



# An Overview of Hawaii Egg Quality Assurance Program for Producer Education and Implementation Programing: A New Producer Guide

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## Introduction

The Hawaii Egg Quality Assurance Program (HEQAP) is a cooperative, voluntary effort of the Hawaii Egg Producers Association, the Hawaii State Department of Health (DOH), and the Hawai'i Department of Agriculture (HDOA) Quality Control and Marketing Division. The program was initiated in the 1990s to improve the quality of eggs produced in Hawai'i and to minimize the public health risk posed by *Salmonella enteritidis* (SE), a zoonotic pathogen transmitted to humans through consumption of contaminated shelled eggs.

The program incorporates the bacteriologic surveillance, biosecurity, and pest-control measures developed by the USDA, during research conducted in Pennsylvania from 1992 through 1996. Consequently, both the State and federal egg-quality programs are being altered as part of the Federal Egg Safety Action Plan and are likely to be quite similar. The federal program, for commercial producers with more than 3,000 birds in lay, began in fiscal year 2004–2005. The objective of this publication is to provide current and future egg producers a simple guide to execute the HEQAP within the state.

## History of Egg Quality Assurance

Government agencies and the egg industry have taken steps to reduce SE outbreaks. These steps include the difficult task of identifying and removing infected hens from flocks that supply eggs, as well as increasing quality assurance and sanitation measures. The US

Food and Drug Administration (FDA) issued a rule (the “Egg Rule”) that went into effect on July 9, 2010, which requires shell egg producers to implement measures on the farm to prevent SE from contaminating eggs. Eggs from commercial flocks that are known to be infected must be pasteurized instead of being sold as grade-A shell eggs. The rule also includes refrigeration requirements during storage and transportation.

State agencies and authorized laboratories of the USDA Animal and Plant Health Inspection Service's National Poultry Improvement Plan (NPIP), an industry–State–federal cooperative program, certify participating breeding flocks and hatcheries of chickens that lay eggs as “tested free” or “*Salmonella pullorum*-typhoid clean.” Commercial poultry producers participate in the Avian Influenza “H5/H7 Monitored” NPIP Program. USDA Food Safety and Inspection Service (USDA-FSIS) regulates the safety of egg products, which are eggs removed from their shells for processing. USDA-FSIS also monitors contamination of broiler chickens with SE and other contaminants at all stages of chicken production at processing plants.

Throughout the 1980s, SE phage type 4 emerged as the predominant phage type in Europe, causing a marked increase in human infections. Phage type 4 had not previously been seen in the US except among persons who became ill after international travel, but in 1993, the first US outbreak of SE phage type 4 infections occurred in Texas (Altekruse et al. 1993). During the next several

years, phage type 4 caused human illness in Arizona, California, Hawai'i, Nevada, and Utah.

Since then, the number of SE outbreaks in the western United States has increased dramatically; most of these outbreaks have been phage type 4. SE phage type 4 also has been isolated from eggs and the farm environment of laying flocks implicated as sources for human outbreaks in that region (Rampling 1993).

The Centers for Disease Control and Prevention (CDC) monitors the spread of phage type 4 by phage-typing isolates from US outbreaks and sporadic cases of SE. Further reductions in SE incidence and SE-related outbreaks will require multiple interventions along the entire farm-to-table continuum.

To address SE prevention issues, on December 10, 1999, the President's Council on Food Safety announced an Egg Safety Action Plan calling for a 50% reduction in egg-associated SE illnesses by 2005 (FDA 2010). The plan aims at reducing consumer exposure to SE-containing foods; expanding and upgrading surveillance systems for human and poultry SE infection; improving communication among federal, State, and local agencies to accelerate SE outbreak detection and initiation of investigations; conducting research; and educating persons using science-based materials.

### What Are the Major Causes of SE Infection in Poultry?

There are many hosts that SE can infect, making control of it very challenging. It has been shown to replicate and spread via insects, birds (Davies & Wray 1996), swine, cattle (Thorns 2000), and rodents (Davies & Wray 1995). Insects and rodents have provided the greatest challenge to poultry producers, as they are the most difficult vectors to eliminate or control effectively. Salmonella has been found to colonize and persist in the house fly (*Musca domestica*) for up to four weeks, which is the average lifespan of the fly (Mian et al. 2002). During this time period it has been found flies can shed up to 107 colony-forming units (CFU) via their feces (Greenburg & Klowden 1972).

A study by Holt et al. (2007) found that hens could become infected with SE after being deliberately fed SE-infected flies. Approximately one third of the hens were found to have their intestines colonized with SE after consumption of the infected flies. However, in the same study by Holt et al. (2007), it was found that if

live flies infected with SE were simply released into a room of previously unchallenged hens, the hens' intestinal tracts were not colonized with SE. So, while flies can become infected with SE and shed the organism, to what degree they increase the spread of SE to hens by consuming fly contaminated feed within a flock is currently unknown.

Rodents have provided perhaps the largest challenge, as they have been found to provide a relatively long-term reservoir for the pathogen, enabling its introduction to SE-free flocks. One study done on mice found that they are able to maintain SE in their population for over 10 months (Henzler & Opitz 1992). Other work has shown that feces from infected rodents have upwards of 10,000 CFU SE bacteria in a single set of droppings (Davies & Wray 1995), with another study suggesting the fecal count could be closer to  $2.3 \times 10^5$  SE bacteria per dropping (Henzler & Opitz 1992).

## Objectives

### 1. Survey and upgrade current plan

Personnel from the Hawai'i Department of Agriculture, Quality Assurance Department, the Division of Animal Industry, and University of Hawai'i Cooperative Extension Service will provide administrative services, certification audits, and producer training to upgrade current standards. A Diagnostic Laboratory in Davis, California, will perform the bacteriologic cultures integral to the program.

To encourage participation and assist producers in their efforts to achieve program standards, a transitional program was offered the University of Hawai'i at Mānoa, beginning with an initial evaluation (Fig. 1). The ramp-up program provides a transition period of 15 months, during which CES personnel make regular farm visits to provide technical guidance and audit services so a written plan can be developed.

### 2. Implementation

When the producer is ready, the prerequisite bacteriologic evaluation is performed and the producer transitions to full HIEQAP certification through third-party examination of recordkeeping.

Major components of the HIEQAP address the following:

- Procurement of replacement birds from certified sources

- Maintenance of grounds and buildings
- Premises biosecurity
- Premises sanitation, including cleaning and disinfection procedures
- Rodent control and monitoring
- Refrigeration and egg storage.

### 3. *Approved HEQAP for farm*

A complete written document of all quality assurances, including an emergency action plan, will be developed for each individual farm within 2 years of initiation of the HIEQAP.

For more information on HIEQAP, contact the Division of Animal Industry.

## Plan of Work

(Adopted from California Egg Quality Assurance Program)

### A. *Administration from Farm*

1. Develop a written farm/premises flock egg quality assurance plan.
2. Designate (an) official quality-control supervisor(s) for in-house operations.
  - The official quality-control supervisor supervisor(s) shall attend one continuing education session every year.

### B. *Production and Record Keeping*

1. Purchase chicks and pullets from hatcheries participating in the National Poultry Improvement Plan (NPIP) “U.S. *Salmonella enteritidis* Monitored Program” or equivalent state plan. Chicks should be delivered with a certifying letter. Started pullets must be obtained from sources with an acceptable *Salmonella* prevention and control program.
2. Chicks and pullets should always be transported in coops and trucks that are cleaned and disinfected between flocks.
3. Obtain feed from mills that follow accepted feed industry “Good Manufacturing Practices” and the “Recommended *Salmonella* Control for Processors of Livestock and Poultry Feeds, 1988,” published by the American Feed Industry Association (AFIA), 1501 Wilson Boulevard, Suite 1100, Arlington, VA 22209, or an equivalent.
4. Use only animal protein ingredients originating from rendering plants participating in the Animal Protein Producers Industry (APPI) *Salmonella* Reduction Education Program or equivalent.
5. If used, medications, feed additives, and pesticides must be administered in adherence with approved label directions.
6. Maintain a flock health program that includes vaccinations, monitoring, and periodic necropsy of mortality or cull birds. Maintain a vaccination program to protect against infection with SE that includes a killed or inactivated vaccine, or a demonstrated equivalent SE vaccination program as determined by a licensed veterinarian.
7. Maintain a farm rodent monitoring plan. Feral bird and animal populations on farms will be monitored, and reduction programs for both will be implemented.
8. Pullet and layer buildings will be cleaned and disinfected by wet or dry methods before restocking. Third-party visual inspection of cleaning and disinfection is required by an official quality control supervisor(s).
9. The farm will maintain an appropriate biosecurity plan to maintain flock health and will train employees on proper procedures to execute the program. All employee trainings and comprehension will be documented annually in an on-farm record book. At a minimum, the plan will address the following:
  - Training of employees, including documentation
  - Premises security
  - Movement of people, including visitors
  - Disposal of manure, mortalities, trash, and spent fowl

- Vehicle, equipment, and supply movement and sanitation (cleaning and disinfecting) in the secure poultry area.
10. Implement an SE environmental monitoring program that includes the following testing protocols:
    - Testing of chick papers at delivery
    - Environmental test at 14–6 weeks
    - Environmental test at 40–45 weeks
    - Environmental test at 4–6 weeks post-molt
    - Environmental test pre depopulation

### ***C. Processing Procedures and Requirements***

1. Follow plant operating guidelines:
  - Facilities and equipment must be kept clean and in good repair and shall be completely washed at the end of each day's operation.
  - Lighting and equipment should be adequate to properly identify egg defects in the processing area.
  - Potable water with less than 2 ppm of iron shall be used for egg washing.
  - Wash water shall be maintained at 90 degrees Fahrenheit or higher and at least 20 degrees Fahrenheit higher than the temperature of the eggs to be washed.
  - A USDA-approved cleaning compound shall be used in the wash water.
  - USDA wash water guidelines shall be followed.
  - Washed eggs shall be spray-rinsed with warm water and a USDA-approved sanitizer.
  - If eggs are to be oiled, follow USDA guidelines.
2. Refrigerate eggs according to applicable federal, State, or local laws.
3. Label egg cartons according to applicable federal, State, or local laws.
4. The plant will maintain an appropriate biosecurity plan to limit cross-contamination by egg flats, pallets, racks, or other materials that are returned to ranches. Plastic egg flats must be washed and sanitized after each use and must be returned to the originating farm. Fiber egg flats cannot be sanitized and thus must be destroyed after first use.
5. The plant will maintain an appropriate biosecurity plan to limit cross-contamination of unpro-

cessed and processed eggs. New egg cartons and fiber flats should be used for all consumer packages. At a minimum the plan must address the following:

- Training of employees, including documentation
  - Premises security
  - Movement of people, including visitors
  - Vehicle, equipment, and supply movement and sanitation (cleaning and disinfecting) related to the egg-processing plant.
6. No returned product shall be reprocessed for retail shell egg sales.

### **On-Farm Visitation and Verification (CES)**

The integrity of the HEQAP is maintained through a system of random inspections managed by State cooperators. For the first 15 months of program, the CES agent will be assigned to visit each farm periodically (6x/year or more) to verify HEQAP records and to see if producer is in compliance and has made improvements to challenges that existed upon last visit. After the program has been established (one year), each participating farm is inspected at least once a year to satisfy the Official State Agency (HDOA) that the operations of the site are in agreement with the Plan's provisions.

Recordkeeping is another important element in the Plan. The records of all flocks maintained primarily for production of eggs and purchases of flocks entries from approved breeders will also be examined, and SE testing will be inspected annually by a State inspector. A complete checklist will be discussed with producer at the end of each visit. The agent is not allowed to visit more than one farm in a day for biosecurity reasons. Noncompliance of HEQAP will result in a farm visit by HDOA.

### **Recordkeeping (Producer)**

Each producer will keep an updated file of all records needed to verify that his or her HEQAP program is up to date. It should be readily available, so Extension personnel can examine and verify records. The file can either be a digital file on a computer or a hard copy. The records should include, but not be limited to, data on egg production, flock movement, bird or chick purchases from SE-free approved hatcheries, feed purchases, and vermin control. It should also include sanitation records, improvements made to facilities to address challenges

of HEQAP program, bird sales off farm, test records, and up-to-date biosecurity and emergency programs for the farm.

### Quality Assurance of Project

All SE analyses will be conducted in certified laboratories using approved assays. All student help will be trained and supervised in collecting samples and recording analysis results onto spreadsheets. Measuring parameters (fly counts, rodent levels) will be identified by the DOH Indemnity Program Standards. Data will be periodically evaluated to determine fulfillment of objectives.

### Conclusion and Impact

#### *On-Farm Inspections*

Current existing farms are monitored monthly via on farm inspection by Extension personnel. An overall evaluation on progress, presented with suggestions for future modifications, was used to document progress.

#### *Workshop Attendance*

All farms have attended all the general informational workshops at the Sand Island Department of Agriculture. All farms passed an oral biosecurity scenario test. Farmers rectified biosecurity challenges and justifications using their farms' best management practices protocol.

#### *On-Farm Adoption and Impacts*

All farms have developed an on-farm training manual for employees and conduct a yearly biosecurity training for farm personnel. Each farm has implemented and continues to build their recordkeeping folder to satisfy needs for SE compliance. All four of the farms have executed a Korean Natural Farming protocol for waste-management practices. Two of the four are currently producing indigenous microorganisms 4 (IMO4) and lactic acid bacteria (LAB) inputs to satisfy needs within industry.

The use of 60ml plastic liners to replace the use of concrete foundations for waste-management purposes has been tested and approved by DOH for commercial poultry operations. Producers are able to adopt best management practices and save thousands of dollars in cement and concrete work while complying with EPA standards.

All farms received a Certificate of Completion for Egg Quality Assurance: "*Salmonella enteritidis*: Farm

Bio-security Protocol Phase I." Farms are debating whether to enroll in new and expanded programs for NPIP certification. Protocol includes further testing and record keeping for Pullorum-typhoid, mycoplasma, and avian influenza.

### Future Work

Currently all farms have satisfied the first level of NPIP certification with SE testing and recordkeeping. New farms entering the marketplace may want to look into testing other parameters of NPIP such as avian influenza and *Salmonella pullorum*. One of the primary challenges is the economics of employing mainland laboratories for analysis of samples and the labor needs to fulfill specimen collection and testing. The UH Department of Human Nutrition, Food and Animal Sciences has just started a microbiologic laboratory to answer food safety challenges with other commodities. It is of value to see if these challenges can be addressed locally.

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# Appendix 1

## Hawaii Egg Quality Assurance Program

### LAYER HOUSE – INITIAL EVALUATION FORM

FLOCK ID # \_\_\_\_\_ PREMISES ID# \_\_\_\_\_

1. Number of houses on premises \_\_\_\_\_
2. Type of houses (circle one): High-rise / Shallow pit / Floor house / Manure belt system
3. Number of cage banks \_\_\_\_\_ 4. Number of tiers \_\_\_\_\_ 5. Number of frames \_\_\_\_\_
6. Water source (circle one): Water cup / Nipples
7. House capacity \_\_\_\_\_
8. Placement date \_\_\_\_\_
9. Twenty-week date \_\_\_\_/\_\_\_\_/\_\_\_\_
10. Farm vaccination program (circle one): None / Live SE / Killed SE bacterin

What company \_\_\_\_\_

Dates administered \_\_\_\_\_

11. Farm manager’s assessment of rodent activity (circle one): High / Moderate / Low / None
12. Current rodent-control program \_\_\_\_\_
13. Egg processor receiving eggs \_\_\_\_\_
14. Approximate age of poultry building/equipment \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

15. Date of Initial inspection with HIEQAP COORDINATOR: \_\_\_\_\_

(Please be sure to set up an initial inspection with CES for this premises, (808) 981-5199.

Date \_\_\_\_/\_\_\_\_/\_\_\_\_

Evaluator \_\_\_\_\_ (Please Print Name)