

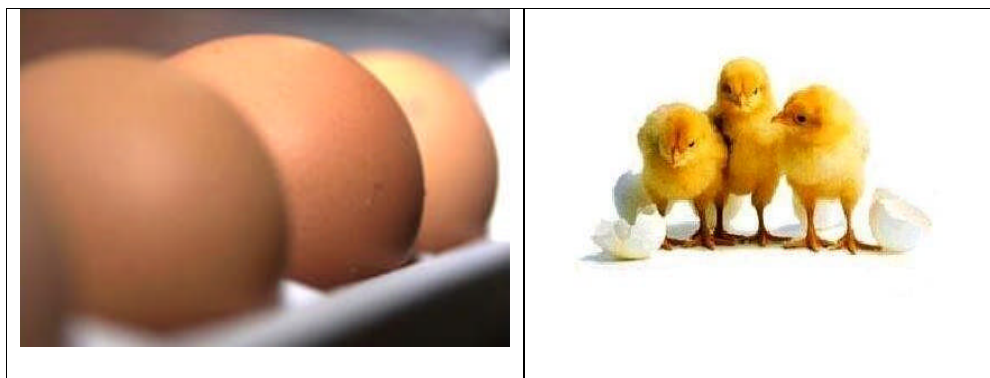
CARIBBEAN POULTRY ASSOCIATION

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CARIBBEAN POULTRY INDUSTRY INTEGRATED IMPROVEMENT PROGRAM

HATCHERY SANITATION MANUAL

A Code of Practice for Hatcheries



December 2004

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CARIBBEAN POULTRY ASSOCIATION HATCHERY SANITATION MANUAL

Foreword

As CARICOM moves towards increased trade liberalization under the Caribbean Single Market and Economy (CSME) and the Free Trade Areas of the Americas (FTAA), Caribbean Poultry Association members will need the need to address the challenge of improving competitiveness more aggressively. While the region already faces the threat of injury from US leg-quarters which are sold onto the world market below the cost of production, the FTAA will bring new competition from low cost producers in South America such as Brazil and from value added producers such as Panama and Costa Rica.

In response to this CARICOM has been advocating for sensitive treatment of the poultry industry to afford our producers more time to improve competitiveness and to secure our food, nutrition and rural livelihood security. CPA members must make use of this time to embrace cutting-edge marketing and production technology, adopt industry best management practices in order to be competitive and maintain profitability.

Already, several of our members have shown that it is possible for us to achieve international competitiveness in areas which are not scale dependant. Two of these, Jamaica Broilers and Chickmont Foods, Barbados, who subscribe to Agristats, the largest international poultry industry benchmarking service, are able to achieve farm performances (FCR, mortality, live weight gains), which frequently ranks them in the top 10% of the database through the use of modern technology and management in their broiler operations.

This manual is intended to help more Caribbean Hatcheries to meet these standards. It is meant to provide hatchery mangers with a core of modern **Biosecurity, Sanitation and Food Safety Management practices**, around which national and company specific programs can be developed. It is designed as a living manual, which needs to be updated periodically by additions by producers from sources such as the internet sites provided in the manual. For these purposes, it is therefore recommended that it be reproduced and distributed in binder format to facilitate easy modification and addition.

We wish to thank some of the leading Caribbean integrators - Best Dressed Chicken, Pinnacle Feeds, Arawak & Co., and the international breeders - Cobb-Vantress Inc, and the Lohmann Group for making their reference guides available as the basis for this manual.

We wish to acknowledge the support of the Canadian International Development Agency – Caribbean Program for Economic Competitiveness (CIDA-CPEC) Program who provided the funding for the development and review of this developing this manual.

We encourage our member associations to distribute this manual to all our producers and to encourage them to participate the in the national poultry production seminars and annual regional CPA Poultry Production Schools where the best practices in this manuals can be taught and updated.

Robin Phillips
President
Caribbean Poultry Association
December 2004

CARIBBEAN POULTRY ASSOCIATION HATCHERY SANITATION MANUAL

Abbreviations

DOA
Hatchability
FCR
ADG

Feed Conversion Ratio
Average Daily Gain

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A. INTRODUCTION

There is more to hatchery bio security than just sanitation. Hatchery location, design, accessibility, workflow, and pest control, all complement a stringent sanitation program to insure good bio security. The temperatures and humidity required for hatching are ideal for growth of bacteria and molds. Problems coming from the breeders can be amplified, and new ones introduced.

Embryos and newly hatched chicks can offer little disease resistance. In other words, the pressure of infection required to impacting their health and viability is much lower than for older birds. It is, therefore, essential to provide them with a clean environment during their incubation and hatching.

Please refer to the breeder section of this program as a complement to the hatchery section.

B. BIOSECURITY

1. Location

The more a hatchery is located in close proximity to other poultry traffic, the more vigilant one should be about issues such as pest infestation, visitors, and ventilation related pathogens. It is important to recognize that lots of poultry in the area increases the risk of transmission of infectious diseases. Therefore, it is best if no poultry related activities (feed mill, farms, live-haul routes, etc.) are conducted next to the hatchery. There is no formal work allowing us to suggest a specific "poultry free distance". In fact, there are several examples of hatcheries located near main company offices and that have not experienced significant infectious disease problems for many years. However, they insist that live haul not use the road in front of the hatchery, and all traffic must use a wash station.

2. Design for hatchery work flow

The work and traffic flow should follow the same route as the hatching egg. Modern hatcheries should be designed with ventilation systems preventing cross-contamination of the different areas of the building. The benefits of such systems will largely be negated if employees are allowed to move freely back and forth between separate areas of the building. If it is needed to "break the unidirectional work flow, it is important for all employees to wear clean hatchery clothing and to change it as necessary.

The hatchery workflow:

- a. Egg receiving area
- b. Egg holding area
- c. Egg cooler
- d. Setters
- e. Hatcher rooms
- f. Tray dumping
- g. Chick processing area
- h. Chick holding area
- i. Chick loading area

A tray wash room would normally be accessible from the tray dumping and chick processing area.

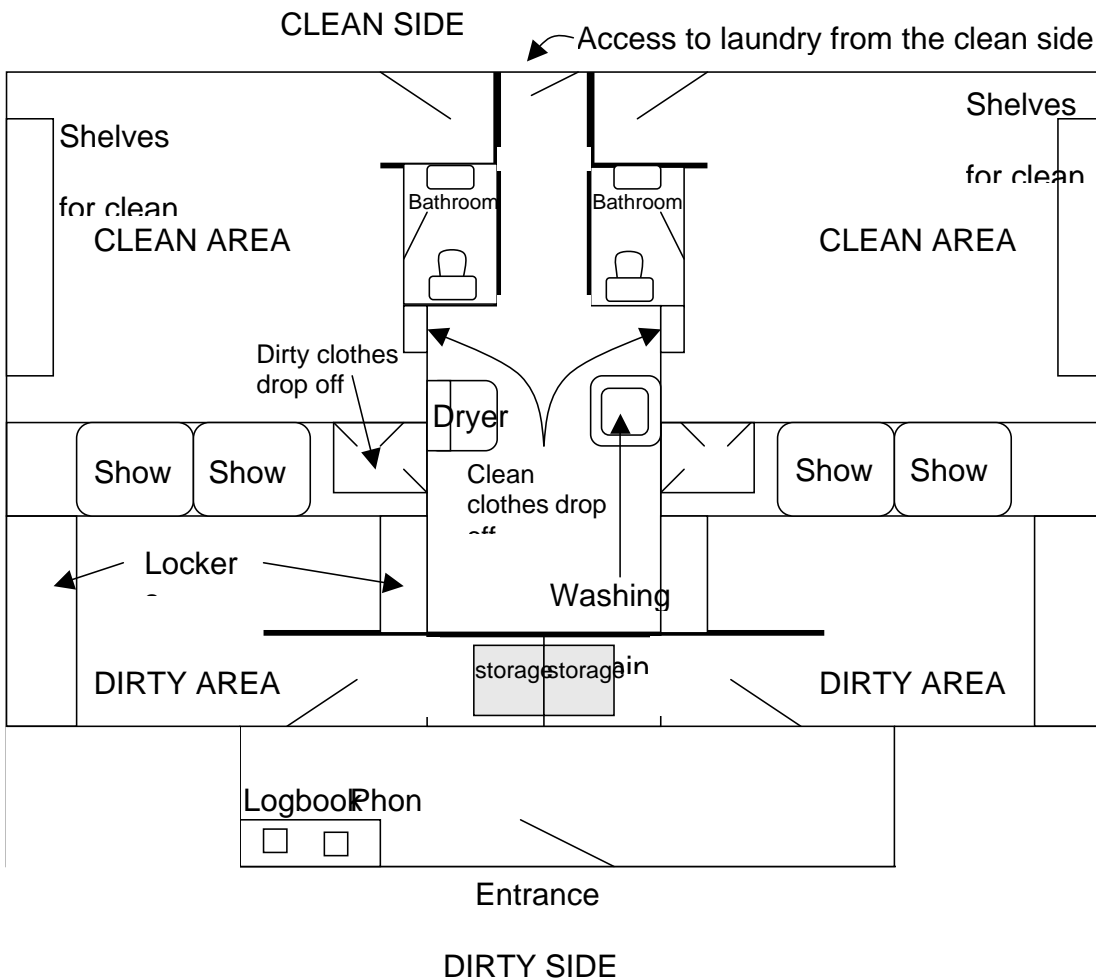
The key is to minimize contamination from one room to the next. Positive pressure rooms are important in critical areas so that contamination won't be drawn in through an open door. Doors help stop cross contamination between rooms. One-way doors can be installed to increase compliance by workers.

Workflow must be monitored and controlled by Management.

3. Facilities

a. Shower

The shower is the line between clean and dirty. A good shower design must have a clear demarcation between the dirty and the clean sides. It is also best if ventilation is designed to prevent contamination of the clean side by the dirty side. Below is a schematic showing key design components:



Note that the clean clothes drop off is only a temporary holding area and it should have a cover.

i. Rationale for showering out:

- By the time you figure out if there is a problem and what it is (i.e. risk of transmission to other locations) it is too late and by not showering out you may have spread the disease to another facility.
- Some companies have tech service people only showered out if they are going to another farm (service techs, vet, breeder manager etc.). The risk there is that you don't shower out planning to go back to the office and then you get another call and you're stuck.
- Farm staff should want to shower out because, by the end of the day, they are dirty and sweaty and showering out enhances their personal hygiene before leaving the workplace.
- Showering out helps contain a disease to one farm. In case of power failure: change clothing, boots, hairnet, and wash hands before going on a farm without power (by-passing the showers).

ii. Shower Procedure - Entering the Hatchery:

- *The key principle:* A shower divides the dirty side from the clean side. Never move any material from the dirty side to the clean side unless it is possible to wash and disinfect the equipment.
- Remove clothing on the dirty side; use lockers if available; if not, keep all your belongings together on a bench.
- Shower using soap. Wash entire body, including hair.
- Use clean towels to dry off once on the clean side of the facilities and put on farm clothing.
- Never cross back to the dirty side unless you are leaving the premises, and you are willing to take a shower on your way out. Employees or visitors' vehicles should be considered as part of the "dirty side". Therefore, no one should return to their personal vehicle after showering or if wearing company or farm clothing.

- If bringing lunch on the clean side: a lunch box with hard cover must be washed before going through the shower to the clean side. Alternatively, a sealed plastic bag can be used and must be washed (outside) before going to the clean side.
- Visitors should sign in where ever the logbook is available.

iii. Shower Procedure - Leaving the Hatchery:

- Remove farm clothing and place in the laundry container or chute.
- Shower like you did to come in.
- Use a clean towel to dry off. If you go on the "dirty" side with a towel, do not return the towel to the clean side.
- Put on your personal clothes.
- Exit the building via the "dirty side".

iii. Cleaning the shower facilities:

- *Clean side:* the person in charge of laundering the farm clothing maintains the clean side. The clean side must be thoroughly washed and disinfected at least weekly (more frequently if heavy traffic).
- The clean side must have:
 - A garbage can,
 - A container or chute for used towels,
 - Anti-slip rubber mats,
 - A plug-in flashlight in case of power failure,
 - Hand/body lotion,
 - A gel-type hand sanitizer.

Each shower must have:

- Shampoo
- Soap (or total body shampoo) and
- Fingernail brushes
- *Dirty side:* If the person responsible for the clean side also services the dirty side, he/she should do so at the end of the day. A different set of broom, mop, soap, etc. must be used. Towels on the dirty side should be laundered at the end of the day as well. The person cleaning this room should wear disposable plastic boots, a clean smock and rubber gloves. The dirty side must have:
 - A garbage can,
 - A container or chute for used towels,
 - Anti-slip rubber mats,
 - A plug-in flashlight in case of power failure,
 - Hand / body lotion.
- Other items that may be considered: combs, blow dryers.

b. Laundry

The laundry facilities should be designed in such a way to be easily and frequently cleaned. For example, it is best to use lockers made of hard plastic instead of metal. The floor should be resistant to frequent washing and with good drainage.

Traffic in the laundry room should be restricted to the personnel working in this area (in cases when the laundry facilities are separated from the clean area).

Washed clothing must be stored in the clean area as soon as possible. Laundry room personnel must wash hands before handling washed clothing.

Floors, carts, lockers, etc. should be washed and disinfected daily. Disinfection can be done with spray products like Lysol.

b. Procedure when going to a quarantine farms

A record should be available for what was taken, by whom, and to go where. Personnel going to a quarantined farm would be expected to have written approval by the production manager or company veterinarian. If approval is over the phone, laundry personnel should register this approval in the same logbook as for the one used to keep track of clothing.

In order to avoid bringing contaminated material to the central facilities, all personnel should proceed as follows:

- i. If shower facilities are available at field office, they should bag personal clothing using a resistant garbage bag and take it through shower.
- ii. Shower and put on clean clothes.
- iii. After completing work on the quarantine farm, they should go to a pre-approved site (other than the field office) to take a shower and put on personal clothing.
- iv. Clothing used on the farm should be washed at this site, or any other approved facilities before being returned to the field office, where it will be treated as dirty (i.e., will be rewashed at the field office laundry facilities). Boots will be washed and disinfected at the remote site and will be disinfected again upon arrival at the field office.

- v. Laundry room personnel should wear disposable gloves when handling clothing that has been used on a quarantined farm or wash hands carefully before handling any other clothing after that.

If personnel that has visited a quarantined farm showers at the field office, they should proceed as a group (nobody else allowed on the "incoming" side of the shower facilities, until they have all gone through showers, and the laundry room personnel have had the opportunity to wash the room: wash and disinfect floor, benches, etc). A sign will be posted to inform other personnel of the current situation.

4. Hatchery Personnel

All hatchery personnel should follow strict hygiene guidelines:

- a. All employees must park in a designated area.
- b. They should not be visiting other poultry facilities. Under the rare occasion when this might occur, they would have to take a shower and use clean clothes before re-entering the hatchery. The hatchery manager must monitor this.
- c. They should use protective clothing, including boots, only used at the hatchery.
- d. If a shower in – shower out facility is available at the hatchery, it must be used consistently and never by-passed (all individuals leaving the hatchery and re-entering must go through the process again).
- e. At the very least, all employees will be expected to have taken a shower at home before coming to work, they must come to work wearing clean clothes AND they will all be required to thoroughly wash their hands when arriving at the hatchery. Therefore, a hand washing station with antibacterial soap should be readily available. Hand washing is essential before, after, and between egg and chick handling operations (e.g., setting, transfer, candling, sexing, vaccinating, packing, etc).
- f. Foot pans separating two sections of the hatchery should be kept cleaned with the disinfecting solution replaced at least every 48 hours (preferably daily). It is understood that boots or shoes used at the hatchery would normally not be covered by organic material (dirt, feces). If they are, they should be cleaned with a brush and a detergent before foot pans are used.
- g. Employees are expected to have lunch in a designated area. They must wash hands before and after lunch. If they need to leave the hatchery during working hours (including lunch time), they must remove hatchery clothing and shoes,

change in their personal clothing, wash their hands, and use the entrance/exit footbath, if present. Upon return, they must proceed like for first arrival (above).

- h. At the end of the workday, all hatchery clothing must be placed in an appropriate container for laundry.
- i. If other company personnel need access to the hatchery, they should not have been in contact with poultry at least 24 hours prior to the visit.

6. Egg delivery

- j. The driver should not enter the egg holding room at the hatchery especially if the driver and truck have been on several farms.
- k. Wash and disinfect the egg truck. Ensure that clean trays and trolleys are returned from the hatchery to the breeder farms. Egg transportation vehicles must be cleaned between collection runs. This includes a wash followed by disinfection (see washing & disinfection sections for details about products).

It is highly advisable to have a vehicle cleaning area next to the hatchery equipment washroom.

7. Visitors

A visitor is anyone who doesn't regularly work at the hatchery. (students, consultants, hatchery inspector etc.). A logbook should be available to record such visits. A visit should be requested in writing and approved by the company veterinarian or any other person responsible for the Bio security of the hatchery. Also for security reasons (e.g., to guard against individuals such as animal extremists), no visitor should be allowed in if the paper work is not available.

Visitors must park in a designated area.

Other operational areas (breeder management, live production, maintenance) should not be located at the hatchery. If they must be, the outside doors of a hatchery should be kept locked at all times or access to the working areas restricted by other means. This is another reason why the outside doors of a hatchery should be kept locked at all times.

This may be inconvenient, but it ensures that only approved personnel have access to the facilities. An intercom on the outside or an enterroom with a window for the secretarial staff can be used to help screen visit requests. In many cases, the business can be handled without the person entering the hatchery.

The visitor form should also clearly state that the person must not be in contact with poultry, feed mill, rendering plant, processing plant, birds of any kind, etc. for at least 24 hours prior to coming to the hatchery.

If visitors must enter the hatchery, they should wear clean coveralls (or laboratory coat), socks, and shoes provided by the hatchery. If the hatchery cannot provide shoes or boots, it should have disposable plastic boots available. Once in the hatchery, visitors must follow the same rules as the employees.

People who have visited a farm affected by an infectious disease (whether or not a Formal quarantine was required), must not visit the hatchery for 72 hours.

8. Pest Control for Bio Security

a. Pest Control for Biosecurity –

The house fly (*Musca domestica*) and blow flies (*Lucilia sericata*, *Calliphora* spp., *Phormia regina*) are likely to be the primary fly pests found in the hatchery. Black garbage flies (*Hydroteae anescens*) or little house flies (*Fannia* spp.) may be more abundant than house flies in some regions. Others, such as the fruit fly (*Drosophila repleta*) and the drain fly or moth fly (*Psychoda* spp.) are of secondary importance. Cockroaches, typically the American cockroach (*Periplaneta americana*) and the oriental cockroach (*Blatta orientalis*), may also become serious pests. The Norway rat (*Rattus norvegicus*) and house mouse (*Mus musculus*) are common rodent pests. The roof rat (*Rattus rattus*) may be present alone, or in mixed populations with the Norway rat and/or mice in some regions.

a. Sanitation practices for Pest control

- i. All hatchery wastes must be removed in a timely fashion to deny potential breeding habitat for flies and food for cockroaches and rodents. Check on top of incubators and remove broken eggs or other debris. Be sure this practice of “out of sight” disposal is halted.
- ii. Inspect air conditioners, cooling towers, humidifiers and drains (floor, sinks and water coolers) for mold and algae and clean as needed to remove breeding habitat for drain flies and fruit flies. Covered drains in particular may also provide concealment for cockroaches. The wet area beneath condensation pipes leading from air conditioners, sewage filtration tanks, and septic tanks are other potential drain fly breeding sites that may require periodic cleaning.
- iii. Keep break rooms, dining rooms and showers clean to eliminate potential food sources and hiding places that attract cockroaches. Require that carry in food be kept in sealed containers.
- iv. Keep rooms and storage areas free of clutter to eliminate hiding and nesting places for rodents. Keep outside areas open, well manicured and free of clutter to eliminate hiding places for rodents.

b. Other cultural practices:

- i. Equip entrances and loading docks with insect barriers or air curtains that provide for human movement but are difficult for flies and other flying insects to penetrate.
- ii. Close or restrict potential entry points. Cracks or breaks in foundations and walls, gaps around entry doors, ventilation inlets, as well as openings around pipes and conduits are common points of entry for cockroaches and rodents.

- iii. Consider use of motion activated security lights around loading docks and entries. Intermittent operation is likely to attract fewer flying insects such as the American cockroach than continuous operation.
- iv. Routinely inspect cupboards, water fountains, hot water heaters and other appliances, air plenums, storage rooms and other spaces for cockroaches and their egg cases. For rodents, thoroughly inspect the premises every 3-4 months for signs of activity. Rodent inspections should be three-dimensional, covering overhead and ground level spaces in and around the building.
- v. Caution employees to inspect all incoming and outgoing items to minimize the risk of transporting cockroaches to and from home or farms.
- vi. Spot check supplies and other materials delivered to the hatchery for evidence of infestation.
- vii. Egg delivery trucks pose a risk of introducing flies or other pests from the farm. Instruct drivers to minimize the time trucks are open at the farm.

c. Control practices:

- i. Space sprays (fogging) are most effective for fly control and can be applied during off hours. Scatter baits and bait strips may be used to control flies inside the hatchery, especially around loading docks. Jug traps are an alternative method of fly control near loading areas. Light traps designed to capture flies are available and may be placed at strategic locations in areas near loading docks, or where critical activities occur. Avoid high voltage electric "zappers" that create an aerosol of tissue and fluids when flies and other insects hit the electrocution grid and explode.
- ii. Use approved insecticides for crack and crevice treatments to control cockroaches. Bait formulations may be used to control cockroaches in offices, labs and break rooms.
- iii. Maintain as standard rodent control program using bait stations containing a single dose rodenticide. Place stations at 40 to 60 foot intervals around building exteriors. Spacing should be closer in areas where rodent activity is high. Place bait stations where rodent activity is noted inside the hatchery. Check and replace bait at 2-4 week intervals where rodent pressure is light. Inspect and replenish bait more frequently where activity is moderate or heavy. Mechanical traps or glue boards may be used in areas (offices, break rooms, labs, etc.) where the use of rodenticides is less desirable.

Enhanced Pest Control for Biosecurity

The same pests listed under Basic are of concern. House flies, little house flies and blow flies will likely be the most common pests. Rodents and cockroaches may also be a problem, especially in older facilities.

a. Sanitation practices - The same approach as listed under Basic, except that the frequency of inspections may need to be increased to insure that nothing is overlooked. Remember that a number of the fly species will complete their life cycles quickly.

b. Other cultural practices - The same practices as found under the Basic plan apply, except that inspections for signs of insect and rodent activity should be conducted weekly in critical areas of the hatchery. The location and closure of entry points must be as thorough as possible. Increase inspection of incoming and outgoing materials to minimize the likelihood of moving unwanted guests around company operations.

c. Control practices - The same general approaches as for the Basic plan apply to the Enhanced plan. Be sure to respond quickly to identified pest problems. Adjustments in control plans may include:

- i. Increase the number of fly bait strips, traps and rodent bait stations to provide better coverage, especially in critical areas of the hatchery.
- ii. Equip trucks with a small pyrethrum fogger to eliminate insect hitchhikers en route between the farms and hatchery, and visa versa. A single fogger operated by a manual switch will generally suffice.

If single dose anticoagulant rodenticides are in use, switch to a single dose acute active ingredient. Acute rodenticides will kill rodents more quickly, further reducing the risk of disease transmission.

C.SANITATION

1. Egg Delivery

Make sure that clean trays and trolleys are returned from the hatchery to the breeder farms. Egg transportation vehicles must be cleaned between collections runs. This includes a wash followed by disinfection. Washing and disinfection of vehicles should be possible at the hatchery.

2. Egg sanitation

Eggs are not laid in a sterile environment. Even before that, eggs are exposed to many microbes. The vent of the hen is a contaminated "delivery environment". Dirty nests, or if eggs are laid on the floor, can also contribute to egg contamination. Eggs do have natural barriers against microbes. They are: the cuticle, the shell, the shell membrane, and the albumen or egg white that contains some anti-microbial properties. The cuticle minimizes bacterial penetration via the egg's pores and the shell membrane acts like a filter. But if the contamination is severe, these natural defenses won't prevent the infection.

3. Building and equipment sanitation

Washing and disinfection of equipment are a critical component of hatchery biosecurity. Even with the best of intentions, sterility cannot be achieved. Therefore, the objective is to incubate and hatch the eggs in a clean environment.

A thorough cleaning of the area (setters, hatcher, floors, chick-go-rounds, vaccinators, etc.) is essential before a disinfectant can be applied. Organic material (fluff, blood, shells, droppings) reduces the effectiveness of most disinfectants. Therefore, washing is paramount.

First, all debris must be removed by sweeping, vacuuming, or by spraying water. A high pressure sprayer can be used, but hand scrubbing will be required if organic material remains or if the equipment being cleaned should not be exposed to a high pressure flow of water. Cleaning should be done using warm water and the proper detergent. It is important to consider the hardness, the salinity, and the pH of the water. Rinsing with clean water is also important to remove detergent residues; it also contributes to removing as much organic material and microbes as possible.

The disinfectant is applied after the washing process has been completed. Please see the disinfectant section for recommendations on which types of product to use. This is critical because the improper selection or use of disinfectant can damage equipment or affect hatchability and chick or poult quality.

a. Setters - Fog a disinfectant after eggs have been set. Multi-stage setters should be fogged each time new eggs are set or transferred.

When setters are emptied, a thorough cleaning and disinfection are required. Like for any other areas, all debris must be removed as part of the cleaning process.

b. Candling and transfer area - After every egg transfer:

- i. Remove all dust and debris and dispose.
- ii. Scrub and wash all wall and floor surfaces with a detergent.
- iii. Leave to dry.

c. Hatchers - The hatcher is the main source of organic contamination in the hatchery (egg shells, unhatched eggs, dead chicks/poults, fluff, droppings). Conditions in the hatcher (temperature and humidity) are also ideal for the growth of many microorganisms. It is, therefore, important to use handling procedures to minimize contaminating the other areas of the hatchery. After all the chicks or poults have been removed, a cleaning team should:

- i. Strip out the equipment.
- ii. Remove (vacuum) all debris
- iii. Apply water and detergent or foaming solution before scrubbing all parts of the Hatcher (walls, floor, and ceiling).
- iv. Pressure wash.
- v. Rinse thoroughly.
- vi. Remove excess water and reposition the equipment
- vii. Apply a disinfectant
- viii. Warm up the hatcher to help dry the interior
- ix. Make sure that the outside of the hatchers is also cleaned.

d. Wash Room - At the end of the day (after transfers and hatches), wash down the walls and floor and rinse with clean water. A disinfectant can then be applied.

Make sure that setter trays and chick/poult drawers (or crates) are cleaned and disinfected before leaving the wash room (pressure washing, rinsing and disinfection). If an automatic tray/crate washing machine is used, make sure the proper products are used and monitor the efficacy of the washing. Trays and crates should be handled to avoid contaminating them before they are returned to the appropriate area of the hatchery or the farm.

e. Vaccinating and beak trimming equipment - This equipment requires a very rigid sanitation schedule to avoid chick quality problems. The following is a sanitation program suggested by Mauldin (1983):

- i. "At the end of hatch day, scrub beak trimming machines and install fresh blades.

- ii. Clean and sanitize Marek's vaccine machines at the end of each day (see Embrex protocol for *in ovo* machines).
- iii. Disassemble and wash the syringes, then pressure cook at 15 psi for 20 minutes.
- iv. Flush vaccine bottles and hoses and wash with a non-residual disinfectant such as alcohol or chlorine. Place them in a steam kettle for 30 minutes. Store unused syringes in alcohol.
- v. Rinse vaccine hose and pump and leave them filled with alcohol. The morning before the next hatch, remove the alcohol and pump the machine with a solution of distilled water and chlorine. Every two days, remove the hose and steam the machine in a pressure cooker at 15 psi for 20 minutes.
- vi. Before starting the next morning, repeat the steam treatment of syringes. Then place the syringes in the machine with new needles.
- vii. Change vaccine bottles, hoses and syringes about the halfway point of the day".

Note: In order to minimize contamination problems, needle burrs must be checked with a cotton swab and alcohol; if there is a burr, it will pull the cotton. Contamination has been documented when operators have used their fingers to directly assess the presence of burrs.

Chick-Go-Rounds and/or chick/poult conveyor belts and other processing equipment can contaminate day old birds. At greater risk are chicks or poults that may have been pulled early. If their navel is incompletely closed and comes in contact with a dirty or contaminated conveyor belt, there will be many cases of infection. Therefore, it is important to clean and disinfect conveyor belts after the chicks/poults from each breeder flock are processed. It is highly recommended to clean and disinfect the belts during the times that beak trimming and vaccinating operators are on breaks.

f. Sexing and holding area - _Wash and disinfect after each hatch.

g. Water system - _ See waterline sanitation below.

4. Waterline sanitation - Hatchery

Dirty water lines may help transmit disease agents. Therefore, waterline sanitation is important.

It is important to use proper products to clean waterlines and to follow the manufacturer's recommendations. Chlorine is effective as a sanitizer at 3 to 10 ppm and iodophors at 12.5 to 25 ppm.

The following tables can be used as guides for cleaning or sanitizing.

Table 1: Cleaning waterlines (Lovell E.J., 1996, reported by Oderkirk A., 1998)

Cleaner	Proportioner (1 oz per gallon)		Bulk tank	
	Cleaning	Maintenance	Cleaning	Maintenance
Citric acid	4-5 packs of 205 gr/pack per gal. water	1 pack per gal. of water	4-5 packs in 128 gal. of water	1 pack in 128 gal. of water
Vinegar	No dilution	0.5 in 0.5 gal. of water	1 gal. In 128 gal. of water	0.5 gal. In 128 gal. of water
Ammonia	12-16 oz per gal. of water	4-6 oz per gal. of water	12-16 oz in 128 gal. of water	4-6 oz in 128 gal. of water
Chlorine (5%)	12 oz per gal. of water		12 oz in 128 gal. of water	-

Table 2: Sanitizing waterlines (Lovell E.J., 1996, reported by Oderkirk A., 1998)

Sanitizer	Proportioner(1 oz per gallon)	Bulk tank
Chlorine (5%)	5 oz per gal.. of water	5 oz per 128 gal. of water
Iodine (18.5%)	12 oz per gal. of water	12 oz per gal. of water
Peroxide (35%)	0.5 – 1.0 oz per gal. of water	0.5 – 1.0 oz per 128 gal. of water

Note that hydrogen peroxide is corrosive and harmful to the skin. Iodine and citric acid are corrosive to galvanized steel; iodine may also affect rubber and latex. Finally, chlorine is corrosive at high levels to all metals.

Other issues about chlorination (Jeffrey, 1997):

- Organic matter inactivates chlorine, so pipes must be relatively clean before using this disinfectant.
- It is best to use chlorine with water at pH 6 to 8.
- Water temperature should be above 65 F; if this is not possible, a much greater contact time (2 to 3 times) is needed for the product to work
- Continuous chlorination is best
- Hard water, up to 400 ppm, is not a problem

Monitoring: Monitoring should be done weekly.

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5. Ventilation

The hatchery ventilation system plays an important role in preventing contamination (when functional and well designed) or by being the source of the problem (e.g., aspergillosis contamination). Ideally, each room of the hatchery should have its own separate ventilation system, so air does not move from one room to another. This way, the ventilation system will not introduce contaminated air from other sections of the hatchery or from outside. The system must provide clean, fresh air to the hatchery and the incubators at all times. Hatcheries should be designed to exhaust air away from intake outlets so contaminated air is not recycled into the hatchery (Mauldin, 1983).

Any sign of chick down in the setter room is a sign of contamination.

Maintenance of the evaporative coolers is critical. Filters must be cleaned and disinfected routinely. Disinfectant can be added to the water in the evaporative coolers, especially when starting them off in the spring.

Technology such as electrostatic air cleaning system may also be considered to reduce bacterial contamination.

6. Waste disposal

All waste (egg shells, fluff, unhatched eggs, dead chicks/poults, culled birds, etc.) must be kept in a sealed container away from the egg-receiving and bird-shipping areas. It should also not be closed to the hatchery entrances and parking lot. Solid waste can be incinerated, rendered, or placed in a sanitary landfill. It is very important to make sure that the trucks used to handle this waste are leak-proof.

Disposal of liquid waste should be done according to state and federal water discharge regulations.

Hatchery waste must be removed within a day. The area around the waste container should be free of debris and grass, to allow for easy washing and disinfection.

7. Monitoring & Microbiological assessment

Records must be kept that the biosecurity program is in place and implemented correctly and continuously.

a. Eggs - The hatchery should have a quality control program to monitor incoming eggs visually and microbiologically to ensure that correct egg handling and sanitation procedures are happening on the farm. Dirty, cracked, toe holes, etc. eggs should be discarded but this has to be followed up at the farm level to prevent it from happening again.

b. Building and equipment - A continuous monitoring program must be in place to determine the microbial populations in the hatchery. State laboratories can assist hatcheries, but hatchery managers should not use such assistance as the only monitoring activity.

Visual inspection is an important monitoring tool. It must be done between washing and disinfection. Any organic material will negatively impact the disinfection process. But visual assessment is not enough.

Monitor the environment on every off-hatch day after clean up. Take numerous samples from all areas of the hatchery. Check surfaces and ambient air for contamination. In particular (Mauldin, 1983):

- i. Tray wash areas,
- ii. Air intakes and outlets,
- iii. Filters,
- iv. Evaporative coolers,
- v. Setters,
- vi. Hatchers,
- vii. Chick down within hatchers,
- viii. Air in chick holding and egg storage rooms,
- ix. Chick conveyor belts,
- x. Water source to hatchery,
- xi. Vaccination equipment including vaccine and diluent.

Samples must be tested for bacteria (coliforms) and fungus.

- i. Satisfactory: less than 10 colonies from a swab of a two-inch square area, and a mold count less than five.
- ii. Moderate contamination: Counts of 10 to 30 colonies
- iii. High contamination: greater than 30 colonies.

Testing should be done for each hatch (including air sampling). Fluff, *Salmonella* and other bacteria tests (in addition to coliform assessment) should be done twice a month.

Water testing should be done weekly.

8. Information Flow

Information is critical to optimize any sanitation program. Close communication must be established between the breeder flock manager, the hatchery manager, and the production manager.

The breeder manager must report any unusual occurrences in the breeder flocks:

- a. eggs getting wet or sweating,
 - b. An abnormal occurrence of floor eggs,
 - c. Problems with the cooler in storage room,
- etc.

“The hatchery manager can use this information to make adjustments in setting times or sanitation procedures to maximize the number of healthy chicks being processed”.

Of course, this is a 2-way street. The hatchery manager can assist the breeder flock supervisor by providing information such as abnormal numbers of cracked eggs, misshapen eggs, dirty eggs, etc.

Good communication must also be in place between the hatchery manager and the production people. For example, good coordination between the hatchery and the production personnel can avoid situations when day old birds are placed on a farm that is not ready to receive them. The service person can also report back to the hatchery on issues such as beak trimming quality, chick or poult quality, etc. The hatchery manager should inform the service personnel about issues such as age of the breeder flocks, abnormal delays in processing the birds, high coliform count in hatcher air samples, and any other factors that could influence the general condition of the birds.

Any company that will be providing repair services should be screened. A yearly meeting with these companies is recommended to review biosecurity procedures. This will help them better understand the poultry business and how what they have been exposed to can affect the hatchery. It is always a good idea to take a look in the back of a service person's van or truck to see how clean it is. Coffee cups are OK but any feathers or what might look like litter would be a reason to terminate services with that company.

D.FOOD SAFETY PROGRAMS

1. Salmonella Challenge

The fact that egg transmission plays a dominant role in the spread of infection of salmonella makes it mandatory that only eggs from flocks known to be free of infection be introduced into the hatchery. Eggs can come from two sources

- a. Imported Hatching Eggs – Only eggs from flocks certified as being free from Salmonella Enteritidis should be allowed in the hatchery. The certifying body should be the regulatory body of the exporting country.
- b. Local Hatching Eggs - Local producing flocks should be exposed to the same level of scrutiny for salmonella.

Samples of chicks hatched should be sent to the lab for testing as definitive diagnosis requires isolation and identification.

The testing procedure for

E.SANITATION MONITORING PROGRAMS

APPENDIX 1

Major Hatchery Equipment Suppliers

<p>1. Chick Master Address: Tel: (201) 947 8810 Fax: (201) 947 4608 Email: Website: www.chickmaster.com</p>	
<p>2. Jamesway Address:30 High Ridge Court Cambridge, ON, Canada N1R 7L3 Tel:1.519.624.4646 Fax:: 1.519.624.5803 Email: Website:www.jamesway.com</p>	<p>3. Petersyne Address: Centrumstraat 125 B-9870 Zulite (Olsene) Belgium. Tel:32(0)9 388 96 11 Fax:32 (0) 9 388 84 58 Email:petersime@petersime.com Website : www.petersime.com</p>
<p>4. Nature Form / Robins Address:PO Box 451, Banbury S.O. OX15 5BF UK Tel:+44 (0) 1296 780 957 Fax:+ 44 (0) 1295 780 958 Email: Europe@natureform.com Website: www.natureform.com</p>	<p>5. Embrex Address Tel: Fax: Email: Website</p>

APPENDIX 2

Poultry Breeder Companies

<p>6. Cobb Address Tel: Fax: Email: Website</p>	<p>7. Aviagen Address Tel: Fax: Email: Website</p>
<p>8. Lohman Address Tel:+49 4721 5050 Fax: Email: Website</p>	<p>9. Isa Hubbard Address Tel: Fax: Email: Website</p>
<p>10. Nicolas Address Tel: Fax: Email: Website</p>	<p>11. Hybrid Address Tel: Fax: Email: Website</p>
<p>12. Cherry Valley Address Tel: Fax: Email: Website</p>	<p>13. Grimaud Freres Address Tel: Fax: Email: Website</p>

APPENDIX 3

APPENDIX 3

Profile of Caribbean Hatcheries (1999/2000)

No	Company Name	Country	Hatchery Capacity Chicks/wk	Hatchery Through Put Chicks/Wk	Local H/Egg %	Hatchery Utilization %	Regional Mkt Share %
1	Jamaica Broilers Group –	Jamaica	750,000	500, 000	30%	67%	22%
32	BDC	Jamaica	200,000	200,000	0%	100%	9%
	Caribbean Broilers Group	T&T	200, 000	200,000	0%	100%	9%
4	Supermix Group - Embrex	T&T	150,000	150,000	0%	100%	7%
	Nutramix Group – Untied						
5	Hatcheries	Jamaica	180,000	120,000	0%	67%	5%
6	Kingston Hatcheries	Belize	120, 000	100,000	90%	83%	4%
7	Spanish Lookout - Fresien	T&T	100, 000	100, 000	0%	100%	4%
8	Supermix Group - Trinidad	Bahamas	90, 000	90, 000	0%	100%	4%
9	Galdstone Farms	Barbados	80, 000	80, 000	0%	100	4%
10	Chickmont Foods	T&T	80, 000	80, 000	0%	100%	4%
11	Ibrahims Hatchery	Belize	80, 000	80, 000	90%	100%	4%
	Spanish Lookout – Fresien						
12	Hatcheries	Jamaica	80, 000	80, 000	0%	100%	4%
13	Jamaica Livestock	T&T	75, 000	80, 000	30%	107%	4%
14	Association	T&T	80, 000	60, 000	0%	75%	3%
	WGM Group –Farmers						
15	Hatchery	Suriname	70, 000	60, 000	90%	86%	3%
16	Suoermix Group – Gerizim	Barbados	60, 000	55, 000	0%	92%	2%
17	Hatchery	Guyana	45,000	45, 000	0%	100%	2%
18	Hillys Hatcheries	Belize	40, 000	30, 000	50%	75%	1%
	Gales Hatchery						
19	Bounty Farm - Hatchery	T&T	35, 000	25, 000	100%	71%	1%
20	Blue Creek – Blue Creek	Suriname	25, 000	25, 000	0%	100%	1%
21	Hatcheries	Guyana	60, 000	20, 000	0%	33%	1%
22	Central Hatcheries	Suriname	24, 000	16, 000	50%	67%	1%
23	Fateh Mohammed	Suriname	16, 000	16, 000	100%	100%	1%
24	Lucid Enterprise	Suriname	40, 000	10, 000	100%	25%	0%
25	Osted Hatcheries	Barbados	15, 000	10, 000	0%	67%	0%
26	Suribred	St. Lucia	10, 000	10, 000	0%	100%	01%
27	Surchick	Guyana	85, 000	5, 000	0%	6%	0%
28	Suttons Hatchery						
	St Lucia Hatcheries		2, 790, 000	2, 247, 000		81%	100%
	Lal Beharry						
	Others						
	All CARICOM						
	Source: Industry						