Butte County

ON-FARM POULTRY SLAUGHTER GUIDELINES

FOOD SAFETY AND BEST MANAGEMENT PRACTICES FOR FARMERS PROCESSING LESS THAN 1,000 BIRDS/YEAR

ENVIRONMENTAL HEALTH DIVISION

BUTTE COUNTY PUBLIC HEALTH DEPARTMENT
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Introduction

The purpose of these Guidelines is to provide processing and handling recommendations to Butte County producers who process and sell less than 1,000 chickens under the Producer/Grower – 1,000 Bird Limit Exemption. The goal is that products offered for sale are wholesome and processed under clean and sanitary conditions, and that the operation itself does not result in environmental harm.

Consumer interest in locally raised pastured poultry is high, and many small-scale farmers are working to meet this demand. Most small commercial producers in California take advantage of federal legislation allowing producers raising less than 1,000 chickens/year to sell poultry they raise, slaughter and process on their own farm in uninspected facilities.

As of June 2012 there are no known cases of food borne illness traced back to a small-scale producer slaughtering birds in uninspected on-farm facilities. But insurers are understandably nervous about covering these operations, especially as they have increased in number in recent years, leading insurers to feel that their risk exposure is greater. This guide is part of a strategy to properly train poultry producers in the regulations and food safety best practices for processing their poultry on-farm. It was developed at the suggestion of a major farm insurer, and should result in fewer insurance coverage denials for small-scale farmers processing their poultry on-farm.

Land Use Requirements

The initial step before initiating a small chicken flock operation is to contact the Department of Development Services to make sure that the operation will meet current land use planning and zoning requirements. DDS can be contacted at (530) 538-7601 or by going onto their website located at: http://www.buttecounty.net/dds/home.aspx

Producer/Grower – 1,000 Bird Limit Exemption

Limited provisions of the Poultry Product Inspection Act (PPIA) apply to poultry growers who slaughter no more than 1,000 poultry in a calendar year for use as human food. A person may slaughter and process poultry that he or she raised on his or her premises and they may distribute such poultry without mandatory inspection when the following five criteria are met [PPIA Section 464(c)(4) “Section 15 (c)(4)”41; Title 9 CFR §381.10(c)].

Criteria

a. The poultry grower slaughters no more than 1,000 healthy birds of his or her own raising in a calendar year for distribution as human food;

b. The poultry grower does not engage in buying or selling poultry products other than those produced from poultry raised on his or her own farm;

1 Some published copies of the PPIA number the sections 1 to 25 instead of 451 to 470 as numbered in the United States Codes.
c. The slaughter and processing are conducted under sanitary standards, practices, and procedures that produce poultry products that are sound, clean, and fit for human food (not adulterated);
d. The producer keeps records necessary for the effective enforcement of the Act [Title 9 CFR 381.175]; and
e. The poultry products are offered only by direct sale to the consumer and do not move in commerce. (In this context, “commerce” is defined as the exchange or transportation of poultry products between States, U.S. territories (Guam, Virgin Island of the United States, and American Samoa), and the District of Columbia) [PPIA Section 453; Title 9CFR §381.1(b)].

Notes
If any of the five criteria are not met, the owner of the poultry is not eligible for this exemption.

The exemption is one of the most important for small-scale poultry farmers. It permits a poultry raiser in California to slaughter and process their own birds on their own premises for marketing within their state as human food without federal inspection as long as the number of birds does not exceed 1,000 chickens (or equivalent) within one calendar year. The exemption restricts where and how the processed poultry can be marketed and has specific labeling requirements.

It should also be noted that the exemption is per “farm” and not per farmer. If a number of farmers or family members operate on a given location known as “a farm”, only 1,000 birds in total are allowed from this farm for the exemption. Each farmer or family member raising birds on a particular farm is not entitled to the 1,000 bird exemption. If any farm is found to produce more than 1,000 chickens, it is a violation of the exemption. In these cases, a USDA inspection will be required.

Records necessary for the effective enforcement of the exemption include slaughter records and records covering the number of poultry products sold to customers. USDA/FSIS or the California Department of Food and Agriculture review such records to determine compliance with the requirement of the sale of no more than 1,000 poultry in a calendar year.² See Appendix A for a sample log.

The Act does not exempt any person slaughtering or processing poultry from the provisions requiring the manufacturing of poultry products to be free from adulteration and properly branded. Thus, all businesses slaughtering or processing poultry for use as human food, including exempt operations, must produce poultry product that is not adulterated or misbranded.³

Sales
Federal legislation does not specify where birds slaughtered and processed under the 1,000 bird exemption can be marketed other than to specify that they cannot be marketed across state lines. Instead, the federal government leaves it to the states to legislate any further restrictions on where these birds can be marketed. Farms operating under the 1,000 bird exemption must

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² "Guidance for Determining Whether a Poultry Slaughter or Processing Operation is Exempt from Inspection Requirements of the Poultry Products Inspection Act" http://www.fsis.usda.gov/OPPDE/rdad/FSISNotices/Poultry_Slaughter_Exemption_0406.pdf
³ ibid
maintain control of their product up to the end consumer and limit sales to their on-farm outlet, roadside stand or Farmers Market.

Both state and federal officials require that poultry product entering interstate commerce to be inspected and passed by the USDA. Poultry slaughtered and processed under the 1,000 bird exemption is not inspected by the USDA therefore these products cannot cross state lines.

The poultry raiser can only process poultry that they have raised. They cannot buy or for purposes of resale any poultry products other than those from poultry of their own raising. All the slaughter and processing must be done on farm. The equipment used may be owned, rented or provided in the form of a Mobile Poultry Processing Unit (MPPU).

**Product Description**

Labels must include the common name of the product (chicken), identify the chicken as raw, and state whether the product is fresh or frozen, and whole or parts. As of May 2012, parts from the same slaughter/processing batch can be grouped for sale, i.e. a bag of wings.

Poultry products may be sold fresh or frozen. However if sold fresh, the product must be picked up within 4 hours of slaughter by consumer or held at less than 41°F prior to sale.

*Uses: Ready to cook carcasses/parts.*

**Packaging Requirements**

All packaging materials in direct contact with food must be safe for their intended use under the Federal Food, Drug, and Cosmetic Act (FFDCA). Poultry products may not be packaged in a container that is composed of any substances that may adulterate the contents or be injurious to health. Only FDA approved food grade packaging is allowed.

It is the farmer’s responsibility to see that approved food-grade packing materials are used.

Proper wrapping and rapid freezing contribute to a longer lasting quality product. The goal is to prevent moisture loss from the meat (freezer burn) and keep air out. Packaging options for poultry include: freezer paper, tray wraps, plastic wraps, barrier films and meat trays, and heat-shrink bags.

**Labeling**

California has adopted the USDA FSIS Mandatory Labeling Requirements. The following items are required to be on the principal display panel (the main label) for all sales of meat or poultry, or meat or poultry products sold in California.

- **Product name** (example- Whole Chicken, Chicken Breast, Whole Turkey with Giblets)
- **Inspection legend and establishment number:** For poultry processed under the 1,000 bird exemption, this does not need to be stated as the farm or product is not inspected. The label must include the statement: Exempted -- P.L. 90-492.
• **Net weight statement**: This includes packed on date, sell by date, price per pound, and net weight. Frozen meat does not require a sell-by date. Products can be sold by the package or by the pound. If sold by the pound the net weight must be on the package and the price per pound price must be posted for all consumers to see. Digital scales suitable for commerce are required for sale by the pound.

• **Address line**: This must include the name and address of the farm.

• **Handling statement**: FSIS expects all poultry sold in commerce to bear safe handing instructions. Producers operating under the 1,000 bird exemption must use a modified safe handling instructions label that denotes processed under Exempt P.L. 90-492.

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**Nutritional Facts**

Nutrition facts are not essential for raw (fresh or frozen) poultry. However, if a farmer makes a nutritional claim in any way, then s/he must provide a nutritional label.

**Processing Guidelines**

**Hand Washing and Toilet Facilities**

Hand washing facilities with warm running water needs to be available in the immediate vicinity of the processing area and toilet facilities need to be available at a location accessible to processing personnel.

**Water Used in Processing and Sanitation**

All water used in processing, cleaning and sanitation, in chilling tanks and ice manufacture, and in any other aspects of the production of whole raw poultry carcasses shall be potable. Private water supply shall be tested annually to determine potability.

**Cleaning and Sanitation Agents**

Approved sanitizing agents (soaps and detergents) for use on food contact surfaces must be used in prescribed concentrations and methods. See Appendix B for more detailed information about the use of sanitizers.

**Equipment Maintenance Agents**

Any agents used in equipment maintenance must be food grade, including any lubricants applied to equipment surfaces subject to corrosion after final cleaning, rinse and sanitation. This applies whether such equipment is rented on a MPPU or owned by the producer and used in the production of raw poultry carcasses.
Environmental Considerations
The on farm processing of poultry whether utilizing MPPU or farm owned equipment must be managed in a manner that protects the environment, including surface and groundwater, and soils. More detailed information about the reuse of processing wastewater and solid waste is outlined under the heading “Managing Processing Waste in the following section.

Good Manufacturing Practices
The following Good Manufacturing Practices (GMP’s) describe what you need to do to “manufacture” safe and wholesome food for your customers. Your own “processing environment” extends well beyond a mobile unit or your own poultry processing equipment to your whole farm. It includes the people and the buildings, grounds, equipment and conditions on your farm site. The following GMP’s address all of these areas. They are designed to help you create a processing environment that allows for the safe and sanitary processing of a potentially hazardous food.

Open-Air vs. Enclosed Processing Area
An enclosed processing area is preferred because it provides for greater control of the processing area from external elements, insects, and rodents or other animals that can spread disease. Use of an enclosure, however, might not be practical for a small scale chicken processing operation due to issues associated with heat, scalding, and odors in an enclosure that is not sufficiently large and properly ventilated.

When processing is in an unenclosed area, it must be performed on a readily cleanable concrete slab and processing activities must be restricted rain, mud, or other conditions would prevent sanitary outdoor operations at any step, including composting and offal handling.

Unenclosed processing is not acceptable to the California Department of Food and Agriculture (CDFA). Therefore chicken producers need to be aware that, if the 1,000 annual chicken slaughter limit is exceeded, an acceptable enclosure will be required by CDFA as part of their regulatory requirements.

Provide Training for Processing Personnel
Design and implement an effective training program in which all those who assist in processing of poultry understand personal hygiene and sanitary product handling procedures.

Establish Health and Hygiene Policies for Processing Personnel
Make certain that you and your personnel have the knowledge, skills and attitude necessary to protect your poultry products from contamination by food handlers. This is especially important because poultry products support the rapid growth of microorganisms and are recognized as a “potentially hazardous food.” Consider attending a ServSafe® or similar food safety training program to insure that you are well informed about safe food handling.
Your Personnel Health and Hygiene Policies and training program must address:

a. Personal Health and Cleanliness. Personnel should be dismissed from the processing environment if they:
   - Have a food borne illness.
   - Show symptoms of a stomach or intestinal illness or jaundice.
   - Have a sore throat or temperature.
   - Have an infected wound or cut.
   - Live with or are exposed to a person who is ill.
   - Personal Cleanliness. You and your personnel must discuss the critical importance of general personal cleanliness. Ideally, you and they should shower and shampoo before work. (Dirty hair, for example, is a prime source of pathogens.)

b. Hygienic Hand Practices. Hand washing is the most important aspect of personal hygiene for food handlers. Train personnel to follow these steps:
   - Wet hands with running water as hot as you can comfortably stand it (at least 105° F) and apply soap. Vigorously scrub hands and arms for at least ten to fifteen seconds. Pay special attention to cleaning between fingers and under fingernails.
   - Rinse thoroughly under hot running water.
   - Dry hands with a single use paper towel.
   - Use a paper towel to turn off the faucet and to open the bathroom facility door.

c. Wash hands frequently when handling live or processed poultry or viscera, as well as before starting work and after:
   - Using toilet facilities.
   - Handling processing by-products or trash.
   - Touching hair, face or body, including an open sore.
   - Sneezing, coughing or using a tissue.
   - Handling chemicals that might affect food safety.
   - Touching dirty clothing, work aprons, work surfaces or anything else that could contaminate hands, such as unsanitary equipment, work surfaces or cleaning tools.

d. Gloves, if used, should be disposable and changed when they become soiled or torn, before changing tasks, and at least every four hours during continued use.

   Hand dips are optional but not required. Nail polish should be prohibited; nails should be clipped short.

e. Proper Work Attire - You and your processing personnel should:
   - Wear clean clothing. If possible, change into clean clothes at the processing site.
• Wear a clean hat or other hair restraint. Hair restraints serve two purposes: they keep you from touching your hair and keep your hair away from food. Personnel with long beards should wear beard restraints.

• Remove jewelry from hands and arms. Jewelry provides a good host site for pathogens and may pose a hazard when working around equipment.

• Wear appropriate, clean boots or close-toed shoes with non-skid soles. Consider providing step-in shoe sanitizing “stations” at points of entry to the processing area.

Create and Maintain a Clean Processing Environment
Establish grounds and building maintenance practices that provide a clean and wholesome processing environment.

a. Set up or arrange your site to allow easy and direct movement of your birds to the holding area and the processing area. Clean and disinfect poultry transport coops before and after use. Plan for easy and direct movement of chilled, packaged carcasses to your on-site refrigerated storage areas.

b. Maintain the following areas in a clean, well-drained condition and free of litter:
   • Poultry holding facilities and adjacent areas.
   • The processing equipment location (including water and electric hook up).
   • Buildings or sheds used for: storage of processing/handling supplies, equipment and finished product (i.e., refrigeration or freezing, and adjacent areas).
   • Facilities used by personnel for personal hygiene (i.e., toilets, handwashing, supplies and clothing) and adjacent areas.
   • On-site areas used for processing waste management (i.e. fields or pastures used for wastewater disposal and compost areas used to process solid wastes).

c. Frequently inspect all outside areas of your site for trash, blood, feathers, fecal material, etc., all of which must be promptly and properly removed and disposed of.

d. Keep trashcans, if any, tightly covered.

e. Maintain adequate dust control throughout your site.

f. Keep the buildings and sheds you use for storing processing supplies and product, and for maintaining personal hygiene of your personnel, in good, easily “cleanable” repair.

Control Pests: Inside and Outside
Install and maintain adequate pest control measures throughout your processing environment.

a. Keep all areas free of harborages for rodents; maintain “clean zones” in and around all storage and processing areas.
b. Install measures to prevent wild birds, domestic and wild animals, and insects from entering your processing environment.

c. Prevent wild birds and other pests from nesting in the processing environment.

d. Inspect all areas prior to processing dates for presence of rodents and all other pests.

e. Establish and maintain rigorous on-farm and farm-to-farm biosecurity policies and practices. Additional information about biosecurity is found in Appendix C.

Control Access

Place signs around your site to provide strict access control in your processing environment. Recognizing and Agra tourism is often an important element of a small chicken processing operation, take steps to control the traffic flow of non-personnel entering your poultry rearing areas (a biosecurity issue) and processing environment, and minimize to the extent feasible on-farm processing area when in use. Limit access to poultry holding areas, processing areas, and on-site storage/refrigeration areas to trained personnel during processing operations.

Personnel should not move back and forth between the slaughter and evisceration areas, between the processing area and poultry holding and on-farm refrigeration/storage areas, or out of and back into the processing environment without removing gloves and aprons when leaving, and without washing hands upon return. Prohibit smoking, eating, drinking, and chewing gum and tobacco in the processing environment when processing is taking place.

Provide and Protect Potable Water

Provide a supply of safe-to-drink, potable water that is sufficient (quantity and pressure) to support all processing, chilling, cleaning, sanitizing and personnel hygiene needs, including ice manufacture. (Sources of potable water include municipal water, private wells that are properly managed and regularly tested; closed portable water containers filled with potable water and bottled drinking water.) In addition:

a. Provide hot water (100° -110°) for personal hygiene (including hand washing) and equipment cleaning (120° minimum).

b. Provide acceptable, food-grade quality (or potable water) hoses and pipes for all water used for processing, cleaning and personal hygiene.

c. Install and maintain measures to prevent contamination of water used in processing, cleaning and personal hygiene; prevent cross-contamination between potable and non-potable water with water system backflow prevention devices (air gaps, vacuum/pressure breakers or check valves).

Maintain and Securely Store Processing Equipment and Utensils

Maintain your processing equipment and utensils in good condition, so that they can perform effectively and can be easily cleaned and sanitized. Store them securely when not in use.

a. Conduct pre- and post-operation inspections of all processing equipment and utensils, checking for cleanliness and signs of rust, wear, damage or other defects. A sample inspection checklist is found in Appendix D. A checklist should typically include the following:
• Transport Coops
• Killing cones
• Scalder and plucker (especially the plucker “fingers”)
• Knives and other implements and utensils
• Evisceration and work tables
• Chilling and holding tanks; ice containers; processing waste collection tubs
• Cleaning and sanitizing equipment
• Hoses, water and propane lines and connections, water backflow devices, electric outlets and wiring, propane tanks, etc.

b. Repair serious defects and/or perform necessary maintenance before processing begins and prior to storage.

c. Store all equipment and utensils in good conditions in clean, secure storage areas, to prevent damage or contamination of any kind.

Provide Secure Storage for Processing Supplies and Materials
Store all supplies and materials used in cleaning, sanitizing, packaging and labeling in clean, secure storage areas, to prevent damage or contamination of any kind. Keep cleaning and sanitizing agents in clearly labeled, secure containers; keep separated from supplies that may come in contact with food.

Manage Processing Wastes
Your plan should describe the steps you will take to manage processing wastes in a safe and environmentally responsible manner. It will insure that:

a. Wastewater, such as that which is generated from chilling tanks, cleaning, and rinsing, must be collected and disposed of in a manner that will not have an adverse impact on any surrounding well or surface water body. Therefore a minimum 200 foot setback between the disposal site and wells and surface water needs to be maintained. A typical method of disposal is subsurface application to biologically active farm hayfields or pastures in a manner that precludes erosion and functions as a safe and appropriate crop nutrient.

The Central Valley Regional Water Quality Control Board is the state regulatory agency responsible for the protection of groundwater and surface water and can be reached for additional information at (530) 224-4845, and at the following website address http://www.waterboards.ca.gov/centralvalley/. In addition, Butte County Environmental Health can be reached for additional information at (530) 538-7281.

b. Solid processing waste, such as poultry feathers, blood and viscera, is properly collected, transported and incorporated into an actively managed agricultural compost pile or windrow. Your proposed compost “recipe” must support active composting, including appropriate bulking materials, moisture content and C:N ratio. Agricultural compost piles from a small
chicken slaughter operation are exempt from state regulation, but guidance on best practices can be found on the web at: http://www.deq.state.or.us/pubs/reports.htm#Compost

c. Trash, such as discarded containers for supplies, damaged packaging materials and disposable gloves, is properly collected, contained and removed from your processing environment.

**Standard Operating Procedures and Sanitation Standard Operating Procedures**

Standard Operating Procedures (SOP’s) and Sanitation Standard Sanitation Operating Procedures (SSOP’s) are designed to prevent the creation of unsanitary processing conditions and ensure that food products are wholesome and unadulterated. They describe how to carry out and document safe food handling and personal hygiene practices (Good Management Practices).

Inspection and completion of checklists for assuring that SOPs and SSOPs are followed is the responsibility of the producer-processor. A sample checklist is shown in Appendix E. The following table summarizes each of the SOP and SSOP procedures that should be incorporated into an overall management plan.

<table>
<thead>
<tr>
<th>Program Element</th>
<th>Frequency</th>
<th>Procedure</th>
</tr>
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</table>
| Site Management and Pest Control                      | Prior to each processing date      | • Visually inspect processing environment (grounds and buildings, including storage areas and sanitary facilities) for cleanliness and presence of pests. List needed corrective actions.  
• Perform corrective actions                           |
| Personnel Health and Hygiene                          | Each day of processing             | • Interview and visually check processing personnel for health and personal hygiene considerations, prior to approving anyone for food handling  
• Dismiss anyone found unsuitable for work              |
| Pre-Operational Inspection and Sanitation             | Each day of processing             | • Visually inspect all equipment and utensils for cleanliness and operability  
• Clean, rinse and sanitize all product contact surfaces, equipment and utensils, including coolers |
| Daily Operational Sanitation Maintenance              | Each day of processing             | Kill Area                                                                |
|                                                       |                                    | • If a piece of equipment or a utensil falls to the floor or ground, wash thoroughly  
• Maintain area in a clean and sanitary condition throughout operation  
Processing Area                                         |
|                                                       |                                    | • If a carcass falls to the ground, or comes in contact with unsanitized surface, discard immediately  
• Maintain entire area in a clean and sanitary condition throughout the daily operation |
| Chill Tank, Giblet Chill Containers and Refrigeration Temperature Monitoring | Chill tank slurry and giblet chill containers | • Change water in the chill tank as needed to maintain sanitary conditions  
• Use a digital thermometer to test ice slurry temperatures of chill tank and giblet chill containers |
<table>
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<tr>
<th>Program Element</th>
<th>Frequency</th>
<th>Procedure</th>
</tr>
</thead>
</table>
|                 |                    | • Use a digital thermometer to test pre-chill potable tank water (add cold water frequently to maintain as cool as possible—ice water slurry is not required)  
|                 |                    | • Use a maximum temperature thermometer to measure refrigerator storage temperatures  
|                 |                    | **Notes:**  
|                 |                    | • The target temperature for the chill tank is between 33° and 41° F (add ice as necessary)  
|                 |                    | • The chill tank must reduce the temperature of carcasses to 41° F or less within 4 hours of evisceration  
|                 |                    | • A digital thermometer with an accuracy of ±2% is needed to measure internal carcass temperatures and a minimum of 5 birds should be tested  
|                 |                    | • Giblets must be chilled to 41 °F or below within two hours of slaughtering the birds  
|                 |                    | • Fresh product must be held at 33°- 41° F during storage and transit, resulting in product shelf life is 4 days (freeze or discard product if held for more than 4 days)  
|                 |                    | **Operational Sanitation Schedule**  
|                 | Each day after processing | **Kill Area**  
|                 |                    | • Pick up feathers and other matter and deposit into receptacle for inedible material.  
|                 |                    | • Briefly pre-rinse all dirty areas with warm water and start the process at the top and work all material down to the floor.  
|                 |                    | • Apply detergent as follows:  
|                 |                    |   • Rinse all equipment from top to bottom  
|                 |                    |   • Inspect and re-clean any missed areas  
|                 |                    |   • After cleaning/rinsing work areas, apply sanitizer to all contact surfaces  
|                 |                    |   • Squeegee standing water to the floor  
|                 |                    | **Processing Area**  
|                 |                    | • Pick up any pieces of bones, fat, meat or other matter and deposit into container for inedible material  
|                 |                    | • Disassemble all equipment and place parts in their designated tubs  
|                 |                    | • Briefly pre-rinse all soiled areas with warm water - start the process at the top and work all material down to the floor  
|                 |                    | • Apply approved soap as directed  
|                 |                    | • Rinse all equipment from top to bottom  
|                 |                    | • Inspect and re-clean any missed areas  
|                 |                    | • After equipment and work areas have been cleaned, apply sanitizer to all contact surfaces  
|                 |                    | • Squeegee any standing water on floor to drainage areas  
|                 |                    | • Remove, clean and sanitize any waste conduits or drains  
|                 |                    | • Apply edible oil to all surfaces that are subject to corrosion  
|                 |                    | **Program Element**  
|                 |                    | **Temperature**  
|                 |                    | Check once per hour of operation  
|                 |                    | **Refrigerator temperature**  
|                 |                    | Check and record once per day  
|                 |                    | • Use a digital thermometer to test pre-chill potable tank water (add cold water frequently to maintain as cool as possible—ice water slurry is not required)  
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|
Sanitation Control Plan

Food safety is a critical concern for your business and your customers. The failure to control a food safety hazard in your operation can make people sick and result in undesirable legal and economic consequences for you and your industry.

A Sanitation Control Plan for your farm is a valuable tool that can help you to produce a safer food product; it focuses your thinking on identifying and eliminating or minimizing food safety hazards to an acceptable level. A Sanitation Control Plan will reduce the likelihood that your operation will produce an unwholesome food and save you from economic losses that can result when you must dispose of an unsafe product at the end of the line.

Development of a Sanitation Control Plan has the following steps:

a. Assess potential hazards associated with all areas of your product and your process, and describe measures that prevent the hazards
b. Determine the observable control measures
c. Establish a monitoring program using a checklist
d. Identify actions needed if control measures are not met

Each Sanitation Control Plan is unique to a specific food product and processing facility. The outline included below has been developed for use for poultry producer processing under the Producer/Grower – 1,000 Bird Limit Exemption to produce raw poultry carcasses for direct-to-consumer sale.

Sanitation Control Planning in Poultry Slaughter

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<tr>
<th>Process Step</th>
<th>Potential Hazard</th>
<th>Control Measures</th>
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</thead>
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<td>Receive/Hold</td>
<td>Biological/Physical: fecal contamination from birds</td>
<td>Withhold feed 12 hours prior to processing. Clean foreign matter from birds</td>
</tr>
<tr>
<td>Kill/Breed</td>
<td>Biological: pathogen introduction</td>
<td>Proper cleaning of cones, equipment and utensils</td>
</tr>
<tr>
<td>Scald</td>
<td>Biological: pathogen introduction</td>
<td>Monitor water temperature: change water if/as required</td>
</tr>
<tr>
<td>Pluck</td>
<td>Biological: pathogen introduction</td>
<td>Proper cleaning of equipment, including rubber picker fingers</td>
</tr>
<tr>
<td>Pre-Chill</td>
<td>Biological: pathogen introduction</td>
<td>Monitor water temperature: change frequently</td>
</tr>
<tr>
<td>Remove head, crop, feet, and oil gland</td>
<td>Biological: pathogen introduction</td>
<td>Proper cleaning of equipment and utensils</td>
</tr>
<tr>
<td>Make cut around vent</td>
<td>Biological: pathogen introduction</td>
<td>Proper training, proper cleaning of equipment and utensils</td>
</tr>
<tr>
<td>Eviscerate</td>
<td>Biological: pathogen introduction</td>
<td>Proper cleaning of equipment and utensils; proper care in not puncturing intestines</td>
</tr>
<tr>
<td>Harvest liver, heart, gizzard and neck</td>
<td>Biological: pathogen introduction</td>
<td>Proper cleaning of equipment and utensils</td>
</tr>
<tr>
<td>Process Step</td>
<td>Potential Hazard</td>
<td>Control Measures</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Trim carcass, final rinse</td>
<td>Biological: pathogen introduction</td>
<td>Trim to remove foreign matter. Proper cleaning of equipment and utensils</td>
</tr>
<tr>
<td>Final inspection; carcass, giblets, neck</td>
<td>Biological: pathogen introduction</td>
<td>Trim to remove foreign matter. Proper cleaning of equipment</td>
</tr>
<tr>
<td>Chill carcass, giblets, neck</td>
<td>Biological: pathogen introduction</td>
<td>Monitor temperature</td>
</tr>
<tr>
<td>Drain carcass, giblets, neck</td>
<td>Biological: pathogen introduction</td>
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<tr>
<td></td>
<td>Physical: contamination from foreign matter</td>
<td>Proper cleaning of equipment, utensils, and food contact surfaces</td>
</tr>
<tr>
<td>Cut up carcass</td>
<td>Biological: pathogen introduction</td>
<td>Proper cleaning of equipment, utensils and food contact surfaces</td>
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<tr>
<td></td>
<td>Physical: contamination from foreign matter</td>
<td></td>
</tr>
<tr>
<td>Package, weigh and label</td>
<td>Biological: pathogen introduction from birds</td>
<td>Include Safe Handling Instructions on label. Wash or trim to remove contamination from foreign matter</td>
</tr>
<tr>
<td></td>
<td>Physical: contamination from foreign matter</td>
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At final inspection there will be no visible foreign matter and zero tolerance for fecal matter and ingesta. The internal bird temperature tested in the cavity with thermal probe is to be below 41° F.

### Glossary of Terms

**Adulterated** Generally, impure, unsafe, or unwholesome; however, the Federal Food, Drug, and Cosmetic Act, the Federal Meat Inspection Act, the Poultry Products Inspection Act, and the Egg Products Inspection Act contain separate language defining in very specific (and lengthy) terms how the term “adulterated” will be applied to the foods each of these laws regulates. Products found to be adulterated under these laws cannot enter into commerce for human food use.

**Corrective action** Procedures to be followed when a deviation occurs.

**Critical control point** A point, step, or procedure in a food process at which control can be applied and, as a result, a food safety hazard can be prevented, eliminated, or reduced to acceptable levels.

**Critical limit** The maximum or minimum value to which a physical, biological, or chemical hazard must be controlled at a critical control point to prevent, eliminate, or reduce to an acceptable level the occurrence of the identified food safety hazard.

**Exemption** The Secretary shall, by regulation and under such conditions as to sanitary standards, practices, and procedures as he may prescribe, exempt from specific provisions of federal and state law.
**Food and Drug Administration (FDA)** is an agency of the United States Department of Health and Human Services and is responsible for regulating food, dietary supplements, drugs and more. FDA derives all of its authority and jurisdiction from various acts of Congress. The main source of the FDA's authority is the Federal Food, Drug, and Cosmetic Act.

**Food Safety and Inspection Service (FSIS)** Under authority of the Federal Meat, Poultry and Egg Products Inspection Acts, FSIS inspects and monitors all meat, poultry and egg products sold in interstate and foreign commerce to ensure compliance with mandatory U.S. food safety standards and inspection legislation.

**Food Safety Hazard** Any biological, chemical, or physical property that may cause a food to be unsafe for human consumption.

**Sanitation Control Plan** is a safeguarding management system that prevents food hazards of a biological, chemical or physical nature.

**Inedible**. Adulterated, uninspected, or not intended for use as human food.

**Inspection** refers to the examination of an animal, meat and meat product by an official inspector to certify wholesomeness and condition.

**Interstate** Movement of products across state lines.

**Intrastate** Movement of products exclusively within a state’s boundary.

**Label**. A display of written, printed, or graphic matter upon the immediate container (not including package liners) of any article.

**Labeling** All brands and labels applied to carcasses, processed meat, wholesale cuts, and edible meat by-products must be approved by the FSIS. Inspection labels must contain the common name of the product and the name and address of the meat processor. Meat products from state inspected 5-A plants must also bear state approved labels that have similar requirements to those for federally inspected products. Labels on poultry products processed on-farm in uninspected facilities must bear the phrase “processed under Exempt P.L. 90-492”

**Misbranded** If the label, brand, tag or notice under which a product is sold is false or misleading in any particular as to the kind, grade or quality or composition; or there is any false statement concerning the sanitary conditions under which it is manufactured.

**Packaging** Any cloth, paper, plastic, metal, or other material used to form a container, wrapper, label, or cover for meat products.

**Poultry** The term "poultry" means any domesticated bird, whether live or dead

**Poultry Products Inspection Act** The PPIA mandates that USDA inspect "poultry," i.e., any domesticated bird, and food products thereof, slaughtered and prepared in Federal establishments and foreign establishments for export to the United States that are intended for distribution in commerce (21 U.S.C. 451 et seq.). The Federal poultry products inspection regulations (9 CFR Part 381) implement the provisions of the PPIA.

The Federal poultry products inspection regulations (9 CFR 381.1) define poultry as meaning any domesticated bird (chickens, turkeys, ducks, geese, ratites, or guineas or squabs), whether live
or dead. The PPIA also provides for exemptions from inspection of the slaughter of poultry and the preparation of poultry products, i.e., poultry carcasses or parts thereof. Among the exemptions, the PPIA provides for the exemption from inspection of the custom slaughter of poultry and the preparation of carcasses and parts thereof at establishments conducting such operations when such products are used exclusively by households and individuals and are not sold. Different from the provisions of the FMIA, the PPIA contains specific criteria for such exemptions based on the volume of poultry slaughtered or processed. The PPIA also includes an exemption from the definition of "poultry product" for products that contain poultry ingredients only in a relatively small proportion or historically have not been considered by consumers as products of the poultry food industry, and that cannot be represented as poultry products. The Federal poultry products inspection regulations address exemptions from inspection, including an exemption from the definition of "poultry product" of certain human food products containing poultry, such as those containing less than 2 percent cooked poultry meat (9 CFR 381.15), and an exemption from inspection for custom operations (9 CFR 381.10).

**Preventive Measure** Physical, chemical, or other means that can be used to control an identified food safety hazard.

**Process-monitoring Instrument** An instrument or device used to indicate conditions during processing at a critical control point.

**Processing** The terms processed and processing refer to operations in which the carcasses of slaughtered animals are cut-up, skinned, boned, canned, salted, stuffed, rendered, or otherwise manufactured or processed.

**Product.** Any carcass, meat, meat byproduct, or meat food product, capable of use as human food.

**Retail** The sale of commodities to ultimate consumers, usually in small quantities.

**Shipping container.** The outside container (box, bag, barrel, crate, or other receptacle or covering) containing or wholly or partly enclosing any product packed in one or more immediate containers.

**Slaughtering** The term slaughter refers to the act of killing livestock or poultry for use as human food.

**Wholesale** The sale of commodities in large quantities to retailers or distributors rather than to end consumers directly.
## References

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Acknowledgements

This Guide is based on the work that took place in the State of New York and represents the hard work of a group of people in that state dedicated to ensuring that small-scale farmers in New York are able to continue producing and selling high-quality, safe food to their eager customers. Specifically, a special thanks goes to:

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- **Brad Banner**, Butte County Environmental Health Director

The most up-to-date version of this Guide will always be available online at:

http://www.buttecounty.net/publichealth/environmental/environmental.html
## Appendix A: Sample Flock Record Log

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<tr>
<th>Number of Birds Purchased/Source</th>
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<th>Bird Processed/Date</th>
<th>Product Sold/Date</th>
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Appendix B: Basic Elements of Equipment Cleaning and Sanitizing in Food Processing and Handling Operations

Ronald H. Schmidt

This document explains the details of equipment cleaning and sanitizing procedures in food-processing and/or food-handling operations.

Background

Cleaning and Sanitizing Program

Since cleaning and sanitizing may be the most important aspects of a sanitation program, sufficient time should be given to outline proper procedures and parameters. Detailed procedures must be developed for all food-product contact surfaces (equipment, utensils, etc.) as well as for non-product surfaces such as non-product portions of equipment, overhead structures, shields, walls, ceilings, lighting devices, refrigeration units and heating, ventilation and air conditioning (HVAC) systems, and anything else which could impact food safety.

Cleaning frequency must be clearly defined for each process line (i.e., daily, after production runs, or more often if necessary). The type of cleaning required must also be identified.

The objective of cleaning and sanitizing food contact surfaces is to remove food (nutrients) that bacteria need to grow and to kill those bacteria that are present. It is important that the clean, sanitized equipment and surfaces drain dry and are stored dry so as to prevent bacteria growth. Necessary equipment (brushes, etc.) must also be clean and stored in a clean, sanitary manner.

Cleaning/sanitizing procedures must be evaluated for adequacy through evaluation and inspection procedures. Adherence to prescribed written procedures (inspection, swab testing, direct observation of personnel) should be continuously monitored, and records maintained to evaluate long-term compliance.

The correct order of events for cleaning/sanitizing of food product contact surfaces is as follows:

1. Rinse
2. Clean
3. Rinse
4. Sanitize.

Definitions

Cleaning

Cleaning is the complete removal of food soil using appropriate detergent chemicals under recommended conditions. It is important that personnel involved have a working understanding of the nature of the different types of food soil and the chemistry of its removal.
Cleaning Methods
Equipment can be categorized with regard to cleaning method as follows:

- **Mechanical Cleaning.** Often referred to as clean-in-place (CIP). Requires no disassembly or partial disassembly.
- **Clean-out-of-Place (COP).** Can be partially disassembled and cleaned in specialized COP pressure tanks.
- **Manual Cleaning.** Requires total disassembly for cleaning and inspection.

Sanitization
It is important to differentiate and define certain terminology:

- **Sterilize** refers to the statistical destruction and removal of all living organisms.
- **Disinfect** refers to inanimate objects and the destruction of all vegetative cells (not spores).
- **Sanitize** refers to the reduction of microorganisms to levels considered safe from a public health viewpoint.

Appropriate and approved sanitization procedures are processes, and, thus, the duration or time as well as the chemical conditions must be described. The official definition (Association of Official Analytical Chemists) of sanitizing for food product contact surfaces is a process which reduces the contamination level by 99.999% (5 logs) in 30 sec.

The official definition for non-product contact surfaces requires a contamination reduction of 99.9% (3 logs). The standard test organisms used are *Staphylococcus aureus* and *Escherichia coli*.

General types of sanitization include the following:

- **Thermal Sanitization** involves the use of hot water or steam for a specified temperature and contact time.
- **Chemical Sanitization** involves the use of an approved chemical sanitizer at a specified concentration and contact time.

Water Chemistry and Quality
Water comprises approximately 95-99% of cleaning and sanitizing solutions. Water functions to do the following:

- carry the detergent or the sanitizer to the surface
- carry soils or contamination from the surface.

The impurities in water can drastically alter the effectiveness of a detergent or a sanitizer. Water hardness is the most important chemical property with a direct effect on cleaning and sanitizing efficiency. (Other impurities can affect the food contact surface or may affect the soil deposit properties or film formation.)

Water pH ranges generally from pH 5 to 8.5. This range is of no serious consequence to most detergents and sanitizers. However, highly alkaline or highly acidic water may require additional buffering agents.

Water can also contain significant numbers of microorganisms. Water used for cleaning and sanitizing must be potable and pathogen-free. Treatments and sanitization of water may be required prior to use in cleaning regimes. Water impurities that affect cleaning functions are presented in Table 1.

Cleaning

**PROPERTIES OF FOOD SOILS**
Food soil is generally defined as unwanted matter on food-contact surfaces. Soil is visible or invisible. The primary source of soil is from the food product being handled. However, minerals from water residue and residues from cleaning compounds contribute to films left on surfaces. Microbiological biofilms also contribute to the soil buildup on surfaces.

Since soils vary widely in composition, no one detergent is capable of removing all types. Many complex films contain combinations of food components, surface oil or dust, insoluble cleaner components, and insoluble hard-water salts. These films vary in their solubility properties depending upon such factors as heat effect, age, dryness, time, etc.

It is essential that personnel involved have an understanding of the nature of the soil to be removed before selecting a detergent or cleaning regime. The rule of thumb is that acid cleaners dissolve alkaline soils (minerals) and alkaline cleaners dissolve acid soils and food wastes. Improper use of detergents can actually "set" soils, making them more difficult to remove (e.g., acid cleaners can precipitate protein). Many films and biofilms require more sophisticated cleaners that are amended with oxidizing agents (such as chlorinated detergents) for removal.
Soils may be classified as the following:

- soluble in water (sugars, some starches, most salts);
- soluble in acid (limestone and most mineral deposits);
- soluble in alkali (protein, fat emulsions);
- soluble in water, alkali, or acid.

The physical condition of the soil deposits also affects its solubility. Freshly precipitated soil in a cool or cold solution is usually more easily dissolved than an old, dried, or baked-on deposit, or a complex film. Food soils are complex in that they contain mixtures of several components. A general soil classification and removal characteristics are presented in Table 2.

**Fat-based Soils**
Fat usually is present as an emulsion and can generally be rinsed away with hot water above the melting point. More difficult fat and oil residues can be removed with alkaline detergents, which have good emulsifying or saponifying ingredients.

**Protein-based Soils**
In the food industry, proteins are by far the most difficult soils to remove. In fact, casein (a major milk protein) is used for its adhesive properties in many glues and paints. Food proteins range from more simple proteins, which are easy to remove, to more complex proteins, which are very difficult to remove. Heat-denatured proteins can be extremely difficult.

Generally, a highly alkaline detergent with peptizing or dissolving properties is required to remove protein soils. Wetting agents can also be used to increase the wettability and suspendability of proteins. Protein films require alkaline cleaners that have hypochlorite in addition to wetting agents.

**Carbohydrate-based Soils**
Simple sugars are readily soluble in warm water and are quite easily removed. Starch residues, individually, are also easily removed with mild detergents. Starches associated with proteins or fat scan usually be easily removed by highly alkaline detergents.

**Mineral Salts-based Soils**
Mineral salts can be either relatively easy to remove or be highly troublesome deposits or films. Calcium and magnesium are involved in some of the most difficult mineral films. Under conditions involving heat and alkaline pH, calcium and magnesium can combine with bicarbonates to form highly insoluble complexes. Other difficult deposits contain iron or manganese. Salt films can also cause corrosion of some surfaces. Difficult salt films require an acid cleaner (especially organic acids that form complexes with these salts) for removal. Sequestering agents such as phosphates or chelating agents are often used in detergents for salt film removal.

**Microbiological Films**
Under certain conditions, microorganisms (bacteria, yeasts, and molds) can form invisible films (biofilms) on surfaces. Biofilms can be difficult to remove and usually require cleaners as well as sanitizers with strong oxidizing properties.

**Lubricating Greases and Oils**
These deposits (insoluble in water, alkali, or acid) can often be melted with hot water or steam, but often leave a residue. Surfactants can be used to emulsify the residue to make it suspendable in water and flushable.

**Other Insoluble Soils**
Inert soils such as sand, clay, or fine metal can be removed by surfactant-based detergents. Charred or carbonized material may require organic solvents.

**QUANTITY OF SOIL**
It is important to rinse food-contact surfaces prior to cleaning to remove most of the soluble soil. Heavy deposits require more detergent to remove. Improper cleaning can actually contribute to build-up of soil.

**THE SURFACE CHARACTERISTICS**
The cleanability of the surface is a primary consideration in evaluating cleaning effectiveness. Included in surface characteristics are the following:

**Surface Composition**
Stainless steel is the preferred surface for food equipment and is specified in many industry and regulatory design and construction standards. For example, 3-A Sanitary Standards (equipment standards used for milk and milk products applications) specify 300 series stainless steel or equivalent. Other grades of stainless steel may be appropriate for specific applications (i.e., 400 series) such as handling of high fat products, meats, etc. For highly acidic, high salt, or other highly corrosive products, more corrosion resistant materials (i.e., titanium) is often recommended.
Other “soft” metals (aluminum, brass, copper, or mild steel), or nonmetallic surfaces (plastics or rubber) are also used on food contact surfaces. Surfaces of soft metals and nonmetallic materials are generally less corrosion-resistant and care should be exercised in their cleaning.

Aluminum is readily attacked by acids as well as highly alkaline cleaners, which can render the surface non-cleanable. Plastics are subject to stress cracking and clouding from prolonged exposure to corrosive food materials or cleaning agents.

Hard wood (naple or equivalent) or sealed wood surfaces should be used only in limited applications such as cutting boards or cutting tables, provided the surface is maintained in good repair. Avoid using porous wood surfaces.

**Surface Finish**

Equipment design and construction standards also specify finish and smoothness requirements. 3-A standards specify a finish at least as smooth as a No. 4 ground finish for most applications. With high-fat products, a less smooth surface is used to allow product release from the surface.

**Surface Condition**

Misure or mishandling can result in pitted, cracked, corroded, or roughened surfaces. Such surfaces are more difficult to clean or sanitize, and may no longer be cleanable. Thus, care should be exercised in using corrosive chemicals or corrosive food products.

**ENVIRONMENTAL CONSIDERATIONS**

Detergents can be significant contributors to the waste discharge (effluent). Of primary concern is pH. Many publicly owned treatment works limit effluent pH to the range of 5 to 8.5. So it is recommended that in applications where highly alkaline cleaners are used, that the effluent be mixed with rinse water (or some other method be used) to reduce the pH. Recycling of caustic soda cleaners is also becoming a common practice in larger operations. Other concerns are phosphates, which are not tolerated in some regions of the U.S., and the overall soil load in the waste stream that contributes to the chemical oxygen demand (COD) and biological oxygen demand (BOD).

**CHEMISTRY OF DETERGENTS**

Detergents and cleaning compounds are usually composed of mixtures of ingredients that interact with soils in several ways:

- Physically active ingredients alter physical characteristics such as solubility or colloidal stability.
- Chemically active ingredients modify soil components to make them more soluble and, thus, easier to remove.

In some detergents, specific enzymes are added to catalytically react with and degrade specific food soil components.

**Physically Active Ingredients**

The primary physically-active ingredients are the surface active compounds termed surfactants. These organic molecules have general structural characteristic where a portion of the structure is hydrophilic (water-loving) and a portion is hydrophobic (not reactive with water). Such molecules function in detergents by promoting the physical cleaning actions through emulsification, penetration, spreading, foaming, and wetting.

The classes of surfactants are as follows:

- Ionic surfactants that are negatively charged in water solution are termed anionic surfactants. Conversely, positively charged ionic surfactants are termed cationic surfactants. If the charge of the water soluble portion depends upon the pH of the solution, it is termed an amphoteric surfactant. These surfactants behave as cationic surfactants under acid conditions, and as anionic surfactants under alkaline conditions. Iionic surfactants are generally characterized by their high foaming ability.

- Nonionic surfactants, which do not dissociate when dissolved in water, have the broadest range of properties depending upon the ratio of hydrophilic/hydrophobic balance. This balance are also affected by temperature. For example, the foaming properties of nonionic detergents is affected by temperature of solution. As temperature increases, the hydrophobic character and solubility decrease. At the cloud point (minimum solubility), these surfactants generally act as defoamers, while below the cloud point they are varied in their foaming properties.

It is a common practice to blend surfactant ingredients to optimize their properties. However, because of precipitation problems, cationic and anionic surfactants cannot be blended.

**Chemically Active Ingredients**

**Alkaline Builders**

Highly Alkaline Detergents (or heavy-duty detergents) use caustic soda (sodium hydroxide) or caustic potash (potassium hydroxide). An important property of these highly
alkaline detergents is that they saponify fats forming soap. These cleaners are used in many CIF systems or bottle-washing applications.

Moderately Alkaline Detergents include sodium, potassium, or ammonium salts of phosphates, silicates, or carbonates. Tri-sodium phosphate (TSP) is one of the oldest and most effective. Silicates are most often used as a corrosion inhibitor. Because of interaction with calcium and magnesium and film formation, carbonate-based detergents are of only limited use in food processing cleaning regimes.

**Acid Builders**

Acid Detergents include organic and inorganic acids. The most common inorganic acids used include phosphoric, nitric, sulfamic, sodium acid sulfite, and hydrochloric. Organic acids, such as hydroxyacetic, citric, and gluconic, are also in use. Acid detergents are often used in a two-step sequential cleaning regime with alkaline detergents. Acid detergents are also used for the prevention or removal of stone films (mineral stone, beer stone, or milk stone).

**Water Conditioners**

Water conditioners are used to prevent the build-up of various mineral deposits (water hardness, etc.). These chemicals are usually sequestering agents or chelating agents. Sequestering agents form soluble complexes with calcium and magnesium. Examples are sodium tripolyphosphate, tetra-potassium pyrophosphate, organo-phosphates, and polyethylenes. Chelating agents include sodium gluconate and ethylene diamine tetracetic acid (EDTA).

**Oxidizing Agents**

Oxidizing agents used in detergent application are hypochlorite (also a sanitizer and/or to a lesser extent--perborate). Chlorinated detergents are most often used to clean protein residues.

**Enzyme Ingredients**

Enzyme-based detergents, which are amended with enzymes such as amylases and other carbohydrate-degrading enzymes, proteases, and lipases, are finding acceptance in specialized food industry applications.

The primary advantages of enzyme detergents are that they are more environmentally friendly and often require less energy input (less hot water in cleaning). Uses of most enzyme cleaners are usually limited to unheated surfaces (e.g., cold-milk surfaces). However, new generation enzyme cleaners (currently under evaluation) are expected to have broader application.

**Fillers**

Fillers add bulk or mass, or dilute dangerous detergent formulations that are difficult to handle. Strong alkalis are often diluted with fillers for ease and safety of handling. Water is used in liquid formulations as a filler. Sodium chloride or sodium sulfate are often fillers in powdered detergent formulations.

**Miscellaneous Ingredients**

Additional ingredients added to detergents may include corrosion inhibitors, glycol ethers, and butylcellosolve (improve oil, grease, and carbon removal).

**Sanitizing**

**THERMAL SANITIZING**

As with any heat treatment, the effectiveness of thermal sanitizing is dependent upon a number of factors including initial contamination load, humidity, pH, temperature, and time.

**Steam**

The use of steam as a sanitizing process has limited application. It is generally expensive compared to alternatives, and it is difficult to regulate and monitor contact temperature and time. Further, the byproducts of steam condensation can complicate cleaning operations.

**Hot Water**

Hot-water sanitizing--through immersion (small parts, knives, etc.), spray (dishwashers), or circulating systems--is commonly used. The time required is determined by the temperature of the water. Typical regulatory requirements (Food Code 1995) for use of hot water in dishwashing and utensil sanitizing applications specify immersion for at least 30 sec. at 77°C (170°F) for manual operations; and a final rinse temperature of 74°C (165°F) in single tank, single temperature machines and 82°C (180°F) for other machines.

Many state regulations require a utensil surface temperature of 71°C (160°F), as measured by an irreversibly registering temperature indicator in warewashing machines. Recommendations and requirements for hot-water sanitizing in food processing may vary. The Grade A Pasteurized Milk Ordinance specifies a minimum of 77°C (170°F) for 5 min. Other recommendations for processing operations are 85°C (185°F) for 15 min., or 80°C (176°F) for 20 min.

The primary advantages of hot-water sanitization are relatively inexpensive, easy to apply, and readily available, generally effective over a broad range of microorganisms,
relatively non-corrosive, and penetrates into cracks and crevices. Hot-water sanitization is a slow process that requires come-up and cool-down time; can have high energy costs; and has certain safety concerns for employees. The process also has the disadvantages of forming or contributing to film formations and shortening the life of certain equipment or parts thereof (gaskets, etc.).

**CHEMICAL SANITIZING**

The ideal chemical sanitizer should:

- be approved for food contact surface application.
- have a wide range or scope of activity.
- destroy microorganisms rapidly.
- be stable under all types of conditions.
- be tolerant of a broad range of environmental conditions.
- be readily solubilized and possess some detergency.
- be low in toxicity and corrosivity.
- be inexpensive.

No available sanitizer meets all of the above criteria. Therefore, it is important to evaluate the properties, advantages, and disadvantages of available sanitizer for each specific application.

**Regulatory Considerations**

The regulatory concerns involved with chemical sanitizers are antimicrobial activity or efficacy, safety of residues on food contact surfaces, and environmental safety. It is important to follow regulations that apply for each chemical usage situation. The registration of chemical sanitizers and antimicrobial agents for use on food and food product contact surfaces and on nonproduct contact surfaces is through the U.S. Environmental Protection Agency (EPA). (Prior to approval and registration, the EPA reviews efficacy and safety data, and product labeling information.)

The U.S. Food and Drug Administration (FDA) is primarily involved in evaluating residues form sanitizer use that may enter the food supply. Thus, any antimicrobial agent and its maximum usage level for direct use on food or on food product contact surfaces must be approved by the FDA. Approved no-rinse food contact sanitizers and nonproduct contact sanitizers, their formulations and usage levels are listed in the Code of Federal Regulations (21 CFR 178.1010). The U.S. Department of Agriculture (USDA) also maintains lists of antimicrobial compounds (i.e., USDA List of Proprietary Substances and Non Food Product Contact Compounds), which are primarily used in the regulation of meats, poultry, and related products by USDA’s Food Safety and Inspection Service (FSIS).

**Factors Affecting Sanitizer Effectiveness**

**Physical Factors**

**Surface Characteristics.** Prior to the sanitization process, all surfaces must be clean and thoroughly rinsed to remove any detergent residue. An unclean surface cannot be sanitized. Since the effectiveness of sanitization requires direct contact with the microorganisms, the surface should be free of cracks, pits, or crevices which can harbor microorganisms. Surfaces which contain biofilms cannot be effectively sanitized.

**Exposure Time.** Generally, the longer time a sanitizer chemical is in contact with the equipment surface, the more effective the sanitization effect; intimate contact is as important as prolonged contact.

**Temperature.** Temperature is also positively related to microbial kill by a chemical sanitizer. Avoid high temperatures (above 55°C [131°F]) because of the corrosive nature of most chemical sanitizers.

**Concentration.** Generally, the activity of a sanitizer increases with increased concentration. However, a leveling off occurs at high concentrations. A common misconception regarding chemicals is that "if a little is good, more is better". Using sanitizer concentrations above recommendations does not sanitizer better and, in fact, can be corrosive to equipment and in the long run lead to less decontamination. Follow manufacturer's label instructions.

**Soil.** The presence of organic matter dramatically reduces the activity of sanitizers and may, in fact, totally inactivate them. The adage is “you cannot sanitize an unclean surface”.

**Chemical Factors**

**pH.** Sanitizers are dramatically affected by the pH of the solution. Many chlorine sanitizers, for example, are almost ineffective at pH values above 7.5.

**Water properties.** Certain sanitizers are markedly affected by impurities in the water.

**Inactivators.** Organic and/or inorganic inactivators may react chemically with sanitizers giving rise to non-germical products. Some of these inactivators are present in detergent residue. Thus, it is important that surfaces be rinsed prior to sanitization.
Biological Factors

The microbiological load can affect sanitizer activity. Also, the type of microorganism present is important. Spores are more resistant than vegetative cells. Certain sanitizers are more active against gram positive than gram negative microorganisms, and vice versa. Sanitizers also vary in their effectiveness against yeasts, molds, fungi, and viruses.

Specific Types of Chemical Sanitizers

The chemicals described here are those approved by FDA for use as no-rinse, food-contact surface sanitizers. In food-handling operations, these are used as rinses, sprayed onto surfaces, or circulated through equipment in CIP operations. In certain applications the chemicals are foamed on a surface or fogged into the air to reduce airborne contamination.

Chlorine-based Sanitizers

Chlorine Compounds. Chlorine, in its various forms, is the most commonly used sanitizer in food processing and handling applications. Commonly used chlorine compounds include liquid chlorine, hypochlorites, inorganic chloramines, and organic chloramines. Chlorine-based sanitizers form hypochlorous acid (HOCl, the most active form) in solution. Available chlorine (the sum of HOCl present) is a function of pH. At pH 5, nearly all is in the form of HOCl. At pH 7.0, approximately 75% is HOCl. The maximum allowable level for no-rinse applications is 200ppm available chlorine, but recommended usage levels vary. For hypochlorites, an exposure time of 1 min at a minimum concentration of 50ppm and a temperature of 24°C (75°F) is recommended. For each 10°C (18°F) drop in temperature, a doubling of exposure time is recommended. For chloramines, 200ppm for 1 min is recommended.

Chlorine compounds are broad spectrum germicides that act on microbial membranes, inhibit cellular enzymes involved in glucose metabolism, have a lethal effect on DNA, and oxidize cellular protein. Chlorine has activity at low temperature, is relatively cheap, and leaves minimal residue or film on surfaces.

The activity of chlorine is dramatically affected by such factors as pH, temperature, and organic load. However, chlorine is less affected by water hardness when compared to other sanitizers (especially the quaternary ammonium compounds).

The major disadvantage to chlorine compound is corrosiveness to many metal surfaces (especially at higher temperatures). Health and safety concerns can occur because of skin irritation and mucous membrane damage in confined areas. At low pH (below 4.0), deadly Cl₂ (mustard gas) can form. In recent years, concerns have also been raised about the use of chlorine as a drinking water disinfectant and as an antimicrobial with direct food contact (meat, poultry and shellfish). This concern is based upon the involvement of chlorine in the formation of potentially carcinogenic trihalomethanes (THMs) under appropriate conditions. While chlorine's benefits as a sanitizer far outweigh these risks, it is under scrutiny.

Chlorine dioxide. Chlorine dioxide (ClO₂) is currently being considered as a replacement for chlorine, since it appears to be more environmentally friendly. Stabilized ClO₂ has FDA approval for most applications in sanitizing equipment or for use as a foam for environmental and non-food contact surfaces. Approval has also been granted for use in flame waters in fruits and vegetable operations and in poultry process waters. ClO₂ has 2.5 times the oxidizing power of chlorine and, thus, less chemical is required. Typical use concentrations range from 1 to 10ppm.

ClO₂'s primary disadvantages are worker safety and toxicity. Its highly concentrated gases can be explosive and exposure risks to workers are higher than that for chlorine. Its rapid decomposition in the presence of light or at temperatures greater than 50°C (122°F) makes on-site generation a recommended practice.

Iodine

Use of iodine as an antimicrobial agent dates back to the 1800s. This sanitizer exists in many forms and usually exists with a surfactant as a carrier. These mixtures are termed iodophors. The most active agent is the dissociated free iodine (also less stable). This form is most prevalent at low pH. The amount of dissociation from the surfactant is dependent upon the type of surfactant. Iodine solubility is very limited in water. Generally recommended usage for iodophors is 12.5 to 25ppm for 1 min.

It is generally thought that the bactericidal activity of iodine is through direct halogenation of proteins. More recent theories have centered upon cell wall damage and destruction of microbial enzyme activity.

Iodophors, like chlorine compounds, have a very broad spectrum: being active against bacteria, viruses, yeasts, molds, fungi, and protozoans. Iodine is highly temperature-dependent and vaporizes at 120°F. Thus, it is limited to lower temperature applications. The degree to which iodophors are affected by environmental factors is highly dependent upon properties of the surfactant used in the formulation. Iodophors are generally less affected by
organic matter and water hardness than chlorine. However, loss of activity is pronounced at high pH.

Iodine has a long history of use in wound treatment. However, ingestion of iodine gas does pose a toxicity risk in closed environments. The primary disadvantage is that iodine can cause staining on some surfaces (especially plastics).

**Quaternary Ammonium Compounds (QACs)**

Quaternary ammonium compounds (QACs) are a class of compounds that have the general structure as follows (Figure 1):

![Diagram of a quaternary ammonium compound](image)

The properties of these compounds depend upon the covalently bound alkyl groups (R groups), which can be highly diverse. Since QACs are positively charged cations, their mode of action is related to their attraction to negatively charged materials such as bacterial proteins. It is generally accepted that the mode of action is at the membrane function. The carbon length of R-group side chain is, generally, directly related with sanitizer activity in QACs. However, because of the lower solubility in QACs composed of large carbon chains, these sanitizers may have lower activity than short chain structures.

QACs are active and stable over a broad temperature range. Because they are surfactants, they possess some detergency. Thus, they are less affected by light soil than are other sanitizers. However, heavy soil dramatically decreases activity. QACs generally have higher activity at alkaline pH. While lack of tolerance to hard water is often listed as a major disadvantage of QACs when compared to chlorine, some QACs are fairly tolerant of hard water. Activity can be improved by the use of EDTA as a chelator. QACs are effective against bacteria, yeasts, mold, and viruses.

An advantage of QACs in some applications is that they leave a residual antimicrobial film. However, this would be a disadvantage in operations such as cultured dairy products, cheese, beer, etc., where microbial starter cultures are used.

QACs are generally more active against gram positive than gram negative bacteria. They are not highly effective against bacteriophages. Their incompatibility with certain detergents makes thorough rinsing following cleaning operations imperative. Further, many QAC formulations can cause foaming problems in CIP applications.

Under recommended usage and precautions, QACs pose little toxicity or safety risks. Thus, they are in common use as environmental fogs and as room deodorizers. However, care should be exercised in handling concentrated solutions or use as environmental fogging agents.

**Acid-Anionic Sanitizers**

Like QACs, acid-anionic sanitizers are surface-active sanitizers. These formulations include an inorganic acid plus a surfactant and are often used for the dual function of acid rinse and sanitization.

Whereas QACs are positively charged, these sanitizers are negatively charged. Their activity is moderately affected by water hardness. Their low use pH, detergency, stability, low odor potential, and non-corrosiveness make them highly desirable in some applications.

Disadvantages include relatively high cost, a closely defined pH range of activity (pH 2 to 3), low activity on molds and yeasts, excessive foaming in CIP systems, and incompatibility with cationic surfactant detergents.

**Fatty Acid Sanitizers**

Fatty acid or carboxylic acid sanitizers were developed in the 1980s. Typical formulations include fatty acids plus other acids (phosphoric acids, organic acids). These agents also have the dual function of acid rinse and sanitization. The major advantage over acid anionics is lower foaming potential. These sanitizers have a broad range of activity, are highly stable in dilute form, are stable to organic matter, and are stable to high temperature applications.

These sanitizers have low activity above pH 3.5 - 4.0, are not very effective against yeasts and molds, and some formulations lose activity at temperatures below 10°C (50°F). They also can be corrosive to soft metals and can degrade certain plastics and rubber.
**Peroxides**

Peroxides or peroxy compounds contain at least one pair of covalently bonded oxygen atoms (-O-O-) and are divided into two groups: the inorganic group, containing hydrogen peroxide (HP) and related compounds; and the organic group, containing peroxyacetic acid (PAA) and related compounds.

**Hydrogen peroxide (HP),** while widely used in the medical field, has found only limited application in the food industry. FDA approval has been granted for HP use for sterilizing equipment and packages in aseptic operations.

The primary mode of action for HP is through creating an oxidizing environment and generation of singlet or superoxide oxygen (SO). HP is fairly broad spectrum with slightly higher activity against gram-negative than gram-positive organisms.

High concentrations of HP (5% and above) can be an eye and skin irritant. Thus, high concentrations should be handled with care.

**Peroxyacetic Acid (PAA)** has been known for its germicidal properties for a long time. However, it has only found food-industry application in recent years and is being promoted as a potential chlorine replacement. PAA is relatively stable at use strengths of 100 to 200ppm. Other desirable properties include absence of foam and phosphates, low corrosiveness, tolerance to hard water, and favorable biodegradability. PAA solutions have been shown to be useful in removing biofilms.

While precise mode of action mechanisms have not been determined, it is generally theorized that the PAA reaction with microorganisms is similar to that of HP. PAA, however, is highly active against both gram-positive and gram-negative microorganisms. The germicidal activity of PAA is dramatically affected by pH. Any pH increase above 7-8 drastically reduces the activity.

PAA has a pungent odor and the concentrated product (40%) is a highly toxic, potent irritant, and powerful oxidizer. Thus, care must be used in its use.

A general comparison of the chemical and physical properties of commonly used sanitizers is presented in Table 3.

**References Used**


Table 1. Water impurities and associated problems.

<table>
<thead>
<tr>
<th>Impurity</th>
<th>Problem Caused</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Impurities</td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td>Corrosion</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>Corrosion</td>
</tr>
<tr>
<td>Bicarbonates (Sodium, Calcium or Magnesium)</td>
<td>Scale</td>
</tr>
<tr>
<td>Chlorides or Sulfates (Sodium, Calcium or Magnesium)</td>
<td>Scale &amp; Corrosion</td>
</tr>
<tr>
<td>Silica</td>
<td>Scale</td>
</tr>
<tr>
<td>Suspended Solids</td>
<td>Corrosion and Deposition</td>
</tr>
<tr>
<td>Unusually high pH (above 8.5)</td>
<td>Mediate Corrosion and Deposition;</td>
</tr>
<tr>
<td></td>
<td>Alter detergent efficiency</td>
</tr>
<tr>
<td>Unusually low pH (below 5)</td>
<td>Mediate Corrosion and Deposition;</td>
</tr>
<tr>
<td></td>
<td>Alter detergent efficiency</td>
</tr>
<tr>
<td>Less Common Impurities</td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>Filming and Staining</td>
</tr>
<tr>
<td>Manganese</td>
<td>Corrosion</td>
</tr>
<tr>
<td>Copper</td>
<td>Filming and Staining</td>
</tr>
</tbody>
</table>

Table 2. Characteristics of Food Soils

<table>
<thead>
<tr>
<th>Surface Deposit</th>
<th>Solubility</th>
<th>Ease of Removal</th>
<th>Heat-Induced Reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar</td>
<td>Water soluble</td>
<td>Easy</td>
<td>Carmelization</td>
</tr>
<tr>
<td>Fat</td>
<td>Alkali soluble</td>
<td>Difficult</td>
<td>Polymerization</td>
</tr>
<tr>
<td>Protein</td>
<td>Alkali soluble</td>
<td>Very Difficult</td>
<td>Denaturation</td>
</tr>
<tr>
<td>Starch</td>
<td>Water soluble, Alkali soluble</td>
<td>Easy to Moderately Easy</td>
<td>Interactions with other constituents</td>
</tr>
<tr>
<td>Monovalent Salts</td>
<td>Water soluble, Acid soluble</td>
<td>Easy to Difficult</td>
<td>Generally not significant</td>
</tr>
<tr>
<td>+Polyvalent Salts</td>
<td>Acid soluble</td>
<td>Difficult</td>
<td>Interaction with other constituents</td>
</tr>
</tbody>
</table>
### Table 3. Comparison of the Chemical and Physical Properties in Commonly Used Sanitizers

<table>
<thead>
<tr>
<th></th>
<th>Chlorine</th>
<th>Iodophors</th>
<th>Quaternary ammonium compounds</th>
<th>Acid anionic</th>
<th>Fatty acid</th>
<th>Peroxyacetic acid</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Corrosive</strong></td>
<td>Corrosive</td>
<td>Slightly</td>
<td>Noncorrosive</td>
<td>Slightly corrosive</td>
<td>Slightly corrosive</td>
<td>Slightly corrosive</td>
</tr>
<tr>
<td><strong>Irritating to skin</strong></td>
<td>Irritating</td>
<td>Not irritating</td>
<td>Not irritating</td>
<td>Slightly irritating</td>
<td>Slightly irritating</td>
<td>Not irritating</td>
</tr>
<tr>
<td><strong>Effective at neutral pH</strong></td>
<td>Yes</td>
<td>Depends on type</td>
<td>In most cases</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Effective at acid pH</strong></td>
<td>Yes, but unstable</td>
<td>Yes</td>
<td>In some cases</td>
<td>Yes, below 3.0-3.5</td>
<td>Yes, below 3.5-4.0</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Effective at alkaline pH</strong></td>
<td>Yes, but less than at neutral pH</td>
<td>No</td>
<td>In most cases</td>
<td>No</td>
<td>No</td>
<td>Less effective</td>
</tr>
<tr>
<td><strong>Affected by organic material</strong></td>
<td>Yes</td>
<td>Moderately</td>
<td>Moderately</td>
<td>Moderately</td>
<td>Partially</td>
<td>Partially</td>
</tr>
<tr>
<td><strong>Affected by water hardness</strong></td>
<td>No</td>
<td>Slightly</td>
<td>Yes</td>
<td>Slightly</td>
<td>Slightly</td>
<td>Slightly</td>
</tr>
<tr>
<td><strong>Residual antimicrobial activity</strong></td>
<td>None</td>
<td>Moderate</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>None</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>Low</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Incompatibilities</strong></td>
<td>Acid solutions, phenols, amines</td>
<td>Highly alkaline detergents</td>
<td>Anionic wetting agents, soaps, and acids</td>
<td>Cationic surfactants and alkaline detergents</td>
<td>Cationic surfactants and alkaline detergents</td>
<td>Reducing agents, metal ions, strong alkalies</td>
</tr>
<tr>
<td><strong>Stability of use solution</strong></td>
<td>Dissipates rapidly</td>
<td>Dissipates slowly</td>
<td>Stable</td>
<td>Stable</td>
<td>Stable</td>
<td>Dissipates slowly</td>
</tr>
<tr>
<td><strong>Maximum level permitted by FDA without rinse</strong></td>
<td>200ppm</td>
<td>25ppm</td>
<td>200ppm</td>
<td>Varied</td>
<td>Varied</td>
<td>100-200ppm</td>
</tr>
<tr>
<td><strong>Water temperature sensitivity</strong></td>
<td>None</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>None</td>
</tr>
<tr>
<td><strong>Foam level</strong></td>
<td>None</td>
<td>Low</td>
<td>Moderate</td>
<td>Low/Moderate</td>
<td>Low</td>
<td>None</td>
</tr>
<tr>
<td><strong>Phosphate</strong></td>
<td>None</td>
<td>High</td>
<td>None</td>
<td>High</td>
<td>Moderate</td>
<td>None</td>
</tr>
<tr>
<td><strong>Soil load tolerance</strong></td>
<td>None</td>
<td>Low</td>
<td>None</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

*Comparisons made at approved "no-rinse" use levels. Adapted from B.R. Cords and G.R. Dychals 1993.
Appendix C: Biosecurity Basics for Poultry Growers

Biosecurity refers to procedures used to prevent the introduction and spread of disease-causing organisms in poultry flocks. Because of the concentration in size and location of poultry flocks in current commercial production operations and the inherent disease risks associated with this type of production, it is imperative that poultry producers practice daily biosecurity measures. Developing and practicing daily biosecurity procedures as best management practices on poultry farms will reduce the possibility of introducing infectious diseases such as Avian Influenza and Exotic Newcastle as well as many others. Contract poultry growers should be familiar with the specifics of their company’s biosecurity protocols and work closely with company representatives to implement those programs. Before implementing biosecurity programs, contract producers should check with poultry company personnel to be sure the measures taken are consistent and compatible with their company’s policies.

How Microorganisms Spread

The primary method of spreading disease causing microorganisms between poultry flocks is the use of contaminated equipment or exposure to contaminated clothing and footwear of humans. Infected animals, such as wild birds and rodents, can also be a source of disease for poultry flocks. Disease causing viruses and bacteria can be transported from one flock to another on bird transporting equipment, trucks, tractors and other farm equipment as well as egg flats and cases. Humans and animals are also important ways of transporting disease causing organisms. Disease causing microbes have been found on human’s clothes, shoes, skin, and hair. As a result, many hatcheries and breeder facilities utilize shower in and shower out protocols as part of their biosecurity programs. Animals such as dogs, cats, mice, rats and free flying birds are also known to be carriers of disease organisms. Insects such as flies, beetles, and mosquitoes are well known to be carriers of disease microbes as well. Another, but less risky form of transmission is through the air.

The following steps are a summarization of standard measures that poultry producers may use on their farms to increase the biosecurity of their flocks:

Keep Visitors to a Minimum

Human transportation of microorganisms is one of the most serious threats to biosecurity. Restriction of unnecessary human traffic is a major component of a sound program. Growers should restrict visitors and make sure that any visitor to their farm has a good reason to be there. Growers should provide protective covering such as boots, coveralls, and headgear to any visitors that work with, or have had recent contact with poultry. This would include friends, neighbors, relatives, equipment and utility service personnel. Visitors should...
never enter poultry houses unless approved by the grower or company personnel. Traffic through poultry houses should always flow from younger to older birds. One useful measure is keeping records of visitors that have been on the farm. If a problem arises, knowing who was there will help in limiting additional flock infections. Growers may post signs at the entrance to the farm indicating that entry to the farm and facilities is restricted. Poultry producers work to educate members of the local community of the risks to their flocks and the need to restrict traffic on their farms. This can be done by attending local community meetings or social events and speaking to groups and individuals about this subject. Print an article in the local newspaper about the importance of biosecurity for your farm and others. This can also help educate people regarding the seriousness of this issue.

Limit Visitations to Other Poultry Farms

Poultry growers should refrain from visiting other poultry operations unless absolutely necessary. Whenever it is necessary to visit another farm, growers should be sure to exercise additional precautions such as showering and changing clothes before arriving and washing any vehicle before entering a farm. It will be very important for growers to wear protective clothing including boots, overalls and headgear and to clean and disinfect all clothing and equipment before returning to their facilities. Showering and changing into clean clothes will also be necessary.

Keep All Animals Out of Poultry Houses

Animals can be carriers of poultry disease causing organisms. Growers should not allow pets such as dogs, cats or other animals in their houses. Some growers will allow their dogs to walk the houses with them, but this is risky because the dogs may have been exposed to other animals or birds that have been contaminated with disease organisms. Poultry houses should be kept as closed as possible to prevent wild birds from getting inside.

Wild birds utilizing the feeders and defecating in the houses can become a source of disease.

Practice Sound Rodent and Pest Control Programs

Rats, mice, and insects such as flies and darkling beetles can carry and spread microorganisms. Growers should consult with their poultry company and practice effective rodent and insect control programs. Eliminating or reducing as many of these pests as possible will reduce the risk of contracting or spreading a disease.

Avoid Contact with Non-Commercial Poultry or Wild Birds

Poultry growers should avoid all contact with non-commercial sources of poultry including backyard flocks, fanciers, fairs, poultry shows, and markets. These types of poultry are seldom fully vaccinated for the major poultry diseases and they are often exposed to many types and flocks of birds. Non-commercial birds represent extremely high-risk contacts. Employees should not be allowed to own their own poultry and neighbors with backyard flocks should be informed of the importance of getting sick or unhealthy birds to a diagnostic lab as soon as possible. Growers should also avoid wild birds such as ducks, geese and turkeys. Growers with farm ponds should be particularly concerned with the potential of carrying droppings from wild birds around ponds into their poultry houses. Wild birds are well known to be carriers of the avian influenza virus as well as other poultry diseases. Hunters should be sure they take the same biosecurity precautions as if they were visiting another poultry farm (i.e. showering, changing clothes, sanitizing vehicles, etc.).

Inspect Flocks Daily

Growers are required by their contract to inspect their flocks every day. Mortality should be picked up daily and disposed of in a timely and approved method. Stockpiling mortality and allowing carcasses to decompose before disposal increases the risk of spreading disease via rodents and insects. Growers should report increases in mortality or signs of health problems to their service representative immediately. This is required by contract and will ensure a rapid detection and response should a disease be present. Growers should check with their poultry company before using any vaccines, medications or drug treatments for a flock health problem. Timely reporting of health issues on a farm will not only help restrict additional infections, but will minimize losses to both the grower and the company.

Maximize the Environment

Maintaining litter in a relatively dry condition (i.e. 20%-30%) and providing good ventilation will help control microorganism numbers. Wet conditions combined with warm in-house temperatures provide a good growth environment for most disease causing organisms. Good ventilation also helps reduce microorganisms as fresh air entering and leaving the house dilutes microbe populations and removes them from the house. Poor ventilation can result in irritation of the respiratory tract of birds making them more susceptible to bacterial and viral infections.
Keep Areas Around Houses and Feed Bins Clean

Keeping grass and weeds cut around poultry houses and removing unused equipment or trash is beneficial in keeping rodent and insect populations under control. Thick grass or weeds and old equipment provide refuge and habitat for rats, mice and insect pests that can spread disease. Spilled feed should be cleaned up regularly and not allowed to collect for long periods of time. Spilled feed around the feed bins will attract birds, rats, mice and insects.

Recognizing Disease Symptoms

It is important for poultry growers to be aware of signs of disease in their flocks. Early detection of contagious diseases can greatly reduce the impact and spread of that disease to other flocks. Clinical signs associated with the possibility of a disease in a poultry flock are:

- Lack of energy and appetite
- Decreased egg production
- Soft-shelled eggs or misshapen eggs
- Swelling of the head, eyes, comb, wattles and legs
- Purple discoloration of the wattles, combs and legs
- Nasal discharge
- Coughing, wheezing and sneezing
- Lack of coordination in mobility
- Diarrhea
- Sudden or excessive mortality without clinical signs

Contract poultry growers should notify a representative of their poultry company immediately if any symptoms of a disease condition is observed. Non-contract producers can contact a poultry veterinarian associated with the Georgia Poultry Laboratory Network or Poultry Diagnostic Research Center (PDRC), Athens, Georgia. The Georgia Poultry Laboratory Network maintains diagnostic laboratories throughout the state and will assist non-commercial poultry producers with poultry health problems. Locations and phone numbers for the laboratory network and PDRC are listed below:

- Oakwood, Georgia (770-515-5996)
- Bowden, Georgia (706-258-0309)
- Camilla, Georgia (229-336-0001)
- Canton, Georgia (770-479-2901)
- Carnesville, Georgia (706-384-2387)
- Dalton, Georgia (706-278-7306)
- Douglas, Georgia (912-384-3719)
- Forsyth, Georgia (478-994-1219)
- Montezuma, Georgia (478-472-9041)
- Glennville, Georgia (912-654-0504)
- PDRC, Athens, Georgia (706-542-5629)

Summary

Protecting poultry flocks from microorganism contamination is an extremely important component of commercial poultry production environment. The introduction of a highly pathogenic, contagious disease organism into poultry flocks could result in serious economic consequences for producers. The effectiveness of a biosecurity program can be optimized by regional participation. While any level of biosecurity is helpful, if all poultry producers in a given area utilize best management programs, the program as a whole will be more effective. Practicing sound biosecurity procedures every day as part of a best management program will help reduce the possibility of contracting a disease and will reduce the spread of disease should an outbreak occur.
## Appendix D: Sample Pre-Operation and Post-Operation Checklist

<table>
<thead>
<tr>
<th>Area</th>
<th>Notes: corrective actions taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive/Hold</td>
<td>Withhold feed 12 hours prior to processing. Clean foreign matter from birds</td>
</tr>
<tr>
<td>Kill/Breed</td>
<td>Proper cleaning of cones, equipment and utensils</td>
</tr>
<tr>
<td>Scald</td>
<td>Monitor water temperature: change water if/as required</td>
</tr>
<tr>
<td>Pluck</td>
<td>Proper cleaning of equipment, including rubber picker fingers</td>
</tr>
<tr>
<td>Pre-Chill</td>
<td>Monitor water temperature: change frequently</td>
</tr>
<tr>
<td>Remove head, crop, feet, and oil gland</td>
<td>Proper cleaning of equipment and utensils</td>
</tr>
<tr>
<td>Make cut around vent</td>
<td>Proper training, proper cleaning of equipment and utensils</td>
</tr>
<tr>
<td>Eviscerate</td>
<td>Proper cleaning of equipment and utensils; proper care in not puncturing intestines</td>
</tr>
<tr>
<td>Harvest liver, heart, gizzard and neck</td>
<td>Proper cleaning of equipment and utensils</td>
</tr>
<tr>
<td>Trim carcass, final rinse</td>
<td>Trim to remove foreign matter. Proper cleaning of equipment and utensils</td>
</tr>
<tr>
<td>Final inspection; carcass, giblets, neck</td>
<td>Trim to remove foreign matter. Proper cleaning of equipment</td>
</tr>
<tr>
<td>Chill carcass, giblets, neck</td>
<td>Monitor temperature</td>
</tr>
<tr>
<td>Drain carcass, giblets, neck</td>
<td>Proper cleaning of equipment, utensils, and food contact surfaces</td>
</tr>
<tr>
<td>Cut up carcass</td>
<td>Proper cleaning of equipment, utensils and food contact surfaces</td>
</tr>
<tr>
<td>Package, weigh and label</td>
<td>Include Safe Handling Instructions on label. Wash or trim to remove contamination from foreign matter</td>
</tr>
</tbody>
</table>
| Site Management and Pest Control          | • Visually inspect processing environment (grounds and buildings, including storage areas and sanitary facilities) for cleanliness and presence of pests. List needed corrective actions. |}
|                                           | • Perform corrective actions                                                                    |
| Personnel Health and Hygiene              | • Interview and visually check processing personnel for health and personal hygiene considerations, prior to approving anyone for food handling |}
|                                           | • Dismiss anyone found unsuitable for work                                                       |
| Pre-Operational Inspection and Sanitation  | • Visually inspect all equipment and utensils for cleanliness and operability                    |
|                                           | • Clean, rinse and sanitize all product contact surfaces, equipment and utensils, including coolers |
| Daily Operational Sanitation Maintenance   | Kill Area                                                                                      |
|                                           | • If a piece of equipment or a utensil falls to the floor or ground, wash thoroughly             |
|                                           | • Maintain area in a clean and sanitary condition throughout operation                          |}
<p>|                                           | Processing Area                                                                                 |</p>
<table>
<thead>
<tr>
<th>Area</th>
<th>Notes: corrective actions taken</th>
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| Chill Tank, Giblet Chill Containers and Refrigeration Temperature Monitoring | • If a carcass falls to the ground, or comes in contact with unsanitized surface, discard immediately  
• Maintain entire area in a clean and sanitary condition throughout the daily operation  
Notes:  
• The target temperature for the chill tank is between 33° and 41° F (add ice as necessary)  
• The chill tank must reduce the temperature of carcasses to 41° F or less within 4 hours of evisceration  
• A digital thermometer with an accuracy of ±2% is needed to measure internal carcass temperatures and a minimum of 5 birds should be tested  
• Giblets must be chilled to 41 °F or below within two hours of slaughtering the birds  
• Fresh product must be held at 33°- 41° F during storage and transit, resulting in product shelf life is 4 days (freeze or discard product if held for more than 4 days) |
| Kill Area                                                           | • Pick up feathers and other matter and deposit into receptacle for inedible material.  
• Briefly pre-rinse all dirty areas with warm water and start the process at the top and work all material down to the floor.  
• Apply detergent as follows:  
  o Rinse all equipment from top to bottom  
  o Inspect and re-clean any missed areas  
  o After cleaning/rinsing work areas, apply sanitizer to all contact surfaces  
  o Squeegee standing water to the floor |
| Operational Sanitation Schedule                                     | • Pick up any pieces of bones, fat, meat or other matter and deposit into container for inedible material  
• Disassemble all equipment and place parts in their designated tubs  
• Briefly pre-rinse all soiled areas with warm water - start the process at the top and work all material down to the floor  
• Apply approved soap as directed  
• Rinse all equipment from top to bottom  
• Inspect and re-clean any missed areas  
• After equipment and work areas have been cleaned, apply sanitizer to all contact surfaces  
• Squeegee any standing water on floor to drainage areas  
• Remove, clean and sanitize any waste conduits or drains |
Appendix E: Poultry Best Management Practices Self-Certification

This document summarizes best management practices for small chicken flock (<1,000/year) that are exempt from inspection by the USDA.

Owner Name: ___________________________  Farm Name: ___________________________

Owner Mailing Address: ___________________________

Farm Address (if different than above): ___________________________

Owner Telephone: ___________________________  Owner Email: ___________________________

Training

Please describe any formal or informal training in poultry processing you’ve received. Include the duration and date(s) of training, as well as the training provider (organization and instructor).

__________________________________________________________________________________________

__________________________________________________________________________________________

Number of birds processed annually on your farm?  _____ Chickens  _____Other

Sanitation Information

1. Does the facility clean and sanitize all food contact surfaces, equipment, and utensils as frequently as necessary to prevent insanitary conditions and the adulteration of product?  □ Yes  □ No

2. Does the facility clean and sanitize nonfood contact surfaces, equipment, and utensils as necessary to prevent insanitary conditions and the adulteration of product?  □ Yes  □ No

3. Are all cleaning compounds, sanitizing agents, processing aids, and other chemicals used by the facility safe and effective under the conditions of use?  □ Yes  □ No

4. Does the facility protect product from adulteration during processing, handling, storage, loading and unloading, and transportation?  □ Yes  □ No

Processing Information

1. Birds processed in:  □ Your own on-farm set-up?  □ Mobile Poultry Processing Unit?

2. Only FDA-approved food-grade packaging materials (freezer paper, plastic wrap, shrink bags) used?  □ Yes  □ No
3. Packaged poultry with farm name and address date slaughtered, safe handling instructions, and “Exempted PL 90-492” properly labeled?  □ Yes  □ No

4. Poultry sold:  □ Fresh  □ Frozen
   If fresh, poultry is:  □ Picked up within 4 hours of slaughter
   □ Held at <41° F for no more than 4 days

5. Handwashing station with soap and hot water?  □ Yes  □ No

6. All poultry processing helpers/personnel trained to wash hands frequently, particularly if they touch anything that could affect food safety?  □ Yes  □ No

7. Poultry holding and slaughter area (including scalding and plucking) kept physically separate from the evisceration and packaging areas?  □ Yes  □ No

8. Helpers/personnel trained to not to move between poultry holding and slaughter areas?  □ Yes  □ No

9. Potable water used for all aspects of processing, including ice and water for chilling the poultry and hand-washing for personnel?  □ Yes  □ No
   Date and results of last water test?

9. Digital thermometer used to ensure that carcass temperatures are reduced to 40° F or less within four hours of evisceration?  □ Yes  □ No

10. All equipment—transport coops, including knives, thermometers, chill tank, and evisceration tables—sanitized with appropriate sanitizer (i.e. bleach, detergent, hydrogen peroxide) before commencing processing?  □ Yes  □ No

11. Any food product that falls on the ground discarded?  □ Yes  □ No

12. Any tool (knife, thermometer, hose, etc.) that falls on the ground re-sanitized?  □ Yes  □ No

13. Poultry sold only to the end consumer either from your farm, a CSA, or at a farmers’ market?  □ Yes  □ No

I certify that I have read and will comply with the Butte County On-Farm Poultry Slaughter Guidelines and that the information presented in this document is correct to the best of my knowledge.

____________________________________________    ______________________________
Farm Owner Signature             Date

____________________________________________
Farm Owner Name Print