



MICROBIAL WATER QUALITY IN THE PROPOSED PRODUCE SAFETY RULE AND FATE INDICATORS IN THE GROVE, YEAR 2

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PRODUCE SAFETY

What is covered?


- Applies to raw agricultural commodities, including fruits, vegetables, mushrooms, tree nuts, sprouts and mixes of intact fruits and vegetables:
 - Applies to domestic and imported produce
 - **Covers the harvestable portion (including peels/shells)** but not the rest of the plant
 - Exhaustive list of “rarely consumed raw” not covered
 - Does not apply to produce that is commercially processed
 - Must have records of who processed it



PRODUCE SAFETY

Why include fruit with peels?

- Recent outbreaks related to fruit with peels
 - Pomegranate Seeds – Hepatitis A, 2013
 - Mangoes – *Salmonella*, 2012
 - Cantaloupe – *Salmonella*, 2012
 - Cantaloupe – *Listeria monocytogenes*, 2011
 - Papaya – *Salmonella*, 2011
 - Melons – *Salmonella*, 2011
 - Mamey – *Salmonella*, 2010




PRODUCE SAFETY

Why include fruit with peels?

- Outbreaks related to Citrus Juice


Type	Product	Pathogen ¹	Year	Location	Venue
Orange	Unpasteurized	Enterotoxigenic <i>E. coli</i>	1992	India	Roadside vendor
	Unpasteurized	<i>Salmonella</i> Gaminara, Harbord and Rubislaw	1995	USA (FL)	Retail
	Unpasteurized	<i>Shigella flexneri</i>	1995	South Africa	Restaurant
	Unpasteurized	Virus suspected	1996	USA	Food Service
	Unpasteurized	<i>S. Muenchen</i>	1999	Canada and USA	Restaurant
	Unpasteurized	<i>S. Anatum</i>	1999	USA (FL)	Roadside stand
	Unpasteurized	<i>S. Typhimurium</i>	1999	Australia	Retail
	Unpasteurized	<i>S. Enteritidis</i>	2000	USA (6 states)	Retail and Food Service
	Unpasteurized	<i>Salmonella</i> Typhimurium and Saintpaul	2005	USA (23 states)	Retail and Food Service
	Reconstituted	<i>S. Typhi</i>	1944	USA (OH)	Hotel
	Reconstituted	Hepatitis A	1962	USA (MO)	Hospital
	Reconstituted	Unknown	1965	USA (CA)	Football game
	Reconstituted	<i>S. Typhi</i>	1989	USA (NY)	Hotel



PRODUCE SAFETY

Approach?

- Takes a “risk based” approach that looks at “high risk” practices not “high risk” commodities
 - Allows for different practices
 - Recognizes further processes and rarely consumed raw
 - Recognizes not all water or soil amendments are the same
 - No prescriptive requirements for uncontrollable factors (i.e. wildlife)



PROPOSED PRODUCE SAFETY RULE

Agricultural Water?

- Inspect entire water system “under your control” (source, distribution system, facilities and equipment).
- Water that:
 - Directly contacts product during/after harvest
 - Used to make “agricultural tea”
 - Used to clean food contact surfaces
 - Used to wash hands
- No generic *E. coli* in 100 ml water

PROPOSED PRODUCE SAFETY RULE

Agricultural Water?

- Directly contacts produce preharvest
 - <235 *E. coli* in 100 ml (single sample)
 - <126 *E. coli* in 100 ml (5 sample rolling geometric mean)

$$\text{Geometric Mean of 5 Water Samples} = \frac{(N1)(N2)(N3)(N4)(N5)}{100000}^{1/5}$$

PRODUCE SAFETY

Agricultural Water?

- No standard for non-direct water application
- Option for Alternative Standards
- Testing
 - Everyone
 - Beginning of growing season and every three months
 - Untreated surface water NOT subject to runoff
 - Monthly
 - Untreated surface water subject to runoff
 - Every 7 days
 - No testing if public source or treated water

PRODUCE SAFETY

Alternatives

- Farms may establish alternatives to certain requirements related to water and soil amendments of animal origin
 - Agricultural water used during production
 - Microbiological quality of compost
 - Interval between compost use and harvest
- No need for FDA approval
 - Until requested by FDA on-farm

PRODUCE SAFETY

Variations

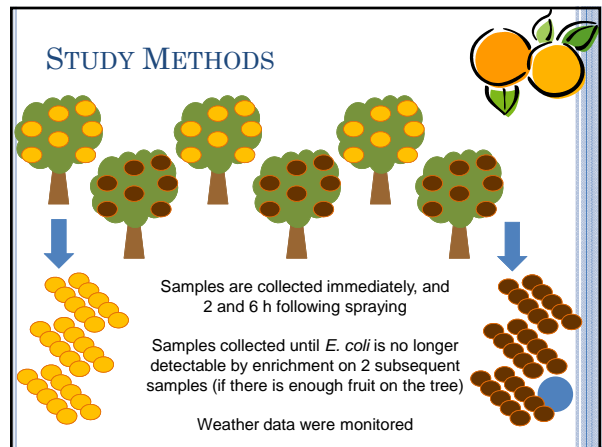
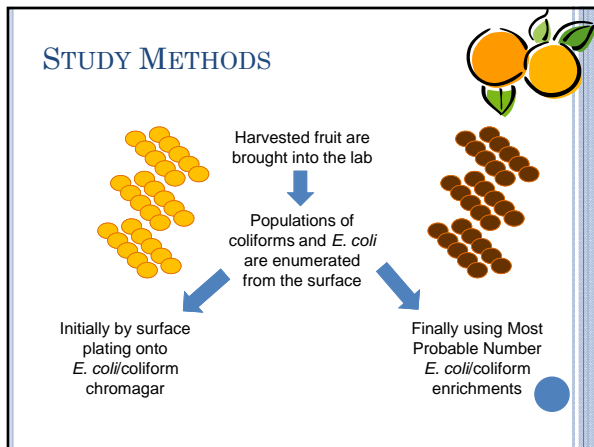
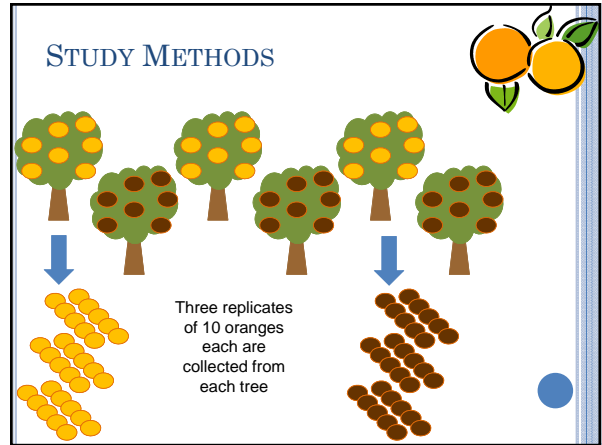
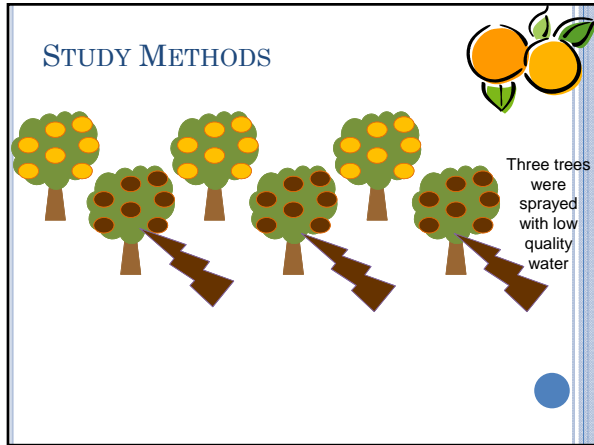
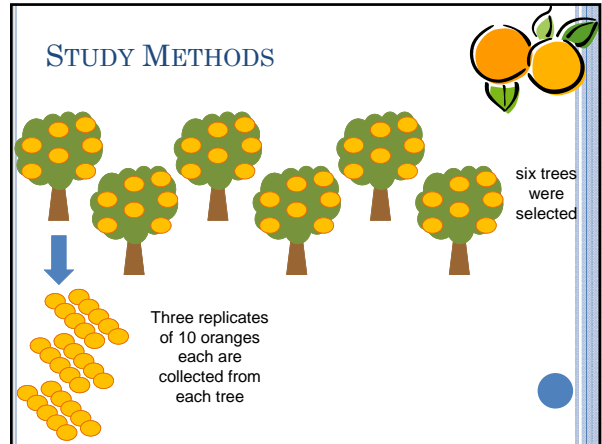
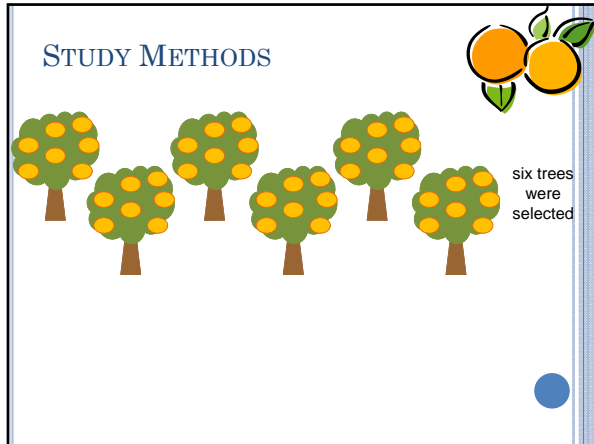
- A framework for developing research protocols for evaluation of microbial hazards and controls during production that pertain to the quality of agricultural water contacting fresh produce that may be consumed raw.
 - 2012 Journal of Food Protection 75: 2251-73

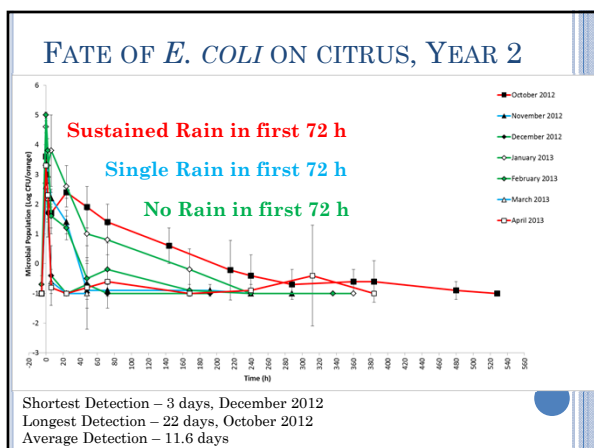
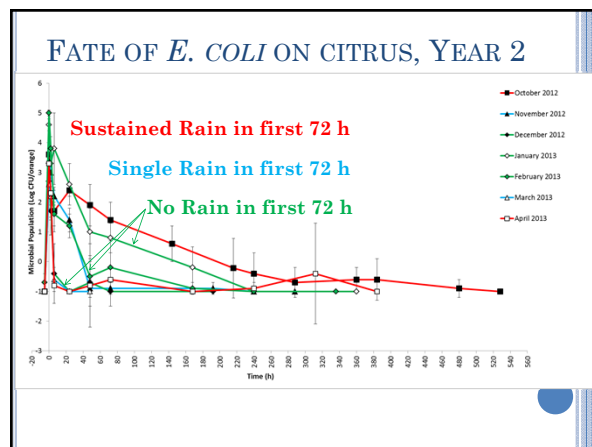
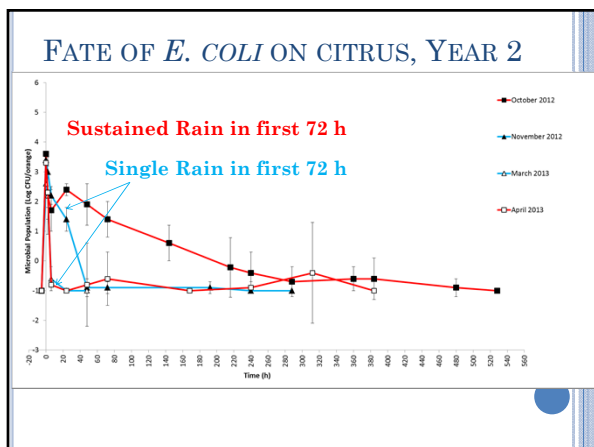
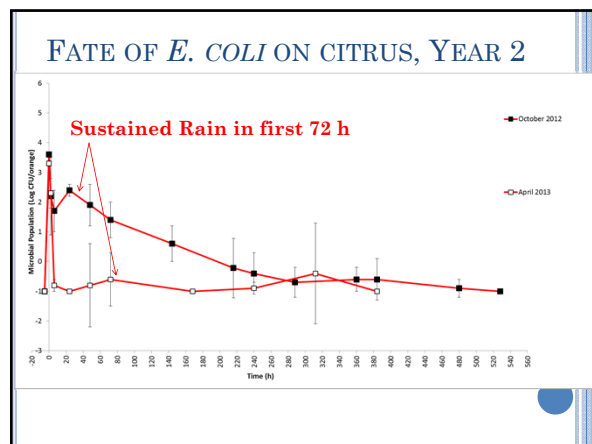
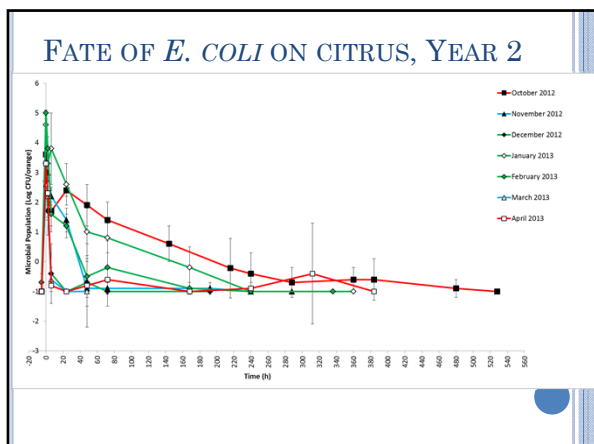
FSMA – FDA FACT SHEETS

- Agricultural Water
 - http://www.fda.gov/downloads/Food/GuidanceRegulation/FSMA/UCM360242.pdf?source=go_vdelivery
- Alternatives and Variations
 - http://www.fda.gov/downloads/Food/GuidanceRegulation/FSMA/UCM360248.pdf?source=go_vdelivery
- Commodities Related to Outbreaks
 - http://www.fda.gov/downloads/Food/GuidanceRegulation/FSMA/UCM360758.pdf?source=go_vdelivery


STUDY OBJECTIVES

- Evaluate the fate of *E. coli* sprayed onto oranges if low microbial quality water is used.
 - Ca. 4 log or 2 CFU/ml *E. coli* water
 - 10,000 or 100 cells per ml!
 - Sensitive method of recovery
 - Allows us to detect 1 *E. coli* cell/10 oranges
- Seven harvest dates; Four Hamlin, Three Valencia
 - October, November and December, 2012
 - January, February, March and April, 2013





SUMMARY – YEARS 1&2



- Survival of *E. coli* sprayed onto oranges varies depending on environmental conditions.
 - Between 3 and 23 days.
 - Longest time, June 2012 during Tropical Storm Debby
 - Sensitive method of recovery
 - Allows us to detect 1 *E. coli* cell/10 oranges
- Because of variability due to weather, may be difficult to establish a pre-harvest interval
- Use of data to establish essential window for proposed produce safety rule instead?
 - Rather than follow rule for entire citrus “growing season”, just for a month preceding harvest?



QUESTIONS?

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