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# National Watermelon Promotion Board Microbial Food Safety Program 2004

L.J. Harris and T.V. Suslow

- ❖ Brief background of outbreaks
- ❖ Cross-contamination concerns
- ❖ Research progress report
  - Survival on the outer rind
- ❖ Possible next steps





# Watermelon Outbreaks

Pathogen	Date	Location	Cases/ Deaths	Cause
<i>Salmonella</i>	1950	Minnesota	6/0	Temperature abuse after preparation.
<i>Salmonella</i>	1954	Mass.	17/1	Possible transfer from rind.
<i>Salmonella</i>	1979	Illinois	18/0	Damaged fruit cut for sale. Temperature abuse after preparation.
<i>Salmonella</i>	1991	Michigan	26/0	Possible transfer from rind. Temperature abuse after preparation.
<i>Shigella</i>	1987	Sweden	15/0	Contaminated water used to inject melon.

**E. COLI TRACED TO WATERMELON**

**SIZZLER APPARENTLY HAD TAINTED FRUIT**

**BY TOM HELD  
OF THE JOURNAL SENTINEL STAFF  
*AUG. 1, 2000***



# Outbreaks Associated with Watermelon

No known outbreaks linked to contamination at production or shipping

- |               |               |   |
|---------------|---------------|---|
| ❖ 2002        | India         | Injecting with unclean sugar-water +color |
| ❖ 2000 (64/1) | Minn. Sizzler | Cross-contamination at food prep          |
| ❖ 1993 (18)   | U.S.          | Home juice preparation                    |
| ❖ 1991 (39)   | Michigan      | School picnic                             |
| ❖ 1979 (18)   | Illinois      | Supermarket salvage + temp. abuse         |
| ❖ 1954 (18)   | Florida       | Injecting with non-potable water          |







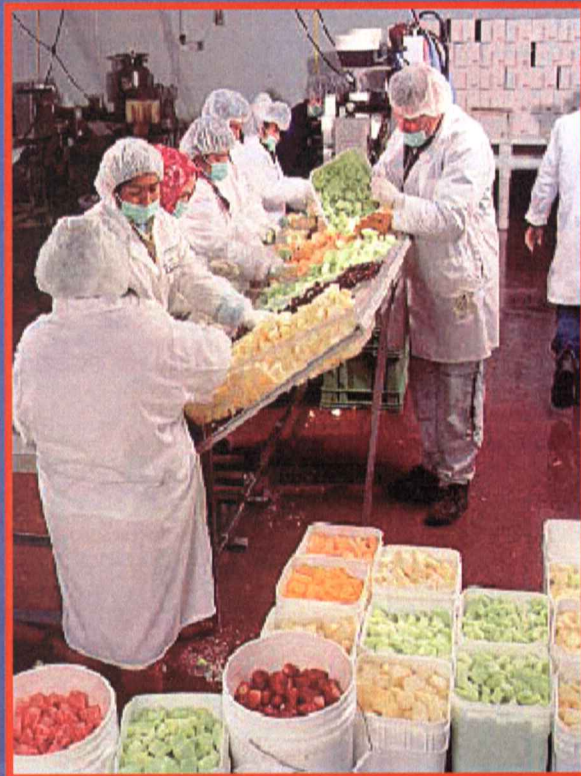
15°C

5°C

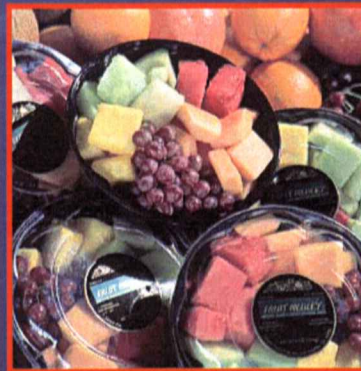




## Melons Present Special Problems in Microbial Food Safety

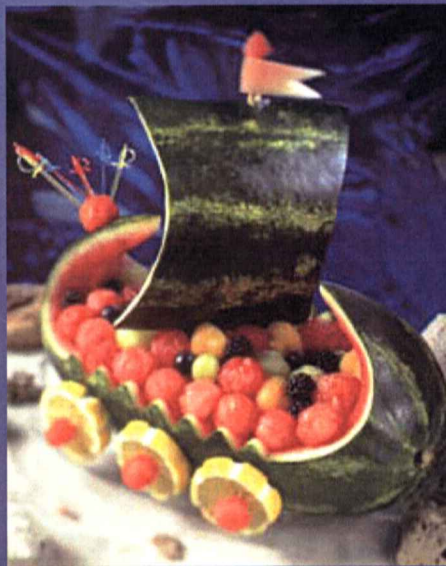


- ✓ High sugars, low acid
- ✓ Internal tissue is “clean”
- ✓ Processing removes barriers
- ✓ Cutting will transfer microbes
- ✓ Rapid multiplication potential
- ✓ High consumer use rate



Foundation for most  
Fresh cut fruit medleys





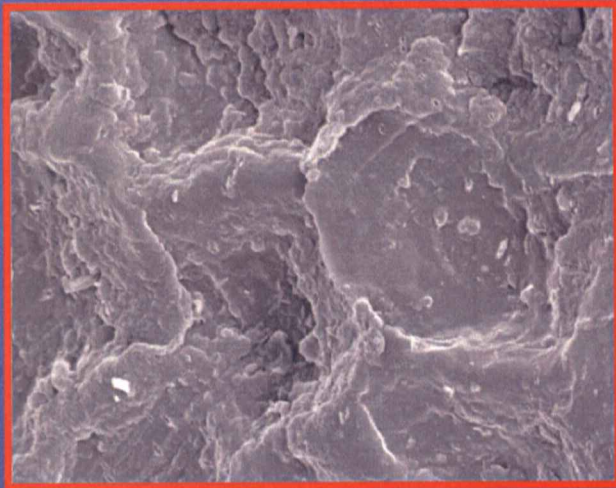
**Direct contact of edible flesh  
with outer rind is common**



# Surface Characteristics Greatly Influence 'Cleanability' and Disinfection Efficacy

50 ppm Free Chlorine @ pH 7.0 for 5 min; 12°C

99.95% reduction



Mature Honeydew

90.5% reduction



Mature Cantaloupe

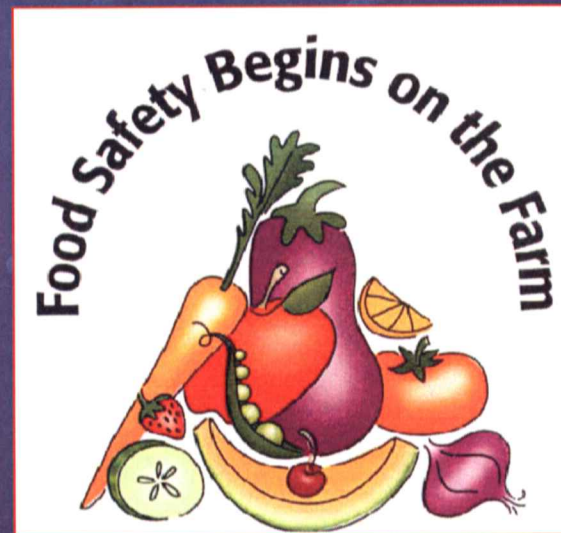


# Washing Produce Does Not *Eliminate* Pathogens

Therefore !!!

At every step in the food chain

- Prevention
- Reduction
- Education



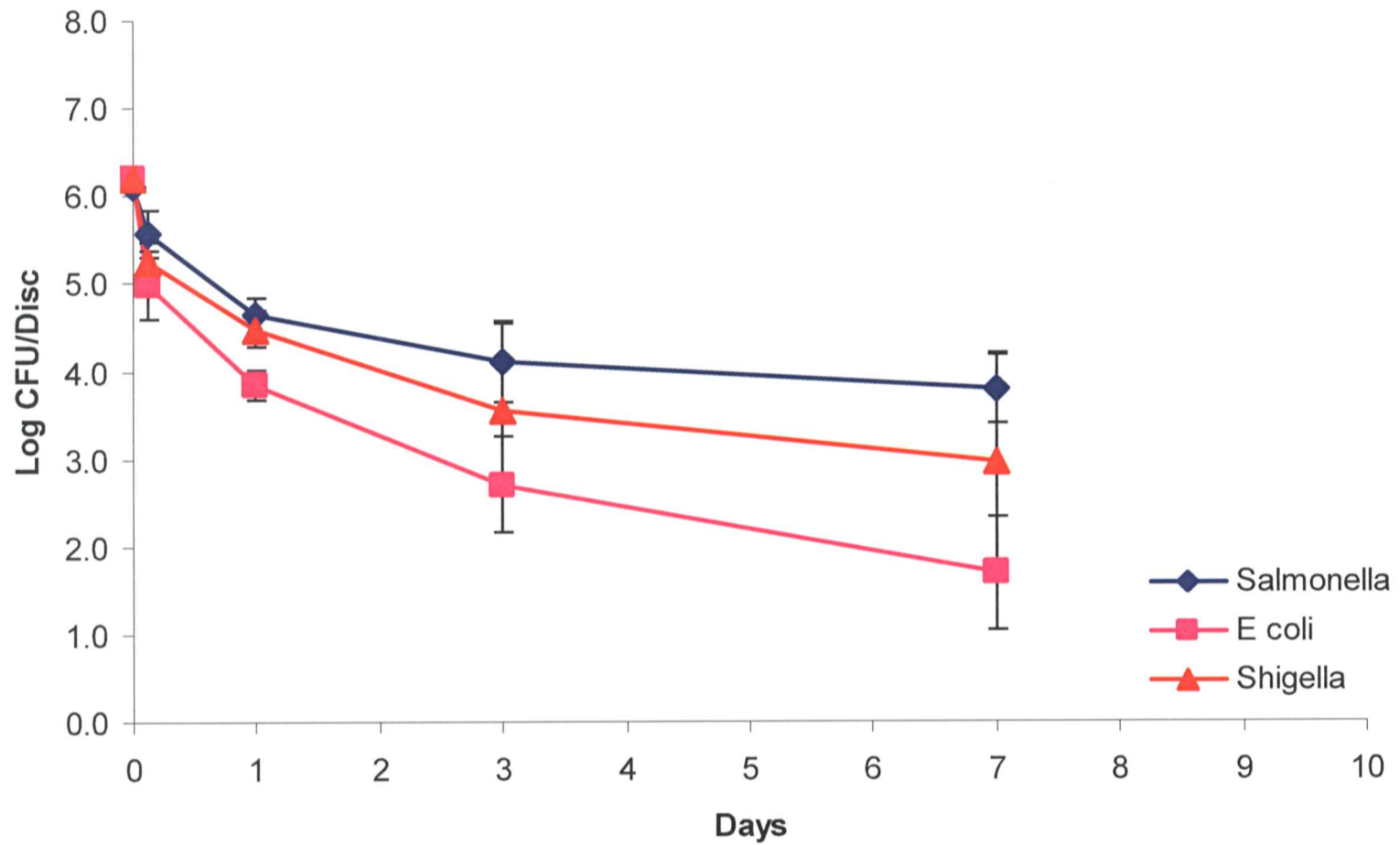


# **NWPB Microbial Food Safety 2004 Objectives**

1. Assess survival of target pathogens on rind
  - a) *E. coli* O157:H7, *Salmonella* spp., *Shigella*
2. Simulate distribution and handling conditions
  - a) Low RH vs. High RH
  - b) Temperature
3. Compare survival among
  - a) Upper vs. lower surface
  - b) At ground spot
  - c) Seed, seedless, flesh color
  - d) Stem scar
  - e) Scuffed or wound-damaged and healed areas

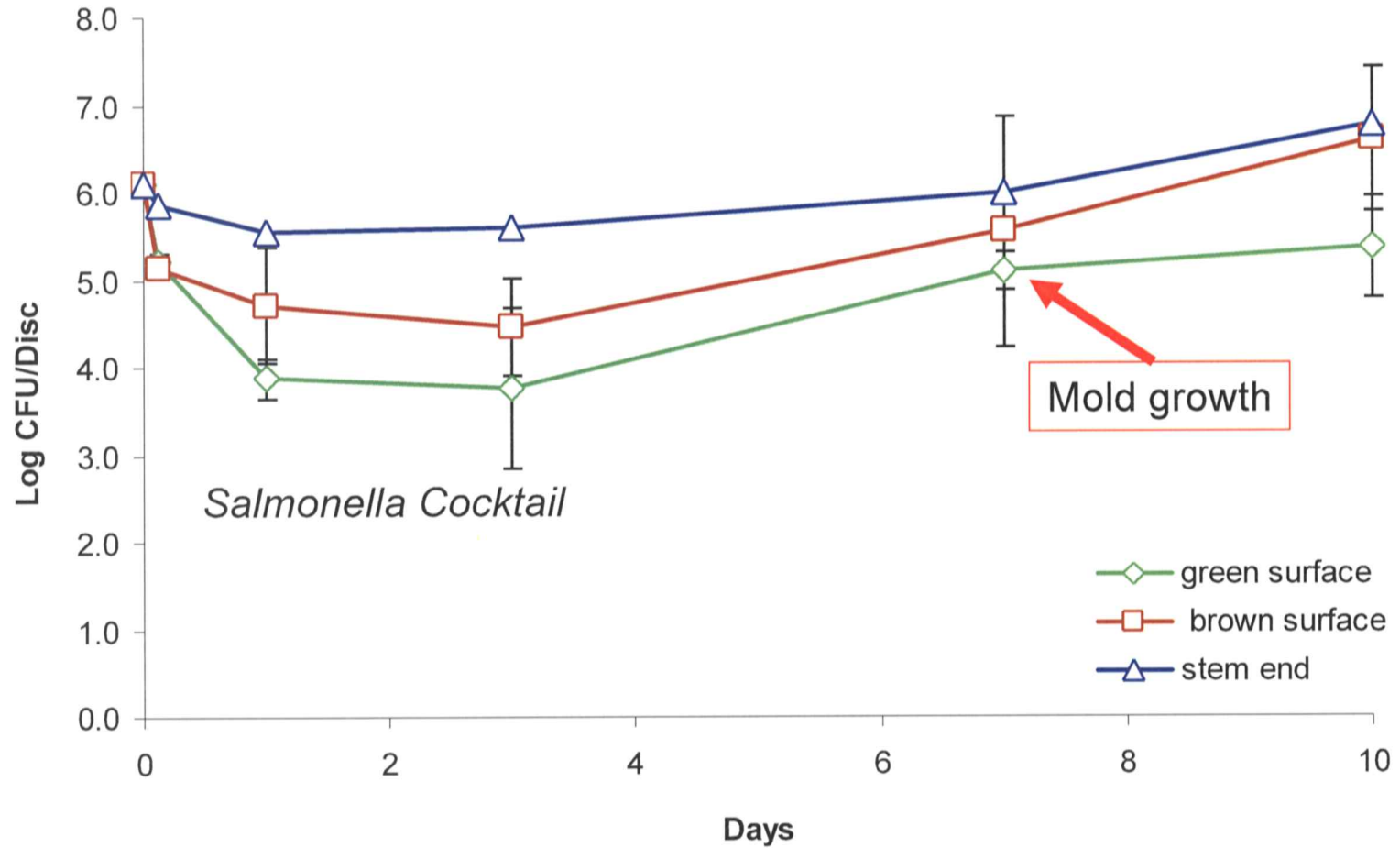


### Green Watermelon Surface at 20°C (68°F)



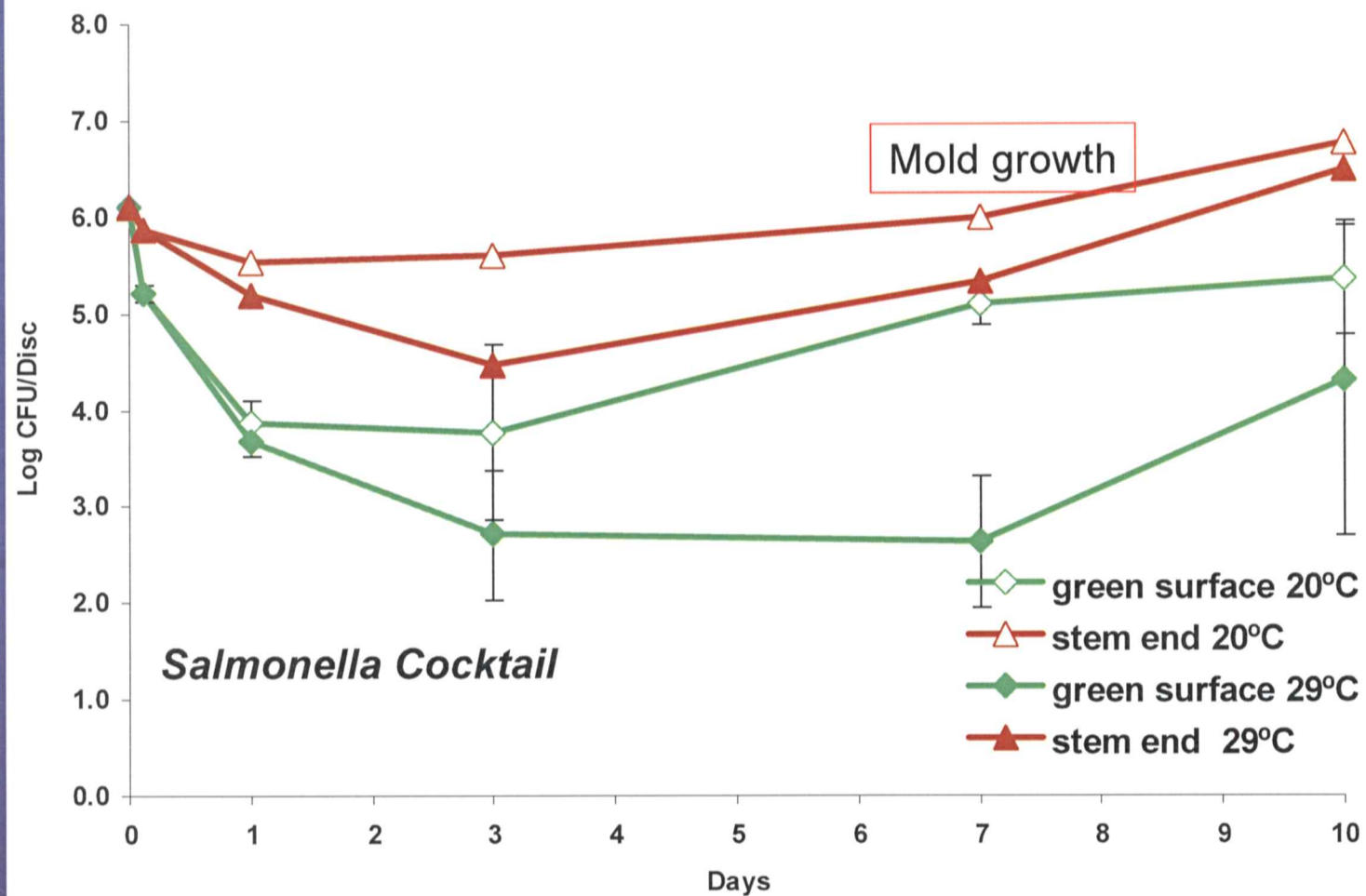


# Seeded Watermelon Surface at 20°C (68°F) > 98% RH



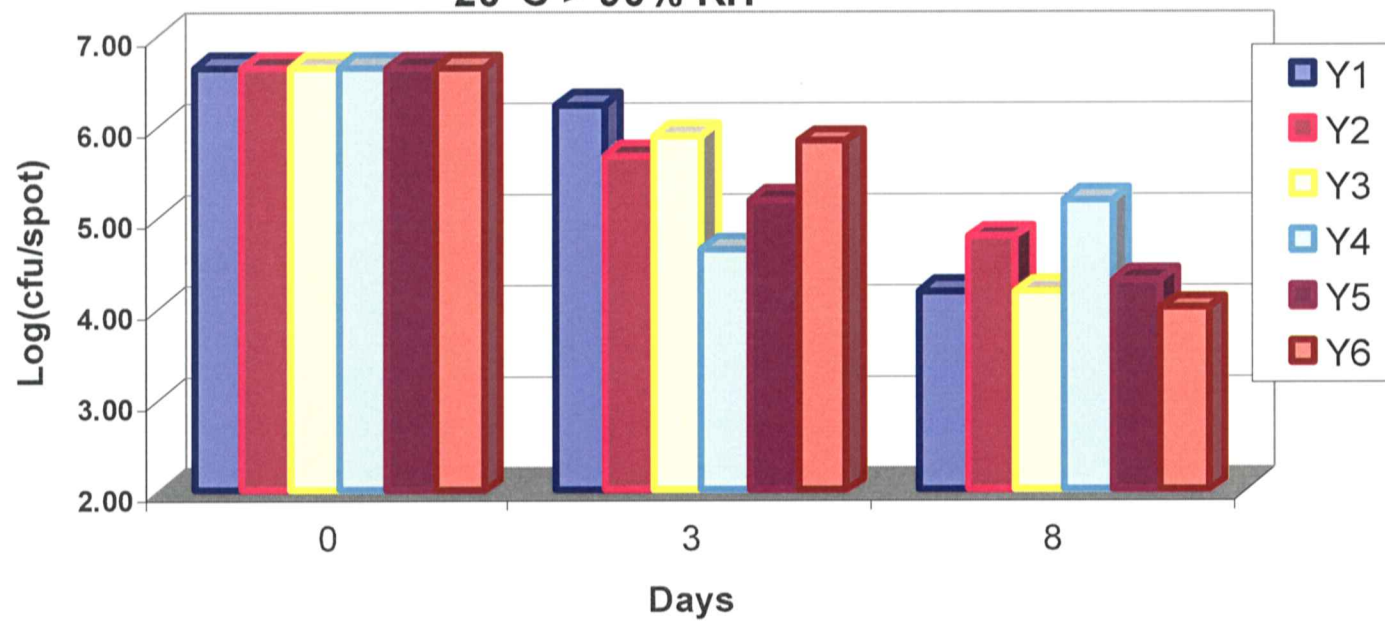


Seeded Watermelon Surface at 20 and 29°C (68 and 89°F)  
> 98% RH




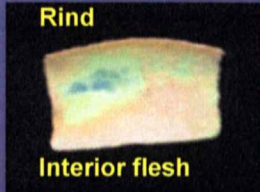
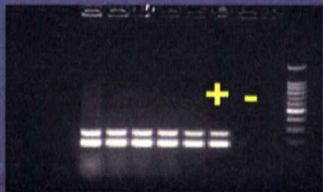


**Survival of *Salmonella* spp. on Whole Seedless Watermelon at  
20°C > 90% RH**





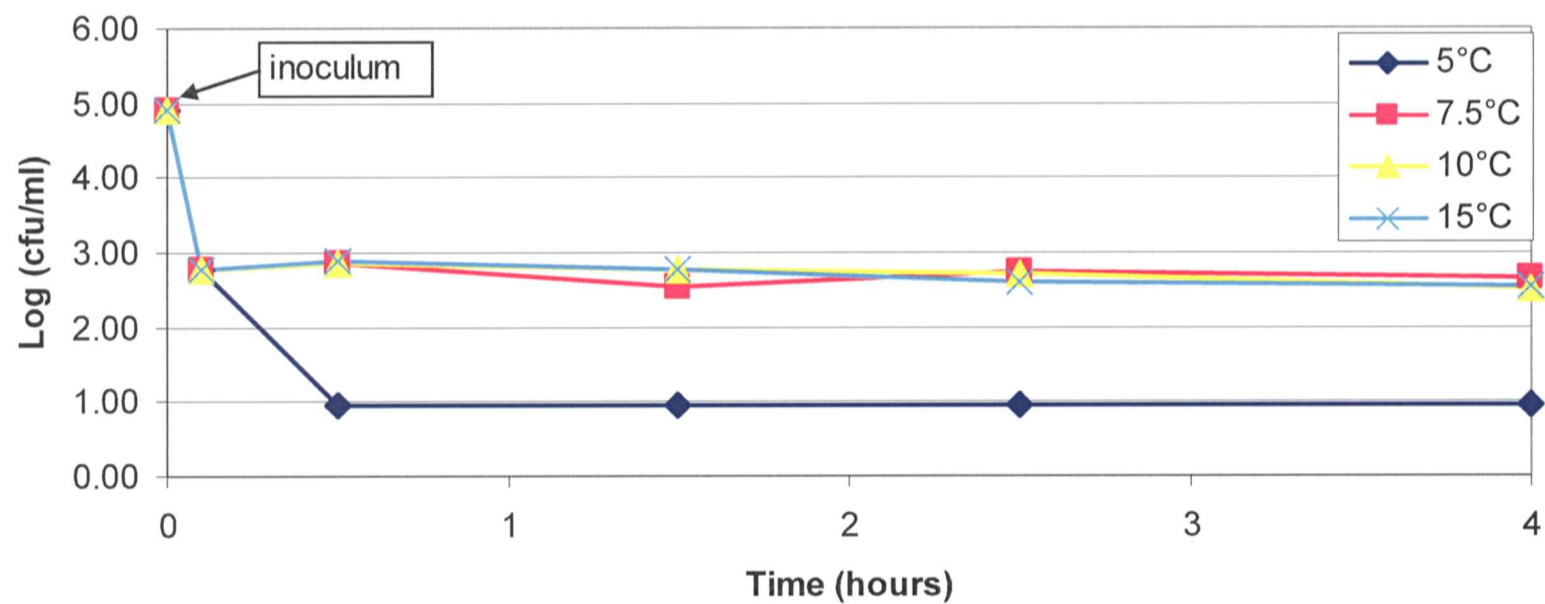
## What is the Threshold for Detectable Transfer at Cutting?

Whole melon	Post-cutting and Incubate 24h @ 80°F			
	Agar plates		UV Light	PCR
Inoculum level (Cells/rind- spot)	 A                  B		 Rind Interior flesh	
Negative control	(-)	(-)	(-)	(-)
1000	(-)	(-)	(-)	(+)
10,000	(+)	(+)	(-)	(+)
100,000	(+)	(+)	(+)	(+)
1,000,000	(+)	(+)	(+)	(+)

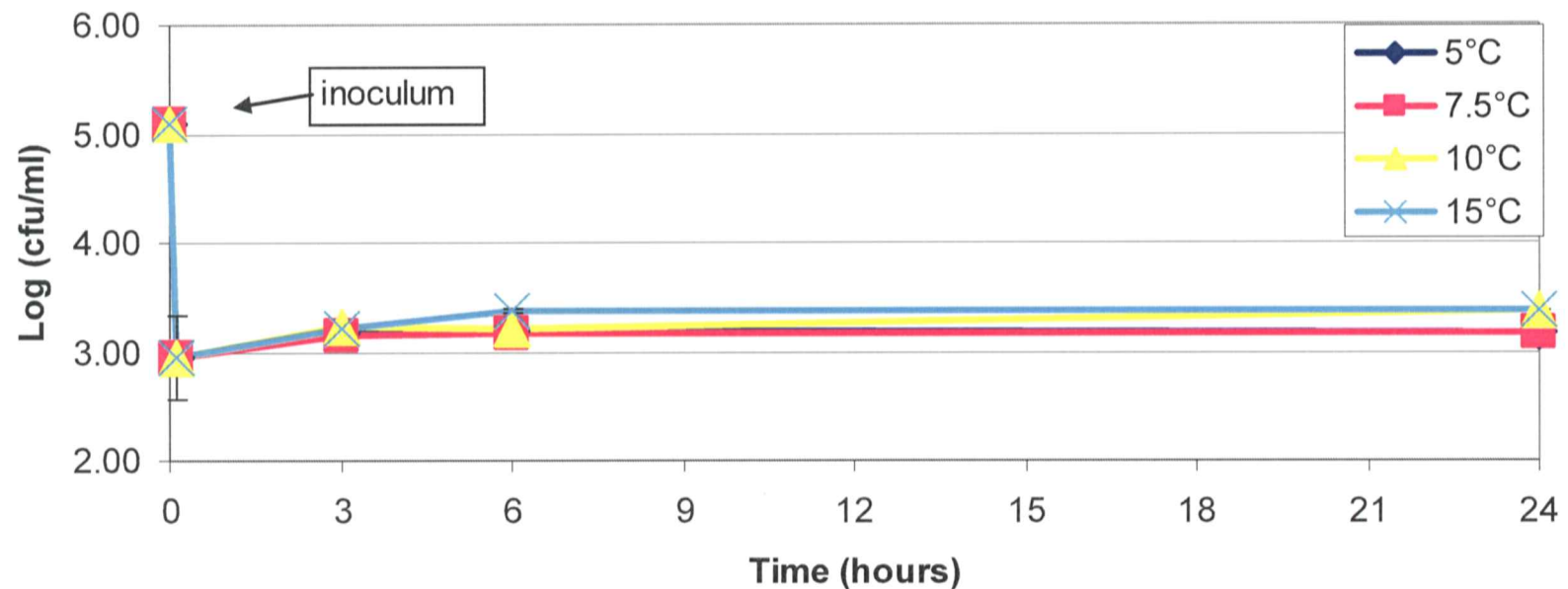
***E. coli* O157:H7**



### Survival of *Shigella sonnei* in Watermelon Juice Extract at different temperatures



### Survival of *E.coli* O157:H7 in watermelon juice at different temperatures



**Temperature abuse post-cutting is #1 concern**

- Prevention from contamination
- Effectiveness of disinfection

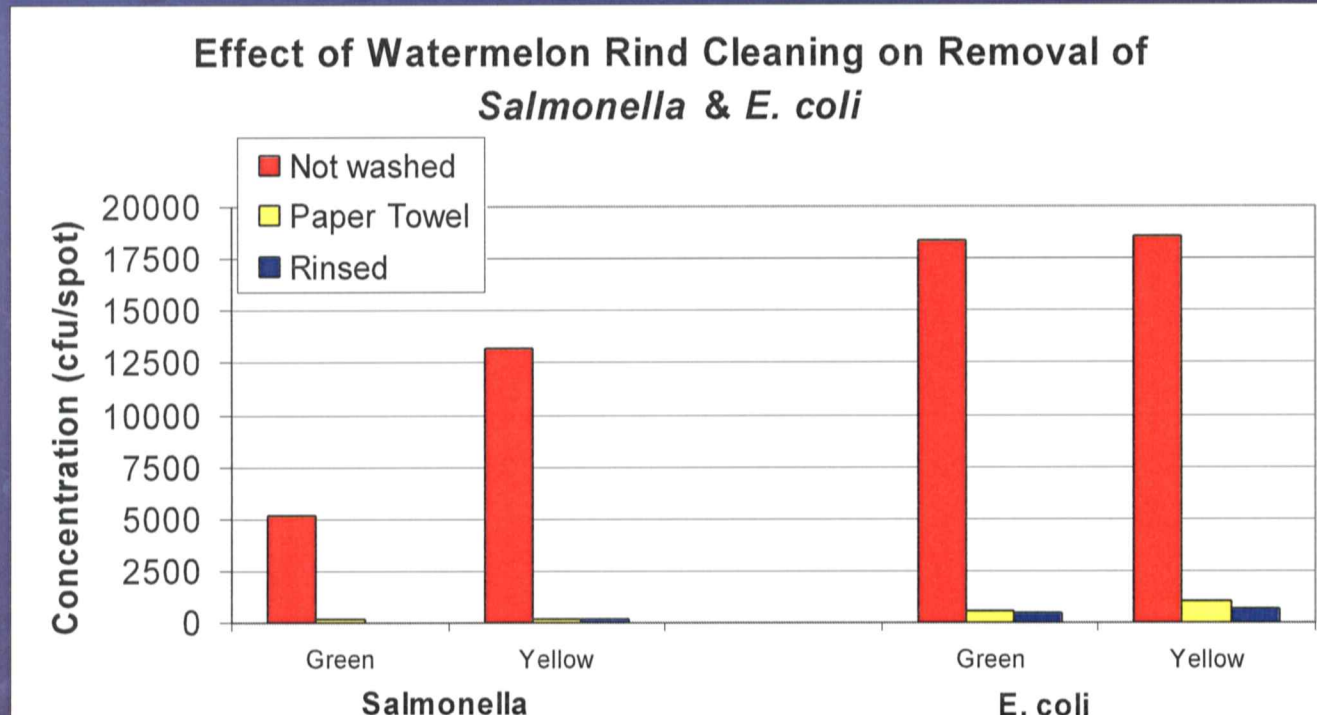


## Possible Next Steps

- ❖ Complete studies under very low RH
- ❖ Consumer and foodservice washing
- ❖ Watermelon specific GAPs guidance
- ❖ Regionally specific RMP's
  - *recommended practices*

# Watermelon Handlers May Enjoy A Relatively Unique Risk Reduction Message

## Results from Limited Model Washing Studies





## Commodity-specific GAPs

- ❖ Cantaloupe
- ❖ Tomato
- ❖ Lettuce
- ❖ Green onions
- ❖ Almond
- ❖ Spring mix

COMING IN 2005

# THE 7 PRACTICES OF SUCCESSFUL ALMOND GROWERS

## Food Quality & Safety Program

*"GAPs are a critical foundation for a comprehensive food safety program for both growers and handlers. The 7 Practices of Successful Almond Growers is an awareness building platform that every grower should apply; it is just good business sense."*

*Trevor V. Suslow, Ph.D., UC Davis*



Almond Board of California