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Preparing a Quality Assurance Plan

CALIFORNIA EGG QUALITY ASSURANCE PROGRAM (CEQAP)
PROCEDURES AND TRAINING

Ralph A. Ernst, Retired Extension Poultry Specialist – UC Davis

To join this program each farm or egg processing plant must prepare a quality assurance plan. After completion the plan should be submitted to the Animal Health Branch of the California Department of Food and Agriculture (CDFA) for review. When approved the plan will be returned to the ranch or company. The CEQAP requires each participant have a quality assurance supervisor to oversee plan development and implementation. The initial training requirements for quality assurance supervisors are as follows:

Pullet or Egg Production Required Training Sessions

1. Program Requirements and Developing Quality Assurance Plans
2. Flock Health Management
3. Cleaning, Disinfection and Biosecurity
4. Vector Control and Biosecurity

Egg Processing Required Training Sessions

1. Program Requirements and Developing Quality Assurance Plans
2. Egg Processing

Training for Environmental Sampling – Training Procedures

All training was originally accomplished in classroom type sessions. These presentations were recorded and are available on the UCCE YouTube channel (search for UC Davis Vet Med Poultry University). A comprehensive examination is available on-line. The test must be completed with a score of 90 percent for certification. Contact Debbie Murdock at the Pacific Egg and Poultry Association (PEPA) at debbie@agamsi.com or 916-441-0801.

Quality assurance supervisors are required to maintain certification by attending one approved education meeting every two years. Approved education events are publicized by PEPA. Information on training opportunities may be obtained from PEPA.

Responsibilities of Quality Assurance Supervisors

Quality Assurance Supervisors have the primary responsibility for assuring that the programs are carried out properly and that appropriate records are maintained. They must document personnel training in biosecurity and inspect facilities and equipment for cleaning and disinfection between flocks in accordance with the plan. These two responsibilities can't be delegated, however; a company or farm may have any number of certified quality assurance people. Quality Assurance Supervisors are expected to be aware of any changes in the CEQAP.

Information may be obtained from the following individuals:

Debbie Murdock, Executive Director
Pacific Egg and Poultry Association
1521 I Street
Sacramento, CA 95814
Office: 916/441-0801

Maurice Pitesky DVM, MPVM, DACVPM
Veterinarian/Associate Specialist in Cooperative Extension
School of Veterinary Medicine
University of California
One Shields Avenue
Davis, CA 95616
4007 Vet 3B
Office: 530/752-3215
Cell: 530-219-1407

DOES CALIFORNIA NEED AN EGG QUALITY ASSURANCE PROGRAM?

Dr. Richard E. Breitmeyer – California Animal Health and Food Safety Laboratory

There are currently many activities at the state and national level in the area of food safety that may have an impact on California's livestock and poultry industries. Consumer concern for food safety is a significant issue for all food producers.

Over the last few years, representatives from CDFA, USDA and FDA have been working with the livestock and poultry industries to develop "preharvest food safety" programs. Preharvest food safety is defined as all management strategies used on the farm to reduce the likelihood of chemical or microbial contamination in animal products. A quality assurance program to reduce the likelihood of *Salmonella* Enteritides (SE) contamination in eggs is an excellent example of preharvest food safety in animal agriculture. In 1994 an industry team was formed to develop the voluntary California Egg Quality Assurance Program (CEQAP). Since then additional efforts have led to mandatory surveillance efforts for SE.

While the above mandatory and voluntary efforts are important, only the producer is capable of implementing successful strategies which may impact food safety at this level. The ultimate goal is the safest possible product for California's consumer.

CALIFORNIA EGG QUALITY ASSURANCE PROGRAM

WHY DO YOU NEED A QUALITY ASSURANCE PROGRAM?

USDA APHIS VS Perspective

Dr. William Utterback

In California, beginning in June 1994, the USDA APHIS Veterinary Services and CDFA Animal Health Branch joined in a cooperative effort to facilitate a team approach to explore the egg industry's interest in the development of an Egg Quality Assurance Program in California. This was done in response to a national USDA initiative to address food safety from a farm to table scope.

REASONS FOR PARTICIPATION IN AN EGG QUALITY ASSURANCE PROGRAM:

1. To have the California egg industry participate in the development of an appropriate action plan to address potential chemical and microbial contamination of eggs at all levels of production, transportation, processing, distribution, handling, preparation and consumption.

2. To have a proactive grass roots approach in addressing food safety issues at the animal production and processing levels and not wait for someone to develop a program for you which may not fit the needs of the CA industry.

3. To reduce the perceived need for more government regulations to deal with food safety issues at the production and processing levels.

4. To improve communications and cooperation among government agencies, the egg industry, researchers to more effectively accomplish both the food safety and quality assurance goals.

5. To support an industry wide approach in a credible contamination prevention effort which will improve consumer confidence and enhance marketing of eggs.

RECORD KEEPING AND VERIFICATION OF FARM PLAN
(Records to be maintained in farm or company office)

Required Items

1. Flock Quality Assurance Plan

2. Training record of the Quality Assurance Supervisor.
3. NPIP Form 9-3. Letter from Pullet grower etc.
4. Certificate(s) by Quality Assurance Supervisor including C and D.
5. Letter from feed supplier re: animal protein source.
6. Mediation and pesticide use records.
7. Mortality and health records, laboratory submissions.
8. Rodent monitoring records.
9. Record of biosecurity training dates and attendees.

Verification Procedures:

1. Review of farm plan by CDFA Veterinarian.
2. Records evaluation by CDFA Veterinarian on an annual basis.
3. Record of monthly review of records by Quality Assurance Supervisor (QAS).
4. Record of review by QAS of any event when critical limits are exceeded.
5. Record any trace-back inquiry regarding human foodborne illness.

POULTRY FACT SHEET NO. 28

COOPERATIVE EXTENSION

UNIVERSITY OF CALIFORNIA

June 1998

Animal Production Food Safety Programs

Ralph A. Ernst, Retired, Poultry Specialist Animal Science Department
University of California

Quality assurance programs have been developed in California for producers of poultry meat and for table egg producers and processors. These are voluntary programs developed at industry request. Producers and processors can join a quality assurance program to assure their customers that products are produced under good management practices.

Cooperating Groups - California Egg Quality Assurance Plan

The egg quality assurance plan was developed by a working committee which provided suggestions for review and modification by a larger industry/agency team. The team had representation from the following:

Industry /Agency Team

- Egg Producers
- Egg Processors
- Egg Distributors
- Pacific Egg and Poultry Association
- California Department of Food and Agriculture, Animal Health Branch
- California Animal Health and Food Safety Laboratory System
- USDA, APHIS, Veterinary Services
- University of California, Cooperative Extension
- University of California, School of Veterinary Medicine
- California Department of Health Services
- U.S. Food and Drug Administration

Cooperating Groups - California Poultry Meat Quality Assurance Plan

The poultry meat quality assurance plan was developed by an industry/agency team with representatives from the following:

Industry/Agency Team

- Chicken meat producers
- Turkey producers
- Squab producers
- California Poultry Federation
- California Department of Food and Agriculture, Animal Health Branch
- California Animal Health and Food Safety Laboratory System
- University of California, Cooperative Extension
- University of California, School of Veterinary Medicine
- USDA, APHIS, Veterinary Services

These teams continue to function as steering committees for the programs.

Core Program Components

Key components of the quality assurance programs are outlined in the core components. These core components include administrative, production and processing guidelines for participants. The egg program is available from the:

Pacific Egg and Poultry Association
1521 I Street
Sacramento, CA 95814
Phone: 916/441-0801

Email: dmurdock@cgfa.org

www.pacificegg.org
For the poultry meat programs contact the:

California Poultry Federation
4640 Spyres Way, Suite 4
Modesto, CA 95356
Phone 209/576-6355

Email: califpoultry@cs.com

All programs require designation of one or more quality assurance supervisors. Quality assurance supervisors for production plans must participate in training on cleaning and disinfection, biosecurity, rodent and insect control, flock health management and development of quality assurance plans. Each participant must develop a quality assurance plan for each production or processing unit. Plans are reviewed by California Department of Food and Agriculture veterinarians. If approved, they are returned to the participant for implementation by the company/farm. Oversight is mandatory for the egg production and egg processing plans but is optional for poultry meat plans. Oversight of plan implementation and plan records is provided by the California Department of Food and Agriculture, as requested or required.

Plan Goals

The overall goal of these programs is to improve the safety and quality of poultry and egg products produced by plan members.

Funding

CEQAP is partially funded by user fees. The California Department of Food and Agriculture, UC Davis Veterinary Department of Population Health and Reproduction-Cooperative Extension, USDA, and the California egg industry work in concert to provide support for the program.

Basics of Plan Development

Ralph A. Ernst, Retired, Poultry Specialist Department of Animal Sciences, University of California, Davis, CA,

The California Egg Quality Assurance Plan (CEQAP) is based on 20 core components. These core components address key points concerning administration of the program and important areas identified as critical in reducing product contamination. These components are good production or processing plant practices rather than true hazard analysis critical control points (HACCP). However, individual plans can follow HACCP principles if properly prepared and written. It is important that the plan for each ranch or plant be designed to deal effectively with any specific problems or conditions that exist at that facility. Remember that every ranch or plant is different. If these differences affect flock health management, rodent control, sanitation, fly control, cleaning and disinfection, etc., your plan needs to describe how you will address this situation.

Successful HACCP plans require accurate record keeping. Information needs to be recorded and analyzed to determine if a certain critical step in production or processing is working successfully. These records will demonstrate that you are carrying out the program in your plan.

Components 1 and 2 of the plan relate to administration of the program and don't require comment here. Each of the other components should be addressed in your plan with a description of how you will meet that component.

PULLET OR LAYING FARM PLANS

ITEM 3 - 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.

Chicks are an obvious source of flock infection. Your plan should indicate how you will document this item. This documentation should accompany the flock as it is moved to additional growing or laying facilities.

Culture of chick papers has been used to determine the status of chicks purchased. Such culturing is required by the program.

ITEM 4 - CHICKS AND PULLETS SHOULD BE TRANSPORTED IN COOPS AND TRUCKS THAT ARE DECONTAMINATED BETWEEN FLOCKS.

Transport vehicles and equipment should always be cleaned and disinfected between flocks (not between loads or houses of the same age group). Describe how you will accomplish this step. Include the equipment to be used to clean and disinfect and the disinfectant(s) to be used. The QA Supervisor needs to inspect the equipment and document successful cleaning and disinfection. Transportation crews should be instructed in proper bird handling and personal hygiene before they are allowed to handle birds. It is recommended (not required) that this crew training be documented.

ITEM 5 - 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", AMERICAN FEED INDUSTRY ASSOCIATION (AFIA), 1501 WILSON BLVD., SUITE 1100, ARLINGTON, VA 22209 OR AN EQUIVALENT PROGRAM.

Indicate the mill(s) that will provide feed and include a letter or document from each indicating that their facility meets these standards. If you change feed sources be sure to obtain the same documentation from your new supplier. If the mill is not participating in the AFIA program it will be necessary to demonstrate that the program used is equivalent.

ITEM 6 - USE ANIMAL PROTEIN INGREDIENTS ORIGINATING FROM RENDERING PLANTS PARTICIPATING IN THE ANIMAL PROTEIN PRODUCERS INDUSTRY (APPI) SALMONELLA REDUCTION EDUCATION PROGRAM OR AN EQUIVALENT PROGRAM.

Indicate the ingredient suppliers from whom you will purchase animal protein ingredients and include a letter or document from each indicating that their facility meets these standards. If you change ingredient sources be sure to obtain the same documentation from your new supplier. If the supplier is not participating in the APPI program it will be necessary for your plan to demonstrate that the program used is equivalent.

ITEM 7 - IF USED, MEDICATIONS, FEED ADDITIVES AND PESTICIDES MUST BE ADMINISTERED ADHERING TO APPROVED LABEL DIRECTIONS.

Your plan should indicate that these materials will be used in compliance with the label. Specify how you will document the use of these materials. A label could be placed in the file for each medication or chemical used, or the material should be described in terms of both the trade name and the active ingredient, use level, duration of use, etc. as appropriate.

ITEM 8 - MAINTAIN A FLOCK HEALTH PROGRAM TO INCLUDE VACCINATIONS, MONITORING AND PERIODIC NECROPSY OF MORTALITY OR CULL BIRDS.

Healthy flocks are more profitable and research has demonstrated that they are much more resistant to Salmonella challenge. For these reasons everything done to assure flock health should be described in this section of your flock plan. Examples would be:

1. vaccination program,
2. serology to check for immune response,
3. mortality records,
4. routine examination of mortality to determine probable cause of death,
5. production records,
6. feed consumption records,
7. proper feed storage,
8. water consumption records,
9. body weight records or other records of growth and development,
10. systems to assure proper ventilation,

11. programs for flushing, cleaning or disinfecting watering systems,
12. monitoring of egg quality or egg weight,
13. treating chicks with a competitive exclusion culture,
14. feeding chicks a product containing lactose or other sugar(s) to inhibit Salmonella colonization of the gut.

Indicate what degree or percentage change in your records would trigger an investigation to determine the probable cause. Outline your planned procedure to respond to a problem situation.

ITEM 9 - MAINTAIN A FARM RODENT MONITORING AND REDUCTION PROGRAM.

Rodents are known to be carriers of Salmonella. They eat from feed troughs and leave droppings that are often consumed by chickens. Studies in the Northeast have implicated rodents as significant sources of Salmonella infection (Henzler, D.J. and H.M. Opitz, 1992, Avian Diseases 36:625-631.) and *Salmonella enteritidis* is often cultured from rodents.

A rodent monitoring protocol is essential for this program. It will help farms determine the extent of rodent problems in poultry houses. Rodent numbers must be monitored at least once per month in all houses participating in this program. Results must be included in the CEQAP file. Your plan should describe how monitoring will be accomplished and what increase in monitoring results will trigger an increased rodent control effort. Your plan should also include the rodent control methods that will be used if needed. Be as specific as possible!

ITEM 10 - PULLET AND LAYER BUILDINGS WILL BE CLEANED AND DISINFECTED BEFORE RESTOCKING.

The cleaning and disinfection that is possible will vary greatly as a result of differences in housing, equipment and fly control methods in use. The cleaning and disinfection procedures to be used should be described in detail in your plan. Include all types of cleaning planned, the disinfectant(s) or fumigants to be used and the equipment that will be used to accomplish these procedures (e.g. spray washers).

ITEM 11 - THE FARM WILL UTILIZE A BIOSECURITY PLAN AND TRAIN EMPLOYEES ON PROPER PROCEDURES TO EXECUTE THE PROGRAM. DOCUMENT EMPLOYEE TRAINING AND COMPREHENSION ANNUALLY.

Exclusion of disease agents is one of the lowest cost methods of maintaining healthy flocks free of Salmonella infections. Your plan should include a description of your employee training program for biosecurity and how this training will be documented.

In developing your plan, carefully consider the methods you will use to prevent disease transmission from necessary traffic. Typical concerns are feed delivery trucks and drivers, rendering trucks, manure hauling trucks or equipment, etc. Do you have a locked gate at critical entry points, are warning signs posted at these locations, are facilities provided for cleaning and disinfection of footwear, truck tires and equipment which must enter buildings. We recommend that you keep unnecessary visitors and vehicles away from poultry houses. Be sure that necessary visitors are wearing clean clothing and footwear.

ITEM 12 - IMPLEMENT A *SALMONELLA ENTERITIDIS* ENVIRONMENTAL MONITORING PROGRAM AT LEAST ONCE DURING THE LIFE OF EACH LAY FLOCK WHILE ON THE LAY FARM.

Environmental monitoring has been added to CEQAP as a required component. This section of your plan should contain a clear statement of how you will accomplish this and what you will do in event that a sample is found to be culture positive for SE. Please refer to the detailed information in Session 6 for details.

EGG PROCESSING PLANT PLANS

Egg processing plant plans will be discussed in more detail in the training session on egg processing. When you are writing your plan be as specific as possible.

ITEM 13 - FOLLOW PLANT OPERATING GUIDELINES.

a) Facilities and equipment must be kept in good repair and shall be completely washed at the end of each day's operation.

b) Lighting should be adequate to properly identify egg defects in the candling booth and processing area.

c) Potable water with less than 2 ppm of iron shall be used.

d) Wash water shall be maintained at 90^{o}F or higher and at least 20^{o}F higher than the temperature of the eggs to be washed.

e) A USDA approved cleaning compound shall be used in the wash water.

f) Wash water shall be added continuously and replaced every four hours.

g) Washed eggs shall be spray rinsed with warm water and a USDA approved sanitizer.

h) If eggs are to be oiled follow USDA guidelines.

Describe your plant location and the processing equipment to be used. Describe how and when your plant will be cleaned (minimum is daily). Your water should be analyzed for iron content at least annually if municipal water is used. When well water is used water must be checked for iron content twice per year and before a new well is used. Egg wash water temperatures and chlorine levels in rinse water must be monitored and recorded at least twice per 8 hour shift. Internal egg temperature should also be checked and recorded. Describe the cleaning compound that will be used for egg washing (a copy of the label should be appended to the plan). If eggs are oiled specify the methods to be used; attach a product label.

ITEM 14 - REFRIGERATE EGGS ACCORDING TO APPLICABLE FEDERAL, STATE OR LOCAL LAWS.

Egg refrigeration is important because lower temperature retards bacterial growth. Egg cooling room temperatures must be checked and recorded at least twice per day to assure proper equipment function.

ITEM 15 - LABEL EGG CARTONS AND CASES WITH A "KEEP REFRIGERATED" OR SIMILAR DESCRIPTOR TO EDUCATE CONSUMERS ABOUT PERISHABILITY.

Consumers, retail outlets and commercial kitchens sometimes don't refrigerate eggs. This descriptor is meant to encourage refrigeration of eggs at all times.

ITEM 16 - LABEL EGG CARTONS AND LOOSE PACK EGGS WITH A JULIAN PACK DATE TO ASSIST WITH PRODUCT ROTATION. AN OPTIONAL "SELL BY" DATE MAY BE USED AT THE DISCRETION OF THE PACKER AS LONG AS IT DOES NOT EXCEED 30 DAYS FROM DATE OF PACK.

Older eggs are more likely to support bacterial growth. Dating is required to encourage proper rotation of product at retail or by commercial customers.

ITEM 17 - LABEL CARTONS AND CASES WITH PLANT OF ORIGIN NUMBER, AND IF POSSIBLE, WITH A FLOCK IDENTIFICATION NUMBER.

If problems occur this identification number will be used to trace the product to its origin. Describe how your cases and cartons will be marked.

ITEM 18 - PLASTIC EGG FLATS SHOULD BE WASHED AND SANITIZED AFTER EACH USE OR RETURNED TO THE ORIGINATING FARM TO AVOID CROSS-CONTAMINATION. FIBER EGG FLATS CANNOT BE SANITIZED, THEY MUST BE RETURNED TO THE FARM OF ORIGIN.

Egg flats can carry disease organisms and external parasites between flocks. If unwashed plastic flats or fiber flats will be reused describe how you will assure that they are returned to the appropriate farm (e.g. are they color coded or marked in some way).

ITEM 19 – GOOD CLEAN EGG CARTONS AND FIBER FLATS SHOULD BE USED.

Consumers deserve a product packaged in a clean carton

ITEM 20 - RETAIL RETURNS SHALL NOT BE REPROCESSED FOR RETAIL SHELL EGG SALES.

There is no way to assure that retail returns meet freshness guidelines. These eggs should be sold to breaking plants or for pet food.

Sample Flock Plan

Dr. Robert Tarbell, Retired, Area Veterinarian, Division of Animal Health, California Department of Food and Agriculture

The sample flock plan includes minimal recommendations for design of a flock plan. We know that the sample plan does not include all of the possible preventive measures that can be used by a company in the design of their quality assurance plan. The plan will be changed as experience and research information are gathered. The items in the sample flock plan provide a framework to describe efforts to control microbiological and chemical hazards.

Testing the Sample Flock Plan

One small and two large egg producers designed a flock plan based on the sample plan. The results of their efforts helped us improve the sample plan and will be useful to consider in your plan development.

Item 1. The Company Team understands how your ranch and plant operates. Only your team can design an effective quality assurance plan.

A site map is useful describing biosecurity plans. It will also help the consulting DFA veterinarian to understand your flock plan.

Many flocks participating in the CEQAP will be in production. Complete the plan for an entire flock cycle, noting in the plan at what point a flock will be in production.

Item 2. Large companies may need more than one Quality Control Supervisor.

Item 3. If it is impossible to obtain pullets from a grower with a Salmonella prevention plan, serological or microbiological evaluation may be used as an alternative. Out of state pullet growers should describe their Salmonella control program. (This item is only needed for pullet growing premises. Once completed, the record will become a part of the flock record and will move with the flock, regardless of location.)

Item 4. Most producers and service companies clean and disinfect transportation equipment between flocks. Disease spread by equipment is well documented. It usually occurs when weather or equipment failure causes cleaning to be rushed. The Quality Control Supervisor must inspect the equipment before it is used.

Item 5. It is also important to maintain feed quality by keeping it dry. If your company is involved in feed manufacture, document that you follow recommended practices or obtain documentation from your feed source.

Item 6. The rendering industry has reduced the amount of Salmonella in their products. The list we provided is already outdated. Almost all California plants are participants.

Item 7. This is the law. Remember that the U.S. Food and Drug Administration tests eggs for residues.

Item 8. Preventing the stress of disease is vital to the production of eggs free of Salmonella. Considerable thought and effort should be used in describing your flock health plan. None of the companies in our sample identified what increase in mortality would trigger a disease investigation. This question should be considered. Indications for disease investigations will depend on the clinical picture, the age of the flock, etc., and should be included in the plan.

Item 9. Many ranches do not have a rodent monitoring system. This makes it difficult to establish a critical limit where the control program would be changed. If possible, describe a percentage increase that would cause an increase in the rodent control effort. Rodent control is the primary key to reducing exposure of the flock to large numbers of Salmonella.

Item 10. We were asked if testing the environment for *S. enteritidis* would replace the need for cleaning and disinfecting. The Pennsylvania Egg Quality Assurance Program only requires complete cleaning and disinfection of culture positive houses. This decision can only be made by a company team.

Environmental culturing can miss *S.* Enteritidis. A negative culture might influence how well a house is cleaned. Good cleaning and disinfection generally decreases the occurrence of disease.

There is also some concern that leaving a dry pad of manure in a pit house for fly control would make adequate cleaning and disinfection impossible.

Item 11. We were asked if vaccination with *S. enteritidis* bacterin would replace the need for using biosecurity. There is no replacement for biosecurity. Vaccination is required as part of the ***.

Sample Egg Processing Plant Plan

Name of Company_____

Name of Owner or Manager_____

Mailing Address_____

_____

Telephone_____Fax_____

ITEM 13. Follow Plant operating Guidelines.

Name(s) of egg processing Quality Control Supervisor(s) who will represent the company in the following areas:

Preparing a Quality Assurance Plan:_____

Egg Processing:_____

Address_____

_____

Telephone_____Fax_____

Describe equipment used in the processing of shell eggs:

Washer; Grader; Packer.

Are eggs cooled prior to processing?

Does the plant contract for USDA grading?

If yes, on what basis: Full-time____ Part-time____ Intermittent____

Describe traffic flow of how eggs are processed: i.e. delivery from farm if off-line, storage of nest run, wash, grading, packaging, storage, how long are eggs held on the loading dock prior to loading in delivery vehicles?

Explain how the following guidelines will be administered:

a) Facilities and equipment must be kept clean and in good repair and shall be completely washed at the end of each day's operation.

(Keep daily records)

b) Lighting should be adequate to properly identify egg defects in the candling booth and the processing area.

c) Potable water with less than 2 ppm of iron shall be used.

(Recommend test twice per year. Provide lab test.)

d) Wash water shall be maintained at 90^0F or higher and at least 20 degrees F higher than the temperature of the eggs to be washed.

(Record wash water and egg temperatures twice per eight hour shift).

e) A USDA approved cleaning compound shall be used in the wash water.

f) Wash water shall be added continuously and replaced every four hours.

(Keep daily records)

g) Washed eggs shall be spray rinsed with warm water and a USDA approved sanitizer.

(If chlorine is used, maintain concentration at a level between 50-200 ppm. Record twice per eight hour shift).

h) If eggs are to be oiled follow USDA guidelines.

ITEM 14. Refrigerate eggs according to applicable federal, state or local laws.

At what temperature are eggs held after packaging in consumer containers?

(Record twice per eight hour shift).

Are delivery trucks capable of refrigerating eggs?

ITEM 15. Label egg cartons and cases with a "keep refrigerated" descriptor to educate consumers about perishability.

Are egg cartons labeled with a "Keep Refrigerated" descriptor?

If yes, all cartons____ Cases____? Some cartons____ Cases____?

ITEM 16. Label egg cartons and loose pack eggs with a Julian pack date to assist with product rotation. An optional "sell by" date may be used at the discretion of the packer as long as it does not exceed 30 days from date of pack.

Are egg cartons or case labels printed with a "sell-by" date?

How is the "sell-by" date established and displayed?

ITEM 17. Label cartons and cases with plant of origin number, and if possible, with a flock identification number.

Are egg cartons or case labels printed with a plant number or flock identification number?

If yes, which is used? Plant number____ Flock identification number____

If a flock identification number is used, describe the monitoring procedures and trace back record maintenance system: How long are records kept?

ITEM 18. Plastic egg flats should be washed and sanitized after each use or returned to the originating farm to avoid cross contamination. Fiber egg flats cannot be sanitized, they must be returned to the farm of origin.

Are plastic or fiber egg collection flats returned to the originating farm?

Are plastic flats washed_____ sanitized_____ prior to reuse?

ITEM 19. Good clean egg cartons and fiber flats should be used.

How are soiled egg cartons or fiber flats identified and removed?

How are they disposed of?

ITEM 20. Retail returns should not be reprocessed for retail shell egg sales.

How are retail egg returns handled? Sent to breaking plant?_____ Other_____

Name of person or persons completing this egg processing plant plan_____
_____

_____

Address_____
_____

Telephone_____Fax_____

Signature of authorized employee or owner_____

Date_____

Record Keeping Requirements

The following records are to be maintained in the company home office:

- Facility and equipment sanitation and repair records.
- Iron content in wash water. Provide lab test.
- Wash water temperature readings.
- Wash water replacement.
- Sanitizer use in spray rinse.
- Cooler room temperature.

Sample Processing Plant Plan

The sample plant plan was designed to help develop a plant quality assurance plan. Research has shown that if Salmonella bacteria are present in an egg, they are usually not numerous. They multiply if the eggs are not refrigerated and are not used in a timely manner.

Item 13. The plan operating guidelines are taken from the USDA regulations. Monitoring can be done by USDA graders i the plan.

I**tem 14.** The USDA requires that cooling rooms be under sixty degrees (60^0). This is the only regulation in effect now. R shown that the most important time for refrigeration is after the eggs are a few days old.

Item 15. Labeling the cartons is important. Food service customers often do not refrigerate eggs.

Item 16. The natural protection against bacterial growth in an egg disappears with age.

Item 17. If it is impossible to identify which ranch produced an egg, keep track of all possible ranches.

Item 18. Ranch biosecurity is a major component of the flock plan.

Item 19. Salmonella bacteria can enter an egg through the shell.

Item 20. Specify how returns will be handled.

Review and Approval of Company Plans

Dr. Kenneth L. Thomazin, Retired, Chief, Animal Health Branch, California Department of Food and Agriculture

Completed quality assurance plans will be submitted to the California Department of Food and Agriculture District Veterinarian who is responsible for reviewing and developing any additions to the plan. The company quality control supervisor will be consulted throughout this process.

PRODUCTION FACILITIES

A "walk through" evaluation with the Quality Control Supervisor will be scheduled prior to preliminary approval by the District Veterinarian. This will be completed along with any needed corrections before certification approval by the District Veterinarian and notification of the Animal Health Branch Chief.

The approved flock plan and all monitoring records or documents will be maintained at the company office. They will be available for inspection and review as necessary. At least one review will be done annually.

To enhance ongoing evaluation and validation of plans, the District Veterinarian may designate one or more special study flocks for voluntary participation in additional study or analysis of record-keeping procedures.

PROCESSING FACILITIES

Quality assurance plans for processing plants will be reviewed and approved in the same manner as production facilities. However, inspections will be scheduled at least twice annually.

CERTIFICATION

If deficiencies are discovered, the District Veterinarian will contact the Company Quality Control Supervisor. If they are not able to resolve the problem, it will be referred to the Chief of the Animal Health Branch. The Branch Chief, after consulting with company management, will make recommendations to the CEQAP Advisory Committee. The CEQAP Committee will make the final determination about the status of continued certification of the flock or processing facility.

Salmonella and Eggs – Is there a Problem?

Donald Bell, Retired Poultry Specialist
Cooperative Extension
University of California
Riverside, CA

Salmonella and Eggs "is there a problem?" Are eggs in themselves unsafe, or do they merely provide a media for Salmonella multiplication when improper handling procedures are used?

Cracked Eggs

Eggs can be contaminated through cracks in the shell and shell membranes. It's been estimated that upwards of 10 percent of all eggs are cracked prior to purchase by the consumer. Serious breakage involving content leakage results in total rejection for human consumption. Eggs broken to a lesser degree are separated during candling and diverted to breaking plants for eventual pasteurization. The consumer, therefore, is exposed to only those cracked eggs that are either missed during candling or are produced after candling. This is estimated to be approximately 2 to 4%.

Washing Eggs

All eggs in the United States are washed. This is done to remove visible and invisible sources of contamination. The USDA requires that eggs be washed with hot water at 90 degrees F or above and that the water temperature be at least 20 degrees above the internal egg temperature to prevent the wash waste water from being drawn into the egg. And finally, all eggs must be rinses with an approved sanitizing material and dried before packing.

Food Preparation

Consumers and food handling establishments must follow recommended procedures when preparing foods using eggs. Only, clean, unbroken eggs should be used, especially for any food involving raw or under-cooked eggs.

Once food products involving eggs are prepared, it is essential to consume them as soon as possible. If they must be stored for any period of time, they must be held at temperatures below 40 degrees F or above 140 degrees F.

Occasionally, the consumer will find a cracked egg in the carton. If the contents are leaking, the egg should be discarded. If the contents are not leaking, it must be used in a well-cooked food. Cracked eggs should not be used in any raw or under-cooked application:

- Homemade ice cream
- Egg Nogs
- Salad dressings
- Meringues

- Custards

Soft-cooked eggs

Salmonella grows between temperatures of 50 degrees and 155 degrees F and extreme, rapid multiplication occurs between 95 degrees and 110 degrees F. At 50 degrees F, Salmonella counts will double in about eight hours. At 80 degrees F, doubling occurs in less than one-half hour.

Food prepared from eggs should have internal temperatures of 165 degrees F or higher to avoid Salmonella problems. Uncoagulated egg whites, for example, seldom reach temperatures of 140 degrees F.

Where do we have our problems with egg-associated Salmonellosis? A study of 287 outbreaks in 1963 – 1970 revealed that fully two-thirds of the individual incidences are associated with banquets, institutions, restaurants, and schools. An example of this occurred in 1985 at a convention in New Mexico. Of 1,000 people attending, 91 developed Salmonellosis. Salmonella Heidelberg was isolated and under-cooked scrambled eggs were identified as the probable source.

Trans-Ovarian Contamination

The final possible source of Salmonella contamination is the clean, unbroken egg. It is known that certain Salmonella can be passed on to the chick in this manner, but no one has yet determined that this is a source of Salmonellosis in humans.

Egg Breaking

In 1971, the Egg Products Inspection Act became effective. This law requires the pasteurization of all egg products.

This law now regulates the operation of some 90 egg breaking plants throughout the US. which process over 10 billion eggs or roughly 15 percent of this nation's total egg production.

The law requires that all breaking stock must be washed and sanitized prior to breaking. No leakers or dirts can be broken. All liquid eggs must be pasteurized at the following temperatures:

Albumen	134 degrees F for 3.5 minutes
Yolks	142 degrees F for 3.5 minutes
Whole Eggs	140 degrees F for 3.5 minutes

Within two hours of breaking or pasteurization, products must be held at 40 degrees F for lower (rules vary with different products and holding times).

Tests with these pasteurization procedures have shown initial levels estimated at 100 Salmonellae per gram would be reduced to one Salmonellae per ton.

Summary

- Animal-origin feedstuffs must be monitored more diligently and recontamination of the product must be reduced or eliminated.
- Egg producers must reduce the incidence of dirty, cracked eggs.
- Wild animals and birds must be excluded from poultry and egg handling premises.
- Egg washing guidelines must be stringently followed.
- Egg packaging and processing plants must maintain strict sanitation procedures.
- The poultry industry needs to make a major effort to educate the consuming public, both home and institutional users, in procedures to minimize the risk of Salmonella contamination of food using eggs.

EGG QUALITY AND SAFETY CONTROL

By Andy Rhorer retired
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What is Quality Control? More specifically, what is Quality Control in Egg Production, Processing and Distribution?

According to a Kramer and Twigg (1973), quality control may be defined as the maintenance of quality at levels and tolerances acceptable to the buyer while minimizing costs to the vendor.

What is Food Safety? More specifically, how to maintain a shell egg that provides protection for consumers against foodborne chemical and microbiological hazards.

When we apply this definition to shell eggs, we conclude that quality control in eggs is defined as maintaining USDA Standards of quality for consumer Grades of eggs, and meeting special specification of large buyers or jobbers, while minimizing production, processing, and distribution costs. When we assess the optimal system for assuring food safety for shell eggs, we must examine risks from five basic classes of potential food hazards: Microbiological contaminants, environmental contaminants, natural toxicants, pesticide residues and food and feed additives.

When assessing food safety the Institute of Food Technologist Blue Ribbon Committee (1989) states that the primary hazard present in the American food supply is posed by pathogenic organisms (i.e., bacteria and their toxins and viruses), not by pesticides. Realizing that the egg is an animal protein product and that many agents have the potential for contamination, it is important to develop an integrated risk reduction program that addresses real risks rather than perceived risks.

First, we require that all hatching eggs and newly-hatched chicks from egg-type chicken breeding flocks moved interstate must be from flocks classified “U.S. Sanitation Monitored” under the National Poultry Improvement Plan (NPIP), or must meet the requirements of a State classification plan determined by the Administrator to be equivalent to the “U.S. Sanitation Monitored” program (USSMP) under the NPIP. Such flocks are called “Certified Salmonella enteritidis serotype enteritidis Tested Free Breeder Flocks” for the purpose of this program.

PART 145—NATIONAL POULTRY IMPROVEMENT PLAN
Subpart B—Special Provisions for Egg Type Chicken Breeding Flocks and Products

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§ 145.23 Terminology and classification; flocks and products.

Participating flocks, and the eggs and chicks produced from them, which have met the respective requirements specified in this section may be designated by the following terms and the corresponding designs illustrated in §145.10:

(d) *U.S. S. Enteritidis Clean.* This classification is intended for egg-type breeders wishing to assure their customers that the hatching eggs and chicks produced are certified free of *Salmonella enteritidis.*

(1) A flock and the hatching eggs and chicks produced from it which have met the following requirements as determined by the Official State Agency:

(i) The flock originated from a U.S. *S. enteritidis* Clean flock, or meconium from the chick boxes and a sample of chicks that died within 7 days after hatching are examined bacteriologically for salmonella at an authorized laboratory. Cultures from positive samples shall be serotyped.

(ii) All feed fed to the flock shall meet the following requirements:

(A) Pelletized feed shall contain either no animal protein or only animal protein products produced under the Animal Protein Products Industry (APPI) *Salmonella* Education/Reduction Program. The protein products must have a minimum moisture content of 14.5 percent and must have been heated throughout to a minimum temperature of 190 ° F., or above, or to a minimum temperature of 165 ° F. for at least 20 minutes, or to a minimum temperature of 184 ° F. under 70 lbs. pressure during the manufacturing process.

(B) Mash feed may contain no animal protein other than an APPI animal protein product supplement manufactured in pellet form and crumbled: *Provided,* that mash feed may contain nonpelleted APPI animal protein product supplements if the finished feed is treated with a salmonella control product approved by the Food and Drug Administration.

(iii) Feed shall be stored and transported in such a manner as to prevent possible contamination;

(iv) The flock is maintained in compliance with §§147.21, 147.24(a), and 147.26 of this chapter. Rodents and other pests should be effectively controlled;

(v) Environmental samples shall be collected from the flock by an Authorized Agent, as described in §147.12 of this chapter, when the flock is 2 to 4 weeks of age. The samples shall be examined bacteriologically for group D salmonella at an authorized laboratory. Cultures from positive samples shall be serotyped. The authorized agent shall also collect samples every 30 days after the first sample has been collected.

(vi) If a *Salmonella* vaccine is used that causes positive reactions with pullorum-typhoid antigen, one of the following options must be utilized:

(A) Administer the vaccine after the pullorum-typhoid testing is done as described in paragraph (d)(1)(vii) of this section.

(B) If an injectable bacterin or live vaccine that does not spread is used, keep a sample of 350 birds unvaccinated and banded for identification until the flock reaches at least 4 months of age. Following negative serological and

bacteriological examinations as described in paragraph (d)(1)(vii) of this section, vaccinate the banded, non-vaccinated birds.

(vii) Blood samples from 300 non-vaccinated birds as described in paragraph (d)(1)(vi) of this section shall be tested with either pullorum antigen or by a federally licensed Salmonella enteritidis enzyme-linked immunosorbent assay (ELISA) test when the flock is more than 4 months of age. All birds with positive or inconclusive reactions, up to a maximum of 25 birds, shall be submitted to an authorized laboratory and examined for the presence of group D salmonella, as described in §147.11 of this chapter. Cultures from positive samples shall be serotyped.

(viii) Hatching eggs are collected as quickly as possible and are handled as described in §147.22 of this chapter and are sanitized or fumigated (see §147.25 of this chapter).

(ix) Hatching eggs produced by the flock are incubated in a hatchery that is in compliance with the recommendations in §§147.23 and 147.24(b) of this chapter, and sanitized either by a procedure approved by the Official State Agency or fumigated (see §147.25 of this chapter).

(2) A flock shall not be eligible for this classification if *Salmonella enteritidis* ser *enteritidis* (SE) is isolated from a specimen taken from a bird in the flock. Isolation of SE from an environmental or other specimen, as described in paragraph (d)(1)(v) of this section, will require bacteriological examination for SE in an authorized laboratory, as described in §147.11(a) of this chapter, of a random sample of 60 live birds from a flock of 5,000 birds or more, or 30 live birds from a flock with fewer than 5,000 birds. If only one specimen is found positive for SE, the participant may request bacteriological examination of a second sample, equal in size to the first sample, from the flock. If no SE is recovered from any of the specimens in the second sample, the flock will be eligible for the classification.

(3) A non-vaccinated flock shall be eligible for this classification if *Salmonella enteritidis* (*S. enteritidis* ser Enteritidis) is isolated from an environmental sample collected from the flock in accordance with paragraph (d)(1)(v) of this section: *Provided,* That testing is conducted in accordance with paragraph (d)(1)(vii) of this section each 30 days and no positive samples are found.

(4) In order for a hatchery to sell products of this classification, all products handled shall meet the requirements of the classification.

(5) This classification may be revoked by the Official State Agency if the participant fails to follow recommended corrective measures.

Farm Sanitation Program

<u>Is the Feed Clean?</u>

Feed is another potential source of Salmonella contamination. Poultry producers should seek assurances from feed suppliers or if mixing their own feed, ensure that:

a) Feeds are processed and transported to exclude the risk of contamination with Salmonella eg. Pelletizing/heat treating.
b) Feed ingredients must be properly stored on the farm in closed bins, not in open piles or containers.

c) Feed storage must be wild bird proof and effective measures must be taken to control rodents, flies and insects.
d) Should a suspicion of contamination occur, samples of feed should be taken and kept in accordance with recommendations from an accredited lab.

IS THE WATER SAFE?

Your water source should be clean and not accessible to wild birds, or water fowl. Untreated surface water (ponds, lakes, streams, rivers, etc.) should not be used. If surface waters such as fresh spring water are used, the water should be treated with chlorine or subjected to ultraviolet light. Water should be tested annually.

Outside area:

1. Grass and weeds should be kept mowed between and around ho8uses.
2. Area between and near houses should be kept free of manure and debris that might harbor rodents.
3. Good drainage away from houses should be maintained.

Inside House:

1. Rodent and insect control should be initiated before clean out is started and continued thereafter. Consider utilizing a professional exterminator on a contractual basis.
2. Remove from the building all dead and live birds.
3. Dry Cleaning

    a. Sweep or blow dust and other loose dirt off ceilings, light fixtures, cages, fan blades, fan louvers, walls, air inlets, walkways.
    b. Open up feeder lines and remove food. Remove feed augers from the feed trough.
    c. Open up egg conveyance equipment at the front of the building and sweep or blow dry material off. Remove all broken and filthy parts that cannot be cleaned.
    d. Remove manure from dropping boards as best as can be done by running manure scraper and manual scraping.
    e. Remove all manure from shallow and deep pit.
    f. Scrape and sweep walkways and manure pit. Clean manure scrapers and augers.
    g. Remove water cups. Remove egg belt and sweep away accumulated debris, both on and under the belt.
    h. Carefully clean electrical equipment.
    i. Remove all clutter, cut grass and other vegetation from around the house perimeter.
    j. Clean fan and air inlet areas from the outside.

Wet Cleaning:

1. Soaking

    a. Soak heavily soiled areas thoroughly (dropping boards, feeders, walkways). Low pressure, 500-800 psi, sprayer delivering plenty of water (10-30 gallons/minute) are adequate.

b. Soak until dirt has softened.

2. Washing

a. Wash the ceilings, walls, floors, walkways, steps and cross-over platforms, egg rollers, all egg conveyors, floors under conveyors, stairs to pit, outside stairs-clean everything completely. Hot water at 190 degrees F or hotter is preferred. Use high pressure sprayer (up to 2500 psi) delivering approximately 5 gallons/minute.
b. Inspect building and manually clean areas that resisted cleaning procedure. Carefully clean electrical parts. Turn off power.
c. Extreme care is needed for egg elevator. All hidden areas, ledges, rollers, niches where any egg material has accumulated, must be made spotlessly clean.
d. Remove egg belts and soak them in a large drum with disinfectant.
e. Use spray or attachments and nozzles that enable thorough washing of hard-to-reach areas.

3. Rinsing

a. A final rinse immediately after washing is recommended.
b. Immediately mop up all water puddles on floors.

4. Drying

Promptly and thoroughly dry the building if final disinfection does not immediately follow rinsing. Consider use of heating fans. This will help the decontamination process. Drying is important to prevent bacterial "bloom" and overgrowth.

REPAIRS: Make necessary repairs before final disinfection.

Disinfection

1. Disinfection should be carried out immediately after the rinse.
2. Use disinfectants at the recommended concentration as recommended by the manufacturer.
3. Calculate the amount of disinfectant solution needed. Determine the total surface are of the floors, ceilings and walls. For cage house, add 30 percent to the surface area.
4. Apply one gallon of diluted disinfectant to approximately 150-200 ft2 of surface area.
5. Soak water cups and egg belts in disinfectant in a large container. Hypochlorite solution (200ppm free chlorine) is effective. Soak for two hours.
6. Flush water lines with hypochlorite (50-100 pp. free chlorine) solution. Drain water lines after 24 hours.
7. Verify disinfection success by swabbing several sites (including floors, walls, beams, equipment, egg conveyors, fans), and culture swabs for SE.

Rodent control in Poultry Facilities

Sanitation:

1. Keep all outside feed bins in good repair.
2. Clean up any grain spillage quickly.
3. Regular removal of debris and control of weeds around the outside of the poultry house.
4. Maintain an uncluttered 3 foot weed-free perimeter around the builidng.
5. Install a strip of heavy gravel around the perimeter of the house.

Rodent-proof Construction

1. Close openings around augers, pipes and wires where they enter structures with cement mortar, masonry, or metal collars.
2. Plastic sheathing, wood, rubber, green cement, or other gnawable materials are not adequate for sealing openings used by rodents.
3. Stuffing steel wool into opening only provides a temporary plug.
4. A common entry point for mice into buildings is the unprotected end of corrugated metal siding. Design or modify building using metal siding so these openings are not present.
5. Doors, windows, and screens should fit tightly.
6. Install anti-pest tension strips or door sweeps.

Population Reduction

1. Traps: set traps close to walls, behind objects, in dark corners, and in places where rodent activity is evident such as on ledges or on top of pallets of stored materials. Place traps so that rodents will pass directly over the trigger as they follow their natural course of travel, usually close to a wall. When trapping rats, leave traps baited but unset until the bait has been taken at least once to reduce the chance of creating trap-shy rats. Set traps no more than 3-6 feet apart for mice and 10 – 15 feet apart for rats.

2. Multiple-capture live traps: called “curiosity traps”, curiosity are most practical for use in areas where

   a. Regular mouse entry into structures is likely.
   b. In areas where it may not be safe or legal to place rodenticide baits (e.g. egg processing areas, feed and drug supply rooms.
   c. In any area where mice appear to be especially persistent and numerous.
   d. Curiosity traps should be serviced on a weekly basis or more often.
   e. For best results, it is wise to keep a map and capture log for each trap and location.

3. Glue Boards:

   a. Commercial-model glue boxes for mice are available, which are similar to the curiosity trap.
   b. Unless glue boards are covered they lose their effectiveness in dusty and damp areas.
   c. Extreme heat or cold also reduce their effectiveness.

4. Poison Baits (Rodenticides) – are of two broad chemical groups: Anticoagulants and non-anticoagulants.

   a. Anticoagulant – Warfarin, diphacinone, and pival are multiple-dose poisons: that is, they cause death only after they are eaten for several days in succession by the rodent. Two of the "newer anticoagulants – brodifacoum and braomadiolone, are exceptions as these rodenticides can cause death following a single night's feeding.
   b. Non-anticoagulant – Bromethalin, choleacalciferol, and zinc phophide act as single –dose poisons. Each have different toxic effects.

General baiting procedures for all poultry facilities.

1. Inspect and Bait Outdoor Rat Burrows. Inspect the exterior of the building and grounds for rat burrows. Place bait containers near the burrows or directly into the burrow. Inspect all burrows to find if they are active. Repeat the baiting procedure daily in those burrows where the bait is consumed.
2. Inspect and Bail Indoor Rat Burrows. Inspect all wall, floor and manure areas for rat burrows. Place bait blocks and/or packet style baits directly into their nests in walls, ceilings, manure.
3. Bait ceiling voids and attics for rats and mice. Insulated ceiling/attic areas must also be baited-especially in severe infestations.
4. Use traps to control rodents in coolers, storage areas, poultry and egg processing areas. To control rodents in these areas, baits can be used, but affected rodents may die inside an egg carton etc.

Baiting tips for high rise egg layer and pullet facilities.

1. Hand baiting wall areas and cage support beams.
2. Using bait containers to supplement hand baiting.
3. The key to controlling mice is to provide many bait placements, each containing a small amount of bait.
4. Pelletized baits can be placed every eight feet at each wall girt support pole intersection from the pit area up to the girting nearest the ceiling.
5. Place small quantities of baits on each cage support beam at the base of the walkway.
6. If the facility has a foundation ledge, bait containers should be permanent6ly maintained on the foundation wall ledge at 8-12 feet intervals for mice and 15-25 feet intervals for rats.
7. Replace bait in only those areas and/or containers in which bait has been entirely consumed or where bait has become damp, dusty, spoiled, or stale.
8. Keeping bait fresh is important in achieving good bait acceptance. At the beginning of the control program check bait weekly.
9. In high rise houses the pit should also be baited as rodents will nest in dry manure. Walk the pit on a regular basis, inspect rodent burrows, and place baits in plastic containers.
10. Rotating bait container method – 8 to 10 containers containing about 2 pounds of bait (either the pvc tubes or rat-size bait containers) can be placed at problem areas and left for 3 days and then moved to another location.

POULTRY HOUSE FLY CONTROL

Several species of flies are common in and around caged layer houses. The most common are the house fly and the little house fly. Most control efforts are directed against thee species. Other flies may be present and occasionally bothersome but are usually not the targets of fly control programs.

The house fly prefers sunlight and is a very active fly which crawls about over filth, people and food products with equal disdain. It is therefore the important species from the standpoint of spreading human and poultry disease and fly specking eggs. The house fly breeds in many types of organic matter, such as decaying plant material including refuse, spilled grains and feed and in all kinds of animal manure. A single adult female can lay up to 150 eggs at a time. As many as 1,000 house flies can complete development in one pound of suitable breeding material. In poultry operations, especially caged layer operations, chicken manure is a highly suitable breeding media for house flies. This is especially so where general sanitation is poor and when there is excessive moisture.

Control of house flies and related species in poultry operations is not a simple process. Successful fly control requires a management approach involving an integration of control methods in a manner compatible with current production practices. Many factors require the development of an integrated pest management approach to fly control. They include the limited choice of effective insecticides and application methods; rapid development of resistance in fly populations to insecticides; the need to avoid insecticide residues in animal tissues and products; changing animal production systems; reader awareness and regulation of environmental consequences of agricultural practices; concern of cost-effectiveness of pest control in livestock production; and realization that flies cannot be simply eradicated, but that it is necessary to maintain and integrated control program on a routine year-round basis.

Management of manure so that it is not conducive to fly breeding is the most effective means of control. Fresh poultry manure generally contains 60-80% moisture. Fly breeding in these materials can be virtually eliminated by reducing the moisture content to 30% or less, or by increasing moisture to liquefy it. Drying usually is preferable because dry manure can be handled more easily, occupies less space and creates few odor problems than does liquid manure.

Dry manure management is practiced under two types of systems: 1) frequent manure removal (at least weekly), and 2) long-term, in-house storage of manure.

Frequent manure removal systems to prevent fly breeding are based upon weekly (or more often) removal, spreading, and drying of manure to break the fly breeding cycle. This is effective if done regularly or thoroughly, but this system requires adequate agricultural land where manure can be spread.

“In house storage of manure” calls for drying the manure to about a 30% or less moisture level and maintaining this level throughout the year. Where sufficient storage space is available, dry manure can be maintained for several years before being removed.

In either system, any practices that limits moisture is droppings or aids rapid drying is helpful. Here are a few practices to follow:

1. Prevent leaks in water troughs or cups. Continuous cool water flowing in the troughs may result in condensation on the outside of the trough; in turn the water drips onto droppings. Restricting water flow to an on-off cycle helps eliminate this problem. Adding a second trough to serve as a drip pan may in some cases be required if drips from the water troughs become a serious problem.
2. When the water table is high or there is a danger of water running in form the outside, adjust the floor/grade relationship to that the floor of the house is higher than the surrounding ground and water runs away from the building.
3. Try to prevent gastrointestinal infection by keeping waterers clean. Use appropriate antibiotics if bacterial intestinal infection develop.
4. Provide abundant cross ventilation beneath cages during hot weather and maintain adequate house ventilation at all times
5. Avoid excessively high house temperatures that encourage abnormal water intake.
6. If necessary, restrict water consumption within the limits of good husbandry,
7. Avid rations that are laxative.
8. With floor operations, use absorbent litter where practical.

When storage space is available under cages, slats, or screen wire, drippings left undisturbed and free of additional moisture will undergo natural composting. This action causes enough reduction in the volume of stored manure to offset the additional dropping build-up which occurs at a slower rate. This system seldom produces flies, especially in high-rise or deep-pit houses with dark, seven to eight foot manure storage areas under the birds. Undisturbed poultry manure accumulations normally support large populations of parasites and predators of fly larvae. These parasite/predator populations primarily consist of predaceous beetles and parasitic wasps. In addition, there will be a large beneficial species in a fly, ophrya sp., that has shown promise in enclosed caged-layer housing.

In poultry houses where weekly manure removal is not practical, natural enemies of the fly may contribute substantially to fly control. The build-up of natural enemies is much slower that of the flies. Populations high enough to substantially benefit fly control can develop only if the manure is not disturbed for predators, complete manure removal should take place only during the non-fly season; and insecticide treatment of manure should be limited to spot application.

Several species of parasitic wasps may be purchased from a few commercial companies. The female wasps oviposit their eggs in the puparia of the flies, and the wasp larvae develop inside the puparium by consuming and killing the developing fly. These suppliers claim the wasps will provide long-term fly control. However, these claims have not been backed by sound research results. Research on the mass release of these wasps has shown promise for use in fly control programs, but their ability to provide large scale fly control has not been proven.

Insecticides should be considered as a supplement to sanitation and management measures aimed at preventing fly breeding. Space sprays, with quick knockdown, but no residual action are usually the most effective for immediate control of heavy populations of the most effective for immediate control of heavy populations of adult flies. Various formulation synergized pryethroids are the best to use in this matter. Synthetic pyrethroids should be avoided because of potential development of resistance in the fly population. There are several kinds of sprayers on the market designed to produce the small particle size of the spray is on that forms a true aerosol that stays in the air long enough to come in contact with the adult flies present at the time of spraying. The best time to use this type of application is early morning before the heat of the day. At this time a majority of the adult flies are usually high up in

the house around the ceiling and upper support posts. Portable equipment, whether electric or gasoline powered, is preferred because of the flexibility it provides reaching all areas of the facility and the ease with which insecticides or formulations can be changed. Permanent piped-in insecticide spray systems are available but are seldom as effective as good portable sprayers. These permanent systems are costly to install and there is less flexibility in the insecticides and formulations that can be used with them. Permanent systems are not usually efficient in dispersing insecticide to all the areas in the house where flies are located.

Residual sprays are available for controlling flies in poultry houses. These are applied to fly resting surfaces where the flies will come in contact with the insecticide. They are designed to kill flies over several days with one treatment. The problem with residual insecticide use is the development of resistance in the fly population with continued use of related insecticides. Also, residual treated surfaces get covered over quickly and the flies often do not get exposed to the insecticide.

A number of commercial fly baits are available for house fly control in either wet or day form. Granular baits are are the most common. They are best used as a supplement to other control efforts. Granular baits can wither be spread along walkways or placed in traps or containers. Liquid baits normally have to be prepared by the user. These can then be applied onto fly resting surfaces.

Larvaicides are applied directly to the manure below cages, screen wire, or slats. This type of application is designed to kill fly larvae (maggots) developing in the manure. It is necessary that the insecticide penetrates the manure and contacts the maggots to kill them. Quite often this is difficult because the constant addition of fresh manure offers new breeding material free of insecticide. This type of application is best reserved and utilized for treatment of fly breeding spots not elimianted by normal cultural practices. Wet areas of manure resulting from leaky watering devices, diarrheic birds, etc., are the most likely location requiring spot treatment. Overall, regular treatment of manure is not recommended because of the high cost, possible resistance development by the flies, and the indiscriminate kill of the natural parasites and predators.

Where available, feed-thru larvicides can be used. Currently, cyromazine (Larvadex), a CIBA-GEICY product, is registered as a feed through treatment. Cyromazine, when mixed in feed according to label directions, passes through the bird's digestive tract and is present in the manure essentially in this unaltered state. It has no adverse effect on feed palatability or consumption, or on egg production. Cyromazine will give best results in integrated into a well-managed fly control program. When initiating its use, a complete manure clean-out should bet made prior to starting birds on cryomazine-treated feed. Cyromazine can then be incorporated in the feed at the labeled rate when flies first become acitve and fed to the poultry continuously for four to six weeks. Discontinue feeding cyromazine when maggot activity in the manure ends. Thereafter, monitor manure until breeding activity again becomes evident. When this occurs, resume feed cyromzaine for tour to sex weeks until activity ceases.

Repeat cyromazine usage as needed. During winter months or during times of low fly pressure, cyromazine should be removed for at least four months in order to minimize the development of fly resistance. If cyromazine is fed continuously throughout the fly season, this could lead to the development of a resistant fly population. In egg layer houses that practice a two to three month manure clean-out schedule, cryomazine should be fed continuously for the first four to six weeks following a clean-out. If adult flies should become a problem in the interim, then proper adult fly control measures should be carried out. Then, following the next manure clean-out, cyromzine can be again fed by following the same schedule.

As a fly control program is carried out it is suggested that a simple, yet effective, monitoring system be used to evaluate the success of the fly management program and to determine when insecticide treatment are needed. Both larval and adult bly insecticide treatments are needed. Both larval and adult fly populations should be monitored. Monitoring for fly larvae is important in order to determine specifically where the flies are developing and to help in knowing when and where to use cultural management and larvicides effectively. In areas of heavy fly larval populations the manure surface will appear disturbed, looking much like coffee grounds. If there is extensive larval activity, a decision should be made to prevent further moisture buildup, if this is a problem, or initiate larvicidal treatments. Daily inspection of the manure pits is recommended to check for water leaks or other problems.

Adult flies can be monitored using various methods. The simplest methods are the use of sticky fly ribbons and/or use of spot cards. Sticky fly ribbons are commercially available and the flies caught on them give a useful index of the fly the population. Also the species of flies tuck on the ribbons can be positively identified. The ribbons can either be placed in established locations for a 24 house period or simply hand held and walked down 1 or 2 aisles of a house. Flies that get stuck on the ribbons can then be counted and identified. It is essential to always use the same number of ribbons, and use the same location each time to accurately compare different monitoring times. Spot cards are simple devices for measuring fly activity. These are white file cards which can be stapled to pre-chosen locations in a facility so that both sides are exposed. Flies resting on the spot cards leave brown regurgitation and fecal spots on the cards. Up to 10 locations in a house should be used. After removal, the number of spots per card can easily be counted. The cards may be labeled, counted and kept for later reference if needed (such as in legal proceedings on fly complaints). The number of flies on ribbons and spots on cards will vary according to the location. An index should be established to determine when fly control is needed. Generally, an average of 50 spots per card during a 24 hour period has been used a threshold for chemical treatments. However, in different situations lower thresholds may be chosen.

PROCESSING

Processing is a very critical area relative to sound quality and safety control. It is highly recommended that a processing facility have a detailed schematic of its egg flow in order to establish the critical control points in an effective quality and safety control program.

Egg gathering belts should be properly maintained to prevent egg jams. Dead birds should be moved daily to prevent egg jams and disease situations. Egg elevators should be under a preventative maintenance schedule to prevent egg breakage at transfer points. Both the egg belt and elevators should be kept clean. If foam rubber is used as nesting material in the elevators they should be replaced when needed. This material is good nesting material for rodents. It can be a way to detect the level of rodent infestation in the laying house.

The common egg conveyor or belt may pose a threat in disease transmission from house to house in an in-line laying facility. These conveyors or belts should be thoroughly cleaned and disinfected at the end of each complete cycle. There are washers that are made to do this on a continuous basis. There should be a dropping pan below them in order to catch eggs and other materials that might fall from the belt. If the conveyor is a solid belt is should be kept in good condition, level to prevent egg jams, or breakage due to egg impact in the trip to the processing area. In colder climates, the eggs should be cleared from the conveyor area between houses and the processing area to avoid frozen eggs and resulting thermal checks.

The orientor can be site for substantial breakage if it is not kept in proper repair and not properly adjusted. The orientor can be used as a means to segregate flocks if there are multiple conveyors coming into the processing area.

Pre-rinse can be a valuable tool in the washing process for several reasons. The moisture aids by loosening the manure on the shell surface prior to the washing process. The temperature of the pre-rinse should be the same as the wash temperature (20 degrees F warmer than the egg with a minimum of 90 degrees F, 110-115 degrees F. Periodic internal egg temperature measurements with a probe thermometer.

In marginal flocks with large numbers of heavily soiled eggs, cracked eggs and think shell use a pre-wash scanner to pull badly soiled and cracked eggs. This reduces the loaf of organic material in the wash water thus improving the cleaning action of the detergent and helping to maintain the proper Ph (10-11) of the wash water.

Washing

Quality control personnel should monitor egg washing often on a routine basis. A log with appropriate check points should be kept attached ot the washer. The following check points are intended to give quality control personnel guidelines to prevent quality and safety problems caused by poor washing practices.

1. Equipment – clean daily or more often.
2. Waste water – directly to drain (note standing water).
3. Continuous – type washer – change water during and at the end of each shift.
4. Water temperature minimum 90 degrees F (20 degrees warmer than egg, 110-115 degrees F)
5. Remove egg from wash area during break period.
6. Use approved compounds
7. <2ppm Iron – Potable water
8. Wash water Ph checked periodically during a routine shift it should be 10-11
9. Continuous operation-rapid
10. Provide continuous overflow.
11. In marginal flocks provide for a prewash scanner to remove cracked eggs.
12. Rinse water should be significantly warmer than wash water and approved sanitizing compound.
13. Eggs should be dry before placing in carton.
14. Use anti-foam if not included in detergent sanitizer.

Mass Candling

This is an area where experience and well managed operations pay off dividends to the processor. Many of the machines today, run at line speeds of 250-300 thirty dozen cases per hours. This speed results in about 25-30 eggs per second crossing the candling light. Normally two employees do the mass candling. Twenty-five – thirty decision per second are made by the two mass candlers. It is imperative that a processing plant run the appropriate speed in regards to the level of quality in the nest run product. In other words, slow down if you are running marginal product. Furthermore use scanners when necessary to assist the mass candlers in the candling booth.

Candling personnel should be rotated every two house to rest the eyes and prevent undergrades passing through un-noticed or to prevent overpull. A well-organized candling booth kept clean and uncluttered can mean substantial difference in egg quality.

Overpull can be a problem in some processing plants. Quality control personnel should check undergrades for excessive numbers of grade A product. In addition, this can be another way to measure the effectiveness of individual candlers.

Training mass candlers should be the responsibility of quality control. A well designed training program for new graders and a refresher course for experienced graders will help in maintaining a consistent quality in the final product.

Cooler Management

After eggs are cased, put in wire baskets, plastic modules, or onto a dolly, they should go directly into the cooler. Quality control has the responsibility to maintain the quality and safety of the product. Storage checkpoints are listed below.

1. Cooler cleanliness-sanitation.
2. Air movement in the cooler.
3. Relative humidity – a sling psychrometer is very useful in determination.
4. Cooler temperature – 50 degrees.
5. Product temperature test with a pocket thermometer should be done periodically. The periodic tests should be done at various levels on a pallet of product. This ensures that eggs in the lower layers of the pallet are kept at the appropriate temperature.
6. Allow a space between the wall and the pallet of eggs for air flow to ensure proper cooling. Allow space between rows of pallets in the cooler to allow air movement.
7. Rotation should be monitored very precisely. First in – First out (FIFO) method of rotation should be used.

Egg Processing Room Sanitation:

Sanitation of the processing plant and surrounding area is important to both management, and plant personnel. According to Herzberg, working condition is one of ten maintenance factors. Herzberg says potent dissatisfiers are called Maintenance Factors in the job, because they are necessary to maintain a reasonable level of satisfaction in employees. Satisfied employees will help make the job of producing a quality product, a more easily attainable goal.

Plant management has a responsibility to sanitation. The following is intended to be only a capsulized list of reasons for good sanitation.

1. Legal responsibility.
2. To protect product from spoilage and contamination.
3. To retain desirable flavor and eating qualities.

4. To prevent the spread of disease.
5. To reduce health and safety hazards.
6. For the aesthetic appearance of the plan and its surroundings.
7. To improve operating efficiency.
8. Maintain good public relations.

SANITATION IS A WAY OF LIFE. It must be included in training programs and rigorously enforced. Food safety and quality control can be a very integral part of this process.

The following check-list may be of some help when instituting a sanitation program for an egg processing plant.

1. Equipment cleaning schedule and regular inspection of cleaned equipment.
2. Work area clean-up schedule and regular inspection.
3. No admittance to bird confinement areas.
4. Rest room clean-up schedule.
5. Break room clean-up schedule.
6. Cooler clean-up schedule.
7. Insect eradication program in the processing plant.
8. Adequate ventilation for work area.
9. Maintain hot water for cleaning – 160 degrees F.
10. Clean drinking water for employees.
11. Adequate water pressure for cleaning equipment.
12. Building in good repair and well maintained.
13. Adequate water disposal equipment.
14. Proper handling and disposition of inedible eggs.
15. Approved sanitizers and cleaning equipment.
16. Develop a training program for sanitation.

Before developing a successful sanitation training program, management and quality control, should evaluate current sanitation procedures in sue. There is little point in expending resources on any training programs, if that training results in ineffective sanitation procedures. Top management must be willing to provide the necessary people, tools, and equipment to implement effective sanitation on a continuing basis. A common complaint of many employees is that they are required to attend training sessions, and then are not able to apply what they have learned because of lack of time, money, materials or equipment.

Quality inspections:

List of equipment needed for quality control inspections.

1. Paper thickness gauge for measuring shell thickness.
2. Haugh Unit micrometer, breakout table, knife, breaking tray and squeegee.
3. High quality egg scale – individual, dozen scale, and case scale.
4. Set of test weights.
5. Sling Psychrometer or wall type thermometer that will provide air and wet bulb temperatures.

6. B&B type candling light
7. Pocket thermometer.
8. Air cell gauge.
9. Sanitizer test kit.
10. Ph meter to test alkalinity of wash water.
11. Hand candling booth-dimensions as prescribed by the USDA specifications.
12. A small laboratory facility to run bacteriological exam.
13. Equipment for specific gravity measurements of the egg.
14. Two wheel cart.
15. Pocket flashlight.

SAMPLING

"Statistical sampling inspection embodies the principle that a number of units of products, known as a sample, can be selected from a large number of these units, designated as a lot, and an interpretation of the actual quality characteristics of the lot can be made from evaluation of the sample's results".

The above quotation states the rationale behind sampling inspection. It speaks of a random sample. Samples should be drawn randomly from a designated lot. Random sampling…that is, giving every possible sample in a population an equal probability of selection…has two purposes. First, it avoids the possibility of bias introduced by a non-random selection of sample elements. Second, to provide a probable basis for the selection of a sample.

A sampling plan consists of the sample size, acceptance number and a rejection number. Sample size is the number of samples to be selected from a given lot. In the case of eggs it would be the number of cases. The sample unit is one hundred eggs from each case in the sample.

There are various types of sampling plans. Among these are single, double, and multiple. We will discuss only single and double.

The single sample plan is merely, a single sample of n units, which are randomly selected from the lot. If the number of defective exceeds the tolerance, the lot is rejected. However, the double sampling plan incorporates along with the inittial sample of n units, and other sample of units, when the first sample fails to be accepted.

In order that the sample selected be a representative sample the lot from which the sample is drawn must approach a homogeneous lot. Limiting bias in the sample can be accomplished by using a table or random numbers to establish which samples you will draw.

To use a table of random numbers effectively you must number your samples. This can be accomplished in an egg processing plant by simply mentally numbering the cases as they come off the line.

Warehouse inspection can be a little more difficult, but can be accomplished with a simple procedure. In a large grouping, the three dimensional position of each case on a given pallet can be used. Mentally numbering the cases from top to bottom or clockwise or counter-clockwise, starting from your designated number one case. If you have one row of pallets just count from one pallet to the next one.

After you have decided how your cases will be numbered, then the sample size must be selected. We must refer back to whether this is a single or double sampling plan. If this is a singly sampling plan then the selection of sample size as instructed by USDA Shell Egg Grading Service is recommended.

SAMPLE SIZE

If the processing plant is an in-line operation then USDA's Shell Egg Grading Service line sampling plan is recommended. This sampling procedure is a form of verification inspection with AQL's for various samples.

However, if this is a double sampling plan, then a reduced first sample may be recommended. This is for those flocks, that you have confidence in and are usually running low in undergrades. Nevertheless, this reduced sample size also has a lower tolerance for undergrades. In the event that the first sample of the double sampling plan doesn't meet the acceptance tolerances for undergrades, then a larger sample must be drawn and increased tolerances for undergrades are permitted. The increased tolerances however must fall within USDA Consumer Grade Tolerances.

The double sampling plan may be simply, a reduced sample size and tolerances for designated lots, and if they fail to meet the reduced tolerances, then the quality control inspector should revert back to the official sample size recommended by USDA specifications.

Once you select the cases for your sample then you should number each case. One hundred eggs should be drawn from each case. Use the official USDA sampling procedures for the different case numbers in you sample in regards to what layers you select your 100 egg sample from in each case.

HAND CANDLING

Instructions for hand candling can be obtained from Handbook No. 75 USDA Egg Grading Manual, 1983.

QUALITY INSPECTION OTHER THAN CANDLING

Candled grade is applicable to "lots" of eggs whereas candled quality is based on individual eggs. Reviewed literature relating to egg quality has been published by Wilhelm (1939) and by Baker and Forsythe (1951). For these papers, the concern is that at best, candling is a rough measure of interior quality. When we apply candling to only fresh eggs, the relationship between candled quality of an egg to its broken out appearance is not nearly so correlated. It is possible that a flock with shell quality problems may show little or no relationship between candling and haugh unit quality evaluation. Normal interior egg quality declines with time. Straight line quality decline usually associated with interior egg quality.

HAUGH UNIT BREAKOUT DETERMINATION EQUIPMENT

1. A flat glass surface approximately 12”X18” or larger. The glass should be placed on a metal stand having adjustable legs for leveling. A mirror of approximately the same size as the glass is needed for observing the underside of the egg.
2. An individual egg scale, and test weight.
3. Knife and breaking tray.
4. A micrometer mounted on a tripod that gives direct haugh unit readings. If you do not have a direct read micrometer a haugh unit conversion chart will be needed.
5. A squeegee.
6. A container for broken eggs.

Procedure:

Care must be taken not to rupture the thick white. The most consistent results can best be obtained by using a breaking knife. Blunt edges, such as a table edge, may cause splintering of the shell with the possibility of puncturing the thick white.

Make sure the breakout surface is level. The micrometer must be properly calibrated. This may be accomplished by setting the micrometer on the glass surface and trun the shaft down until it just touches the surface. The micrometer should read zero.

The first step in the actual procedure is to weigh the egg. Once you have determined the individual egg weight, the tripod micrometer should be set at the proper egg weight selection on the gauge.

When determining quality of the thick white, select a flat area in the surface of the widest expanse of the thick white for measurement. Do not measure over air bubbles or chalazae. Pick a distance half way between the outer edge of the thick white and the yolk. Dial down the middle shaft until it barely touches the thick white. A meniscus will form around the shaft when this occurs.

According to statistical analysis, 10 eggs per week per flock are enough to assure the packer of uniform high quality, however, much, can be determined by haugh unit measurement. Many times a sharp drop in albumen quality may indicated a dietary deficiency or lock diseases, therefore this tool can be used as a management tool as well as a quality control measure.

SHELL THICKNESS

Shell thickness has been found significantly correlated with strength. Shell thickness varies over the entire surface of the egg and is generally thicker at the poles, small end or large end, usually the small pole being thicker than larger pole. The equator tends to be the thinnest portion. A meaningful measurement of shell thickness depends on location of the measurement.

According to Kramer, the best method for determining shell thickness is by using a paper thickness gauge, which measures in .001 of an inch, taking three measurements along the longitudinal line of the shell. For the sake of brevity, leaving the membrane on the shell will be sufficient and credible. It is recommended that shell thickness measurement be made while measuring haugh unit values to conserve on destruction of good quality eggs.

SPECIFIC GRAVITY

Specific gravity has been found significantly correlated with shell strength by a number of workers. One serious problem arises when one uses specific gravity to determine shell strength or quality. The size of the air cell affects the measurement. It is imperative that one uses freshly laid eggs to determine specific gravity. Specific gravity found in most flocks ranges from 1.065 to 1.100. Stadelman found that as a whole, very few flocks vary much from this range at same day production readings.

One of the best methods available is the Archimedes method. This entails weighing the egg in water and out of water. Special calculators have been made to solve the following equation when determining specific gravity of certain foods.

$$\text{Specific Gravity} = \frac{\text{Weight in Air}}{\text{Weight in Air} - \text{Weight in Water}}$$

EGG IDENDIFICATION METHODS

It is unfortunate, but a reality, that the egg industry is being held accountable for the safety of its product long after that product has left it control. Product identification is very important in order to establish direct line of accountability in a quality control program. The following identification requirements for shell eggs are recommended.

Invoice/packing slip – Grade, Size, Quantity, Lot#, Registration # (State or Federal), Packer/Distributor name and address, Buyers name and address, Invoice data.

Carton – Grade, Size, Quantity, Lot #, Registration # (State or Federal), Packer/Dist name and address, Refrigeration notice.

Cases of cartoned eggs – Grade, Size, Quantity, refrigeration notice

Cases of loose eggs – Grade, Size, Quantity, Lot #, Registration # (State or Federal), Packer/Dist Name and Address, Refrigeration notice, Packing slip with all of the above information inserted in the case.

WHAT IS A FARM BIOSECURITY?

Biosecurity is the short form for Biological Security. It is a variety of procedures used to establish sanitation barriers between unwanted organisms and flocks.

The first basic requirement for effective Biosecurity is to place a sign at the laneway or approach road to the egg laying operation that reads: **WARNING DO NOT ENTER DISEASE PREVENTION PROGRAM.** The purpose of this sign is to keep visitors to a minimum.

The second basic requirement for effective Biosecurity is to establish “restricted” and “unrestricted” zones on your premises. Restricted zones can be defined as those areas restricted to personnel wearing appropriate attire. Unrestricted zones are free areas in which vehicles and service personnel are allowed to work and move about without restriction. The family residence is included in this zone.

Ordinarily the restricted zone will include at least the laying house, the egg collection room and the cooler. The manner in which a given operation should be divided into restricted and unrestricted zones will depend on its layout.

All entrances to the facility should be well lit and locked at all times to deter unauthorized access. The “No Entry” sign should again be placed at these points or any point where the restricted zone begins.

HOW CAN GOOD HYGIENE BE ASSURED?

It is important that day to day hygiene is of a high standard in order to minimize transmission of infection between houses, and particularly to newly placed pullets. Strict Biosecurity and sound sanitation practices are essential to the success of your program.

“Start Clean-Stay Clean”

All visitors, staff and service personnel should change into protective clothing (coveralls, boots, hats/bonnets) when moving into the restricted zone. Spare clothing should be on hand for individuals who do not provide their own clean, protective clothing.

Procedures for entering the restricted zone.

Some physical barrier should divide restricted and unrestricted zones (e.g. painted lines on floor or partial walls). In order to cross this barrier, outdoor footwear should be removed or covered and clean inside footwear should be removed or covered and clean inside footwear should be used.

Washing of hands should occur at this point of crossing into the restricted zone.

Exterior Maintenance

Regular housekeeping will help to eliminate breeding areas for flies and rodents. All repairs to the exterior of the building should be completed before cleansing and disinfecting of the interior.

1. Patch gaps under eaves to prohibit birds nesting and rodent entry.
2. Repair any damaged screens promptly.
3. Keep weeds and grass cut around laying facility. Keep area clean, tidy and free of general rubbish.
4. Any low areas where water may stagnate, should be made level. This should prevent the buildup of micro-organisms and insects that could be carriers of Salmonella.
5. Areas around manure pits should be kept trimmed and preferably a cover should be provided for the pit. For other manure handling systems provide for the minimization of odor, rodent and/or insect prevalence.
6. Spilled feed below bins should be cleaned up.

Temperature requirements distribution

Quality control does not end at the processing plan, Warehouse, institutional food service accounts and retail stores need more attention from quality control sections in commercial egg processors. It is important to spot check quality, rotation, sanitation, temperature, and general handling in warehouses, institution food service accounts and retail stores. The inspection may use the following checkpoints.

1. Check walk-in cooler temperature and humidity. 45 degrees F, 80 % R.H.
2. Watch rotation in walk-in cooler
3. Watch movement of eggs into walk-in cooler upon receipt.
4. Watch stock turnover in walk-in cooler.
5. Watch cleanliness of walk-in coolers.
6. Fresh fruits and vegetables with strong odors (apples, onions, citrus) should be stored in a cooler separate from eggs, since the egg readily absorbs odors (Berry 1978).
7. Egg cases should not be stacked any higher than five cases.
8. Store eggs away from the wall in a walk-in cooler in order to allow air movement to properly refrigerate the eggs away from the flow of air movement.
9. Forbid repacking of eggs in cartons due to damage in shipment to the retail store.
10. Eggs should be located where heavy objects are not positioned directly over them in the display case.
11. Check display case temperature in a least three locations. Check for warm eggs and check for damage due to freezing. Check for cartons being stacked too high and preventing the movement of cold air (freezing cracks in the shell are usually hair-line in configuration and do not exhibit a point of impact or insult).
12. Watch rotation in display cases.
13. Recommend shelf pricing of eggs to eliminate extra handling of eggs resulting in breakage.
14. Pull samples of each size, date and line number from both the walk-in cooler and display case. These samples should be hand candled for quality determination. Sample selection should be conducted in a random manner and a representative size.
15. Check cleanliness, stock turnover, and general upkeep of the retail case.