

# **Evaluating on-farm food handling practices and microbiological quality of locally grown produce and eggs**

Project #MSP1-2004

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May 2003 – May 2004  
\$27,885

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October 25, 2004

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## **NONTECHNICAL SUMMARY**

Since 1999, Iowa State University Hotel, Restaurant and Institution Management (HRIM) Extension faculty and staff have been conducting research, educational and outreach projects about linking local food producers with foodservice operations. Some of these projects have focused on purchasing needs and behaviors of foodservice managers.

This project “Evaluating on-farm food handling practices and microbiological quality of locally grown produce and eggs” was a qualitative study that examined food safety practices used on the farm by Iowa produce and shell egg producers. Sponsored by the Leopold Center for Sustainable Agriculture, the project culminated with a workshop conducted by faculty and staff in HRIM and the Department of Food Science and Human Nutrition (FSHN). Presenters reviewed on-farm safe food handling practices and provided an update on the latest food safety research related to Good Agricultural Practices (GAPs).

Jason Ellis served as project coordinator while Catherine Strohbehn and Dan Henroid were principal investigators. An advisory board, consisting of Extension Specialists, Leopold Center staff, and representatives from producer organizations, provided input into data collection tools and protocol, and identified possible project participants. One project goal was to conduct an objective assessment of current operating procedures and provide recommendations for improvement.

Prior to the workshop, local producers were visited by Ellis to assess current food safety practices in place at each operation. Standardized tools and procedures, based on USDA information and other research, were used. A confidential report with results and recommendations for improvement was provided to each participant following the visit.

All producers were conscious of product safety, but levels of awareness about risk varied. Results indicated participating operators were conscientious of production and processing practices that impacted the safety of their products. Producers maintained the quality and safety of water used for production and processing; were concerned with employee hygiene for all segments from harvest to transportation; used basic field processing techniques to minimize contamination of processing areas; and used packaging that maintained product integrity. Many appropriate practices were in place for maintaining product safety and quality, but could be enhanced so producers and their customers receive the full benefit of these measures. Areas for additional consideration by operators include improved handwashing facilities and practices; provision of formal employee training; and the development of cleaning and sanitizing protocols for both products and food contact surfaces. As a result of these findings, researchers have developed fact sheets and user guides for these areas: GAPs, Food Handling, and Cleaning and Sanitizing. These materials will be useful for project participants and other producers wanting to enhance the safety of their products, and in turn, satisfy increasing concerns of consumers and foodservices about food safety.

Participants from the on-farm food safety project gathered in Ames on November 19, 2003, to discuss issues related to safe handling of fresh produce and eggs. At the workshop, Strohbahn and Henroid gave an introduction to current food safety issues and research about linking local food producers with area commercial and institutional foodservice managers. Ellis provided summaries from the on-site farm assessments. Dr. Aubrey Mendonca and Dr. Lester Wilson, FSHN faculty members, spoke about cleaning and sanitizing practices of product and food contact surfaces, and good agricultural practices, respectively. An All-Iowa meal was served featuring menu items made from Iowa products. Table tents also were set up to inform participants of the origin of their food.

A description and results of this pilot project were presented at the annual meetings of the Iowa Fruit and Vegetable Growers' Association and Practical Farmers of Iowa. There was also a scheduled presentation for the Iowa Network of Community Agriculture which was cancelled due to weather conditions. Presentations to these producer organizations helped to increase awareness of food safety and the concepts of GAPS and a farm food safety plan. Information about this and other HRIM Extension projects related to local foods is available at <http://www.extension.iastate.edu/hrim/localfoods/>.

## TECHNICAL REPORT

### Introduction

With concerns about food safety and recent headlines about foodborne illnesses from fresh produce items, there are justifiable reasons for producers to increase attention to on-farm practices. Researchers at Cornell University, Kansas State University and other universities have addressed some producer issues related to sanitation and safety on the farm. However, information was not readily available or known about local Iowa producers. Because of fruit and vegetable promotions, increases in the number of farmer's markets, and new threats to safety of food from cross-contamination, food producers must play a critical role in ensuring the safety of food while under their control. Thus, food safety and Good Agricultural Practices (GAPs) are issues for the food producer. Objectives of this project were to:

1. Increase fruit and vegetable growers' and fresh shell egg producers' awareness and understanding of harvest, post-harvest, and delivery practices consistent with GAPs and methods of assessment in qualitative research.
2. Increase fruit and vegetable farmers' and fresh shell egg producers' knowledge of food safety issues when supplying restaurants and institutional foodservice establishments.
3. Identify areas for improvement in production practices of fresh produce and shell eggs to minimize risks of foodborne illness.

### Study Design, Methods, and Materials

A qualitative approach was used in this project. A project advisory team (n=10), comprised of representatives from producer organizations and other groups interested in the safety of direct-marketed foods was formed to provide input on project objectives, data collection procedures and assessment tools, and identification of project participants. The focus of the study was food producers who direct marketed fresh produce or fresh shell eggs. After a review of the literature and other farm safety reports, the research team (Ellis, Strohbehn, and Henroid) developed an on-farm food safety assessment tool. The assessment form referenced USDA information and material from Cornell University, the University of California at Davis, and the New England Extension Food Safety Consortium Good Agricultural Practices (GAPs) programs. (See Appendix A, Data Collection Tools).

The first page of the assessment tool consisted of open-ended questions about the farm and items produced. The remainder of the assessment form was comprised of six categories of information with specific standards of practice phrased as "yes or no" questions listed under each heading. A response option of "not applicable" and a space for written comments also were provided. Six categories of information were collected: general information; the farm; field harvest and packing; packaging/processing facility; transportation from farm to market; and pick-your-own. A point total, with one point for each "yes" response, was tallied for each category. The project coordinator completed this form at each farm visit.

The research team also developed a structured interview form for the coordinator's conversations with each producer. (See Appendix A, Data Collection Tools). Questions were posed to producers about their interests and current practices about on-farm food safety and their perceptions of buyer's concerns.

Advisory team members met in May 2003. Minor suggestions were made to the data collection tools. Discussion about procedures for identification and recruitment of participants, and the collection and analysis of food samples was lengthy. The advisory team consensus was that data collection and analysis of food samples would be an option for participants and information would be kept confidential between producers and research team members. Potential participants were sent a communication advising them of the project objectives and requesting a response if interested in participating. Participants were informed of the option to have food samples collected and analyzed for levels of specific pathogens. Dr. Aubrey Mendonca, a professor in Food Science and Human Nutrition, developed and trained project investigators (Ellis, Strohbehm, and Henroid) on collection protocol (see Appendix A, Data Collection Tools) and supervised analysis of samples for particular pathogens. Fresh shell eggs were tested for levels of *Salmonella* spp, while fresh produce for *Listeria monocytogenes*, *Salmonella* spp, and *Escherichia coli*. All samples were analyzed for coliform counts.

The Iowa State University Institutional Review Board approved the data collection tools and the project protocol. Approval was granted in June 2003 (IRB# 03-568).

The project coordinator scheduled appointments with each producer participating in the study. Eleven sites were visited, including farms growing fresh produce and those raising fresh shell eggs. It was determined that project participants would schedule an appointment with the project coordinator for an on-site farm visit. On each farm visit, the project coordinator assessed current operating practices and interviewed the producer. If desired, food samples were collected following the developed protocol and stored in a sterile bag in a cooler during transport to Mendonca's ISU laboratory. All of the participating producers received a booklet about GAPs (Rangarajan, Bihn, Gravani, Scott, & Pritts, 2000) published by Cornell University. After each visit, the project coordinator prepared a confidential report for each farm. Laboratory analyses with interpretations were included if applicable.

After all site visits were completed, the project investigative team prepared a draft agenda for the producer workshop, scheduled for November 19<sup>th</sup>, 2003 at the Hotel at Gateway Center. The advisory board reviewed this draft agenda and offered suggestions. A packet of information for producer participants was prepared. Presentations were given by Rich Pirog, Dan Henroid, Jason Ellis, and Drs. Catherine Strohbehm, Aubrey Mendonca, and Lester Wilson. (See Appendix B for Workshop Agenda and Presentations). Discussion between participants and speakers, and among participants themselves, resulted in meaningful information and identification of future strategies for education (through Extension and producer organization meetings) and for on-site operations.

## **Data and Discussion**

Data from on-site visits were tabulated. As this was a qualitative study with limited observations, statistical analysis was not conducted. However, some patterns from on-site assessments did emerge. These observations were discussed at the workshop with producers.

### *Summary of Site Visits*

There were 11 farms included in the study. These operations produced fresh produce (n=9) and fresh shell eggs (n=2). Only 2 had livestock production (i.e. cattle feeding) and 3 other farms had livestock pets (i.e. goats). The farms were located primarily in central Iowa with a few in northeast Iowa. Farm visits were conducted July 7<sup>th</sup> through October 18, 2003.

### *General Information*

A potable water source was identified at all 11 farms. Improvements were needed in handwashing at 8 of the 11 sites (72%), specifically with regard to the facilities, supplies, frequency and signs. Another area of improvement identified was the need for formal training of staff, as only 2 of the 11 sites (18%) currently offered to employees.

### *The Farm*

All 11 farms had good water quality and proper use practices. Of the 6 farms with on-site manure handling and application, there was adherence to best practices. Water testing and documentation of the results was a recommendation for 5 of the 11 farms (45%). Policies for visitors and compost management were recommended.

### *Field Harvest*

Good agricultural practices were observed at all farms for field cleaning procedures while 91% of the farms (n=10) were seen demonstrating appropriate hygiene practices and 73% (n=8) handled product appropriately. Improvements in training of staff, handwashing practices, and restriction of pets and wildlife from food fields were recommended. Recommendations also were made for equipment with regards to segregation (64%); cleaning (55%); and sanitation (45%) practices.

### *Packing/Processing Facility*

Good agricultural practices were seen at all farms for packaging, at 91% of farms for hygiene; at 73% of farms for facilities; and for 70% of the 10 farms with cold storage. Recommendations were made with regards to handwashing and improvements of break facilities (55%); equipment cleaning (55%) and sanitation (45%); product washing (64%) and sanitation (27%); and use of proper clothing (27%) at this stage of the food production process.

### *Transportation*

Good hygiene and attention to product handling to minimize damage were practices observed at all farms. The need for improvements was observed for cleanliness (55% of farms) and temperature control (27%) for this phase of production.

### *Pick Your Own*

Only 4 of the 11 farms had “pick your own” operations. Of these operations, 75% had good practices with regard to policies for pets. Two of the 4 were recommended to consider improvements to visitor facilities and containers used by visitors for harvesting.

General conclusions from the on-farm food safety assessments were that 1) many good agricultural practices are currently performed, yet 2) there is a need to implement practices that will help ensure the safety of the product at all phases of the operation. The importance of off-season planning and documentation were stressed in the workshop. The development of a farm food safety plan should prove useful to farmers who continue direct-marketing of product to consumers and foodservices.

### **Summary and Recommendations**

A summary of the observations from the on-farm assessments indicates good agricultural practices are generally followed. Greater attention to development of on-farm food safety plans whereby written policies and procedures guide employee practices when handling food is needed. Discussion from producers at the workshop indicated high interest in information about effective cleaning and sanitizing agents and procedures for use on food products and contact surfaces. As fresh produce items may frequently not receive heat treatment, it is very important that any pathogenic bacteria be kept to minimal levels. Transmission of viruses from food handlers not observing proper hygiene practices is another area of concern of which producers should be aware. Procedures should be implemented to minimize the impact of these risks to food safety.

### **Impact of Results**

Little research has been reported on food handling practices of producers and the microbiological quality of locally grown produce. This pilot project has provided a methodology for evaluating operations of local producers and some initial results based on a limited sample. More work needs to be done to evaluate food handling practices of local producers and identify appropriate channels to distribute information about food safety as it relates to their operations. A multidisciplinary approach about food handling practices for local producers needs to be developed. Due to complexity of food production operations, academic programs and Extension areas in addition to HRIM and FSHN need to be involved in providing food safety information and education to producers.

### **Outreach, Education, and Information Transfer**

Presentations were done at the Iowa Fruit and Vegetable Growers Association annual meeting in Marshalltown, Iowa, on January 15, 2004 and the Practical Farmers of Iowa on January 10, 2004 by the project coordinator, Jason Ellis. Project results, workshop presentations, and other related information about local foods have been posted on the Iowa State University Extension Hotel, Restaurant, and Institution Management web site at <http://www.extension.iastate.edu/hrim/localfoods/>. Other resources related to on-farm food safety have been compiled and are available at <http://www.iowahaccp.iastate.edu>.

## **Publications**

Based on results of the on-site assessments, gaps identified in food safety education materials, and feedback from local producers at the November workshop, three extension publications have been developed about on-farm food safety practices (GAPs), food handling practices, and cleaning and sanitizing programs. These are available in electronic and print form. A fact sheet about various cleaning and sanitizing agents on the market also was developed upon request from local producers. (See Appendix C, Publications)

- Ellis, J.D., Strohbehn, C.A., Henroid, Jr., D.H., and Wilson, L. (2004). On-farm food safety: A guide to Good Agricultural Practices (GAPs). Iowa State University Extension. Available at: <http://www.extension.iastate.edu/publications/pm1947a.pdf>
- Strohbehn, C.A., Ellis, J.D., Henroid, Jr., D.H., & Wilson, L. (2004). On farm food safety: A guide to food handling. Iowa State University Extension. Available at: <http://www.extension.iastate.edu/publications/pm1947b.pdf>
- Henroid, Jr., D.H., Ellis, J.D., Strohbehn, C.A., and Mendonca, A. (2004). On farm food safety: A guide to cleaning and sanitizing. Iowa State University Extension. Available at: <http://www.extension.iastate.edu/publications/pm1947c.pdf>

A refereed journal article about the project is in development and will be submitted for publication by January 2005.

## **Cooperative Efforts and Student Support**

The project provided support for a graduate student in agriculture education (Ellis). This work continued previous efforts with local producers done by HRIM faculty and staff.

## **Evaluation**

Because the project was qualitative pilot work with a limited time frame, a comprehensive follow-up assessment was not possible. Workshop participants evaluated this component of the project positively.

The original project goals were met and exceeded. Project participants were very satisfied with the project results and information provided in the reports and through the workshop. During the development of the project, concern was expressed about confidentiality issues related to the microbiological testing of product and food contact surfaces. Perhaps due to the protocol that returned microbial test results and confidential interpretation directly to the producer, all participants availed themselves of the opportunity for testing. Based on cost savings in travel expenses, a budget revision was requested to develop a series of Extension publications to meet the information needs of Iowa local producers. This series is being distributed to project participants and will be available for other local producers through the Extension Distribution Center and on the Internet.

## **Bibliography**

- Food and Drug Administration. (1998). Guide to minimize microbial food safety hazards for fresh fruits and vegetables. Washington, DC. Available at: <http://vm.cfsan.fda.gov/~dms/prodguid.html>
- HACCP Information Center – <http://www.iowahaccp.iastate.edu>
- Iowa State University Extension Local Food Project – <http://www.extension.iastate.edu/hrim/localfoods/>
- New England Extension Food Safety Consortium – Good Agricultural Practices - <http://www.hort.uconn.edu/IPM/foodsafety/>
- Penner, K., Janke, R.R., Beyer, S., Nangenast, D., Cress, D.C., Stokka, G.L., Gast, K.L.B., Rogers, D.H., Godfrey, G., & Willingham, J. (2001). Kansas Food\*A\*Syst: A food safety risk management guide for the producer. Kansas State University Cooperative Extension. Available at: <http://www.oznet.ksu.edu/library/fntr2/foodasyst/foodasysbook.pdf>
- Rangarajan, A., Bihn, E.A., Gravani, R.B., Scott, D.L., & Pritts, M.P. (2000). Food safety begins on the Farm: A grower's guide. Cornell University Cooperative Extension. Available at: <http://www.gaps.cornell.edu>.
- USDA/FDA Foodborne Illness Education Center Produce Links - <http://peaches.nal.usda.gov/foodborne/fbindex/Produce.asp>

## **BUDGET REPORT**

### **Budget Detail and Expenditures**

The total amount of the grant was \$27,885 for a one-year project. Because of unexpected efficiencies, a budget revision was requested and approved in May 2004. This extension allowed for development of the publications cited previously. Overall expenditures were consistent with the proposed budget. A majority of the budget (77%) was spent on labor related to project research and development, on-site visits, workshop planning, and publication development. Nine percent of the budget was for subcontracted services to the Practical Farmers of Iowa and the Iowa Network of Community Agriculture for promotion of the project, recruitment of participants, and travel expenses. Other expenditures included workshop expenses (4%), food sample analysis services (4%), and miscellaneous expenses such as photocopying, food safety educational materials, travel, and postage (6%).

### **Potential Sources of Additional Funding**

Additional funding for this type of project may be sought from several USDA grant programs. The Sustainable Agriculture Research and Education (SARE) program in the Cooperative State Research, Education, and Extension Service (CSREES) funds projects and research to improve agricultural systems. USDA CSREES also has funded research and projects related to produce and food safety through the National Integrated Food Safety Initiative.

## **APPENDIX A: DATA COLLECTION TOOLS**

Code: \_\_\_\_\_

**On-farm Food Safety Assessment**  
**Locally Grown Produce and Eggs**  
Iowa State University

Person(s) interviewed: \_\_\_\_\_

Farm or operation name: \_\_\_\_\_

Audit site: \_\_\_\_\_

Street address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_ Telephone: \_\_\_\_\_

Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

Auditor(s): \_\_\_\_\_

Date: \_\_\_\_\_ Time arrived: \_\_\_\_\_ Time departed: \_\_\_\_\_

Is there a packing house floor plan indicating product flow, storage areas, cull areas, employee break areas, restrooms, and offices? YES NO N/A

Does the farm have more than one location for growing and packing? YES NO

- Are all facilities included on this audit? YES NO

Total acres farmed: \_\_\_\_\_

Foods produced (and est. acres or number of birds): \_\_\_\_\_

Type of farming operations (produce, crops, livestock, etc.) \_\_\_\_\_

**On-farm Food Handling Assessment Form**  
**Locally Grown Produce and Eggs**  
 Iowa State University

<b>1. General information</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Comments</b>
Is potable water available to all workers?				
Are all workers trained on sanitation and hygiene practices?				
Are signs about handwashing posted for workers?				
Are handwashing facilities available to workers?				
Are employees and visitors following good hygiene/sanitation practices?				
Is smoking and eating confined to designated areas separate from product areas?				
<b>Total</b>				<b>(6 possible)</b>

<b>2. The farm</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Comments</b>
<b>Water</b>				
Are wells protected from contamination?				
Is potable water and/or wells tested at least 1 time per year?				
Are water test records on file?				<b>D</b>
Is product wash water source protected against potential contaminants (e.g., manure, livestock, pesticide storage, septic system drainage)?				
Are backflow devices and air gaps installed?				
Is irrigation water quality protected?				
Is farm livestock access to irrigation sources (e.g., ponds, streams) restricted?				
Is farm sewage treatment system working properly with no visible leaking or runoff?				
<b>Manure and Bio-solids Management</b>				
Are storage and treatment facilities located away from growing and product handling areas?				

Do storage and treatment facilities have physical barriers that prevent leakage, runoff and wind spread?				
Is there a manure management plan?				D
Is equipment used with manure/bio-solids cleaned before harvest or product transport?				
Is raw manure incorporated into the soil at least 2 weeks prior to planting or 120 days prior to harvest?				
Is land use history available to determine risk of product contamination?				D
Are soil test results available to determine risk of product contamination?				D
Are compost temperatures monitored and recorded?				D
Are analysis reports available for composted manure?				D
Are measures taken to minimize risk of recontamination of treated manure?				
<b>Total</b>				<b>(18 possible)</b>

<b>3. Field harvest and packing</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Comments</b>
<b>Worker Sanitation and Hygiene</b>				
Is there a worker food safety training program?				D
Do workers practice good hygiene by:				
- wearing clean clothing and shoes?				
- refraining from eating in work area?				
- refraining from smoking in work area?				
- keeping hair covered?				
- washing hands as required?				
- limiting bare hand contact with fresh products?				
- covering open wounds with clean bandages and wearing single-use gloves?				
Are toilets accessible to workers?				
Are handwashing stations accessible to workers?				

<b>Sanitation</b>				
Are toilets clean and regularly serviced with appropriate supplies?				
Are handwashing stations clean and regularly serviced with appropriate supplies?				
Are portable toilets transported in a way that prevents field contamination from waste water?				
Are farm livestock restricted from areas where products are being harvested?				
Are baskets, totes, or other containers cleaned and sanitized before use?				
Are clean containers kept covered until used in the field?				
Are damaged or soiled containers removed from use?				
Is the equipment/machinery that contacts product kept clean and sanitized?				
Are workers instructed not to use containers for carrying/storing non-product items?				
Is potable water applied to products?				
Is dirt, mud, or other debris removed from product before going to the packing facility?				
Is product transportation equipment clean?				
<b>Total</b>				<b>(22 possible)</b>

<b>4. Packing/processing facility</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Comments</b>
<b>Worker Sanitation and Hygiene</b>				
Is there a worker food safety program in place?				<b>D</b>
Do workers practice good hygiene by:				
- wearing clean clothing and shoes?				
- refraining from eating in work area?				
- refraining from smoking in work area?				
- keeping hair covered?				
- washing hands as required?				

- limiting bare hand contact with fresh products?				
- covering open wounds with clean bandages and wearing single-use gloves?				
Are toilets and handwashing stations accessible to workers?				
Are employee facilities (locker rooms, break areas, etc.) located away from product areas?				
Do visitors follow a policy regarding hair restraints in product areas?				<b>D</b>
Do visitors follow a policy regarding loose jewelry in the product areas?				<b>D</b>
<b>Receiving</b>				
Is product covered during transport and staging prior to unloading?				
<b>Washing/Packing</b>				
Is source water used in packaging potable?				
Is processing water treated to reduce microbial contamination?				
Is water treatment and exposure time monitored?				<b>D</b>
Are product contact surfaces in good condition?				
Are product contact surfaces washed, rinsed, and sanitized at the end of each day?				
Are product flow zones protected from contamination sources?				
Is product cooled with water or ice?				
- If so, is water for chilling/making ice potable?				
- Is ice made, transported, and stored in sanitary conditions?				
Is sanitizer agent concentration level monitored?				<b>D</b>
Is wash water changed as needed?				
Is wash water maintained at a temp. no more than 10°F cooler than the product?				<b>D</b>

<b>Sanitation</b>				
Are toilets and handwashing stations clean and regularly serviced?				
Are food contact surfaces cleaned and sanitized?				
Are approved sanitizers used to sanitize food contact surfaces?				
Is processing equipment cleaned and sanitized at least once a day?				
Are unused and new packaging containers protected from contamination?				
Is there a pest control program in place?				
Are pest control service reports available?				<b>D</b>
Is product waste removed daily?				
<b>Temperature control</b>				
Are refrigerated storage units at the proper temperature?				
<b>Storage</b>				
Are storage areas clean and free of visible contamination?				
Are storage areas used exclusively for food products and their containers?				
Are products stored at least 6 inches from the floor, depending on the product?				
<b>General</b>				
Are food-grade approved and labeled lubricants used in the packing facility?				
Are chemicals not approved for use on product stored and segregated away from packing area?				
Are the grounds free of litter and debris?				
Are the grounds free of standing water?				
Are outside garbage receptacles closed and away from entrances?				
Are packing facilities enclosed?				
Is the facility's interior clean and orderly?				
Are floor drains free of obstructions?				
Are pipes, ducts, fans, and ceilings over food handling operations clean?				
Are glass materials above product flow zones contained in case of breakage?				

Is possible wastewater spillage prevented from contaminating handling areas with barriers, drains or sufficient distance?				
Are walls, floors, and ceilings well maintained and free of major cracks/crevices?				
<b>Total</b>				<b>(49 possible)</b>

<b>5. Transportation – Farm to market</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Comments</b>
Do workers loading and transporting products practice good personal hygiene?				
Is product loaded and stored to minimize physical damage?				
Is product loaded and stored to minimize risk of contamination?				
Is product loaded and stored to allow for air circulation?				
Is transport vehicle well maintained and clean?				
Is transport vehicle only used for product and not animals or animal products?				
Are trailers cleaned and free of odors, visible dirt or debris and capable of maintaining temperature?				
Are food products separated from non-food products?				
<b>Total</b>				<b>(8 possible)</b>

<b>6. "Pick your own"</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Comments</b>
Are pets and farm livestock restricted from the "pick your own" area?				
Are toilets and handwashing stations clean and regularly serviced?				
Are clean containers available for purchase and customer use?				
Are facilities available for visitors to wash hands after coming in contact with animals (petting zoo) before entering the "pick your own" area?				
<b>Total</b>				<b>(4 possible)</b>

D=Documentation

**On-farm Food Safety Assessment Score Sheet**  
**Locally Grown Produce and Eggs**  
 Iowa State University

Firm name: \_\_\_\_\_  
 Audit site: \_\_\_\_\_  
 Street address: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_ Auditor(s): \_\_\_\_\_  
 Date: \_\_\_\_\_ Time arrived: \_\_\_\_\_ Time departed: \_\_\_\_\_

**Evaluation Summary**

Segment	Yes	No	Points available <sup>1</sup>	Points received <sup>2</sup>
1. General information				
2. The farm				
3. Field harvest and packing				
4. Packing/processing facility				
5. Transportation – Farm to market				
6. “Pick your own”				

<sup>1</sup> Points available is the total of Yes and No marks recorded for the segment

<sup>2</sup> Points received is the number of Yes marks received for the segment

<sup>3</sup> Passing score is 70% of the Points available (.7 \* Points available)

Commodities reviewed:

\_\_\_\_\_  
 \_\_\_\_\_

Auditor name: (print) \_\_\_\_\_ (sign) \_\_\_\_\_

Date: \_\_\_\_\_

**On-farm Food Safety Assessment**  
**Locally Grown Produce and Eggs**  
Iowa State University

1. **General** – Basic practices, including presence of employee facilities and hygiene practices
2. **The farm**
  - a. Water – Monitoring and maintenance of irrigation and wash water quality
  - b. Manure and bio-solids management – Storage, handling, and application of manure, compost, and other bio-solids
3. **Field harvest and packing**
  - a. Worker sanitation and hygiene – General hygiene practices (e.g., clothing, handwashing, etc.) and available hygiene facilities
  - b. Product and equipment sanitation – Condition of hygiene facilities, equipment, totes, and water supplies
4. **Packing/processing facility**
  - a. Worker sanitation and hygiene – General hygiene practices (e.g., clothing, handwashing, etc.) and available hygiene facilities, practices related to visitors
  - b. Receiving – Protection of product during transport, unloading and staging
  - c. Washing/packing – Water quality evaluation and monitoring, condition of product contact surfaces, and product sanitizing
  - d. Product and equipment sanitation - Condition of hygiene facilities, equipment, totes, and water supplies
  - e. Temperature control – Proper storage of perishable products
  - f. Storage – Condition of storage areas
  - g. General – Conditions of facilities, equipment, and proactive steps to reducing environmental recontamination of products
5. **Transportation** – Appropriate product handling, vehicle and equipment condition, and product separation
6. **“Pick your own”** – Prevention of animal contamination and maintenance of product and facility quality



### **Food safety program and responsibilities**

8. Do you have an on-farm food safety program?

YES

NO (go to Q 9)

- a. When did you develop and implement your food safety program?
  - b. Why did you develop and implement your food safety program?
  - c. Does this program incorporate GAPs and/or GMPs?
  - d. What resources did you use in developing this program?
  - e. How are all of the employees trained regarding the food safety program, GAPs, and/or GMPs? (If not trained, why not?)
  - f. Is this program available to all workers in written form? Multiple languages?
  - g. Who is responsible for implementing and overseeing your food safety program?
  - h. What other responsibilities does this person have, if any?
9. Why haven't you developed a food safety program?
10. What is needed for you to establish one for your operation?

## **Food Sample Collection Procedures**

### **Locally Grown Produce and Eggs**

Iowa State University

#### **Introduction**

Research team met with Dr. Aubrey Mendonca 6/19/03 to review general principles and specific procedures for collection of fresh produce and shell egg samples, compost and possible equipment food contact surfaces for microbial analysis. Foods not receiving further heat treatment (exception fresh shell eggs) and in form as presented to consumer will be collected. Two foods from each participating farm will be analyzed.

#### **General Principles:**

1. Representative samples of foods – three samples per lot
2. Prevention of contamination
3. Prevention changes in microbial numbers

#### **Supplies:**

Foods:  
Alcohol wipes  
Disposable gloves  
Sterile bags  
Sterile spoons  
Sterile hard plastic egg carriers  
Test tubes with buffer solution  
Sterile templates  
Sterile cotton swabs  
Coolers  
Crushed ice  
Markers  
Thermometers  
Labels or tape

#### **Procedure for collection of foods (lettuce, apples, tomatoes, green beans, cucumbers, carrots)**

1. Hands washed or wiped with alcohol wipes
2. New pair disposable gloves
3. Collect 3 samples of food items and place each sample in separate sterile bag. Sample will include one each of whole foods (apples, tomatoes, cucumbers, carrots) and handful of loose items (lettuce and green beans).
4. Label bags: farm code; name of product; location/point of collection (carton or lot number); condition of product (washed or unwashed); time collected; room or air temperature.
5. Place bag in cooler with crushed ice.
6. Return to lab for analysis.

**Procedure for collection of fresh shell eggs:**

1. Hands washed or wiped with alcohol wipes.
2. New pair of disposable gloves
3. Collect one egg and place in sterile, hard plastic egg carrier. Prepare a label with above information for each egg.
4. Place carrier in cooler with crushed ice.
5. Return cooler to lab for analysis.

**Procedure for collection of compost:**

1. Hands washed or wiped with alcohol wipes.
2. New pair of disposable gloves
3. Use sterile spoon to dig slightly below surface to collect spoonful of cured compost. Place each sample in sterile bag. Label.
4. Place in cooler.
5. Return to lab for analysis.

**Procedure for food contact surface sampling:**

1. Refer to Microbial Examination of Surfaces handout.

**Lab Analysis Timeframe:**

1. Samples will be held at 4°C.
2. Samples will be analyzed for specific pathogens within 36 hours of delivery.
3. Dr. Mendonca will email report with brief narrative (levels found on each sample and ranges of acceptability) to Jason within one week.
4. Jason will include confidential report with assessment report that will be sent to producers.

## **APPENDIX B: WORKSHOP AGENDA AND PRESENTATIONS**



## **ON-FARM FOOD SAFETY PROJECT PRODUCER WORKSHOP PROGRAM**

**November 19, 2003  
The Hotel at Gateway Center  
9:30AM to 4PM**

- 9:30 – 10:45**                      *Welcome and Introductions*  
*How the project began - Rich Pirog*
- Is Food Safety Really an Issue? – Dan Henroid*
- Local Foods Research – Dr. Cathy Strohbehn*
- 10:45 – 11:00**                      *Break*
- 11:00 – 11:15**                      *Activity*
- 11:15 – 12:15**                      *Action Steps to Reduce Microbiological Pathogens –*  
*The latest research – Dr. Aubrey Mendonca*
- Questions/Answers/Discussion*
- 12:15 – 1:15**                      *Discussion over All – Iowa Luncheon*
- 1:15 – 1:45**                      *Good Agricultural Practices*  
**Dr. Lester Wilson**
- 1:45 – 2:15**                      *Best Practices in Action*  
**Jason Ellis**

**2:15 – 2:30**

***Break***

**2:30 – 3:00**

***Project Summary***  
**Jason Ellis**

**3:00 - 3:30PM**

***Where Do I go From Here?***  
**Dan Henroid and Cathy Strohbehn**

**3:30 – 4:00 PM**

***Future Directions:***  
***Where Do We Go From Here?***  
**Andrew Hug**

***Presenter Information***

***Hotel, Restaurant and Institution Management Extension***

**Jason Ellis: Project Coordinator, Research Team**

**Dan Henroid: Extension Specialist, Research Team**

**Cathy Strohbehn: Adjunct Assistant Professor, Research Team**

***Leopold Center for Sustainable Agriculture***

**Andrew Hug: Advisory Group**

**Rich Pirog: Facilitator and Advisory Group**

***Food Science and Human Nutrition***

**Aubrey Mendonca: Professor, Advisory Group and Microbiological Assessments**

**Lester Wilson: Professor**

## **APPENDIX C: PUBLICATIONS**

## Resources

Additional production materials can be located at [www.iowahaccp.iastate.edu](http://www.iowahaccp.iastate.edu) under "Farm Food Safety" and then "resources".

### Water/sanitizer testing materials

LaMotte – 1-800-344-3100

**Orders less than \$25 assessed a \$10 flat shipping fee. Orders over \$25 charged actual freight**

- pH test stick – part # 3-2950
  - range from 0-14
  - 100 per pack
  - \$16.95 per pack
  
- chlorine test strip – part # 4250-BJ
  - range from 10-200ppm
  - 200 per pack
  - \$4.60 per pack

Micro Essentials Laboratory, Inc. - 718-338-3618

- pH test paper – part # 95
  - range from 5.0-9.0 (.5 increments)
  - ¼" x 15' roll
  - \$4.50 each
  
- chlorine test paper – part # cm-240
  - indicates 10, 50, 100, 200ppm free chlorine
  - ¼" x 15' roll
  - \$4.00 each

### Citric acid

Local canning/home preservation supply source(s)

[www.kitchenkrafts.com](http://www.kitchenkrafts.com) – 800-776-0575

- \$2.80/5 oz.
- food-grade
- granules

[www.groworganic.com](http://www.groworganic.com) – 888-784-1722

- \$2.95 per pound
- food-grade
- fine granular

## Composting

- <http://whatcom.wsu.edu/ag/compost/horsecompost2.htm>
- <http://www.ag.ndsu.nodak.edu/carringt/livestock/Beef%20Report%2002/manure%20composting.htm>
- On-farm Composting Handbook - \$25 (186 pgs.) NRAES-54. [www.nraes.org](http://www.nraes.org), 607-255-7654

## Sanitation

- [http://www.davisfreshtech.com/articles\\_washwater.html](http://www.davisfreshtech.com/articles_washwater.html)
- <http://ucce.ucdavis.edu/files/filelibrary/5359/3843.PDF>
- <http://www.cfsan.fda.gov/~comm/ift3-toc.html>

Calculate sanitizer mix

1. % of original solution times 10,000 to get ppm
  - 6% bleach X 10,000 = 6,000 ppm original concentration
2. Desired concentration (in ppm) divided by original concentration (in ppm) to get dilution factor
  - 100 ppm/6,000 ppm = 1/600 dilution factor *which means* 1 part 6% bleach to 600 parts water.
3. Mix sanitizer solution.

## Eggs

Egg washing

<http://www.ianr.unl.edu/pubs/poultry/g466.htm>

[http://www.kyagr.com/cons\\_ps/ri/pdf/eggproducerguideline.pdf](http://www.kyagr.com/cons_ps/ri/pdf/eggproducerguideline.pdf)

Iowa Egg Handler Licensing

[http://www.state.ia.us/government/dia/481-30\\_Food\\_and\\_Consumer\\_Safety.pdf](http://www.state.ia.us/government/dia/481-30_Food_and_Consumer_Safety.pdf)

<http://www.legis.state.ia.us/Rules/Current/iac/481iac/48136/48136.pdf>