ASTA 2009
Annual Meeting and Trade Show
April 26-29, 2009
Loews Ventana Canyon Resort
Tucson, Arizona

Spice Pasteurization

A menu of technology options

Ethylene Oxide

- The most common technology for controlling bacterial contamination of spices
- First used in the 1930's, EO's popularity grew in the 1960's and remains an important food safety tool
- Highly effective against all bacteria including food borne pathogens

Directions for Use

Pasteurization | Ethylene Oxide | Propylene Oxide | Steam | Choices

- Revised Directions for Use
  - Significantly improved lethality
  - All ASTA spices acceptable except Basil
  - EPA Crop Group 19
  - Difficult for some ground spices and herbs
- Residue tolerances pending
  - Ethylene chlorohydrin 940 ppm
  - Ethylene oxide 7 ppm

Proven Technology

- FDA approved validation for all spices in 2-ply poly-woven sacks
- Updated validation for new process in progress
- Challenge bacteria *Bacillus atrophaeus*
  - Commonly available biological indicators
- Demonstrated minimum 5-log kill of pathogens of concern, “Pasteurization”

Logistics

- Lethality related to product temperature
  - Seasonal variations in effectiveness are common if uncontrolled
- Product and chamber temperature both recorded
- Batch process requiring no changeover
- Products may be mixed in chamber to reduce costs
  - Allergens should be considered

Process Control

- Process Control
  - PLC control
  - Digital reports in hardcopy or electronic
  - Automated alarms
- Critical Control Parameters
  - Temperature
    - Product, chamber, jacket
  - Gas concentration / pressure
  - Relative humidity / pressure
  - Exposure time

Propylene Oxide

Pasteurization | Ethylene Oxide | Propylene Oxide | Steam | Choices

- Excellent replacement for standard EO processes
- Approved for use on a wide range of materials including spices, nuts, cocoa and dried fruits
- Recent technological advances yield much higher lethality than previously observed
- Canada tolerance expected shortly
- California Prop 69 “Safe Harbor” pending

Directions for Use

Pasteurization | Ethylene Oxide | Propylene Oxide | Steam | Choices

- Revised Directions for Use
  - For spices
    - 2.0 oz a.i.*/ft^3 for maximum 12 hours or
    - 0.2 oz a.i.*/ft^3 for maximum 48 hours
- Residue tolerances
  - Propylene chlorohydrin 1500 ppm (except Basil 6000 ppm)
  - Propylene oxide 300 ppm

*a.I – active ingredient

Effectiveness

Pasteurization | Ethylene Oxide | Propylene Oxide | Steam | Choices

- USDA approved for use on Almonds to control *salmonella spp.* contamination
- Validation for FDA detentions pending
- Recommended Challenge bacteria *Bacillus stearothermophilus*
- Commonly available biological indicators
- Demonstrated 5-log kill of pathogens of concern, “Pasteurization”

Propylene Oxide

- Lethality related to product temperature
  - Seasonal variations in effectiveness are common if uncontrolled
  - >87 Deg F recommended
- Product and chamber temperature both recorded
- Batch process requiring no changeover
- Products may be mixed in chamber to reduce costs
  - Allergens should be considered

Cycles

- PPO Enhanced
  - 2.0 oz ai/ft^3 for maximum 12 hours
  - Combined with steam pulses to increase product temperature
- PPO Extended Dwell
  - 0.2 oz ai/ft^3 for maximum 48 hours
  - Standard replacement for traditional EO processes

Process Control

- Process Control
  - PLC control
  - Digital reports in hardcopy or electronic
  - Automated alarms
- Critical Control Parameters
  - Temperature
    - Product, Chamber, Jacket
  - Gas concentration / pressure
  - Relative humidity / pressure
  - Exposure time

H2O Express™

Pasteurization | Ethylene Oxide | Propylene Oxide | Steam | Choices

- Patented, sub-atmospheric pressure, dry steam pasteurization technology
- Exposure temperature precisely controlled
- Product and packaging treated
- USDA Organic Certified
- Suitable for international markets including Canada, Asia and Europe

Common Uses

- Proven effective on
  - Herbs
  - Spices
  - Roots powders, i.e licorice
  - Dietary supplements and botanicals
  - Ground nuts and tree nuts
  - Dried tomatoes
  - Bird seed

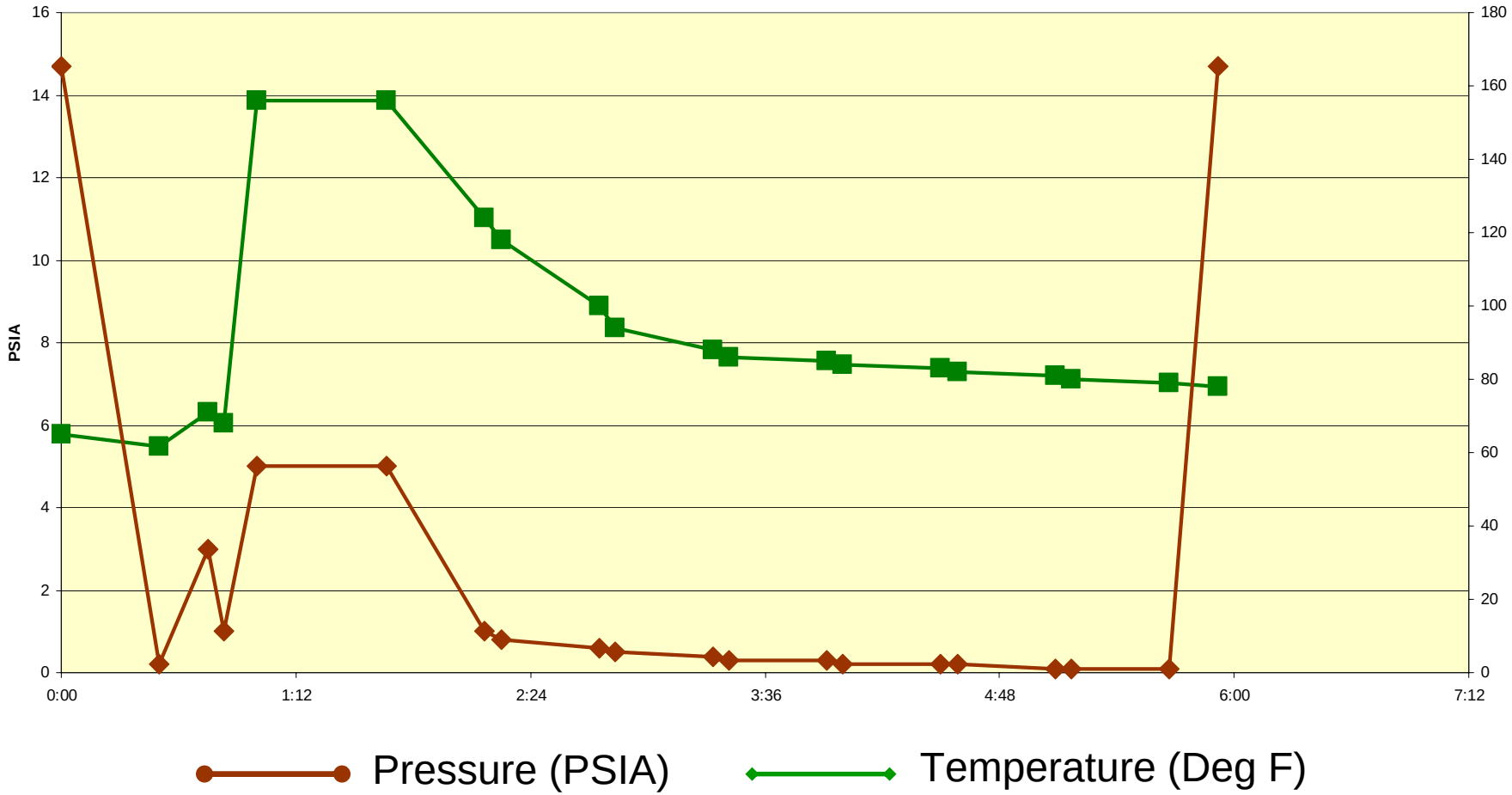
The Process

Pasteurization | Ethylene Oxide | Propylene Oxide | Steam | Choices

- Product Temperature
  - 165^{o} F for pathogens
  - 150 -195^{o} F for TPC, yeasts and molds
  - >245^{o} F for noxious weed seeds of increasing concern to state and federal agencies
  - Effective against all life stages of common stored product pests
- Dry Conditions
  - Product returned to original moisture content
  - Pallet weight not increased

The Process (continued)

Pasteurization | Ethylene Oxide | Propylene Oxide | **Steam** | Choices



Effectiveness

Pasteurization | Ethylene Oxide | Propylene Oxide | Steam | Choices

- Approved for use on Almonds to control *salmonella spp.* contamination
  - 5-log Pasteurization observed
- USDA approved for use on imported Nyjer™
  - Polywoven bags
- Surrogate bacteria for validation
  - *Enterococcus faecium*[1]

[1] Almond Board of California , Guidelines for Process Validation Using Enterococcus faecium NRRL B-2354

Bulk Processing

- No post-process handling required
  - Reduced risk of recontamination
    - Many recent outbreaks have been traced to recontamination following kill step
  - Packaging pasteurized
- Bulk packaging
  - Poly-woven bags
  - Super sacks
  - Tri-walls / Totes

Logistics

- Lethality related to product temperature
  - Seasonal variations in effectiveness are common if uncontrolled
  - Product and chamber temperature both recorded
- Batch process requiring no changeover
  - Allergens should be considered
- No risk of in line contamination affecting multiple lots

How do I Choose?

- Moisture sensitive?
  - Propylene oxide with extended dwell
- Organic?
  - H2O Express™ dry steam
- Long history of reliability?
  - Ethylene oxide

Thank You

Pasteurization | Ethylene Oxide | Propylene Oxide | Steam | Choices

- Thanks to Margarita Passero and ASTA for allowing us to participate

- And thank you to Cheryl Deem of Smith Bucklin for extending the invitation to speak to this forum

Our Company

Pasteurization | Ethylene Oxide | Propylene Oxide | Steam | Choices

- Facilities nationwide
  - Baltimore Quality Assurance (BQA), Baltimore, MD
  - ETO Sterilization (ETO), Linden NJ
  - Sterilization and Fumigation Services, Inc. Newman, CA

- Contact
  - Bill Lanning
    (208) 880-0746

Cosmed Group, Inc.