



Cornell University  
College of Agriculture and Life Sciences

# Adding Value and Safety to Agricultural Commodities

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Innovation & Diversification – Adding Value to Your Products  
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# Presentation Overview

- Importance of Specialty Foods
- Regulatory classification of food products
- Ensuring Food Safety
- Manufacturing options appropriate for small and start-up companies
- Working with the FVC



# Importance of Food Entrepreneurs

- Specialty foods: \$40 billion growing industry
- 1.5 million micro-enterprises in NYS
- Employing 19% of the workforce (almost 2 million people)



## What Value-Added can Offer Farm-Based Businesses

- Extend season for farm products
  - Ex: Veggies → Salsa
- Diversify product line
  - Fresh, preserved, etc.
- Utilize farm waste
  - Ex: Squash seeds → Oil
- Increased knowledge, skills, income



# Impact of Supporting Farm-based Food Production

Food Venture Center worked with Agricultural Producers in 2007 - 2010 through funding provided by the NY Farm Viability Institute:

In 2007-2008:  
191 NY producers developed  
328 new food products for sale





## Producer Survey: 07-08

From **53** completed surveys (61 producers), the major indicators were:

- 47 farms have started production of new food products
- 44 said that their business has grown since working with the FVC
- 35 have extended the season for their farm products.
- 16 reported an increase to the household income
- 15 reported the creation of new jobs
- 22 reported better efficiency and/or utilization of production waste
- 44 reported skills and knowledge gained



# New Product Challenge

8 of 10 new products fail

- Costs
- Competition - 9 new specialty food products each day
- Market fragmentation - smaller segments
- Public concerns - safety, environment, regulation



# New Product Success

- Keep it simple - consumer friendly
- Know your market, related markets - trends, regs, patents
- Make sure the product fits your strategy and image
- Fill current consumer needs
- Learn from the past - reasons for failure



## 2009 Consumer Trends

- Farmers' market cuisine, including:  
organic/natural; fresh; local; tradition made new;  
heritage and heirloom; made-in-house foods;  
slow-cooking (Julius, 2009. *In Prepared Foods Magazine*)
- Organic: 142% growth during 2003-08
  - Slowing down due to economy
  - Natural, local and private label pose challenge to organics (October 2008, Mintel)



# The Reality of Food Processing

Foods usually prepared for immediate consumption may need significant changes to be successfully preserved and sold.





## Regulations: Federal and State

- Bioterrorism Act: registration of food manufacturing facility with FDA
- Good Manufacturing Practices (21 CFR Part 110): guidelines for buildings, equipment, personnel, sanitary conditions
- Further Regulation depends on Product classification (acid, low acid, acidified, etc.) and Packaging (air packed, reduced oxygen packaging, etc.)



## Regulations: Federal and State

- Hazard Analysis and Critical Control Point (HACCP) plan (required based on packaging, product type)
- Standards of Identity, labeling
- Certification (FDA for acidified, some water activity controlled foods)
- NY State requires approval from Processing Authority (a scheduled process) for most products to issue Food Manufacturing License



# Regulatory Food Product Classification

- Non-Hazardous/  
Hazardous
- FDA/USDA inspected  
products
- Acid foods
- Fermented acid foods
- Juices and purees
- Shelf-stable low acid  
foods
- Shelf-stable acidified  
foods
- Refrigerated
- Frozen
- Reduced oxygen  
packaging



# Hazards

- Pathogens (biological):
  - *Clostridium botulinum*
  - *Escherichia coli* O157:H7
  - *Listeria monocytogenes*
  - *Salmonella* spp.
  - *Cryptosporidium parvum*
  - Viruses
- Chemical contaminants: pesticides, poison, toxins, allergens
- Physical: foreign objects
- Prevented through Critical Control Points, GMPs, HACCP





## Non-Hazardous Foods

- Breads or rolls
- Standard Jams, jellies, marmalades
- Cookies, brownies, fudges
- Double crust fruit type pies
- Cakes that require no refrigeration
- Candy (not chocolate)
- Dried spices or herbs
- Snack items like popcorn, peanut brittle



## Intrinsic Parameters for Food Product Classification

- Acidity of the food
    - Low acid:  $\text{pH} > 4.6$  = High risk
    - Acid:  $\text{pH} < 4.6^*$
    - Acidified:  $\text{pH}$  lowered to  $< 4.6$  by addition of acid\*
    - Acid fermentation:  $\text{pH} < 4.6$
- \*For Small-Scale processors, the practical limit is 4.20  
- corresponding hot fill temperature requirements



## Intrinsic Parameters for Food Product Classification

- Water activity ( $A_w$ ) of food
  - Non-hazardous:  $A_w < 0.85$
  - Hazardous:  $A_w > 0.85$
  - Shelf-stable:  $A_w < 0.60$
- Allergens/sensitivities: peanut, gluten, nuts



# External Parameters for Food Product Classification

- **Packaging**
  - Air packed
  - Reduced oxygen: vacuum, modified/controlled atmosphere
- **Temperature control**
  - Refrigeration
  - Freezing
- **Sterilization/pasteurization**
  - Heat, high pressure, irradiation, chemical sterilants (DMDC, ozone)
- **Added antimicrobials:**
  - Salt, sugar, CO<sub>2</sub>, sorbate, benzoate, propionate, nitrite, nisin, natamycin, sulfite



# Determining Food Product Classification

- Measurement of pH, water activity, headspace composition
- Determination of critical control points based on
  - Food classification/risk
  - Food characteristics and formulation
  - Packaging and distribution conditions
  - Expected shelf-life



## Food Product Safety

- Additional changes/adjustments in the formulation and/or process might be necessary
- Heat penetration studies conducted if required - by process authority
- Challenge studies if necessary conducted by a Food Microbiologist



# Manufacturing Options

- Shelf-stable foods
  - Acid and Acidified, pasteurized (hot-packed or water bath), packaged in hermetically sealed containers (salsa, vinegars, sauces, dressings, juices) - if cold packed, pathogen free ingredients
  - Dried foods (mixes, dehydrated, smoked)
  - Water Activity Controlled foods:  $A_w < 0.90$ , pasteurized, in hermetically sealed containers (high sugar products, some baked products)
  - Low Acid Foods - High Risk; cannot be practically done by small-scale processors



# Manufacturing Options

- Refrigerated foods - variable risk
  - Pasteurized (juices, beverages, milk, fermented foods)
  - UV treated (apple cider)
  - Treated with acid and preservatives (horseradish)
  - Fresh-cut produce and fresh meat - high hygiene conditions and limited shelf-life
  - Soups - limited shelf-life, low acid
- Frozen - low risk



# High Risk Products for Entrepreneurs

- Minimally processed low acid foods - high microbial risk
- Thermally processed low acid foods (canned, aseptic) - equipment and controls are not typical of small scale processors
- Fresh-cut produce and other foods that will be consumed fresh
- Ready-to-eat refrigerated low acid foods (can be temperature abused)
- Reduced oxygen perishable foods - two barriers against *C. botulinum*
  - pH<4.6, Aw<0.93, Oxygen content>2%, nisin, lactic acid bacteria
  - Refrigeration



# Guidelines for Product Selection

- Low pH or low water activity
- Product can receive a pasteurization treatment or an equivalent process to ensure safety
- Product is packaged properly to protect from post-process contamination
- Product has a scheduled process issued by a Recognized Process Authority
- Product fits the processing conditions/equipment available at the plant/kitchen - sufficient control
- Trained operators/handlers - education & certification



# The NYS Food Venture Center

- Extension Program, in operation since 1988
- Technical support to food entrepreneurs, start-up food companies
- Foster job creation and economic development





# The FVC Team

- Dr. Wayne Wilcox, chairman FST, Administrator
- Dr. Olga Padilla-Zakour, Director and Processing Authority
- Elizabeth Keller, Extension Support Specialist
- Cheryl Leach, Extension Support Specialist
- Herb Cooley and Tom Gibson, Research and Technical Support
- Students

On-going support from  
Dr. Randy Worobo,  
food microbiology expert





## What we do



- Assist with product “finessing”
  - tweaking formulation to meet processing parameters
- Trouble shoot processing problems
- Provide lists of labs, co-packers, commercial kitchens, labeling design, packaging suppliers, etc.



## What we do

- Support efforts by Farm-Based businesses to introduce value-added foods
  - through funding from the Farm Viability Institute
  - some fee waivers/assistance, process development assistance





## What we do

- Review and Approve recipes and issue Scheduled Processes
- Review and Approve changes to existing Scheduled Processes and issue amendments





# Specialty Farm Based



Control points: pH, hot fill temperature



# Specialty Farm Based



Control points: pH, pasteurization, refrigeration



# Specialty Snack - Farm based



Control points: Aw, barrier bag



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# Gourmet Pickle - Farm based



Control points: pH, water bath time & temperature, vacuum



**If you have a food product you want to sell, contact us.**

- [necfe@nysaes.cornell.edu](mailto:necfe@nysaes.cornell.edu)
- 315-787-2273
- Cheryl Leach or Elizabeth Keller

**THANK YOU!**