SAFE FOOD: RESEARCH TO PRACTICE

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HOME FOOD PROCESSING & PRESERVATION

• A specialized area of food safety in which federal government has been a leader.
  • With extensive landgrant collaborations

• Requires pulling from science in many fields to make best consumer recommendations
  • Microbiology, chemistry, engineering

• Got my start in 1980s due to USDA interest in scientific basis/history of its recommendations
  • Particularly home canning
  • Had been dormant for a while
  • Activity had increased in the 1970s along with botulism problems
HOME FOOD PROCESSING & PRESERVATION

Today’s Consumer Food World

- Food security
- Gardening
- Local foods
- Household economies
- Artisan and entrepreneurship interests

- HOME food production and processing activity increasing for several years now
U.S. Household Activity Snapshots

1944: Seven out of ten households (over 24 million) preserved fruits and vegetables.
- Primarily canning
- Majority of households canned 100 to 200 quarts of food; many canned 200 to 500 quarts
  - (Bureau of Ag. Econ., 1945).

1976: One out of three households surveyed canned fruits and/or vegetables.
- Majority of households canned 100 quarts of food or less; 10 percent canned 200 quarts or more.
- Ten to 15 percent experienced food spoilage.
  - (Davis and Page, for USDA)
U.S. Household Activity Today

National Center for Home Food Preservation

- **2000-01**: National telephone survey
  - 500 interviews about canning and freezing practices

- **2005**: 800 interviews
  - 22% canned food at home in 2004*
  - 94% froze previously unpackaged food
  - ~14% home-dried foods
  - *Reason to suspect higher % of actual households today
## U.S. Household Activity Today

### National Center for Home Food Preservation

### Percent of Households Canning Various Products

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<tr>
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<tbody>
<tr>
<td>Tomatoes</td>
<td>73</td>
<td>60</td>
</tr>
<tr>
<td>Fruits</td>
<td>56</td>
<td>47.4</td>
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<tr>
<td>Vegetables</td>
<td>51.0/18.0*</td>
<td>71.1</td>
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* Percent canning low acid vegetables/vegetable mixtures (separate questions in the USDA survey).
There is still work to be done to encourage (safe) pressure canning for low acid foods.

- Over half home canners underprocess
- CDC: Botulism still occurs
- Botulism case ~ $726,362 (Pew)

Large % using oven or open kettle “canning” methods.
- Which are really not canning at all.

Large % adapting recommendations in their own ways.
Various studies through the years show consumers not following science-based recommendations.

Not willing to change from old methods when science updates indicate new needed.

The federal government has always been the leader since the late 1800s.

- Cooperative Extension programs in 4-H and Home Economics delivers the message since early 1900s.
HOME FOOD PRESERVATION:
THE LEGACY

- 1909 - *Canning Vegetables in the Home*
  - Farmers Bulletin 359
  - USDA Bureau of Chemistry in 1909

- World War I
  Can the Kaiser

- World War II
  Victory Gardens
HOME FOOD PRESERVATION: FAST FORWARD

- The majority of today’s USDA home canning processes are based on research from 1944-46.
  - USDA research switched from canning emphasis to freezing in early 1950s.
    - Invention of the home freezer!

- Last major release on pickling was 1964.
  - Several decades of research.
HOME CANNING RESEARCH

Limited more recent activity after USDA stopped, and done at universities often with USDA support.

1970s  Issues related to equipment and saving energy.

1970s/80s  Some testing of tomato acidification effects on quality at various universities

1978  Zottola et al. at U. Minnesota re-evaluated some USDA low-acid processes
HOME CANNING RESEARCH

- University of Massachusetts (Hayes)
  Home canned tomato processes, other f&v
  Atmospheric steam canning

- Virginia Tech (Montville)
  Metabiosis in home canned tomatoes

- Oregon State University (Woodburn, Raab, Hilderbrand)
  Home canned figs, Asian pears
  Smoked fish

- Washington State University (Dougherty and Hillers)
  Home canned tomato-pepper salsa

- University of Alaska (Long and Crapo)
  Fish and other marine issues
HOME CANNING RESEARCH

USDA Eastern Regional Research Center
Sapers et. al., 1970s

- acidification of home canned tomatoes
- pH of tomato, pepper varieties
- acidified mixtures for home canning

USDA/Penn State Center of Excellence
Kuhn et al. at Penn State University, 1980s

- critical literature review,
- evaluated tomato processes,
- national training for Extension faculty,
- first Complete Guide to Home Canning
National Center for Home Food Processing and Preservation
1999-present

The University of Georgia – Lead Institution
Department of Foods and Nutrition
Department of Food Science and Technology
Department of Housing and Consumer Economics

Two other consistent PI’s at UGA for all years:
Dr. Judy Harrison, Dr. Mark Harrison
NATIONAL CENTER FOR HOME FOOD PROCESSING AND PRESERVATION

Collaborators

- 1999-2004
  - *Alabama A&M University*
    - Department of Food and Animal Sciences
  - *University of California-Davis*
    - Department of Food Sciences and Technology

- 2005-2010
  - *Clemson University Extension*
  - *University of Illinois Extension*
  - *Oregon State University Extension*

- 2011-present
  - *University of Wisconsin*
    - Departments of Food Science & Chemical and Biological Engineering
  - *Clemson University Extension*
ADVISORY COMMITTEE in beginning

Composed of individuals from
Auburn University
Clemson University
Colorado State University
Cornell University
Kansas State University
North Carolina State University
University of California-Davis
Washington State University
Alltrista Consumer Products Company
National Presto Industries, Inc.
**Plan of Work, 1999-2010**

**Applied Research**

- Critical literature reviews
- Original applied laboratory research
  - Product development for home canning
  - Basic information (e.g., survival of *Listeria* bacteria)
Microbial profiles of selected fresh herbs and whole spices used in home preparation of flavored vinegars, salsas, oils

Effect of pressure canner size on heat penetration in stewed tomatoes

Documenting effect of fill weight on heat penetration in a pickled product (boiling water canning)

Survival of *Listeria monocytogenes* in refrigerator dill pickles (half-sours)

Reduced sugar in fruits
NCHFP Product Development

- Salsas
  - Jicama, mango, peach-apple, traditional pepper-tomato

- Pickled Products
  - Jicama, asparagus, carrots, onions, peppers, tomatillos, chayote
  - Some with sugar substitutes
  - Total, at least 34 new offerings
Plan of Work, 1999-2010

University Instruction

- Undergraduate course
  - Two specialized short sessions
  - Mixture of lecture and laboratories

- Undergraduate research projects
  - Product development
  - Impact of deviations on a canning process
  - Laboratory employment

- Graduate assistantships
  - Laboratory work
  - Literature searches and summaries
PLAN OF WORK, 1999-2010

Outreach and Extension

- Updating of existing USDA and Extension consumer publications
- Establishing additional distribution channels for dissemination of guidelines, including
  - A new website: www.homefoodpreservation.com
  - Instructional video series
  - An original web-based curriculum on home food preservation
- Training workshops around country
- Presentations at scientific professional meetings
OUTREACH PRODUCTS

- Website
- Video series, So Easy to Preserve
- Online self-study
NCHFP Website Outreach

- 1.4 million unique visitors per year
- Over 4.5 million page views

- Online self-study: since 2005
  - 13,000 participants; about 3000 last year
  - Increase in knowledge

- Started a blog late 2012
- Started public webinars in 2013

- Interests for consumers, educators, media, entrepreneurs
CHALLENGES FOR PUBLIC RESOURCE/RESEARCH FUNDING

- Keeping up with demand for creative new canned products.
- Keeping up with changing marketplace supplies and ingredients:
  - Canner changes
  - New small appliances and tools
  - Ingredient changes
- Desire for nutritious changes in product formulations (eg, reduced sugar) and nutrition analyses.
- Keeping Extension and other educators up to date.
Questions?

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