V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Food Safety

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
402	Engineering Systems and Equipment	0%		6%	
404	Instrumentation and Control Systems	0%		16%	
501	New and Improved Food Processing Technologies	25%		48%	
502	New and Improved Food Products	11%		0%	
503	Quality Maintenance in Storing and Marketing Food Products	28%		0%	
511	New and Improved Non-Food Products and Processes	0%		10%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	14%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	22%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.5	0.0
Actual Paid Professional	1.1	0.0	1.1	0.0
Actual Volunteer	0.6	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
6801	0	18267	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
139005	0	197819	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
234	0	8926	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Good Agricultural Practices (GAP) and certification of agricultural producers for food safety in order to avoid bacterial or other contamination of produce have become increasingly important to processors, retailers, and the public. This concern continues up the processing chain through processing plants and into restaurant operations. Compliance is challenging for Hawaii's small farms, many of which are operated by recent immigrants with limited English language skills. In FY2012, approval of the Food Safety and Modernization Act (FSMA) accelerated concerns over food safety and compliance. To address these needs, CTAHR continued the food safety certification coaching program, one of the only such one-on-one coaching programs in the nation, developed over the past 20 years to assist local farmers with GAPs and certification audits. In addition, CTAHR's Local and Immigrant Farmer Education (LIFE) program offers workshops for socially disadvantaged producers on correct handling and application of pesticides, fertilizer/pesticide monitoring and record keeping, and sanitation requirements to reduce risk of food borne illness. Four grower workshops were conducted in FY2012; and LIFE partnered with the Hawaii Department of Agriculture to conduct on-farm worker protection workshops in immigrant farmers' native languages. CTAHR faculty also conduct food handling workshops for employees in food processing facilities in Hawaii, and throughout the American Pacific.

Research efforts emphasized improved detection of pathogens, and improved/alternative methods of decontamination and pasteurization. Electrical impedance spectroscopy (EIS), using a novel nano-needle probe biosensor, was demonstrated to be a highly specific and accurate alternative to fluorescence microscopy for detection and quantification of Escherichia coli cells. Microbial decontamination of fresh produce, in particular, due both to the fragile nature of these materials, and growing concerns over residues left by chemical decontamination treatments. An effective photothermal nanotherapy, using a pulsed CO2 laser, was developed as an alternative to chemical treatment, and was demonstrated to heat-sterilize a localized area around targeted bacteria such as E. coli without damaging the food surface. This method of sterilization is also applicable to liquids such as fruit juices. Detection of E. coli and Salmonella in refrigerated acidic juices is problematic, and temperature adaptation and reduced oxidative tension were found to greatly improve detection and recovery of these pathogens. For use in food processing facilities, particularly in dairy applications, an energy efficient nanocomposite coating technique using superhydrophobic and superhydrophilic layers was developed and demonstrated to be highly effective in preventing fouling and removing bacteria from food contact surfaces.

The handheld field device developed in CTAHR for simultaneous detection of multiple environmental pathogens in the field was validated with US FDA in 2012 in trials detecting Salmonella on food samples. Efforts continued to add further value to this $600 (production cost) device, which is adaptable for rapid field detection of a variety of plant and public health pathogens.

Farmers who participated in CTAHR educational workshops or coaching sessions have made changes to reduce microbial risks on the farm including improving hand hygiene facilities and practices, improving pest control in fields and packing areas, mitigation efforts to minimize animal activity in the growing and packing areas, removal of used materials that can attract pests, employee training on GAP, development of farm maps, water testing, and use of traceback labels on boxes. Approximately 54 growers, wholesalers and other interested individuals recognized the importance of food safety throughout the market system and increased their knowledge of GAP to minimize microbial risks. Approximately 240 adults and youth increased their knowledge of safe food handling practices, such as 1) keeping foods out of the danger zones, 2) using of food thermometers to cook to proper temperatures, 3) keeping foods separate to prevent cross-contamination, and 4) chilling foods promptly. In the past year, information was disseminated through the Food Safety website and Keep It Simple and Safe (KISS) website got 1903 hits.

Fifteen short courses and accompanying course materials for the Hawaii food industry members were delivered focusing on Hazard Analysis, Critical Control Point and Preventive Controls Systems. This is because buyers and inspectors are including competence in these systems as a requirement for purchasing of produce, ingredients, or foods. Other courses on bioterrorism, Country of Origin Labeling (COOL), prerequisite programs for food safety, Food Allergens Control Programs, and general food safety workshops remained popular with the clientele. Requests for designing Food Allergen Control Programs, and training staff on food allergies continued to increase. Compliance to food additive regulations, microbial contamination training sessions, and brief presentations on general food safety (especially on hot topics) were also popular. Increasingly more of the food manufacturers are now following their control programs, partially due to the insistence of food inspectors and the mandatory requirements of buyers. Consumer pressure to be more transparent in the use of processing methods and technologies, and the pervasive concern for food safety are influencing the long-term changes among the food processors. The changes are demonstrated by the processors' willingness to attend certification courses that are mandated by their buyers and by their food inspectors.

A series of meetings were held with CTAHR, Hawaii Department of Agriculture, Hawaii Department of Health, Hawaii Farm Bureau Federation, individual growers, and school garden supporters to discuss good agricultural practices, food safety certification, organic certification, water quality, and animals in food production areas. This improved dialog is expected to result in increased collaboration in educational programs on food safety.

2. Brief description of the target audience

This program reaches from farms to food processing facilities; to consumers, hospitals and research facilities. Detection and mitigation of food-borne pathogens is a critical concern for local farms and processing facilities, home gardeners, medical laboratories, and the many importers and retailers of food products imported from outside of the State of Hawaii.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	751	10769	525	1040

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	1	6	7

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations

Year	Actual
2012	30

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2012	9

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2012	8

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of people adopting one or more practices which result in improved food safety.
2	Dollar value of grants and contracts obtained.

Outcome #1

1. Outcome Measures

Number of people adopting one or more practices which result in improved food safety.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	310

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Protection of food safety is both an individual and well as a societal responsibility. Farms, food processors, markets, restaurants as well as the individual consumer all have their respective responsibilities in maintaining a safe food supply. CTAHR has the responsibility to provide science-based information on food safety to all these groups.

What has been done
Training of farmers and food processors has been accomplished through individual coaching, extension publications, websites, workshops and non-formal education. Individuals have reported adoption of practices learned.

Results
The safety of Hawaii's fresh and processed foods has been improved through these activities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and

Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Dollar value of grants and contracts obtained.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	630198

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Improved food safety practices by food producers, processors and consumers are needed to protect public health. Funding is needed to support these programs, as well as research on improving food safety.

What has been done
Extramural funds have been obtained.

Results
Hawaii's food supply is safer.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
501	New and Improved Food Processing Technologies
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V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Retailers and consumers have a strong interest in food safety, but processors and farmers face difficulties from the costs associated with food safety certification, particularly in a weak economy. Thus, funding for this program, and public/client and political interest is inconsistent.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

All projects conducted under this program were peer-reviewed before initiation. Annual progress reports were collected and evaluated by the associate deans for research and extension. Funds are not released for those projects which did not show tangible progress.

Key Items of Evaluation

None.