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College of Agriculture and Life Sciences

# Juice HACCP – Past, Present, and Future

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In the beginning.....



## History of Juice Outbreaks

Year	Juice	Disease agent
1922	Apple	<i>Salmonella</i> Typhi, France
1944	Orange	<i>S. Typhi</i> , OH
1962	Orange	hepatitis, MO
1974	Apple	<i>S. Typhimurium</i> , NJ
1980	Apple	enterohemorrhagic <i>E. coli</i> , Canada
1989	Orange	<i>S. Typhi</i> , NYC
1991	Apple	<i>E. coli</i> O157:H7, MA
1991	Orange	Norwalk-like virus, Australia
1992	Orange	enterotoxigenic (?) <i>E. coli</i> , India
1993	Apple	<i>Cryptosporidium parvum</i>
1993	Recon. OJ	Gastroenteritis, OH
1994	Recon. OJ	Gastroenteritis, AL
1995	Orange	<i>S. Hartford</i> , Gaminara, Rubislaw, FL
1996	Orange	Gastroenteritis, CO
1996	Apple	<i>E. coli</i> O157:H7 (3), CT/NY, WA, US/Canada
1996	Apple	<i>Cryptosporidium parvum</i> , NY
1999	Orange	<i>Salmonella</i> Typhimurium, Australia
1999	Orange	<i>Salmonella</i> Muenchen, AZ
1999	Orange	<i>Salmonella</i> Anatum, FL
1999	Apple	<i>E. coli</i> O157:H7, OK
2000	Orange	<i>Salmonella</i> , CA
2004	Apple	<i>E. coli</i> O111, <i>C. parvum</i> , <i>G. lamblia</i> , NY



# Juice HACCP History

- Federal Register - August 28, 1997
  - Notice of Intent for HACCP program & labeling rule for fresh juices
- Federal Register - April 24, 1998
  - Juice Warning Label Rule



# Juice HACCP History

- Federal Register - January 19, 2001
  - Vol. 66, No. 13, pp 6138-6202
  - 21 CFR Part 120
  - Hazard Analysis and Critical Control Point (HACCP); Procedures for the Safe and Sanitary Processing and Importing of Juice



# Juice HACCP History

## Effective Dates:

- January 22, 2002 for all juice processors except:
- January 21, 2003 for small businesses
- January 20, 2004 for very small businesses
  
- Retail establishments are exempt from 21 CFR 120



# Juice HACCP Regulation

## The Condensed Version

- Retail exemption
- $>5$  log pathogen reduction step required unless exempt
  - Shelf stable juices and concentrates
- Metal and glass control
- Patulin control via culling for apple cider and juice
- Citrus is the only juice allowed for a fruit surface decontamination and not on the juice itself
- **Juice HACCP Training requirement**



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# The Evolution of Juice





# Juice HACCP Training in the Beginning

- Train the Trainer requirement to conduct training
- No Hazards and Control Guide
  - What FDA expects from industry
- Focus on the biggest volumes of juice
  - Citrus, apple, tomato, grape
- Numerous trainings offered the first 2 years....
  - Joint institution trainings to better answer industry questions without Hazards and Control Guide



# Juice HACCP Training in the Beginning

- Interpretation of the regulations was problematic
  - Definition of retail
  - Warning label requirements
  - Training requirement
  - 5 log performance standard – when and where?
    - Concentrate regulatory discretion
  - Cider vs juice
  - Carbonated juice or beverage?
  - Fruit purees - exempt?
  - Is sweetened juice still juice?



# Juice HACCP Training in the Beginning

- No bulk transportation guidance
- Imported juice HACCP compliance
  - no MOU for other countries in place
- Patulin - WTH?
  - Testing and presence in fresh cider
  - January - April increasing levels with cold storage apples
  - Remediation issues
- Some companies became beverage producers to avoid the Juice HACCP regulation
  - FSMA made them change their mind later on...



# The Evolution of Juice – 10 years later



TopLine MD  
How to Clean Your Stomach and ...

2000



Zuma Nutrition  
Best Natural Colon Cleanse | Detox ...



Mindfully Healthy Living  
Colon Cleanse Juice Reci...

Present



## Juice HACCP Training – 10 years later

- Realization that “colon cleanse” beverages ARE juice and subject to the Juice HACCP regulation
- No guidance on low acid juices
  - Carrot, beet, green juices, coconut water
- Bolthouse carrot juice outbreak and deaths due to *Clostridium botulinum*
  - New guidance issued for low acid juices
  - Clearing labeling requirements
  - Acidification of low acid juices guidance issued
- Alternatives to thermal processing emerging in the juice industry and how it complies with the 5-log performance standard




## Juice HACCP Training – 10 years later

- Alternatives to thermal processing emerging in the juice industry and how it complies with the 5-log performance standard
  - FDA's recognition of alternative processes
- Outbreaks due to ozone treated
  - Guidance issued for ozone to treat juices
- The “Belly Wash” dilemma



# The Evolution of Juice – 20 years later



 Cleveland Clinic Health Essentials  
Kombucha: What Is It and 7 Benefits

2000



**Tapping Into Probiotic  
Drinks: Exploring the  
Growing Market of  
Digestive Health  
Beverages**



Present



# Consumer Trends

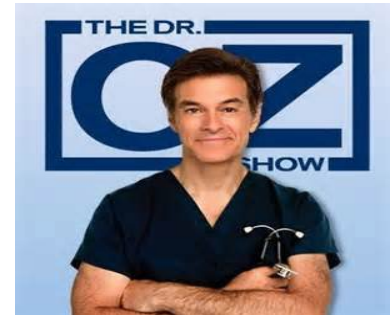
- Aversion to “chemical” additives & GMO
  - Fueled by social media and TV personality misinformation
    - “The Food Babe”, Dr. Oz
- High nutrition composition
- Retention of flavors, nutrients, and characters
- Minimally or unprocessed foods
  - “Raw foods” diet movement





# Juice HACCP Issues

- Arsenic limits of 10 ppb (inorganic arsenic)
- State to state regulations
  - New York 5-log requirement for all apple cider
  - Maine labeling of thermally processed “cider”
    - Title 7, Part 2, Chapter 103, Subchapter 1m § 543-A. Cider





# The Evolution of Juice – Present Day



2000



Present



# Juice HACCP Training Present Day aka “Is it Juice Era”

- Exotic or nontraditional fruits and vegetables
  - Tumeric
  - Ginger
  - Acai
- New hazards due to nontraditional raw ingredients?
  - New pathogens or chemical hazards to consider in the US?
    - Chaggas disease aka kissing bug disease
- Expansion of heavy metal oversight
- Additional guidance on heavy metals other than Arsenic
  - lead, tin, copper, zinc, mercury, cyanide



# Juice HACCP Training Present Day aka “Is it Juice Era”

- Juice used in alcoholic beverages
  - Back-sweetening of wine, beer, gose (sours)



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# **Where is Juice HACCP Now?**



## Juice HACCP Present Day

- Training primarily conducted by University of Florida and Cornell are the only two Certified trainings by trained trainers since the beginning
  - >5000 individuals trained at Cornell
  - At least as many if not more at University of Florida
  - Juice HACCP Train the Trainer conducted at U of Florida – May 2025
  - Future one at Cornell in Winter



## Juice HACCP Present Day

- Additional trainings were occurring by non-certified Juice HACCP trainers
  - FDA expressed concern of training by non-trained trainers
    - Juice HACCP Train the Trainer conducted at U of Florida
      - May 2025
    - Future one at Cornell in Winter



# Juice HACCP Regulation and Industry Compliance Impact

- Estimated 462-508 less foodborne illnesses per year

**THANK YOU!**

