

Fortieth Annual Citrus Packinghouse Day  
 Citrus Research and Education Center  
 Lake Alfred, Florida

**- Food Safety -  
 Problems and Solutions**

Jim Rushing

Jrshng@clemson.edu

Clemson University  
 Coastal Research and Education Center  
 2865 Savannah Highway  
 Charleston, SC 29414



**CONSUMER CONCERNS**

- ▶ CHEMICAL RESIDUES
- ▶ MICROBIOLOGICAL CONTAMINATION
- ▶ GENETICALLY ENGINEERED FOODS
- ▶ USE OF HORMONES

Late 1980's.....

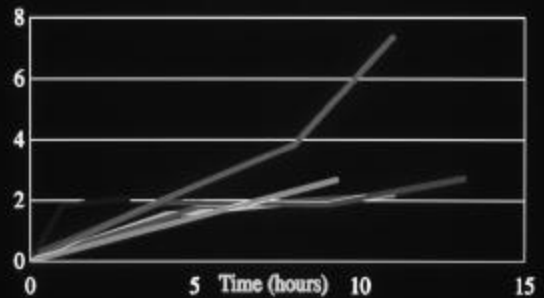
**Issue:** Pesticides and Residues  
**Source:** Packinghouse Wastewater  
**Concerns:** Consumer Safety  
 Environmental Safety

**Research:**

Accumulation of pesticides in packinghouse wastewater and the influence of integrated pest management on reducing residues.

Rushing, Cook and Spell. 1995. HortTechnology 5:243-246

**Copper (ppm)**



**Harvest 22 June 1990**

	IPM Program	Modified IPM	Calendar Spray
Bravo (ppb)	ND	ND	2.40
Asana (ppb)	0.31a	0.47b	3.19c
Zn (ppm)	0.33a	0.35a	0.61b
Mn (ppm)	0.43a	0.45a	0.70b

**S.C. Industry Response to Research Report.....**

- Tomato growers pledged to utilize scouts and implement IPM practices more aggressively.
- Tomato packers constructed holding ponds to collect packinghouse wastewater.
- Analyses of pesticide residues from fruit did not indicate that consumer safety was an issue.
- Note. Peach packers already had constructed holding ponds to collect rinse water from de-fuzzing brushes and hydrocoolers.

Issue: Microbial Contamination

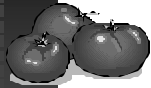
Crises: Two Outbreaks of Salmonellosis

1990

*Salmonella javiana*  
174 cases identified

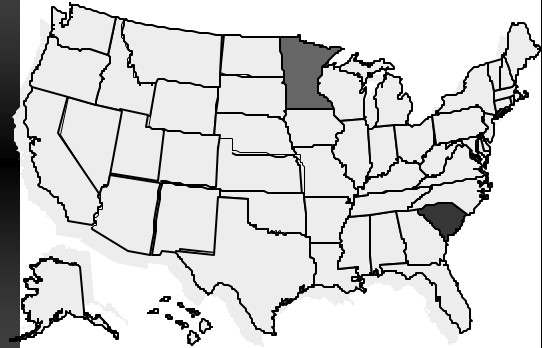
1993

*Salmonella montevideo*  
79 cases identified

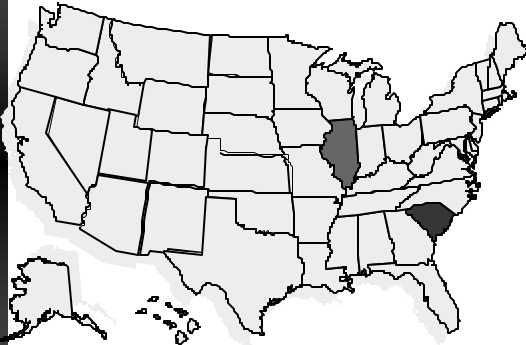


- Epidemiological Linkage -  
No Direct Evidence

1990 - Salmonellosis outbreak in Minnesota.



1993 - Salmonellosis outbreak in Illinois.



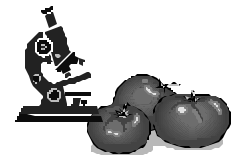
Can tomatoes support the growth of *Salmonella* ?

S.C. Tomato Association provided funding.

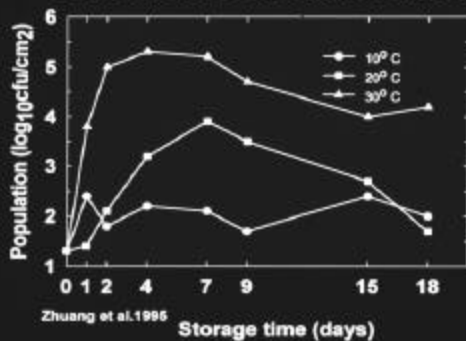
Clemson University conducted sample collection.

University of Georgia conducted research.

Centers for Disease Controlled provided oversight.



Effects of temperature on growth of *S. montevideo* on tomato surface.



Zhuang et al. 1995

Storage time (days)

South Carolina Tomato Growers Association

University of Georgia – Research Results

1. Salmonella infiltrated into a tomato can grow.
2. Salmonella can grow on surface of tomato.
3. Salmonella grows well on chopped tomatoes.
4. Salmonella growth is temperature dependent.
5. Chlorine can control Salmonella in the water, but does not disinfect fruit effectively.



**Critical Control Points in a Tomato Packinghouse  
Where Can Contamination Occur ?**

1. Water quality maintenance.
2. Field and facility sanitation.
3. Hand sorting on the packingline.

**Industry Response to Extension Reports**

**Implement Recognized Good Agricultural Practices (GAPs) for Each Step in the Handling Operation.**



**Mandatory Microbiological Testing ?**

**1994 Results**

Private Lab - 158 fruit samples.  
CDC - 40 fruit and water samples.  
All tests negative.

**1995 Results**

Private Lab - 77 fruit samples  
All tests negative



**Cost to Business**

**?????**



**A Case Study of Salmonellosis Associated  
With Consumption of Fresh-market Tomatoes  
and the Development of a Hazard Analysis  
Critical Control Points (HACCP) Program.**

Rushing. 2001. HortScience 36: 29-32



**Be Proactive, Not Just Reactive**

**=====**  
**Interagency Food Safety Council**

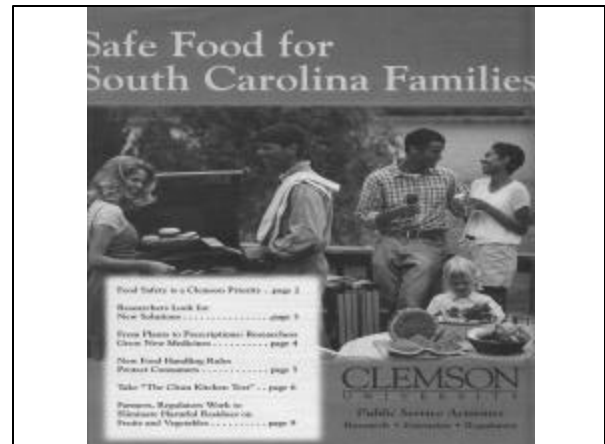
Clemson University  
Medical University of South Carolina (Agromedicine)  
S.C. Department of Agriculture  
S.C. Department of Health and Environmental Control  
U.S. Food and Drug Administration  
U.S. Centers for Disease Control  
Industry Organizations  
Fresh Produce, Beef, Poultry, Seafood, Restaurants, etc.

**South Carolina Food Safety**  
News and Information

A Publication of Clemson University and The South Carolina Interagency Food Safety Council

Countdown to  
The Holiday

**Clemson University  
Food Safety Institute**



**Crisis Management Workshops**

**The Media –  
Information or Misinformation**



**First Test of the Interagency Food Safety Council's  
Crisis Management Strategy**

**Issue:** *Cyclospora* related illness in Charleston, SC during the spring of 1996. First report from CDC, berries probably were responsible.

**Misinformation:** Second report from Texas stated that strawberries from CA were responsible.

**Damage to California industry:** ~\$50 million

**Challenge for SC:** Prevent damage to our small pick-your-own strawberry industry.

**Interagency Food Safety Council Plan**

- Designate a media spokesperson (Rushing).
- Develop a statement for the media and stick to it. Avoid giving misinformation.
- Update the statement as new information becomes available.
- Inform the growers through County Extension.
- MUSC – Dept. of Agromedicine sent a fact sheet to family physicians by fax and e-mail on symptoms and diagnosis of *Cyclospora* related illness.



April 27, 1996 THE PINECK

□ GUATEMALAN RASPBERRIES

## Groups try to regain market

Efforts aim to reopen spring and summer export seasons.

By Emily Hulsewood Staff Writer

Growers and government officials involved with the Guatemalan berry industry are working to establish spring and summer raspberry export rights to the United States.

Guatemalan growers, the Guatemalan Berry Commission and the High Level Commission, a group composed of several levels of government and private sector organizations, submitted a proposal to the Food and Drug Administration outlining the steps growers have taken to improve sanitation and health standards in the growing, packing and shipping areas.

Robert Rosenburg, commercial attaché for the Guatemalan Embassy in Washington, D.C., said growers and government officials are optimistic about the proposal, saying growers went beyond the guidelines required by U.S. government agencies. However, the FDA's decision is not expected soon.

Under the Guatemalan proposal, raspberry exports to the United States would come from a selected group of approved berry farms.

Rosenburg said the proposal, if approved, will inspire others to implement similar programs. In early March, officials from the FDA and the Center for Disease Control and Prevention visited farms in Guatemala that are implementing Good Agricultural Practices and Good Manufacturing Practices. The officials evaluated a process to certify farms as low risk.

"There are a lot of scientific studies and the work is on our side," said Allan Gelfink, president of Utopia, a Guatemala City-based berry exporter. "I believe we will become bank and be higher than what it was before."

In the meantime, Guatemalan berry growers are filling the void by exporting to Europe and Canada.

"We export to Europe with no problem, but we are still struggling," said Gelfink, who also is the marketing associate and procurement officer for Agro International Inc. "We need the U.S. market."

Raspberry exporter George Ellis, president of Agro International Inc., Hollywood, Fla., said he agreed.

"We sell worldwide," Ellis said. "The only place we are having a problem is in North America."

Last season, the United States imported about 250,000 pounds of raspberries from Guatemala, according to the U.S. Department of Agriculture. About 700,000 pounds were imported in 1995, and 430,000 pounds in 1996.

Many growers, especially the smaller ones, reduced raspberry acreage or changed to another commodity.

"Small producers could not handle not being able to export as they changed to other produce," Rosenburg said. "Especially the small farmers who could not handle the hassle of so many months without exporting."

Exporters based in the United States also are having little to no problems finding alternative sources for the spring and summer raspberry season. Many are sourcing berries from Chile, California, Oregon and Canada.

"Guatemala doesn't play a major role," said Mark Haskin, director of sales for Pro-Veg Sales Inc., Miami. "The significance is during September and October when we normally bring them in."


Guatemalan growers substantially lowered exports to the United States from March 15 through Aug. 15. The ban covers the spring and summer months when consumers are most likely to be a problem.

## More Problems for S.C. Produce

2000

During routine screening by US-FDA, 3 samples of fresh produce tested positive for human pathogens.

- Cantaloupes - *Salmonella*
- Cantaloupes - *E. coli*
- Green onions - *Shigella*



But no outbreaks of illness.


## Clemson University's Response to FDA's Findings

=====

- On- farm training with growers on GAPs in the presence of FDA inspector.
- Training workers (Spanish) in personal hygiene.

2001

- All FDA tests negative.



## Conclusions and Questions

Food safety problems can occur in any industry, in fact occurrence seems inevitable.



Be proactive, develop a plan, anticipate a crisis.

Appoint and train a spokesperson for your company.

Could you recall your product if you had to?

Participate in programs, like this one.

Respond to the information you receive.

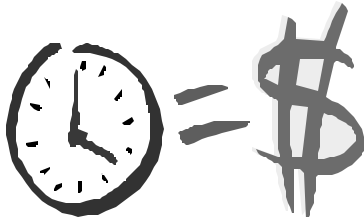
## More Conclusions

- Utilize the resources that are available to you. There are many.
- Demand help from the people who are supposed to help you.
- Observe what your competitors are doing, especially the off-shore companies. Their livelihood depends on exports. (Brazil, Argentina, South Africa, Australia).
- Know which regulatory agencies impact your business.





**Time is Money !!!**



**Set a Date and Get Started !!!**