

**V(A). Planned Program (Summary)**

**Program # 10**

**1. Name of the Planned Program**

Food Safety

**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%		8%	
501	New and Improved Food Processing Technologies	25%		24%	
502	New and Improved Food Products	10%		0%	
503	Quality Maintenance in Storing and Marketing Food Products	30%		0%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	15%		4%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	20%		47%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		17%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	1.0	0.0	1.5	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
4362	0	70632	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
115976	0	140541	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
590	0	0	0

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Stakeholders have a variety of concerns relative to bioterrorism (of increasing importance); good agricultural practices (in order to avoid bacterial or other contamination of produce); food allergen control; and general food safety (e.g., food additives). In response to these needs, CTAHR has developed and maintained a strong food safety program targeted at food processors for over 20 years. Certification of agricultural producers in their use of good agricultural practices is a clear trend and is challenging for many of Hawaii's small farms, many of which are operated by recent immigrants with limited English language skills.

In research on the three pathogenic bacteria (*E. coli* O157:H7, *Salmonella*, and *L. monocytogenes*) known to be present on fresh produce and able to develop in acidic fruit juices, we developed a novel method of bacterial detection in refrigerated juice using plate count agar containing 0.2% sodium pyruvate (PCA-SP) in combination with selective agar media. A novel method of detecting *Salmonella* in lettuce by propidium monoazide real-time PCR was also developed, and it was found that DNA from dead *Salmonella* remains stable in lettuce for at least 8 days. For single-step detection of food pathogens in processing facilities, we focused on development of microbial sensor technology exploiting novel nanoneedle probes, using the lethal bacterial strain *E. coli* O157:H7 as a model organism. A microwire sensor device was designed and fabricated successfully, and demonstrated to provide high sensing efficiency that allows the entire procedure to be completed within 15 minutes. Current research focuses on scaling this device down to nanowire, and potential use as a tool for detection of extracellular DNA markers in food samples. Finally, we optimized a targeted gene knockout method to generate over 200 mutants as the first step in better understanding of mycotoxin production.

CTAHR has continued efforts in educating growers about food safety practices on farm and in the packing areas. Through one on one visitation and consultations, growers indicated an increase in knowledge and heightened level of competencies in identifying high-risk areas. Modified operations have minimized the risk associated with food safety issues and secured their marketplace. In 2008, there were approximately 10 growers on Oahu who have successfully obtained Food Safety certification. In 2010, the number of food safety certified operation increased through our collaborative efforts. We are continuing to work to safeguard Hawaii's agricultural food supply through minimizing risk associated with food borne illnesses. In 2009-2010 we provided food safety opportunities in: 1) on farm audits, 2) farm manual and document development and 3) on farm education of managers and employees. We stress the importance of education in conjunction with certification to help socially disadvantaged growers transition toward food safety certified operation while maintaining their market share and position at the Hawaii Farm Bureau Federation Farmers Markets, in which farm food safety certification is increasingly being required.

**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.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
<b>Actual</b>	1073	10350	200	1060

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

**Patent Applications Submitted**

Year: 2010

Plan:

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Actual</b>	0	1	1

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Grant proposals submitted.

Year	Target	Actual
2010	{No Data Entered}	8

**Output #2**

**Output Measure**

- Presentations at national and international meetings.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	{No Data Entered}	2

**Output #3**

**Output Measure**

- Number of workshops or demonstration activities held on food safety

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	{No Data Entered}	35

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

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

## **Outcome #1**

### **1. Outcome Measures**

Dollar value of grants and contracts obtained.

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	{No Data Entered}	86282

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Resources are needed to conduct research and extension programs to assist stakeholders.

#### **What has been done**

Resources were obtained and programs were conducted.

#### **Results**

Hawaii's economy benefited from external funds and programming to assist stakeholders was conducted.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

## **Outcome #2**

### **1. Outcome Measures**

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

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	{No Data Entered}	390

### **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**

Various stakeholders were educated about improving food safety through workshops, extension publications, websites and non-formal educational activities.

#### **Results**

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

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
501	New and Improved Food Processing Technologies
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
722	Zoonotic Diseases and Parasites Affecting Humans

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

- Economy
- Appropriations changes
- Competing Public priorities
- Competing Programmatic Challenges

### **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 and Data Collection)**

### **1. Evaluation Studies Planned**

- Before-After (before and after program)
- During (during program)

## **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.