

- *Completed review and comparison of various state regulations and FDA Food Code.*
- *Developed a chart of terminology, jurisdictions, & definitions as a reference document.*
- *Summarized current Food Code provisions addressing produce related regulations.*
- *Reviewed chart showing FDA and EPA areas of responsibilities, and decision tree for produce antimicrobials*

The Committee recommends that a letter be sent to the FDA requesting the Food Code be amended by including the definition for "crisping" to section 1-201.10 and to amend the section 3-302.15 as follows (using underlining for language additions and strikethrough for language to be deleted):

Crisping definition for section 1-201.10:

<u>"Crisping" means the practice of exposing fresh produce to water for the purpose of improving quality. Crisping can be accomplished by holding fresh produce under running water or by immersion in water for a time sufficient to allow for rehydration. In addition, crisping may include a method for chilling such as submersion in ice water or refrigeration after submersion.</u>

<u>3-302.15 Washing and Crisping Fruits and Vegetables.</u>

(A) Except as specified in ¶ (B) of this section and except for whole, raw fruits and vegetables that are intended for washing by the CONSUMER before consumption, raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in READY-TO- EAT form.

(B) Fruits and vegetables may be washed <u>or CRISPED</u> ~~by~~ using chemicals as specified under § 7-204.12.

(C) Devices used for on-site generation of chemicals meeting the requirements specified in 21 CFR 173.315, Chemicals used in the washing or CRISPING or to assist in the peeling of fruits and vegetables, for the washing or CRISPING of raw, whole fruits and vegetables shall be used in accordance with the manufacturer's instructions.

d. Charge #4: Consult with appropriate professional produce trade organizations

Findings and Recommendation Rationale:

Contacted Produce Marketing Association (PMA) and United Fresh for feedback; reached out to academic experts and obtained feedback and comments (example: University of California, Davis, Michigan State University). Arranged and had several presentations during full committee conference calls (see supporting documents attached). Information obtained included in the white paper and has influenced the recommendations provided.

e. Charge #5: Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection.

4. Charges INCOMPLETE and to be continued to next biennium:

None

COMMITTEE REQUESTED ACTION FOR EXECUTIVE BOARD:

☒ ***No requested Executive Board action at this time; all committee requests and recommendations are included as an Issue submittal.***

LISTING OF CFP ISSUES TO BE SUBMITTED BY COMMITTEE:

1. *Issue #1: PWWC 1-Acknowledgement of the 2016-2018 Produce Wash Water Committee report and thanking the committee for the effort the members put forth in working on the charges.*
   a. *Content Documents*
      a.1. *Committee final report*
      a.2. *Committee roster*
      a.3. Produce Wash Committee White Paper
      a.4. CFP Produce Committee Survey
      a.5. Comparison of state regulations with 2013 FDA Food Code
      a.6. Terminology, jurisdictions & definitions chart
      a.7. Summary of current FDA Food Code provisions addressing produce washing

   b. *Supporting Documents*
      b.1. Meeting Notes. All meeting notes were approved by the majority of the voting members via e-mail responses.
      b.2. *Power point presentations*
         - *Sanitizers efficacy in preventing cross-contamination of heads of lettuce during retail crisping, Dr. Matthews, Rutgers*
         - *University*
         - *Produce Crisping Risks and Mitigations, Dr. McEntire, United Fresh*
         - *Common regulatory questions/concerns related to produce washes & treatments, Dan Dahlman, Ecolab*
         - *Safe washing & crisping of produce, Dr. Gorny, Produce Manufacturing Association (PMA)*
      3 Documents' Reference List

2. *Issue #2: PWWC 2 – Amend Food Code to add the definition for "crisping".*
3. *Issue #3: PWWC 3 – Post the document created by the committee on CFP website.*
4. *Issue #4: PWWC 4 - Re-create – Produce Wash Water Committee with the charge to develop a Produce Guidance Document to address washing, crisping and the use of antimicrobial water treatments in food establishments.*

Conference for Food Protection

Produce Washing Committee

Meeting Minutes October 26, 2017 2-3pm (EST)

Charges:

Committee Charges:
1.Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;
2.Identify conditions of use, including types of RACs and RTE fruits and vegetables, and methods for assuring efficacy of use;
3.Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.
4.Consult with appropriate professional produce trade organizations; and
5.Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection.

Working Group 1
Charge 1
Working Group 2
Charge 3

Attendance: A. Staroben, K. Matthews, Barbara Ingham; Chris Zetterland; Jane Lipe, Susan Kenrick, Vannesa Cranford
Several non-voting members.

Anna: Welcomed group.

Anna: Attendance.

The final report was sent to all voting members and opportunity for comment was provided. All comments were considered and text modified as appropriate. All members were pleased with final prepared document.

Anna provided background information.

Barb: 2nd page charge #2. Recommend that number of surveys that were returned. Revision will be made.

Preparation of report based on format provided by board.

Should submit by Nov 1. Must prepare issues by Dec. 12th. Suggestions at bottom of document.

Not all committee calls included since limited of scope.

Anna summarizing the written text by each section and requesting comments as we move through the document.

- Create new or re-create the existing committee to address charge #1.
- Will suggest work on the guidance document over the next couple of years.
- Anna noted definition of crisping not included in the food code. The definition of "crisping" was indicated and the potential to include definition of crisping to the code.
- Mentioned presentation that we arranged for interested parties to attend.
- Propose three issues to submit…by Dec. 12th. Perhaps more important than report

Barb questioned the terminology in definition included in food code.

Barb: "used in accordance with manufacturer's instructions" Will the manufacturer include new information on label specific to crisping. Not certain whether this is appropriate to address at the stage.

Anna: concluded mtg indicating that we will continue with development of issues.

Requested interest in joining group to write issues.

Karl: Send invitation to entire group to work on issues.

Meeting concluded.

Conference for Food Protection

Produce Washing Committee

Agenda: July 27, 2017 2:00 to 3:00 PM (EST)

Charges:

Committee Charges:
1.Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;
2.Identify conditions of use, including types of RACs and RTE fruits and vegetables, and methods for assuring efficacy of use;
3.Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.
4.Consult with appropriate professional produce trade organizations; and
5.Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection.

Working Group 1
Charge 1
Working Group 2
Charge 3

Topic of discussions

- Progress on white paper
- Issues that arose during preparation of white paper
- General discussion
- New business

All the issues discussed were resolved, no additional notes were taken.

Call in Information:
Date: 07/27/17
Time: 2:00 – 3:00 PM (Est)
Call in number: 877-394-5901.
Moderator number is 6800708.
Access code is 3988523.

Conference for Food Protection

Produce Washing Committee

Meeting Minutes May 25, 2017 2-3pm (EST)

Charges:

Committee Charges:
1.Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;
2.Identify conditions of use, including types of RACs and RTE fruits and vegetables, and methods for assuring efficacy of use;
3.Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.
4.Consult with appropriate professional produce trade organizations; and
5.Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection.

Working Group 1
Charge 1
Working Group 2
Charge 3

Attendance: A. Starobin, K. Matthews, Barbara Ingham; Chris Zetterland; Jill Hollingsworth; Marlene Gaither, Susan Kendrick, Diane Johnson,

Anna: Welcomed group.

Karl: Attendance.

Anna: Will vote on approval of minutes by email.

Presenters for the group.

Jim Gorny – Produce Marketing Association. Presentation: Safe washing and Crisping of Produce. Gave 25 minute presentation. For aspects of the talk please refer to the PDF of the talk.

Q&A. Use of antimicrobials. Can it be done effectively in grocery stores?

Water changing, water antimicrobials, risk assessment.

Water antimicrobials: Prevent cross-contamination. Not trying to reduce microbial load on commodity

When washing: Small volume, one commodity

Anna: Thanked Jim for presentation.

Dan Dahlman – Ecolab Presentation: Q&A for Produce washes and treatments

The group asked questions during the presentation

Open to discussion:

Q. Jill: Antimicrobials: Efficacy hurdles that must be met to claim it is an antimicrobial

Q. Is a requirement 3-log, 5-log reduction

Anna: Meeting adjourned, since time had elapsed.

Conference for Food Protection

Produce Washing Committee

Meeting Minutes April 27th, 2017 2-3pm (EST)

Charges:

Committee Charges:
1.Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;
2.Identify conditions of use, including types of RACs and RTE fruits and vegetables, and methods for assuring efficacy of use;
3.Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.
4.Consult with appropriate professional produce trade organizations; and
5.Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection.

Working Group 1
Charge 1
Working Group 2
Charge 3

Attendance:

Anna: Welcomed group

Karl: Attendance.

Karl: Indicated that sufficient voting members were not present on the call to approve the 3/23/17 meeting minutes that it would be sent out electronically for voting.

- Anna: Introduction of Kris Zetterlund, Director of Quality Assurance with Darden who gave an overview of Darden's current practices as it relates to produce washing in foodservice.
    - Darden several chain locations including Olive Garden, Seasons 52, Long Horn and Capital Grill and their procedures are about reducing and managing risk.
    - The focus is on prevention and traceability utilizing key strategic partners with knowing their suppliers down to the field level. Focusing on the raw material and supply chain is the starting point. They have developed and are using a Supplier Expectations Manual that outlines the best practices their suppliers should be implementing.
    - The distribution chain of partners is defined for where products can be purchased and sourced to the locations. If they run out of product they do permit the locations to go to another restaurant or to a grocer like Wal-Mart for obtaining replacement product.

- The restaurant brands use some washed and some RTE produce at the locations with a wide range of usage.
- Darden does not use any chemical antimicrobial treatment in their washing procedure.
- Cutting Tomatoes:
  - The items that are prepared in-house they focus on preparation temperature for cutting tomatoes and cutting head lettuce, once these items are cut in accordance with the FDA Food Code it becomes a TCS product. Tomatoes arrive pre-chilled and there is not a wash step at the packing houses providing the tomatoes. In some locations like Capital Grill to maintain the quality integrity, they do not store the whole tomatoes refrigerated prior to rinsing and cutting ~~t~~omatoes but they are placed on a time stamp for 4 hrs at room temperature and if not used then discarded.
  - In other locations the whole tomatoes are pre chilled and once rinsed the product is processed immediately and placed into shallow pans for cooling. Only food that is pre-chilled is permitted to be taken to the line. If it is not pre-cooled it would not make temperature on the line. The cut product if not held on time needs to be maintained <41F.
  - The tomatoes are rinsed with tap water in a colander and then sliced or diced for usage, placed into shallow pans and cooled.
- Cutting Head lettuce:
  - Long Horn is known for their Steakhouse but they also pride themselves on their hand chopped salads.
  - The processing begins with following their recipes that exist for each product to clean and sanitize the sink.
  - The sink is then filled with tap water and ice is added to bring the temperature to 35-38F.
  - The outer leaves of the head lettuce are removed as needed due to visible soil or damage to the leaves.
  - Whole head lettuce is washed by rinsing in a colander basket
  - On a clean and sanitized cutting board the whole heads are cut, chopped, and then placed into the sink with water agitated.
  - A skimmer tool then removes the lettuce from the sink and places in into a salad spinner to be spun dry.
  - The product is placed into bus tubs and it can get to 43F in batches, so the cut product is given 4hrs to cool to <41F.
  - Salad spinners and salad mix may do 2-3 batches in a shift. The salad spinner is cleaned at the end of the shift. It is 24" tall and fits in the dish machine but the base needs to be cleaned with a CIP procedure.
- Verification of the Processes:
  - Verification that the locations are following the procedures occurs during the 3rd party audits that are received at the locations. They obtain 2x per year audits and for some locations 3x per year.
- The following questions were asked:
  - Karl: What is the frequency of changing the water?
    - The water is changed for each batch of lettuce in the sink.
  - Karl: What is the procedure for removing outer head lettuce leaves?
    - They are removed only if damaged on bruised.
  - Jill: Are the whole tomatoes being washed at the packing houses?
    - No, tomatoes are not being washed at the packing houses.
  - Jill: Is there a specific temperature for soaking the iceberg and romaine in water.
    - No, the ice is used to help bring the temperature down when using tap water.
  - Vanessa: Are you using cut gloves? If so, how are they cleaned? Are slicers and dicers being used for cutting the tomatoes? If so, how are they cleaned?

- They are using cut gloves. A glove is placed over the hand cutting the tomato, then a cut glove, and another glove is placed over the cutting glove. They are run through the dish machine for cleaning.
- The slicers the blades are removed and then sent through the dish machine.
- The dicer uses a different device and the dicers are not generally able to be cleaned since it is CIP on the parts and not run through the dish machine. This is something that is continually being monitored during the audits at the locations.

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Anna:

- Thanked Kris for his presentation which was very informative and insightful.
- Indicated that Dan Dalham with Ecolab was not able to present on regulatory requirements for antimicrobial washes it is a very long document that was requested to be condensed into 4-5 slides and very difficult will continue to work on this for the next call.
- It was requested to the CFP Board permission to share the raw data that had been obtained on the responses from retail and foodservice regarding washing practices. There were 3,800 responders. The Board approved the request but it needs to have a disclaimer CFP offers no opinion on the raw data. The raw data can be found on the FoodShield site.
- Will share the draft of document for the final report being created.

Anna: Meeting adjourned.

Conference for Food Protection

Produce Washing Committee

Meeting Minutes March 23, 2017 2-3pm (EST)

Charges:

Committee Charges:
1.Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;
2.Identify conditions of use, including types of RACs and RTE fruits and vegetables, and methods for assuring efficacy of use;
3.Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.
4.Consult with appropriate professional produce trade organizations; and
5.Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection.

Working Group 1
Charge 1
Working Group 2
Charge 3

Attendance: A. Staroben, K. Matthews, Barbara Ingham; David Crownover; Jill Hollingsworth; Vanessa Cranford; Alison Hurysz, Susan Kendrick.

Anna: Welcomed group.

Karl: Attendance.

Anna: Introduction of Jennifer McEntire, VP Food Safety and Technology, United Fresh Produce Association.

- Jennifer gave a PPT entitled "Produce Crisping Risks and Mitigations" . The PPT was provided to the entire committee.
- The talk lasted approximately 15 minutes and was followed by a Q&A session.
- Risk associated with handling of a commodity in a retail setting was discussed.

Anna: Thanked Jennifer for her presentation. Indicated working group 1 has completed charge. Only a few papers remain that need to be reviewed. Requested that additional papers can be posted, but must be accompanied by a review. Introduced subject of development of a "white paper" and requested volunteers to serve on the preparation of the document. It was felt that having a few people involved in construction of the paper would be best. A draft of the document could then be provided to the full committee for comment and review. Jill volunteered to serve on committee preparing the initial draft.

Anna: Meeting adjourned.

Conference for Food Protection

Produce Washing Committee

Meeting Minutes February 23, 2017 2-3pm (EST)

Charges:

Committee Charges:
1.Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;
2.Identify conditions of use, including types of RACs and RTE fruits and vegetables, and methods for assuring efficacy of use;
3.Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.
4. Consult with appropriate professional produce trade organizations; and
5. Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection.

Working Group 1
Charge 1
Working Group 2
Charge 3

Attendance: A. Starobin, K. Matthews, Barbara Ingham; David Crownover; Jill Hollingsworth; Vanessa Cranford; Marlene Gaither; Susan Shelton, Diane Johnson, L. Williams.

Anna: Welcomed group.

Laurie Williams – FDA consultant on committee; Alternate is Vanessa Cranford. Will confer on all items.

Barbara: Provided update on working Group 1. Reviewed 32 articles on the relevance to the charge of group. Main portion of work near completed.

Anna: Asking for volunteer to serve as chair of working group 1. No volunteers.

Tom: Industry connections to answer questionnaire.

Karl: Reviewed paper on cross-contamination in retail setting: "Sanitizer efficacy in preventing cross-contamination of heads of lettuce during retail crisping" (2017).

Tom: Commented on relevance of paper.

Anna: Meeting adjourned.

Conference for Food Protection

Produce Washing Committee

Minutes – January 26, 2017 2-3pm (EST)

Voting Members in attendance: A. Starobin, K. Matthews, J. Hollingsworth, Vanessa Cranford, Alison Hurysz, Jayne Lipe, Susan Kendrick, Susna Shelton, Diane Johnson, Priya Nair, and others.

Welcome: Anna

Attendance: Karl

Vanessa provided update working Group 1. Publications uploaded to Food Shield and check list provided for assessment of each article based on charge.

Karl: Provided background on Jan 11 group call. Review of assessments was initiated. Completed 17 reviews of assessments.

Anna commented that all members should look at questionnaire to post only paper that are relevant. Difficult to keep focused on each charge.

Encourage all members to review materials that we have for all charges. The document that we are preparing is fluid.

Can remove scheduled mtgs for Group II.

Anna discussed approach to address charge 2. Developed questionnaire. Responses to questionnaire – total 3800 responses. Went through breakdown. Low participation from grocery chains. The data is available on the FoodShield website.

Anna asked for volunteers to write report that is due March 1, 2017. Jill Hollingsworth volunteered.

Open to group discussion:

Tom: Separate organic from conventional. Non differentiation in data being collected.
Anna: Does not impact charge.
Daveine - Not within the charge
Tom: Single step in process. Response: Needed to focus on charge.
Jill: Did not request info on temp., chemical used, etc. Is it a common practice?

Tom: Must recognize that other countries have different methods of processing – Two steps, one step.

Remember in literature review process – must post paper and assessment.

Jill: Point on charge. Can we provide evidence of outbreak associated with cross-contamination at retail level. Levels of pathogen contamination of produce that will be crisped. So, even if present is there a public health impact. FDA may have data.

Tom: Has ARS been contacted. Increase in hyper-local produce.

General discussion. CDC data – general contamination. Did commodity come into the facility contaminated. Must stay focused on charge was final conclusion. Should consideration be given to only specific commodities.

Anna closed the meeting

October 27, 2016

Produce Wash Committee Meeting Notes, Issue 2016 III-026

Call begun at 2:02 pm by Anna Starobin

- Roll call (Anna)

Voting members in attendance: Anna Starobin; Barbara Ingham; David Crownover; Jill Hollingsworth; Vanessa Cranford; Dan Goldberg; Alison Hurysz; Jayne Lipe; Marlene Gaither; Elizabeth Green; Diane Johnson; Keith Jackson

Karl Mathews; Hilary Thesmar; Susan Kendrick; Susan Shelton; Laurie Williams sent a note prior to the call about the schedule conflict they had.

Committee at large members in attendance: David Abney; Robert Brown; Christina Meinhardt; Tim Mitchell; Ellen Thomas; Woo-Jin Yoo; Kris Zetterlund; Aubry Kreske; Dan Dahlman; Steve Hails; Diane Johnson;

Tim Mitchell; Ellen Thomas; Stan Goldman; Peter Hibbard; Layra Dykman; Joshua Funk; Thomas Johnson sent a note prior to the call about the schedule conflict they had.

- Approval of Produce Wash Committee Meeting Notes of September 29, 2016
- Call frequency: Anna suggested that fewer calls might give people a chance to more actively participate in working groups. It was noted that the schedule of calls (table format) was incorrect.

    - ➔ Participants should email Anna with ideas/recommendations for call frequency. Anna.Starobin@ecolab.com
    - ➔ Number of calls will be reduced, when working group 2 would complete it work (most likely soon).
    - ➔ It was suggested to meet earlier November, due the Thanksgiving, and not to meet in December, and then meet again in January.
    - ➔ A revised schedule of Committee and Working Group calls will be distributed, taking into account major holidays such as Thanksgiving (current date for the next Committee call).
- FoodSHIELD: A FoodSHIELD group has been created for the CFP Produce Wash Committee. https://www.foodshield.org/member/login/ If you are unable to login- contact the FoodSHIELD help desk. Important Committee items are now posted to the FoodSHIELD site (and more are being added). helpdesk@foodshield.org When logged into the FoodSHIELD site, look in apps, open "Documents" and look for information in the relevant Folders for downloaded documents.
    - ➔ Participants should make sure that they have access to FoodSHIELD.
- Jennifer McEntire presentation: A suggestion has been made to ask Jennifer McEntire (VP Food Safety & Technology, United Fresh Produce Association) to present to the entire Committee. A recommended focus for the presentation would be to discuss how the industry assesses risk of cross contamination and determines if there is an appropriate preventive control that can be used to eliminate or minimize risk under FSMA.
    - ➔ Suggestions/concerns related to this potential discussion/presentation should be directed to Anna Starobin.

- Progress update Working Group 1 (Vanessa). Notes from work group meetings can be found on the FoodSHIELD site. On the October 12th call, Karl reported that there are no peer reviewed articles related to crisping but there are 2 theses. Dr. Trevor Suslow has contributed information (placed on FoodSHIELD) related to published papers in the area of produce washing; there is a manuscript that has been submitted to JFP relative to washing and Dr. Suslow has offered to determine if it would be possible to share the manuscript pre-publication – no decision has been made. Dr. Eliot Ryser indicated that most produce washing research which he has directed has dealt with cross contamination during processing steps of cutting, dicing, etc. (not retail). The pertinent information would pertain to the efficacy of sanitizers. There is a comprehensive position paper forthcoming in JFP addressing the efficacy of sanitizers. Work Group 1 has been gathering information for a literature review or white paper; the actual structure of the work group's output has yet to be determined. Whether the Work Group will focus on particular commodities or on general recommendation has also not yet been determined. The next call for the Work Group will focus on more literature review as well as more time spent in outlining the final paper/report.
  - Progress update Working group 2 (Anna). Work Group 2 has focused on defining regulatory terms, and has looked at particular wording in the FDA Food Code. Registration jurisdiction for antimicrobial treatments will be placed in the simplified version of the decision tree available in the Annex of the Code. Additional information was included regarding the current citation within the Food Code for washing fruits and vegetables. 3-302.15 & 7-204.12
  - A question was presented on potable water. Washing may or may not include a chemical treatment. Potable water regulated by EPA. EPA definition and reference for potable water added to the definition table. Brief discussion on bottled water, regulated by FDA. Perhaps could be used during natural disaster…emergency situation. Determined to be out of scope of the committee work, addressed in other CFP emergency related guidelines. Will not be discussed.
  - Regulations differences in various states were researched by Susan Shelton. Information collected was place on FoodSHIELD site. Example of the differences: In Washington State: If produce is soaked/immersed, the rinse step is required. Regulations are changed after consultation with WA University.
  - Tom Johnson emailed particular concerns related to developing an understanding of the regulations and the appropriate regulatory authority related to produce ("food contact sanitizers"). Anna shared Tom's email with the regulatory advisors to Produce Wash Committee and is awaiting a response. "Food contact sanitizers" and regulations pertained to them are outside of the scope of this committee charges.
- A questionnaire is being developed to understand how retail is washing produce today. It was suggested that certain segments of the industry be targeted to respond to the survey, with particular point-people named:
    - Hilary Thesmar –FMI
    - Jill Hollingsworth – National Grocery
    - David Crownover – National Restaurant Association. David will investigate NRA polices regarding distribution of surveys.

  ➔Targeted survey distribution.

- Keith Jackson commented on the committees good progress.

The Committee returned to a discussion of call frequency and the need to update the calendar of upcoming calls (see notes under Call frequency – page 1).

Call ended at 2:41 pm.

Notes are taken by Barbara Ingham

September 29, 2016

Produce Wash Committee Meeting Notes, Issue 2016 III-026

Voting members in attendance: A. Starobin, K. Mathews, B. Ingham, D. Crownover, H. Thesmar, V. Cranford, D. Goldberg, A. Hurysz, S. Kendrick, S. Shelton, J. Patel, L. Morgan.

Anna:

Welcome and attendance

Dates for each group and entire committee to meet were presented: Group 1 – Second Wednesday each month at 2PM; Group 2 – Third Wednesday of each month, 2PM; Entire committee – Fourth Thursday of each month, 2PM.

The issue of providing materials to group and concerns with copy write materials was put forth. CFP will cover costs associated with securing publications associated with literature. The process requires 2 to 3 days to complete for approval.

CFP is looking into depository space. Until space is determined for depository of material will be sent via email.

Vanessa: Group 1: Confirm dates of call to groups and committee. Must have definitions for various terms – crisping, washing, etc. Decision that two-buckets of literature will be filled, 1) focus on wash water, 2) on other areas. Will sort out later. Will focus on whole and cut commodity.

Anna: Format of final document has yet to be determined. Adhoc committee associated with CFP will look at how documents will be used.

Keith: Emphasis – Focus on water, not microbial load reduction on commity.

Tom Johnson: Look at commercial processing. May have initial wash and then sanitizing wash. Concern with temperature differential. May need to consider sequential processing of product.

Karl: Emphasize that charge is control of microbial load in water. Focus on retail NOT commercial production.

Tom: Must look at totality of research not just retail segment.

Anna: Emphasize charge of working group. Focus is retail. Will not dismiss information associated with commercial process.

Barbara: Need to have process flow diagram so committee will know what focus is and to narrow the literature search.

Dan: Recall we have distinct processes – washing, re-hydrating, treating, crisping.

Barbara: Perhaps should develop flow diagram similar to type used when developing HACCP plan.

Anna: We will seek information on current retail practices. Will send email to committee. Reminder – not all produce is washed in similar fashion. Should look at FSMA regulations and definitions.

There are experts at USDA in Produce Safety unit that can provide guidance.

Meeting adjourned

August 31, 2016

Produce Wash Committee Meeting Notes, Issue 2016 III-026

Voting members in attendance: A. Starobin, K. Mathews, B. Ingham, D. Crownover, J. Hollingsworth, H. Thesmar, V. Cranford, D. Goldberg, A. Hurysz, J. Lipe, M. Gaither, A. Pierce, S. Kendrick, S. Shelton, E. Green, D. Johnson, P. Nair, J. Patel, L. Morgan, L. Williams.

Anna Starobin welcomed the committee and covered the agenda for the meeting.

Karl read the antitrust statement.

Due to the 2/3 voting members' attendance requirement in order to have a quorum, it is important to make sure that the voting members are calling in on a regular basis. Anna discussed the basis for being removed as a voting member in cases when members are not able to meet this requirement. Karl will send a poll to vote whether 2 or 3 calls can be missed, before being moved to a non-voting status member.

Question was raised on the frequency of committee meetings.

Discussed the best system for sharing information. Dropbox is not available to several members. Several members are not allowed to use a personal Dropbox at work. Shared systems cannot be used because of security. Until a better system is found, information will be shared via e-mail. Deadlines were discussed. All deadlines were provided to the committee electronically. Final report is November 1st 2017.

Committee Charges

Karl provided the key points that drove the issue to be brought before the CFP committee.

Anna indicated that the issue as submitted was not approved, and the committee was created.

Five charges: Reading of charges by Anna (available to committee electronically)

Discussion on best approach to address the charges. Suggested creating two working groups.

Jill Hollingsworth provided insight into charge #2 (Identify conditions of use, including…..)

Cas Tryba shared a concern that if not properly parsed then a single group, addressing regulatory related issues, will have an onerous charge. Karl and Anna further discussed to provide understanding of Jill's suggestion for making the workload more equitable. The task for investigating regulations under charge #3 could be completed in a timely fashion. Suggestion was made that we consult a range of academic institutions – domestic and international.

Anna suggested two groups.

Group 1 (sub-committee) – Charge #1;

1. Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;

Group 2 (sub-committee) – Charge #3;

3. Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.

Entered into discussion on regulations and guidelines. Anna brought back discussion to charge of committee.

Jill requested final clarification on working groups. Anna confirmed that two groups will be formed: Group 1(sub-committee) – Charge #1; Group 2 (sub-committee) – Charge #3

The decision was made to hold polls on the following topics:

- Will hold poll so that members can indicate choice for serving on a given sub-committee.
- Will hold vote on number of working groups (sub-committees).
- Will hold poll to determine how often working groups (sub-committees) will meet.
- Will hold poll on meeting notes approval
- Will hold poll on the next meeting date

Will use Google poll and send individual e-mails to those members that cannot access Google poll.

Meeting is brought to an end.

Next Meeting will be held on the date identified by the poll.

Conference for Food Protection
Produce Washing Committee: Working Group 1

AGENDA / NOTES – September 27th 2016 2-3pm (EST)

Charge: Working Group 1:

Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;

Volunteers on Working Group 1:

Working Group 1:	Call 9/27 Attendance
Vanessa Cranford- Group 1 Lead	**Present**
Ali Hurysz	
Anna Starobin	**Present**
Hilary Thesmar	**Present**
Priya Nair	**Present**
Susan Kendrick	**Present**
Susan Shelton	
Karl Matthews	**Present**
Barbara Ingham	
Laurie Williams (FDA consultant)	**Present**
Marlene Gaither	**Present**
Jane Lipe	
Jill Hollingsworth	**Present**
Sue Tyjewski	**Present**
Woo Jin (Joey) Yoo	
Cas Tryba	

Agenda Working Group 1:

- Determine call frequency of the Working Group 1
- Discuss the criteria that will enable a document to be used as a scientific reference.
- Determine plan for researching information and also plan for how the summarized data will be submitted to the Produce Committee from Working Group 1.
- Food Code References on Washing (Review existing references and where additional references are needed).
- Define the terms listed in the charge. (Review on crisping and water bath provided)
    - Review definitions in reference to the FSMA Produce Rule.

Discussion:

Frequency of Working Group Meeting:

- The working group discussed the meeting dates and it was determined that the group would meet 1x per month.
    - Working Group 1 every 2nd Wednesday at 2pm
    - The Working Group 2 Anna explained was meeting every 3rd Wednesday at 2pm
    - The Produce Washing Committee as a whole meets on the last Thursday of the month at 2pm.
    - The three missed calls standard only applies to the Produce Washing Committee and not to the working group meetings.
    - Please provide an email if you will be missing a call and unable to attend.

Criteria for Scientific Reference:

- It was questioned if there was a defined reference established by CFP for a scientific reference? Anna indicated she would confirm with CFP.
- Line references in the Food Code Annex 3.
- Anna indicated references have been FDA Guidance documents, publications, and peer reviewed literature.
- It was suggested by Jill that we could gather all information and place into two categories:
    - Peer Reviewed Scientific Publications and Government Guidance Documents
    - Opinion papers and educational articles
- The group agreed on this approach as it would enable all data to be considered before it was disqualified.

Plan for Researching Information:

- Jill explained that when the charge had been submitted for Produce Washing it was not with the intent for microbial logarithmic reduction on the product. It was aimed to focus on the prevention of cross contamination on the wash water.
- It was discussed the differences between retail produce washing and commercial produce washing:

Commercial	Retail
Large Scale Processing	Small volume of product
Single line and single product washing	Possibility that multiple products washed together
Whole produce washed and some products like leafy greens or cabbage, cut and then washed.	In the Food Code 302.15 indicates Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form except as specified in ¶ (B) of this section and except that whole, raw fruits and vegetables that are intended for washing by the consumer before consumption need not be washed before they are sold.
Control of wash water ppm concentrations	Challenging to have a measurement system in the retail environment.
Produce Processing Facility Controls	Produce but also may handle other

	commodities like meat, fish, etc.

- Treatment of the water to prevent cross contamination if washed in the same container and possibly co-mingled. What are the risk mitigation approaches if we treat the water?
- Using a chemical treatment is not currently required in the Food Code.

References and Terms on Washing:

- Washing, crisping, rinsing, terms for review and discussion when water is placed into a container and used for washing produce in retail. The analysis to review all the words that accompany these actions and the definitions.
- It was discussed that fresh running water is a different scenario than water in a container that may potentially be re-used.
- Whether RAC and RTE items would the same container be re-used. The application that when one product is washed to another product without changing the water or between RAC and RTE commodities.
- Laurie indicated that FDA does not prohibit the usage of chemicals it is just not required.
- Jill explained that with CFP 'may' or 'shall' references a must do action. It is suggested that as a best practice it is reviewed and submitted for a common water bath but then you would be required to use a chemical.
- It was suggested that the group would divide reaching out for produce washing research to the following:
    - Vanessa: Trevor Suslow UC Davis and Elliott Ryser MSU
    - Priya Nair: Larry Bushat GA
    - Anna Starobin: Science using Antimicrobials
    - Jill Hollingsworth: United Fresh
    - Marlene Gaither: PMA
- All research being obtained must focus on the applicability of usage in a retail environment.
- It was also suggested that the FSMA changes should be included in the review from the Working Group 2.

Next Call: in accordance with the planned meeting schedule **Oct 12th 2pm.**

Food Code References:

3-302.15 Washing Fruits and Vegetables.

1. Beuchat, L. 1998. Food Safety Issues. Surface Decontamination of Fruits andVegetables Eaten Raw: A Review. World Health Organization. 42 pp.
2. Chia-Min, Lin, Cheng-I Wei*, 1997. Transfer of Salmonella montevideo onto the Interior Surfaces of Tomatoes by Cutting. J. Food Prot. 60(7): 858-863.
3. Geldreich, E.E. and R.H. Bordner, 1971. Fecal contamination of fruits and vegetables during cultivation and processing for market. J. Milk Food Technol. 34:184-195.
4. Heisick, J.E., D.E. Wagner, M.L. Nierman and J.T. Peeler, 1989. Listeria spp. found in fresh market produce. Appl. Environ. Microbiol. 55(8):1925-1927.
5. Madden, J.M., 1992. Microbial pathogens in fresh produce - the regulatory perspective. J. Food Prot. 55(10):821-823.
6. Satchell, F.B., P. Stevenson, W.H. Andrews, L. Estela and G. Allen, 1990. The survival of Shigella sonnei in shredded cabbage. J. Food Prot. 53:558-562.
7. Steinbrugge, E.S., R.B. Maxcy and M.B. Liewen, 1988. Fate of Listeria monocytogenes on ready-to-serve lettuce. J. Food Prot. 51:596-599.

7-204.12 Chemicals for Washing Fruits and Vegetables, Criteria.

1. Code of Federal Regulations, Title 21, Part 173.315, Chemicals used in washing or to assist in the peeling of fruits and vegetables.
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Annex 2 – References
2. Code of Federal Regulations, Title 21, Part 173.405, Secondary Direct Food Additives Permitted in Food for Human Consumption; Sodium Dodecylbenzenesulfonate.

Definitions: (Provided by Jill Hollingsworth)

Crisping: "crisping" is a secondary benefit of washing. The FDA Food Code refers to "washing" but the same procedures apply to crisping (also sometimes referred to as "re-hydrating.") The practice of crisping is therefore regulated at retail/food service the same as washing, by the same regulatory authority (state, local, etc.) that regulates the facility. The FDA supports crisping as part of the industry guidance posted on the FDA Web site. Crisping best practices are included in the Commodity Specific Guidance for Leafy Greens.

Commodity Specific Guidance for Leafy Greens
http://www.fda.gov/downloads/food/guidanceregulation/ucm169008.pdf

The Guidance specifically states: Lettuce may be re-crisped by placing fresh-cut lettuce/leafy greens in containers with tap water. The small amounts of chlorine present in the re-crisping tap water may be quickly inactivated by the organic load presented by lettuce/leafy greens. This may increase the potential for lettuce/leafy greens cross contamination particularly if additional lettuce/leafy greens are added to the re-crisping container (Wachtel and Charkowski, 2002).

Things to Consider (Retail and Foodservice):

• When re-crisping whole lettuce, reduce the potential for water and utensils to contaminate lettuce/leafy greens. Clean and sanitize the sink or container first and use water supplies that meet drinking water standards for re-crisping. The water should be changed at a frequency sufficient to ensure that it is of appropriate microbial quality for its intended use.

• Evaluate use of running water to re-crisp lettuce as needed, in lieu of re-crisping by water soaking, to reduce the potential for cross contamination.

FMI Produce Guidance - includes best practices crisping
http://www.fmi.org/docs/default-source/food-safety/produce-safety-best-practices-guide.pdf?sfvrsn=2

The Science of Crisping _ Article from Produce Retailer
http://www.produceretailer.com/produce-retailer-research/the_science_of_crisping_122998618.html

Waterbath (as a treatment option): "Water bath" is a term frequently used to describe a method of washing produce. The term describes a method whereby a container (including a sink, bucket or similar container) is filled with water and produce is submerged into the water (similar to a person getting into a tub of water for a bath.) The term is used to differentiate the soaking/submerging of produce into a container of water from the practice of washing fresh produce under a stream of running water.

FMI Produce Guidance - includes best practices crisping
http://www.fmi.org/docs/default-source/food-safety/produce-safety-best-practices-guide.pdf?sfvrsn=2

Conference for Food Protection
Produce Washing Committee: Working Group 1

AGENDA / NOTES – Oct 12th 2:00-3:00pm (EST)

Charge: Working Group 1:

Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;

Volunteers on Working Group 1:

Working Group 1:	Call 9/27 Attendance
Vanessa Cranford- Group 1 Lead	**Present (Late)**
Ali Hurysz	
Anna Starobin	**Abesent**
Hilary Thesmar	**Present**
Priya Nair	**Absent**
Susan Kendrick	**Present**
Susan Shelton	
Karl Matthews	**Present**
Barbara Ingham	
Laurie Williams (FDA consultant)	**Present**
Marlene Gaither	
Jane Lipe	
Jill Hollingsworth	**Present**
Sue Tyjewski	
Woo Jin (Joey) Yoo	
Cas Tryba	

Agenda Working Group 1:

- Updated from persons contacted on produce research updates.

Discussion:

Frequency of Working Group Meeting:

- Karl welcomed participants to the call.
- Jill will contact folks at United Fresh and ask if they are willing to join one of the group's conference calls. Provide insight on produce manufacturing. Under FSMA there is no specific requirement for utilizing a chemical antimicrobial in water. Most companies do use a chemical antimicrobial to prevent cross-contamination.
- Jill spoke with Jennifer McEntire at United Fresh and Jennifer agreed to share document associated with validation methods for preventing cross-contamination

- Karl indicated that a review of the literature shows no peer reviewed publications specific to the practice of crisping. There are two published thesis.
- Jill mentioned that Anna has a portal "Food Shield" that can be used as a depository for literature. All participants should have received an email with link and password.
- Vanessa provided an update from contacting Trevor Suslow at UC Davis that there is a PDF collection of available current publications and a post-reviewer white paper manuscript to JFP from the IFSH/FDA Wash Water Working Group that had been submitted. Trevor suggested he could ask for permission to forward a pre-pub copy of the manuscript if interested.
    - The group expressed interest in the PDF collection and the JFP manuscript.
- Vanessa provided an update from contacting Elliott Ryser at MSU that he indicated most of the produce washing work has been done at the processing rather than retail level. However, many of the same rules regarding sanitizer efficacy still apply. Within the next few months, a comprehensive position paper from a group of experts regarding the efficacy of produce sanitizers will appear in JFP so we should keep an eye out for this article. Most of his work was published in JFOPP with a few papers in Food Control and the International Journal of Food Microbiology. Some of the work on bacterial transfer and slicing/dicing work has also been aimed at retail.
    - The group determined that the work done on slicing and dicing at retail is not the focus on the charge on produce washing but an interest exists on the JFP article on sanitizer efficacy.
- Priya Nair: Larry Bushat GA- Priya was not able to be on the call and will provide an update on the next call.
- Anna Starobin: Science using Antimicrobials- Anna was not able to be on the call and will provide an update on the next call.
- The question was put forth concerning the type of document that the group was to develop. Through discussion it was suggested that the document resemble a literature review or critical paper. A specific outline for the document must be developed that will guide construction of the document.
- The suggestion was made that members of the group reach out to stakeholders at the retail level such as Krogers, Shoprite, on current practices etc
    - Jill volunteered to reach out and contact suppliers.
- A revision was made to the table in the previous minutes containing differences between commercial and retail practices that was previously sent to the group. Specifically, the statement "In the Food Code it is not permitted to cut and then wash a product 302.15 indicates that raw fruit and vegetables should be washed before being cut" was modified to the exact verbiage in the food code.
- Should we consider risk associated with a given commodity being processed at the retail level? For example, would Romaine lettuce represent a greater risk of being contaminated then a cucumber? Do we need to consider developing a matrix on different commodities and washing combination pros and cons? To be discussed more in depth on the next call.

Next Call: in accordance with the planned Working Group 1 meeting schedule **Nov 9th 2pm.**

Food Code References:

<u>3-302.15 Washing Fruits and Vegetables.</u>

1. Beuchat, L. 1998. Food Safety Issues. Surface Decontamination of Fruits andVegetables Eaten Raw: A Review. World Health Organization. 42 pp.
2. Chia-Min, Lin, Cheng-I Wei*, 1997. Transfer of Salmonella montevideo onto the Interior Surfaces of Tomatoes by Cutting. J. Food Prot. 60(7): 858-863.
3. Geldreich, E.E. and R.H. Bordner, 1971. Fecal contamination of fruits and vegetables during cultivation and processing for market. J. Milk Food Technol. 34:184-195.
4. Heisick, J.E., D.E. Wagner, M.L. Nierman and J.T. Peeler, 1989. Listeria spp. found in fresh market produce. Appl. Environ. Microbiol. 55(8):1925-1927.
5. Madden, J.M., 1992. Microbial pathogens in fresh produce - the regulatory perspective. J. Food Prot. 55(10):821-823.
6. Satchell, F.B., P. Stevenson, W.H. Andrews, L. Estela and G. Allen, 1990. The survival of Shigella sonnei in shredded cabbage. J. Food Prot. 53:558-562.
7. Steinbrugge, E.S., R.B. Maxcy and M.B. Liewen, 1988. Fate of Listeria monocytogenes on ready-to-serve lettuce. J. Food Prot. 51:596-599.

<u>7-204.12 Chemicals for Washing Fruits and Vegetables, Criteria.</u>

1. Code of Federal Regulations, Title 21, Part 173.315, Chemicals used in washing or to assist in the peeling of fruits and vegetables.
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Annex 2 – References
2. Code of Federal Regulations, Title 21, Part 173.405, Secondary Direct Food Additives Permitted in Food for Human Consumption; Sodium Dodecylbenzenesulfonate.

Definitions: (Provided by Jill Hollingsworth)

Crisping: "crisping" is a secondary benefit of washing. The FDA Food Code refers to "washing" but the same procedures apply to crisping (also sometimes referred to as "re-hydrating.") The practice of crisping is therefore regulated at retail/food service the same as washing, by the same regulatory authority (state, local, etc.) that regulates the facility. The FDA supports crisping as part of the industry guidance posted on the FDA Web site. Crisping best practices are included in the Commodity Specific Guidance for Leafy Greens.

Commodity Specific Guidance for Leafy Greens
http://www.fda.gov/downloads/food/guidanceregulation/ucm169008.pdf

The Guidance specifically states: Lettuce may be re-crisped by placing fresh-cut lettuce/leafy greens in containers with tap water. The small amounts of chlorine present in the re-crisping tap water may be quickly inactivated by the organic load presented by lettuce/leafy greens. This may increase the potential for lettuce/leafy greens cross contamination particularly if additional lettuce/leafy greens are added to the re-crisping container (Wachtel and Charkowski, 2002).

Things to Consider (Retail and Foodservice):

- When re-crisping whole lettuce, reduce the potential for water and utensils to contaminate lettuce/leafy greens. Clean and sanitize the sink or container first and use water supplies that meet

drinking water standards for re-crisping. The water should be changed at a frequency sufficient to ensure that it is of appropriate microbial quality for its intended use.

• Evaluate use of running water to re-crisp lettuce as needed, in lieu of re-crisping by water soaking, to reduce the potential for cross contamination.

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Waterbath (as a treatment option): "Water bath" is a term frequently used to describe a method of washing produce. The term describes a method whereby a container (including a sink, bucket or similar container) is filled with water and produce is submerged into the water (similar to a person getting into a tub of water for a bath.) The term is used to differentiate the soaking/submerging of produce into a container of water from the practice of washing fresh produce under a stream of running water.

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Conference for Food Protection
Produce Washing Committee: Working Group 1

Call Minutes – Nov 9th 2016 2-3pm (EST)

Charge: Working Group 1:

Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;

Volunteers on Working Group 1:

Working Group 1:	Call 11/9 Attendance
Vanessa Cranford	**Present**
Ali Hurysz	
Anna Starobin	**Present**
Hilary Thesmar	**Absent- sent email notification**
Priya Nair	**Present**
Susan Kendrick	**Absent- sent email notification**
Susan Shelton	**Present**
Karl Matthews	**Present**
Barbara Ingham	**Present**
Laurie Williams (FDA consultant)	**Present**
Marlene Gaither	**Absent – sent email notification**
Jane Lipe	
Jill Hollingsworth	**Present**
Jaymir Patel	
Woo Jin (Joey) Yoo	**Present**
Cas Tryba	
Dan Goldberg	**Present**
Ellen Thomas	**Present**

Minutes Working Group 1:

1. Review of items currently obtained in Food Shield Linked to Working Group 1
   - The group discussed the approach for reviewing the documents in Food Shield and how the group should approach the review.
   - Jill discussed that the review of the documents include how is it relate to crisping, washing, does it look for reduction in surface or wash water, what chemical is being used, and what is the outcome of the study. Did the study look at just the product or also cross contamination, identifying things in the literature that we need to pull out – did they inoculate with pathogens, what commodity, and what did the study prove.
   - When reviewing the information we should be looking to identify can we use this study and is it relevant to the charge of the group.

- Barb and Karl agreed that it was a great approach for reviewing the documents. To have a brief overview of the document but looking to determine if it controls the wash water. Also, the commodity washed and the procedure used.
- Anna explained wash water had a standard requirement by EPA
- Priya- The reviews should consider the effects on different wash water disinfectants water quality and cross contamination prevention.
- Vanessa volunteered to create a template to be shared with the group to be used for performing a documentation review based on the components highlighted on the call.
- Barb suggested that articles are assigned for reading and performing the review in Food Shield. Karl, Prya and Jill all agreed to that approach.

2. Discuss the criteria of items still needing to be obtained for scientific literature review based on Food Code requirements.
   - Anna- Food Code recommends washing before cutting of produce (RAC).
   - Laurie- The food code does not prohibit the use of chemicals. 302.15 explain washing fruit and vegetables. If it is going to be cut then is must be washed. You can still wash after the product has been cut but it has to be washed before it is cut.
   - Anna- If you wash it before you cut it you may get E.coli into the product you cannot cut and then wash the product.
   - Laurie- The product has to be washed before it is cut. Annex 3 it is silent for washing after cutting. For example if you have unpeeled carrots, it can be peeled and then sliced for a salad bar. Carrots can be washed remove dirt and debris, then you can take the tops off, peel, and then wash again.
   - Anna- Any produce item going to be placed into a water bath and submerged is a risk for cross-contamination in the product. Does adding chemical reduce the risk and is it important to public health that it should be mandated? Did the treatment prevent cross contamination and what does the science in the study show.
   - In the review it may conclude that an article is irrelevant to the charge given by CFP and not relevant for including in the final summary.

3. What scientific data still needs to be captured?
   - Once the review is performed on the existing documents in Food Shield, then the group will know what data is still missing or needing to obtain.
   - Priya informed the group that she recently uploaded a document related to crisping.

4. Survey
   - The group discussed the survey at it was determined that the survey needs to be cut back and ask only a handful of relevant questions.
   - Anna indicated that questions not relevant would be removed
   - Jill included that the questions have a foodservice focus and needs to include a retail approach as well
   - Anna- The survey goal to be 10 minute max for completing. Is there a way that participants can check more than one component for when multiple components apply to simplify the form.
   - Anna- The survey will be revised for simplicity and including retail.

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Conference for Food Protection

Produce Washing Committee

Minutes – January 11, 2017 2-3pm (EST) Working group 1

Voting Members in attendance:

Working Group 1:	**Call 1/11 Attendance**
Vanessa Cranford	**NO**
Ali Hurysz	**NO**
Anna Starobin	**YES**
Hilary Thesmar	**YES**
Priya Nair	**YES**
Susan Kendrick	**YES**
Susan Shelton	**YES**
Karl Matthews	**YES**
Barbara Ingham	**YES**
Laurie Williams (FDA consultant)	**YES**
Marlene Gaither	**NO**
Jane Lipe	**YES**
Jill Hollingsworth	**YES**
Sue Tyjewski	**No longer on committee**
Woo Jin (Joey) Yoo	**YES**
Cas Tryba	**NO**

Dan Golberg, Bob Norgella

Welcome: Anna

Attendance: Karl

The group required time to access materials on FoodShield so that all participants could participate in the review process. This also served as a learning process.

The focus of the call was to continue review of “Literature Review Assessments”. All “assessments” were available in a specified folder located on FoodShield.

Karl called out each “assessment” and read the key information: title, pathogens, commodity, inclusion of document in review, etc. Discussions of each review ensued. The group determined disposition of each assessment – YES, NO, MAYBE. Papers that received an assessment review of MAYBE could have utility in writing the introductory materials.

The group completed review of 17 assessment reports.

Meeting Adjourned: 3:20PM

Conference for Food Protection

Produce Washing Committee: Working Group 1

Minutes of the Conference Calls February 8, 2017 2-3:40 pm EST

Voting Members in attendance:

Working Group 1:	**Call 2/8 Attendance**
Vanessa Cranford	**No longer on committee**
Ali Hurysz	**YES**
Anna Starobin	**YES**
Hilary Thesmar	**NO**
Priya Nair	**NO**
Susan Kendrick	**YES**
Susan Shelton	**NO**
Karl Matthews	**NO**
Barbara Ingham	**YES**
Laurie Williams (FDA consultant)	**YES**
Marlene Gaither	**NO**
Jane Lipe	**YES**
Jill Hollingsworth	**YES**
Woo Jin (Joey) Yoo	**YES**
Cas Tryba	**YES**

Welcome: Anna

Attendance: Barbara

The Working Group continued a review of documents posted to Food Shield https://www.foodshield.org/

The Working Group was presented with a list of articles to review (table below); with reviewers completed on items #1-17 January 11, 2017. The Working Group continued with the review, considering items #18-32 in the table below (15 articles). A summary of the outcomes of all reviews is listed below.

Article summaries are posted to Food Shield in the **Completed Literature Review Assessments** folder.

Naming of files posted to the site should follow this style: First author name, abridged title, reviewer

#	Author	Citation	Reviewer	Outcome
1	Shen	Dynamic effects of free chlorine concentration, organic load, and exposure time on the inactivation of *Salmonella*, STEC, and non-O157 Shiga toxin-producing *E. coli* (2013)	Woo	YES
2	Eifert	Chemistry of chlorine sanitizers in food processing (2002)	Woo	YES
3	Pirovani	Reduction of chlorine concentration and microbial load during washing-disinfection of shredded lettuce (2004)	Cranford	Maybe

#	Author	Citation	Reviewer	Outcome
4	Pangloli	Reduction of *Escherichia coli* O157:H7 on produce by use of electrolyzed water under simulated food service operating conditions (2009)	Gaither	Maybe
5	Suslow	Water disinfection: a practical approach to calculating dose values for preharvest and postharvest applications (2001)	Gaither	Yes
6	Parish	Methods to reduce/eliminate pathogens from fresh and fresh-cut produce (2003)	Cranford	Maybe
7	FAO	Microbial hazards in fresh leafy greens and herbs (2008)	Cranford	Maybe
8	Van der Linden	Minimal processing of iceberg lettuce has no substantial influence on the survival, attachment and internalization of E. coli and Salmonella (2016)	Matthews	Maybe
9	Suslow	Production practices as risk factors: microbial food safety of fresh and fresh cut produce (2003)	Gaither	No
10	Gil	Fresh cut produce sanitation and wash water disinfection: problems and solutions (2009)	Hollingsworth	Maybe
11	Lou	A pilot plant scale evaluation of a new process aid for enhancing chlorine efficacy against pathogens	Hollingsworth	NO
12	Beuchat	Food safety issues: surface decontamination of fruits and vegetables eaten raw: a review	Ingham	NO
13	Lopez-Galvez	Prevention of Escherichia coli cross-contamination by different commercial sanitizers during washing of fresh-cut lettuce (2009)	Ingham	YES
14	Luo	Fresh-cut produce wash water reuse affects water quality and packaged product quality and microbial growth in romaine lettuce (2007)	Ingham	NO
15	Luo	Fresh cut produce wash water reuse affects water quality and packaged product quality and microbial growth (2007)	Cranford	NO
16	Fishburn	Efficacy of various consumer friendly produce washing technologies (2012)	Kendrick	YES
17	Luo	Improving produce safety by stabilizing chlorine in washing solutions with high organic load (2012)	Matthews	NO
18	CA dept public health	Retail fruit and vegetable marketing guide	Hollingsworth	YES
19	Gombas	Guidelines to validate control of cross-contamination during washing of fresh-cut leafy vegetables (2017)	Matthews	NO** (use in lit review ?)
20	Suslow	(duplicate of #9)	Gaither	
21	Gombas	(duplicate of #19)	Matthews	
22	Van der Linden	(duplicate of #8)	Matthews	
23	Hilgren	Antimicrobial efficacy of peroxyacetic/octanoic acid mixture in fresh-cut vegetable process waters (2000)	Matthews	NO**
24	Luo	(duplicate of #17)		

#	Author	Citation	Reviewer	Outcome
25	Han	The effects of washing & chlorine dioxide gas on survival and attachment of EC O157 on green peppers (2000)	Hollingsworth	NO
26	Industry trade groups	Commodity specific food safety guidelines for the lettuce and leafy green supply chain	Ingham	MAYBE (litreview)
27	Fishburn	(duplicate of #16)	Kendrick	NO**
28	Nou	Chlorine stabilizer T-128 Enhances efficacy of chlorine against (2011)	Kendrick	MAYBE
29	FDA	Center for produce safety reveals 10 research grants	Kendrick	NO
30		Code of hygienic practice for fresh fruits and produce	Kendrick	MAYBE
31	Jung	Sanitizer efficacy in preventing cross-contamination of heads of lettuce during retail crisping (2017)	Matthews	YES
32	Jung	(duplicate of #31)	Matthews	

**Changed from reviewer/previous recommendation.

Articles not yet been reviewed – posted in the Working Group 1 Literature Search folder in Food Shield.

#	Author	Citation	Reviewer	Outcome
33	Zhou	Inactivation dynamics of Salmonella enterica, Listeria monocytogenes, and Escherichia coli O157:H7 in wash water during simulated chlorine depletion and replenishment processes (2015; Food Microbiology)	Goldberg	
34	Zhang	Efficacy of antimicrobial agents in lettuce leaf processing water for control of Escherichia coli O157:H7 (2009; JFP)	Goldberg	
35	Wisniewsky	Reduction of Escherichia coli O157:H7 counts on whole fresh apples by treatment with surface sanitizers (2000; JFP)	Goldberg	
36	[training resources]	Program Information Manual: retail food protection storage and handling of tomatoes		
37	Starobin	Fruit and vegetables washing in food retail environments (2017; Food Protection Trends)		
38	Palma-Salgado	Whole-head washing prior to cutting provides sanitization advantages for fresh-cut iceberg lettuce (Latuca sativa L.) (2014; IJFM)		
39	Keskinen	Efficacy of chlorine, acidic electrolyzed water and aqueous chlorine dioxide solutions to decontaminate Escherichia coli O157:H7 from lettuce leaves (2009; IJFM)		
40	Hoelzer	Reduction of Listeria monocytogenes contamination on produce – a quantitative analysis of common liquid fresh produce wash compounds (2014; Food Control)		
41	Goodburn	The microbiological efficacy of decontamination methodologies for fresh produce: a review (2013; Food Control)		

#	Author	Citation	Reviewer	Outcome
42	Jung	Sanitizer efficacy in preventing cross-contamination during retail preparation of whole and fresh-cut cantaloupe (2017; Food Control)		

Conference for Food Protection

Produce Washing Committee

Meeting Minutes June 19, 2017, 2-3pm (EST)(Working group 1)

Charges:

Committee Charges:
1.Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;
2.Identify conditions of use, including types of RACs and RTE fruits and vegetables, and methods for assuring efficacy of use;
3.Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.
4.Consult with appropriate professional produce trade organizations; and
5.Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection.

Working Group 1
Charge 1
Working Group 2
Charge 3

Attendance: A. Starobin, K. Matthews, Barbara Ingham; Jill Hollingsworth; Susan Kendrick.(Hilary Thesmar and Priya Nair indicated they could not make the call). Laurie Williams – FDA regulatory

Anna: Welcomed group.

Karl: Attendance.

Anna:
Anna indicated she merged comments that she had received from the committee concerning draft of the white paper. Basically, went line by line to vet comments.

Jill: Due we need to have quorum to proceed. Anna, indicated that we should keep going and then request mandatory meeting.

Based on Laurie's comments requirements to use antimicrobial chemicals in water will not be accepted by

FDA. So, will come-up with "best practices" or SOPs to address the issues.
Clarified individuals that reviewed document at FDA – individual (Cecilia) part of produce safety team.

Anna – would like to create guideline
Barbara – Perhaps the introduction should start with an "Executive Summary"

Jill and other agree. Take a step back from requiring chemicals. Best practices and guidance would be best.

So, from the white paper the recommendation of the committee would be “best practices” guidance document to address concerns raised

Conclusion. Let’s include executive summary.

Start with what we are proposing and then explain why.

Start with Food Code language.

At this point went through each comment and agreed that the paper would be reorganized.

Conference for Food Protection

Produce Washing Committee

Meeting Minutes September 12, 2017 (working group 1)

Charges:

Committee Charges:
1.Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;
2.Identify conditions of use, including types of RACs and RTE fruits and vegetables, and methods for assuring efficacy of use;
3.Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.
4.Consult with appropriate professional produce trade organizations; and
5.Report back with recommendations to the 2018 Biennial Meeting of the Conference for Food Protection.

Attendance: A. Starobin, K. Matthews, Jill Hollingsworth; Laurie Williams, Vanessa Cranford, Keith Jackson
Anna: Welcomed group.

Anna: Attendance.

Anna provided summary of the 8/29/17 call.
Due to the limited time left before the final report submission, we will work on the issue submission, rather than working on the guideline outline alone.
Within the issue we will recommend to create, or recreate a committee with a charge to write a retail produce handling guideline. We will include a list of the topics, which we recommend to be covered in this guideline. The 'chapters" may include, but not limited to the following:

1. Scope
2. Target audience
3. Type of produce covered
4. Receiving the produce
5. Storage of the produce
6. Produce washing facilities, sinks
7. Equipment cleaning and sanitation
8. Employees personal hygiene
9. Washing produce
10. Produce crisping
11. Produce display and merchandising
12. Record keeping (with examples of the forms)

Further discussions of the outline:
It was proposed not to name sections of the outline as “chapters’.
Additional topics for the outline were proposed:

- Fresh cut produce handling
- Rewashing of prewashed produce
- Sample SOP
- Definitions
- References

It was suggested to create subcategories in the document. (I tried to organize it based on this recommendation after the call. Will discuss during the next call- AS)

1. Scope
2. Target audience
3. Definitions
4. Type of produce covered
5. Produce Handling (RAC, Fresh cut produce)
    - Produce Receiving
    - Produce Storage
    - Washing produce
        - Washing produce in water
        - Produce washing chemicals (detergents)
        - Produce washing with a/m treatments
        - Re-washing of prewashed produce
    - Produce crisping
    - Produce display and merchandising
    - Record keeping (with examples of the forms)
    - Sample SOP (with examples of the forms)
6. Produce washing facilities, sinks
7. Equipment cleaning and sanitation
8. Employees personal hygiene
9. References

Team will start working on the report. Karl will put together a draft to report on Charge 1:” Review science and public health impact of water treatment options to minimize cross-contamination when using a water bath for washing, rinsing, crisping, processing, and/or other treatments of Raw Agricultural Commodities (RACs) and ready-to-eat (RTE) fruits and vegetables in food establishments;”
Anna will put together a draft to report on Charge 3: “Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.”

Everybody interested in helping Karl and Anna, please let us know.

Drafts of the documents are due on 9/27, and will be send to the team on 9/26 for review (or before if ready). Keith and Davene will provide Anna and Karl with the required format for these documents.

Next call is scheduled for 9/27, 4-5 (Est)
Anna: Meeting adjourned.

Conference for Food Protection

Produce Washing Committee: Working Group 2, Oct 19th, 2016

Participants: Karl Matthews, Anna Starobin, Vanessa Cranford, Dan Dahlman, Liz Green, David Crownover, Hillary Thesmar, Susan Shelton, Lisa Morgan.

Initiated discussion on definitions and terminology.

Dan Dahlman and Laurie Williams drafted the "terminology jurisdiction" report to define terms used in produce wash/treatment discussions and to outline the regulatory jurisdiction of the use of antimicrobial chemicals. Exercise also helped determine whether there were discrepancies between agency definitions. Committee members must use terminology correctly. Example: "Disinfectant" – not appropriate terminology for a treatment of fruits and vegetables.

Other comments- Which definition should we use…CDC, FDA, EPA, Web? Should use definitions associated with agencies that have regulatory function, enforceable.

Summary: Will use official FDA definition if available, otherwise will use definition from other sources in order to help the group conversations (e.g., Google).

Regulatory bodies have problem defining "washing". The group should not try to define "washing". Work with definition from the "Food Code" in 3-302.15. If needed then the committee could develop definition for "washing" (and any others pertinent terms)

Discussion of table (EPA/FDA jurisdiction) on antimicrobials. Reviewed table as provided

Additional information was included regarding the current citation within the Food Code for washing fruits and vegetables. 3-302.15 & 7-204.12

A question was presented about FSMA and relevance to this discussion. Retail is exempt from FSMA requirements. Need to determine if produce controls under FSMA would impact retail process.

A question regarding the regulations in Europe was presented. Follow-up needed.

A question was presented on potable water. Washing may or may not include a chemical treatment. Potable water regulated by EPA. EPA definition and reference for potable water added to the definition table.

Brief discussion on bottled water, regulated by FDA. Perhaps could be used during natural disaster…emergency situation. Determined to be out of scope of the committee work, addressed in other CFP emergency related guidelines. Will not be discussed.

Other discussion items
Are all establishments using potable water? Is it municipal or well?
Is portability of water ever questioned? Can receive potable water certificate.

Food Code does not cover emergency situations and implied that starting with potable water. Food Code uses term drinking water and drinking water is potable water.

Is there a requirement that a restaurant has potable water? Will allow well water but must be tested/monitored regularly.

What is federal document on well water quality? *Will investigate.*

Regulations related to a process. For Rinsing. Water quality should be same as for washing. Is there a difference in regulation of washing and rinsing? Discussion quality of water not the action…washing or rinsing. Need to concentrate on water application not on the water itself.

Crisping and rehydration of leafy greens. New area must address. No definitions exist.

No regulations about soaking. Soaking implies a long period of time for produce being immersed in water. For example, soaking beans overnight as opposed to five minutes of washing. What is difference in uptake of a chemical agent if added to the water? See statement in Food Code and the annex.

Chemicals if registered should have a specific contact time. Must have information for a specific commodity and chemical. Must study residues and determine acceptable levels of consumption.

Annex portion has public health reason to support codified section.

In Washington State: If produce is soaked/immersed, the rinse step is required. Regulations are changed after consultation with WA University. During crisping process likely have uptake of liquid, chemicals and microbial contaminants. Not addressed by Washington study. If using chemical then must follow EPA regulations concerning use and contact times. Contact time is approved based on toxicology studies.

Closing point: What are food safety issues with current practices and if so what needs to be changed to improve food safety.

September 21, 2016

Working group 2

Produce Wash Committee Meeting Notes, Issue 2016 III-026

Attendance: A. Starobin, D. Crownover, H. Thesmar, V. Cranford, S. Shelton, L. Morgan, L. Williams, Dan Dalhman, Robert Maldonado

Anna Starobin welcomed the committee and covered the agenda for the meeting.

Working group charge: Review applicable rules and regulations pertaining to the use of water and chemicals for washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables as it relates to food establishments to avoid creating conflict.

Agenda items:

1. Working group lead volunteer
2. Call frequency
3. How our final product needs to look like?
4. What are washing, rinsing, crisping, processing, and/or other treatments of RACs and RTE fruits and vegetables, and regulatory agency (Laurie Williams, Dan Dalhman)
5. Regulation decision tree

There were no volunteers to lead the working group. Unless it changes, Anna will lead the group.

It was decided to have one call a month, on the third Wednesday of the month at 2 pm (a week prior to the whole committee update call).

Sharing information is still a challenge for the government members of the committee. We will send the documents via e-mail. Big files will be zipped.

Materials will be gathered and the format of the delivered result will be discussed.

Laurie Williams (FDA) covered current relevant Food Code requirements which pertain to produce wash. They included in 3-302.15 and 7-204.12. Additional information is available in the relevant areas of the Code's Annex.

Food Code recommends water wash as a main process for the produce treatment; antimicrobials could be used as an additional option for this application. Chemistries which are allowed for produce washing are discussed in 7-204.12.

Some changes of this section of the code are being considered by FDA based on CFP III-027 submission in order to include other than Ozone currently listed as an antimicrobial treatment option.

Dan Dalhman (ECOLAB) provided definitions of the terminology used in the sub-committee charge and briefly discussed registration responsibilities of the produce antimicrobials between EPA and FDA. Laurie Willams asked for clarification on the source of some definitions, since EPA and FDA definitions may not be the same. Dan will provide the summary of the information presented, with the relevant references to the source of information.

It seems like that there is no clear definition for "crisping", Laurie and Dan will investigate further on FDA and EPA position for this process. Anna will contact Jill Hollingsworth, one of the issue submitters, for clarification. Need to understand the difference between crisping vs. rehydration. Suggestion was made for adding "crisping" definition to the code, and to come up with a temporary definition. Hilary expressed a concern over a consensus on such definition among FMI members.

Crisping practices were discussed. It a common practice in food retail to soak produce in ice water in order to maintain produce appearance. This practice may lead to water uptake by produce. Annex of the code advises against soaking produce, and use 10F water/produce difference in order to reduce the uptake of water. Guidelines based on which these recommendations are made, need to be evaluated. Literature search related to this recommendation need to be included into a working group 1 list.

Anna asked if any state regulators are looking for proper amicrobial products registrations during routine audits. Susan Shelton (WA state regulator) stated that water is the main method used for produce wash in WA State. WA State requires rinse step for any soaking or crisping process. Anna commented that this requirement may not match EPA registered label approved procedures for some antimicrobial products when soaking, or crisping done.

Susan Shelton suggested to look into any applicable international regulations. Dan Dalhman and David Crownover will connect with international colleagues to provide such information.

Regulations related to onsite generators need to be covered as well (both working group 1 and 2).

Follow up tasks

- Laurie and Dan will provide materials they presented during a call.
- Dan, and David will research and provide any international regulations covering produce treatment related practices.
- Laurie connect with other FDA experts to find out if there is crisping definition in any FDA documents
- Anna will connect with Jill Hollingsworth to better understand charges of the group, and possibly find a reference to "crisping".

Meeting is brought to an end.

Next meeting is scheduled for 10/19 at 2 pm (Est)

Q&A for Produce Washes & Treatments

Dan Dahlman

Regulatory Affairs Manager

Food, Drugs and Cosmetics

Ecolab, Inc.

Common questions/concerns related to produce washes & treatments

What are Food Code requirements for the produce wash?

- **3-302.15 Washing Fruits and Vegetables.**

(A)…raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants **before being cut, combined with other ingredients, cooked, served**, or offered for human consumption in READY-TO EAT form.

(B) Fruits and vegetables may be washed by using chemicals as specified under § 7-204.12.

(C) Devices used for on-site generation of chemicals meeting the requirements specified in 21 CFR 173.315, Chemicals used in the washing or to assist in the peeling of fruits and vegetables, for the washing of raw, whole fruits and vegetables shall be used in accordance with the manufacturer's instructions.

Common questions/concerns related to produce washes & treatments

What does washed “before being cut” mean?

- Cut= processed or, cored, chopped, sliced, etc. (post-harvest)

Food Code reference system:

- Question: Does the Food Code definition for “cut leafy greens” apply to leafy greens that have been harvested in the field by cutting into the stem or leaf of the plant but have not otherwise been cut, shredded, sliced, chopped or torn?
- Response: Harvesting of a leafy green often involves cutting the plant’s root or leaf to remove the leafy green from the ground. At this point the leafy green remains a raw agricultural commodity (RAC) * …

Common questions/concerns related to produce washes & treatments

- What kind of products are available?
  - Non-antimicrobial (wash)
  - Antimicrobial (treatment)
- Does the Food Code have requirements for wash/treatment chemicals, including those generated on-site?
  - Be an approved food additive listed for this intended use in 21 CFR 173, or
  - Be generally recognized as safe (GRAS) for this intended use, or
  - Be the subject of an effective food contact notification (FCN), and
  - Meet the requirements in 40 CFR 156 Labeling Requirement for Pesticide and Devices

Common questions/concerns related to produce washes & treatments

- Why do I need them, what do they do?
  - Non-antimicrobial
    - Helps remove soils, waxes, residues from the surface of the produce
    - Not designed to kill microorganisms in wash water or the surface of the produce
  - Antimicrobials
    - Reduce pathogens in wash or process water for RACs
    - Reduce pathogens on the surface of processed produce
    - Controls spoilage and decay in the wash or process water Controls spoilage organisms on the surface of the produce surface. Helps extend shelf-life
    - Crisping

Common questions/concerns related to produce washes & treatments

- How do I know if the residues of chemicals are safe to consume?
  - Processing aids (such as produce antimicrobials) are substances that are added to a food for their technical or functional effect in the processing but <u>are present in the finished food at insignificant levels and do not have any technical or functional effect in that food</u>.
- **<u>Products are designed to meet FDA and EPA standards!!</u>**
- For new chemistries,
  - Data must be submitted to the agency (FDA and if applicable to EPA) to demonstrate the safe and suitable use in food.
  - Safety studies and a comprehensive toxicological profile for each ingredient are required.

Common questions/concerns related to produce washes & treatments

- How do I know that antimicrobial produce water treatment works?
  - Efficacy data is submitted and reviewed by the agencies and must demonstrate log reductions as determined by the governing federal and state agencies
  - Request performance data from your supplier

Common questions/concerns related to produce washes & treatments

- Who regulates antimicrobial treatments?

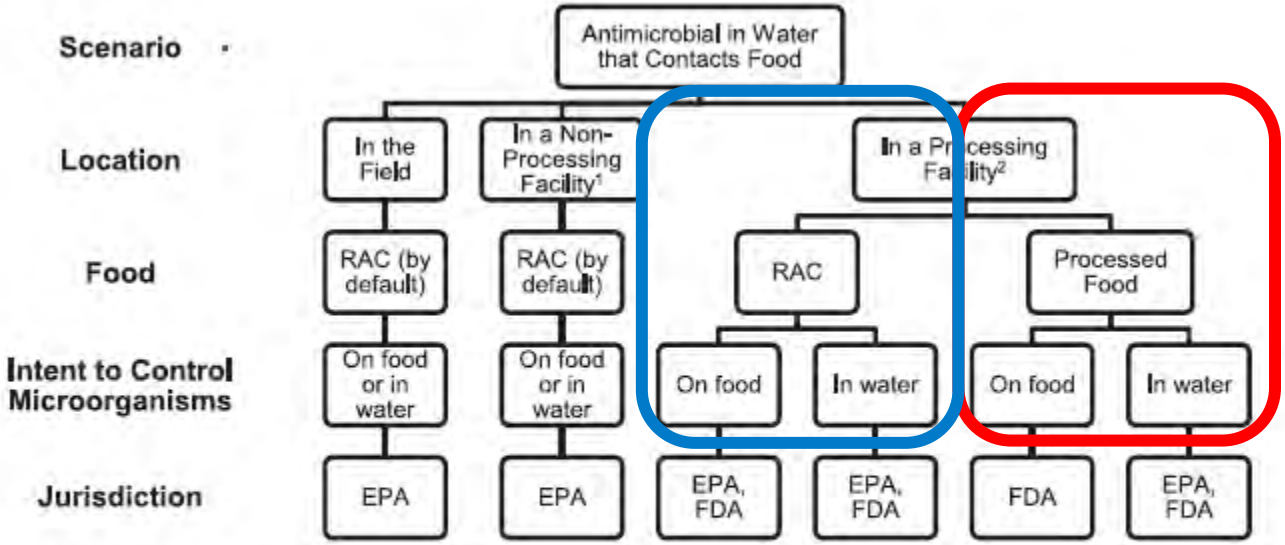

FIGURE 1. *U.S. regulatory oversight of antimicrobials for control of microorganisms (46).* [1] *A place where RACs (raw agricultural commodities) are the ONLY food treated and the antimicrobial treatment activity does not change the status of the food as a RAC (e.g., washing).* [2] *A place where any of the following are happening: canning, freezing, cooking, pasteurizing, homogenizing, irradiation, milling, grinding, chopping, slicing, cutting, or peeling. Figure created by Ecolab, Inc. Please consult a regulatory representative to ensure product use compliance.*

Gombas et al. JFP, Vol 80, #2, 2017

Common questions/concerns related to produce washes & treatments- FDA safety considerations

- Notifier must submit data to demonstrate:
  - Quantity of residues migrating to food, or in absence of migration data, 100% worst-case transfer
  - Safety of each ingredient/ tox. profile
  - No ongoing effect
- Residue levels are used to estimate the highest level in food based on consumption data- EDI and CEDI
- Supporting information

Common questions/concerns related to produce washes & treatments- EPA safety considerations

- EPA sets tolerances using the following criteria to assess the safety and ensure a reasonable certainty of no harm
  - Toxicity of the pesticide and its break-down products
  - Dosage/Application rate
  - Residues remaining in or on food item by the time it enters the channels of trade
  - All possible routes of exposure (i.e. crop use, drinking water, residential)
- Dietary risk assessments are performed to ensure that established tolerances are safe
- Tolerances apply to food grown in the U.S. as well as imports

Always follow manufacturer label directions for use!

Questions?

Safe Washing & Crisping of Produce

Jim Gorny, Ph.D.
Vice President of Food Safety & Technology

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What Does RTE mean?

Ready-to-eat food (RTE food) *means any food that is normally eaten in its raw state or any other food, including a processed food, for which it is reasonably foreseeable that the food will be eaten without further processing that would significantly minimize biological hazards.*
(Excerpted from Preventive Controls for Human Foods Rule § 117.3 Definitions)

Ready-To-Eat (RTE) Food: *The terms RTE food and RAC are not mutually exclusive. Some RACs (such as lettuce, tomatoes, berries, and apples) are ready-to-eat, whereas other RACs (such as artichokes and potatoes) are not. The requirements for product testing as a verification activity are flexible requirements that depend on the facility, the food, and the nature of the preventive control (see § 117.165). See also Response 525.*
(Excerpted from Preventive Controls for Human Foods Rule Response 122 / pg 55955)

Are All RTE Produce Created Equal?

Bunched Spinach

Unwashed

Bagged Spinach

Washed

Frozen Spinach

Washed/Blanched

FDA Consumer Recommendations

- All produce should be thoroughly washed before eating. This includes produce grown conventionally or organically at home, or produce that is purchased from a grocery store or farmer's market. Wash fruits and vegetables under running water just before eating, cutting or cooking.

- Many precut, bagged produce items like lettuce are pre-washed. If so, it will be stated on the packaging. This pre-washed, bagged produce can be used without further washing.

Washing Fruits and Vegetables

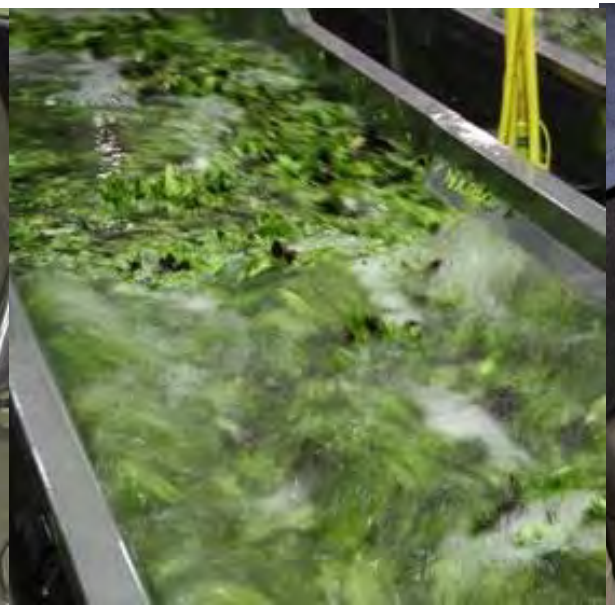
"Raw fruits and vegetables shall be thoroughly washed in water to remove soil and other contaminants before being cut, combined with other ingredients, cooked, served, or offered for human consumption in ready-to-eat form."

2013 FDA Model Food Code 3-302.15 Washing Fruits and Vegetables.

Crisping is a method used to improve produce visual quality that involves soaking fresh produce in tepid water followed by refrigeration.

Washing

Washing



Crisping

An Outbreak of *Escherichia coli* O157:H7 Infections Associated with Leaf Lettuce Consumption

M. Ackers et al, 1998 J. of Infectious Diseases 177:1588–93

- July 1995, 40 Montana residents were identified with laboratory-confirmed *E. coli* O157:H7
- 4 of 10 retail stores where implicated produce was purchased practiced lettuce crisping.
- Crisping basin water was changed infrequently, and numerous cartons and types of leaf lettuce were bathed in the same water.
- Crisping may have facilitated cross-contamination among batches of lettuce as numerous batches of leaf lettuce were processed in the same water.
- Lack of cases associated with restaurants or other retail markets suggests an amplification event, possibly by “crisping”

Journal of Food Protection, Vol. 65, No. 3, 2002, Pages 465–470

Cross-Contamination of Lettuce with *Escherichia coli* O157:H7

MARIAN R. WACHTEL[1,2*] AND AMY O. CHARKOWSKI[1†]

- March 1999, 72 restaurant patrons infected *E. coli* O157:H7
- Likely food vehicle: shredded iceberg lettuce prepared on-site
  - Lettuce was cored, outer leaves removed then shredded
  - No rinse prior to shredding
  - Stored refrigerated in water
- Research Conclusions
  - Water storage of cut lettuce in water is not advisable due to cross contamination.
  - Washing with chlorinated water may slightly reduce the bacterial load.
  - All lettuce pieces were contaminated after 24 h of storage in water containing one inoculated lettuce piece.
  - *E. coli* O157:H7 levels were consistent throughout the tubs, regardless of the distance from the inoculation point.

pma

Hepatitis A Outbreak Associated with Green Onions at a Restaurant --- Monaca, Pennsylvania, 2003 MMWR November 28, 2003 / 52(47);1155-1157

- 555 Hepatitis A cases / 3 deaths
- Green onions most likely food vehicle; contaminated by farm workers
- Food Service workers unlikely Hep A source

- **Potential Contributing Factors:** restaurant produce handling practices
  - Green onions were shipped in 8.5-lb. boxes containing multiple small bundles (6--8 green onions per bundle).
  - Each box was unpacked, and bundles were stored upright (root side down) and refrigerated <u>in a bucket with ice</u> included in the shipment.
  - Green onions were stored <5 days before processing, which consisted of rinsing intact onion bundles, cutting the roots off, and removing the rubber bands.
  - Green onions from each box were chopped by machine to yield approximately 8 qts.
  - Chopped green onions were refrigerated for approximately 2 days.

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CHI-CHI'S

Journal of Food Protection, Vol. 80, No. 2, 2017, Pages 312–330
doi:10.4315/0362-028X.JFP-16-258
Published 2017 by the International Association for Food Protection

General Interest

Guidelines To Validate Control of Cross-Contamination during Washing of Fresh-Cut Leafy Vegetables

D. GOMBAS,[1] Y. LUO,[2] J. BRENNAN,[3] G. SHERGILL,[4]† R. PETRAN,[5] R. WALSH,[5] H. HAU,[5] K. KHURANA,[6]‡
B. ZOMORODI,[7] J. ROSEN,[8] R. VARLEY,[9] AND K. DENG[10]*

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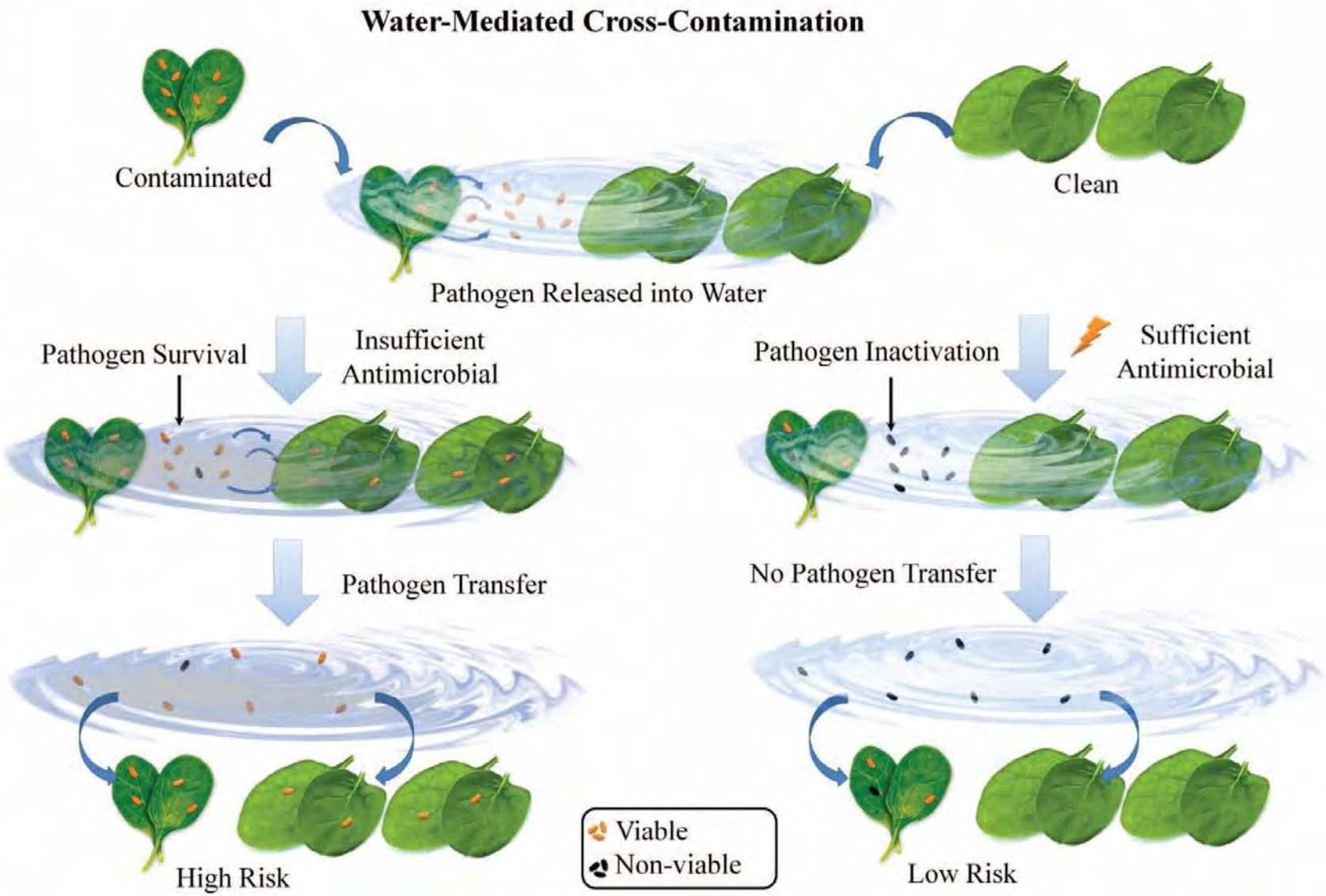


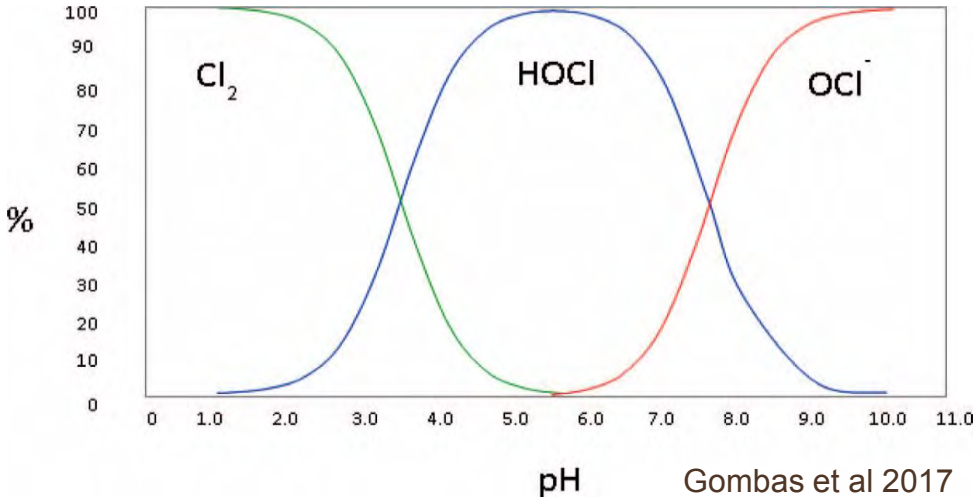
Gombas et al 2017

Wash Water Antimicrobials

- Sodium Hypochlorite (NaOCl or Cl_2)
- Calcium Hypochlorite $Ca(OCl)_2$
- Chlorine Dioxide ClO_2
- Peroxy Acetic Acid (acetic acid + hydrogen peroxide)
- Ozone

Key Efficacy Variables: to prevent cross contamination

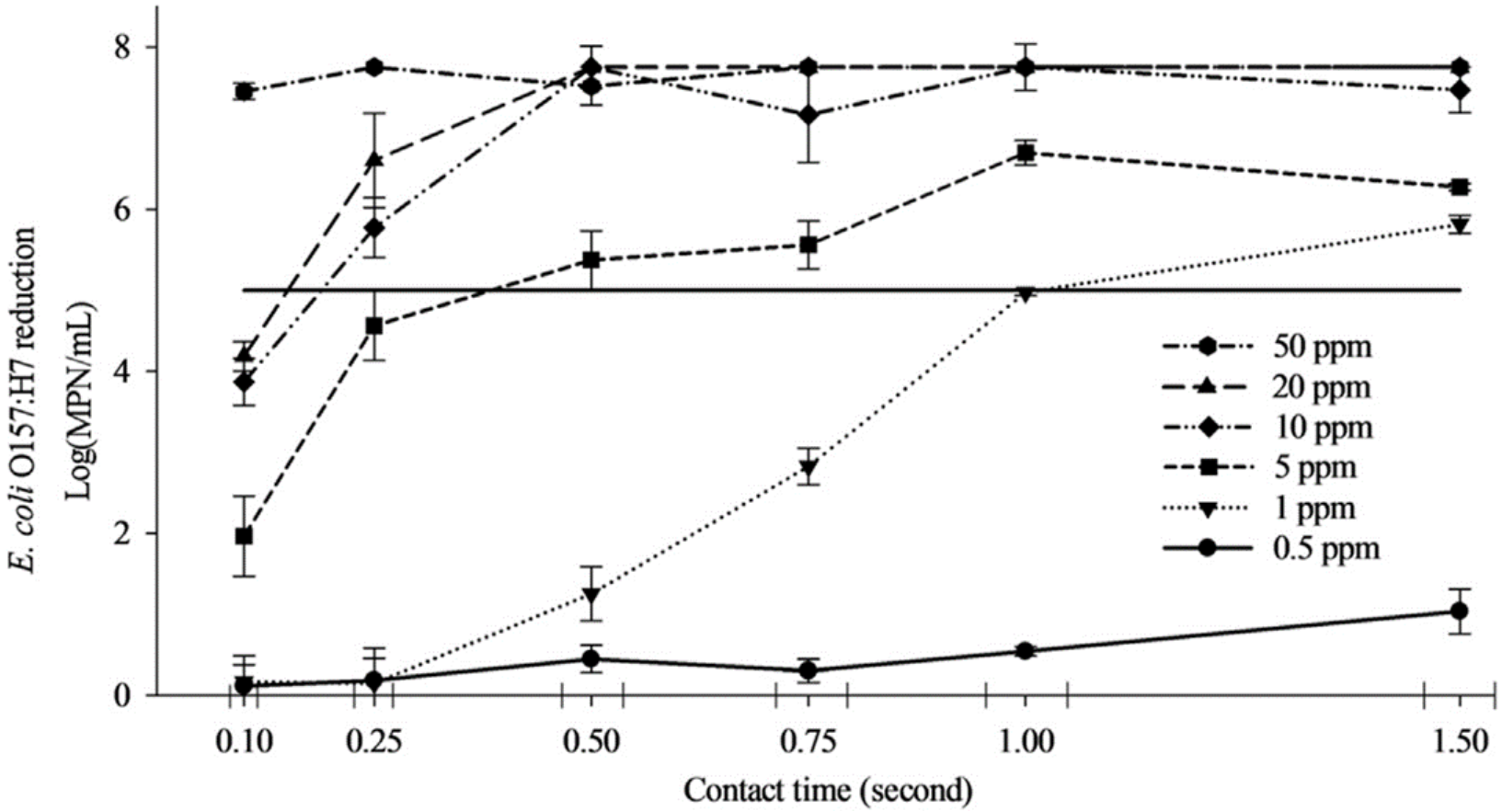
- Concentration X Time
- pH
- Temperature
- Insoluble Solids = produce
- Soluble Solids = produce



Gombas et al 2017

Goodburn & Wallace microbiological efficacy of decontamination methodologies for fresh produce: A review Food Control 32 (2013) 418-427

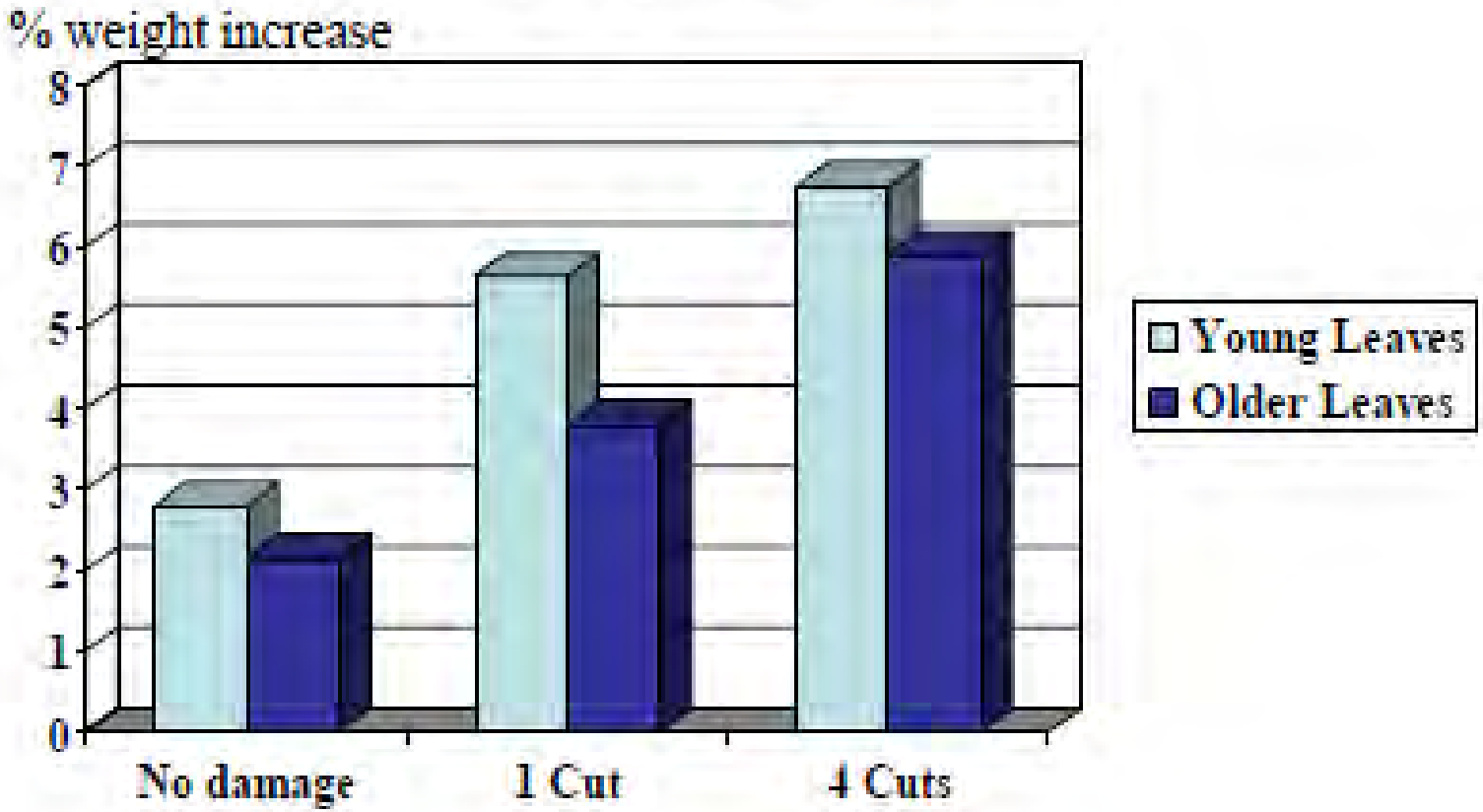
The Chlorine C X T Relationship



A novel microfluidic mixer-based approach for determining inactivation kinetics of *Escherichia coli* O157:H7 in chlorine solutions Zhang et al 2015 Food Microbiology 49 (2015) 152-160.

Spinach Damage Increases Water Absorption in Wash Flume

20°C water 3 min



(Cantwell, 2013)

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Journal of Food Protection, Vol. 75, No. 2, 2012, Pages 297–303
doi:10.4315/0362-028X.JFP-11-078

Effects of Tomato Variety, Temperature Differential, and Post–Stem Removal Time on Internalization of *Salmonella enterica* Serovar Thompson in Tomatoes†

XIAODONG XIA,[1,2] YAGUANG LUO,[2]* YANG YANG,[2] BRYAN VINYARD,[3] KEITH SCHNEIDER,[4] AND JIANGHONG MENG[5]

Factors Affecting Water Uptake Into Produce

- Produce Hydration /Dehydration Status
- Submersion Depth
- Temperature Differential (produce vs water)
- Produce Type & Variety
- Time After Harvest

Produce Washing or Crisping

- Produce occasionally harbors human pathogens (low prevalence and low populations)
- Produce will absorb water during washing or crisping.
- Surface cross contamination and internalization can occur during produce washing or crisping.
- Contamination is mediated by wash water-to-produce cross contamination.
- Food contact surface-to-wash water-to-produce cross contamination can occur.
- Antimicrobials reduce cross contamination potential; They DO NOT pasteurize produce (1-2 log reduction at best).

FDA Consumer Recommendations

- All produce should be thoroughly washed before eating. This includes produce grown conventionally or organically at home, or produce that is purchased from a grocery store or farmer's market. Wash fruits and vegetables under running water just before eating, cutting or cooking.

- Many precut, bagged produce items like lettuce are pre-washed. If so, it will be stated on the packaging. This pre-washed, bagged produce can be used without further washing.

ARTICLES
Food Protection Trends, Vol. 27, No. 11, Pages 892–898

6200 Aurora Ave., Suite 200W, Des Moines, IA 50322-2864
International Association for Food Protection.

Recommendations for Handling Fresh-cut Leafy Green Salads by Consumers and Retail Foodservice Operators

- Leafy green salad in sealed bags labeled “washed” or “ready-to-eat” that are produced in a facility inspected by a regulatory authority and operated under cGMPs, does not need additional washing at the time of use unless specifically directed on the label.
- Additional washing of ready-to-eat green salads is not likely to enhance safety.
- The risk of cross contamination from food handlers and food contact surfaces used during washing may outweigh any safety benefit that further washing may confer.

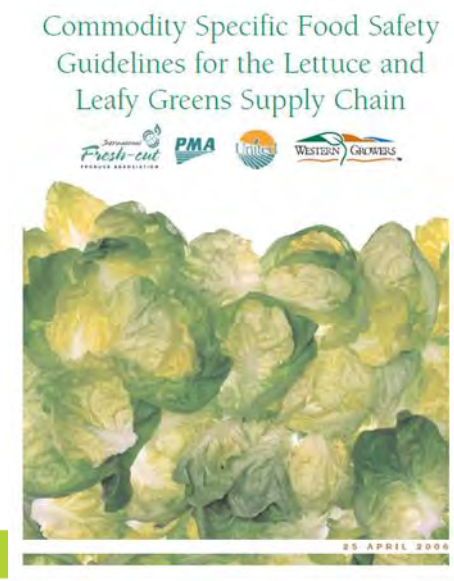
Issue: Lettuce Re-Crisping

Lettuce may be re-crisped by placing fresh-cut lettuce/leafy greens in containers with tap water. The small amounts of chlorine present in the re-crisping tap water may be quickly inactivated by the organic load presented by lettuce/leafy greens. This may increase the potential for lettuce/leafy greens cross contamination particularly if additional lettuce/leafy greens are added to the re-crisping container (Wachtel and Charkowski, 2002).

Things to Consider (Retail and Foodservice):

- When re-crisping whole lettuce, reduce the potential for water and utensils to contaminate lettuce/leafy greens. Clean and sanitize the sink or container first and use water supplies that meet drinking water standards for re-crisping. The water should be changed at a frequency sufficient to ensure that it is of appropriate microbial quality for its intended use.

- Evaluate use of running water to re-crisp lettuce as needed, in lieu of re-crisping by water soaking, to reduce the potential for cross contamination.



Crisping & Washing POS Considerations

Risk of Cross Contamination Exists

Vs

Risk of Improper Antimicrobial Use Exists

Crisping & Washing POS Considerations

Wash Water Antimicrobials are not a panacea

Wash Water Antimicrobials Need to be Managed

- ❖ Concentration
- ❖ Time
- ❖ Total Solids (Soluble & Insoluble)
- ❖ Water re-fresh

If Wash Water Antimicrobials are NOT used

- ❖ Use running water
- ❖ Keep batches small
- ❖ Change water often

Always clean & sanitize food contact surfaces

Crisping & Washing POS Considerations

Limit the need for crisping, if possible

- ❖ Inventory control
- ❖ Supply chain management (Temp, RH, Packaging)

Washing

- ❖ Don’t re-wash fresh-cut produce that has been washed and is ready-to-eat.
- ❖ Always wash whole produce before preparation.

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Thank You

Dr. Jim Gorny
VP, Food Safety & Technology
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RUTGERS
School of Environmental and Biological Sciences

Sanitizer efficacy in preventing cross-contamination of heads of lettuce during retail crisping

Yangjin Jung, Hyein Jang, Mengqi Guo, Jingwen Gao, Karl R. Matthews*

Department of Food Science, Rutgers University, New Brunswick, NJ 08901, United States

Food Microbiology (2017) 64:179-185

Cross-contamination is a concern when processing products at retail establishments?

Crisping

Soak commodity in water or sanitizer* for 5 min, drain, and place in cooler

Microbial analysis of crisping water

Microbial analysis of crisped lettuce immediately upon removal from water

No Misting

Product placed in chill cabinet 24h

Refrigerator (4°C). Held for up to 7d.

Microbial and sensory quality analysis of lettuce at 4 and 7 d

Misting
Water alone
Place product butt-end down in chill cabinet (4°C). Product misted for 10 sec at 10 min intervals for 24 h period (4°C)

Microbiological testing

Product transferred to refrigerator and held for up to 7 d.

Microbial and sensory quality analysis of lettuce at 4 and 7 d

Inoculation of lettuce

- *Salmonella* Newport H1275 (sprout outbreak), *S*. Stanley H0558 (sprout outbreak), *S*. Montevideo G4639 (raw tomato outbreak).
- *E. coli* O157:H7 isolated from lettuce and clinical samples.
- *L. monocytogenes* L008 (serotype 4b, Canadian coleslaw/cabbage outbreak), L2624 (serotype 1/2b, cantaloupe outbreak), and L2625 (serotype 1/2a, cantaloupe outbreak).
- Dip-inoculated in 6 L of sterile tap water containing a cocktail for 5 min to achieve approximately 5 log CFU/g

Experimental Approach

Three consecutive soaking processes were performed as follows. For the first batch, one head of inoculated lettuce and seven heads of non-inoculated lettuce were soaked together in 76 L of TW, EW, LPA, or CA. After 5 min of soaking, the seven heads of non-inoculated lettuce were removed from each treatment sink and placed in a perforated crisping tray. The inoculated lettuce was handled separately. The inoculated and non-inoculated heads of lettuce were subjected to microbiological analysis. For the second and third batch, eight heads of non-inoculated lettuce per batch were soaked for 5 min in the same TW, EW, LPA, or CA crisping solutions that had been used to soak the first batch.

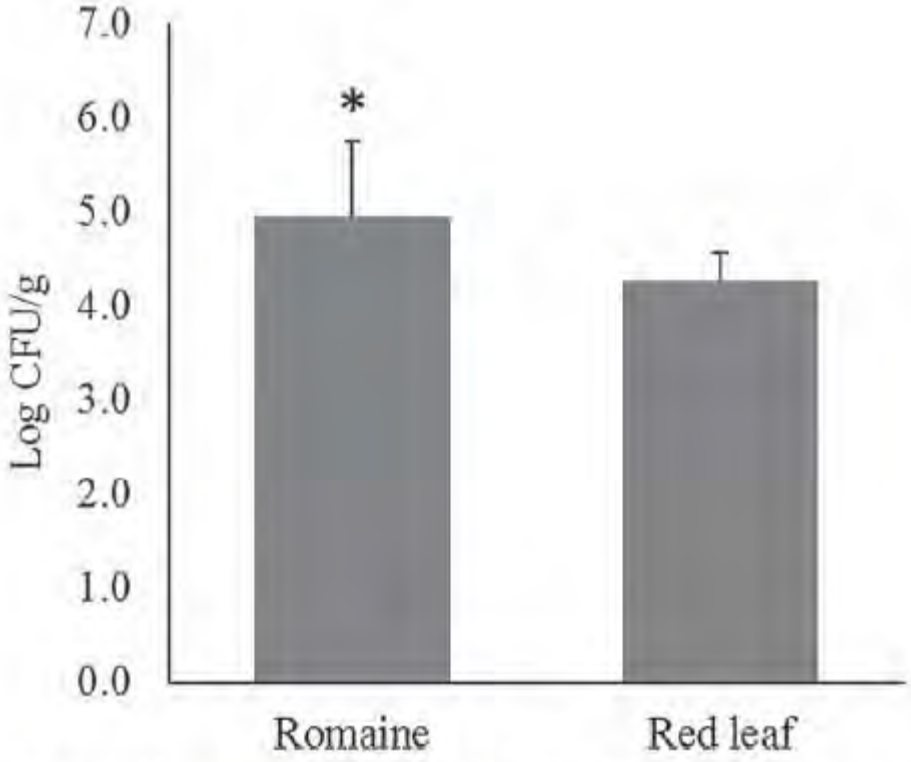

Fig. 1. Natural flora of whole heads of Romaine and Red leaf lettuce. Asterisk indicates a significantly different mean value between Romaine and Red leaf lettuce (PROC TTEST, $p < 0.001$).

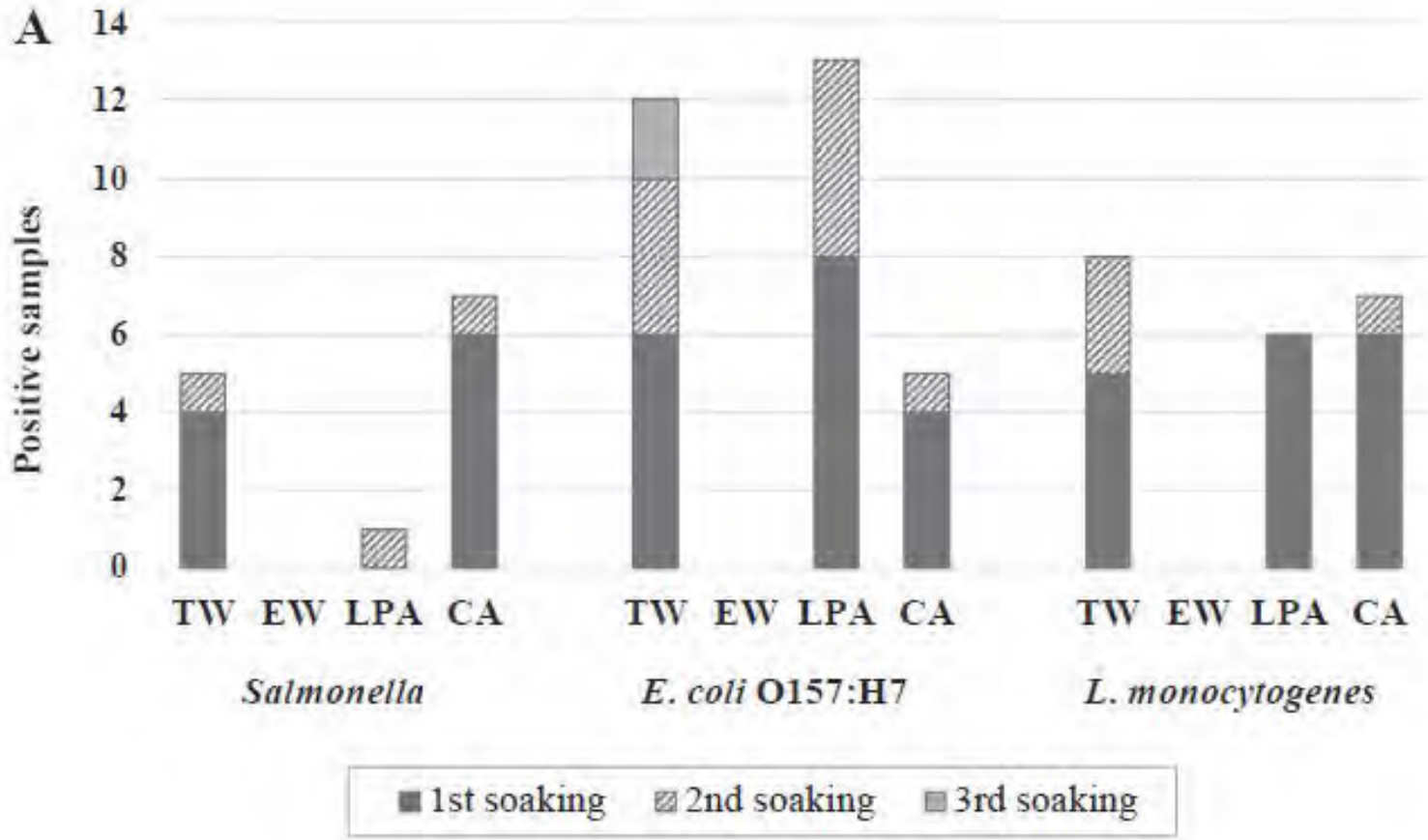

Fig. 2. Cross-contamination of non-inoculated Romaine (A) and Red leaf (B) lettuce associated three consecutive uses of soaking water. Colonies were not detected following direct plating of samples, so all samples were subjected to enrichment and processed for presence of *S. enterica*, *E. coli* O157:H7 and *L. monocytogenes*. Positive samples from all experiments are reported.

Table 3
Microbiological quality of soaking water.

		Soaking event[B]	Treatment[A]			
			TW	EW	LPA	CA
Romaine lettuce	Aerobic filter counts[C]	1st	>250	0	>250	>250
		2nd	>250	0.1 ± 0.3[D]	>250	>250
		3rd	>250	0.1 ± 0.3	>250	>250
Red leaf lettuce	Aerobic filter counts	1st	>250	0.1 ± 0.3	>250	>250
		2nd	>250	0.5 ± 0.8	>250	>250
		3rd	>250	0.5 ± 0.8	>250	>250

[A]Tap water alone (TW), electrolyzed water (EW), citric acid-based sanitizer (CA), and lactic acid and phosphoric acid-based sanitizer (LPA).
[B]Three consecutive soakings were processed without changing crisping water.
[C]Aerobic filter count: Total colony count associate with 100 mL soaking water.
[D]Values are the mean colony count from samples for all experiments (n = 12).

Table 2
Log reduction of *S. enterica*, *E. coli* O157:H7 and *L. monocytogenes* on Romaine lettuce following a 5-min soak.

Treatment[1]	*S. enterica*[2]	*E. coli* O157:H7	*L. monocytogenes*
TW	$1.8 \pm 0.3^{ab}_{B}$	$2.2 \pm 0.6^{a}_{B}$	$1.5 \pm 0.5^{b}_{A}$
EW	$3.0 \pm 1.2^{a}_{A}$	$3.7 \pm 1.5^{a}_{A}$	$3.4 \pm 1.3^{a}_{A}$
LPA	$1.2 \pm 0.1^{b}_{B}$	$1.7 \pm 0.3^{a}_{B}$	$0.9 \pm 0.1^{c}_{A}$
CA	$1.8 \pm 0.2^{a}_{B}$	$1.9 \pm 0.2^{a}_{B}$	$1.9 \pm 0.3^{a}_{A}$

[1] Tap water alone (TW), electrolyzed water (EW), citric acid-based sanitizer (CA), and lactic acid and phosphoric acid-based sanitizer (LPA).
[2] Population on inoculated lettuce of *S. enterica*, *E. coli* O157:H7, and *L. monocytogenes* were 5.1 ± 0.3, 5.3 ± 0.2, and 5.4 ± 0.2 log CFU/g, respectively, prior to treatment.
[A] Averages compared between soaking treatments on each foodborne pathogen with the same capital letter are not significantly different ($P > 0.05$).
[a] Averages followed by the same lower case letter indicate no significant difference between foodborne pathogens on the same soaking treatment ($P > 0.05$).

While the project is interesting, it is hard to assign priority when there is no solid data to show how much of the contamination is attributed handlings of produce at retail levels.

While retail operations are not required to incorporate sanitizers in wash, crisping or misting waters to prevent cross-contamination, there is extensive amounts of peer-reviewed research available to demonstrate their effectiveness in systems of various sizes. In reality, a small-scale farmer will very closely mimic the handling described in this proposal. The lack of novelty to this approach is a major drawback to the proposal.

Washing steps have been very well studied for cross-contamination in produce. Although the food code does not require retailers to incorporate sanitizers, their efficacy has been validated. Additionally, how well the data mirror parameters experienced at retail is not discussed. As it stands, it appears that research parameters were not obtained based upon retail observations.

Produce Crisping Risks and Mitigations

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UNITED FRESH
PRODUCE ASSOCIATION

Overview

- Why crisp produce?
- Risks
- Antimicrobials in water
- Alternative considerations
- Resources

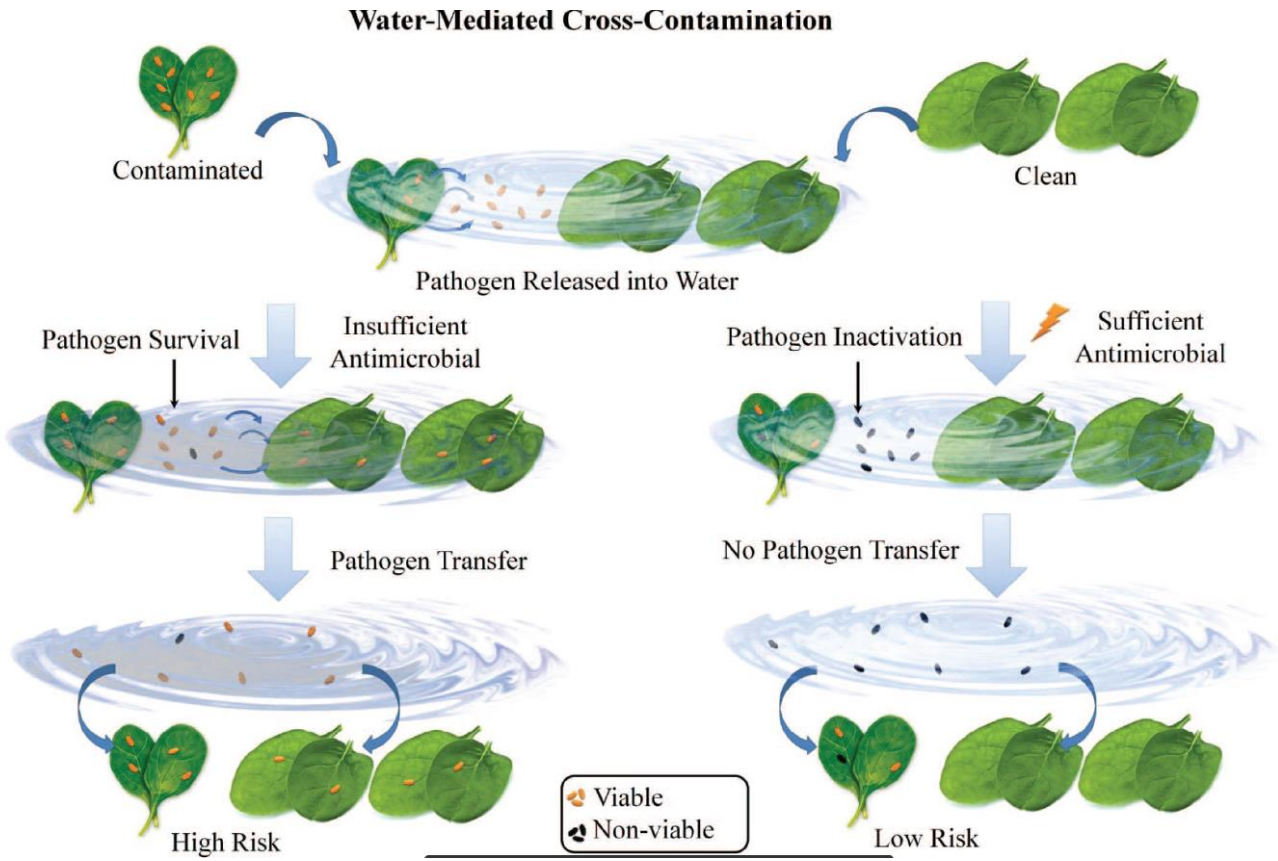
RACs vs RTE

- Most fresh produce is considered RTE
  - "Any food that is normally eaten in its raw state or any other food, including a processed food, for which it is reasonably foreseeable that the food will be eaten without further processing that would significantly minimize biological hazards" (117.3; Preventive Controls for Human Food Rule)
  - FDA guidance on RTE forthcoming
  - RTE and RAC are not mutually exclusive
  - Includes apples, tomatoes, lettuce, cherries etc.

Process

- Trim
- Soak 3-20 minutes
  - Tepid/ lukewarm water
- Refrigerate

Risks



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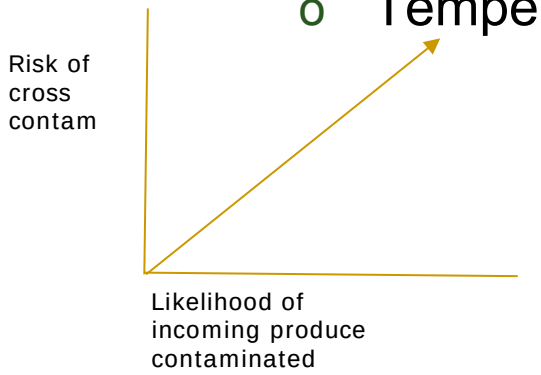
Risks

- What is risk of contamination of individual piece?
  - Supply chain control & previous handling
    - Produce Safety Rule
    - Washing (not a kill step!)
    - Post wash contamination (Lm)
    - Temperature control



Commercial Washing

- Antimicrobials
  - Chlorine (hypochlorite)
  - PAA (peracetic acid/ peroxyacetic acid)
  - Ozone and aqueous chlorine dioxide
- Temperature
  - 10 degrees warmer than product
    - Prevent infiltration
    - (For crisping, you want infiltration)

Purpose

- Prevent cross contamination
- NOT a kill step

Effectiveness

- Concentration
- Product: water
- Contact time
- pH
- Temperature
- Water hardness
- Insoluble solids
- Soluble solids
- Product type and quality

TABLE 1. *Comparison of commonly used antimicrobial agents*[a]

Key attributes	Hypochlorite	Peracetic acid	Ozone	Chlorine dioxide
Final rinse with potable water required	Yes	No[b]	No	Yes
pH must be controlled	Yes	No	No	No
Organic load tolerance	Very sensitive	Less sensitive	Very sensitive	Less sensitive
Off-gassing hazard potential	Yes at low pH	No	Yes	Yes
Approved for use in wash water for organic produce	See NOP[c]	Yes	Yes	See NOP
Mechanism of action	Oxidizer, metabolic poison	Oxidizer	Oxidizer	Oxidizer

[a] Always follow label instructions. Similar chemistries may have different claims or use requirements, depending on the product.
[b] A final rinse is not required when usage does not exceed 80 ppm in wash water.
[c] National Organic Program *(44)*.

Retail Considerations

- Risk of cross contamination vs risk of improper antimicrobial use
- Need to maintain effective levels
- Need for potable water rinse

Alternatives

- Limit need for crisping
  - Manage supply chains and inventory
  - Control environment (temperature, humidity, packaging)
- Limit scope of cross contamination
  - Small batches
  - Change water

Resources

- https://www.fmi.org/docs/default-source/food-safety/produce-safety-best-practices-guide-for-retailers.pdf?sfvrsn=15

- http://ucce.ucdavis.edu/files/datastore/234-2083.pdf

UNITED FRESH PRODUCE ASSOCIATION

Questions?

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