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Biosecurity Guide for Commercial Poultry Production in the Middle East and North Africa

INDEX

International customers are vital to the success of the U.S. soy industry with over 60% of U.S. soybean production exported in the last year making soy products the #1 U.S agricultural export. The U.S. soy industry appreciates the partnership with you and your local industries and customers. Our goal is to provide international customers with sustainable U.S. soy extending a performance advantage, delivery confidence, and a long term commitment to your markets and industries.

We hope you find this manual helpful to your business and look forward to continuing our partnership to support the growth of the poultry and soy industry in the Middle East and North Africa.

Brent Babb
Regional Director – Europe & Middle East/ North Africa
U.S. Soybean Export Council

INTRODUCTION

Over the past 20 years, the commercial poultry industry has grown tremendously worldwide. Chicken consumption has increased due to its versatility as a food, and it is lower priced and considered a healthier choice as compared to other meats. As the poultry industry has rapidly expanded, diseases have become more common and costly.

In many regions of the world, diseases in the commercial poultry industry are resulting in devastating losses.

Companies have to rely on more vaccines and antibiotics to control losses. In recent years, several diseases including a variant Newcastle disease and several types of Avian Influenza have become endemic and are resulting in substantial loses.

In the Middle East and North Africa, the poultry industry is plagued with many diseases and these are having a negative impact on performance and profitability. As the poultry industry expanded, there was little thought put into potential impacts of diseases. As a result, poultry farms were located and designed without regard to disease control.

The poultry industry has attempted to limit losses due to disease. However, it is becoming apparent that it is necessary to go back to the 'basics'. Many realize that vaccines and other treatments have limitations. To be successful, there has to be a change in the manner in which poultry is raised. The key to future success and expansion will come about through elimination and control of diseases and this can only be brought about by implementation of biosecurity programs.

When visiting the poultry industry throughout the world, it is possible to visit countries and regions where poultry diseases have been eliminated and there is little need for vaccines and treatments.

In these areas, the efficiency of production is excellent. These successful areas have incorporated stringent biosecurity programs into their industries. Biosecurity has become part of the culture of raising poultry.

We at the United Soybean Export Council decided to prepare this manual to give farmers the information they need to implement a successful biosecurity program. This program will enable farmers to control and eliminate diseases that are currently devastating the poultry industry. The success of the poultry industry depends on improved performance. This will allow the industry to continue to grow and increase demand for soybeans.

IMPORTANCE OF BIOSECURITY

In commercial poultry farms, the risk for disease outbreaks is high and can result in significant economic loss for the farmer and the integration. When major disease outbreaks occur in a region, this may also result in loss of employment. A Newcastle or Influenza outbreak in an area involving numerous farms in close proximity can be catastrophic.

Modern strains of commercial broilers and layers have the genetic potential for high levels of production of meat and eggs. However, modern chickens are more susceptible to disease and management problems than chickens in past years. As a result, the introduction of a disease into a flock results in much higher morbidity and mortality.

In Tunisia, despite modernization, improved management practices and development of an integrated poultry industry during the past 30 years, the industry has suffered severe disease challenges in recent years. The general health of the nation's poultry flocks has deteriorated following the introduction and spread of several diseases. There is much discussion over the recent introductions of these diseases and their rapid spread throughout the country. For example, Newcastle disease of Genotype 7 entered the country and rapidly spread. This is resulting in substantial losses and vaccine efforts alone are doing little to control or eliminate the problem.

It is suspected that these disease introductions were due to unregulated and unauthorized poultry farms that do not comply with the basic standards of management and disease control. As well, illegal imports of hatching eggs and chicks from neighboring countries, where these diseases have been endemic, and the uncontrolled movement of poultry and poultry products within the country are also suspected.

The poultry industry has expanded considerably so that the density of poultry and farms in some regions is very high. Thus, it is necessary to implement strict sanitary and hygienic measures to prevent the introduction and spread of avian pathogens.

Biosecurity is critical to the future of the poultry industry. While there are vaccines and antibiotics to assist, it will be necessary to prevent and eliminate disease agents if the poultry industry is to prosper. Biosecurity will determine the success or failure of the industry in the region. Thus, it must be fully understood and strictly implemented. Biosecurity is simply a plan to prevent the entry of a disease agent onto a farm and spread among farms. Mostly this is common sense, but a basic understanding of how diseases enter a farm, persist

in farm and are disseminated needs to be understood so control can be approached scientifically. Biosecurity must be approached from a country wide perspective to be truly effective.

FOR WHOM IS THIS GUIDE INTENDED?

This guide was developed as a practical tool intended for those working directly with the commercial poultry industry; including poultry farmers, technicians and other stakeholders in the poultry farming sector. The objective was to provide a practical plan on how to establish a barrier to prevent entry of disease onto a farm. It is hoped that the simple recommendations provided will be studied and implemented throughout the region. It cannot be denied that in areas where biosecurity is an integral part of daily operations, disease challenge is much lower; and when rare challenges occur, the diseases are quickly eliminated.

The guide was produced by the Interprofessional Association of Poultry and Rabbit Products (Groupement Interprofessional de Produits Avicoles et Cunicoles, GIPAC), with the assistance of the United Nations Food and Agricultural Organization (FAO) and the valuable contribution by Dr. Khaled Kaboudi, the veterinary specialist in poultry and avian pathology. He is an assistant professor at the University Hospital of the National School of Veterinary Medicine of Sidi Thabet. This guide was translated from Arabic to English by Dr. Kamel Sultan.

A special thanks to the editorial team and everyone else who contributed to the development of this practical guide.

The Editorial Board

DEFINITION AND BASIC PRINCIPLES OF BIOSECURITY

Biosecurity simply means 'what do we have to do to keep diseases from entering a poultry farm'. Biosecurity has been defined as 'informed common sense'.

This means that the basic principles of biosecurity are learned and this is combined with common sense husbandry practices. There is nothing complex about biosecurity. As most people learn about biosecurity they often state that "I knew that".

Once it is understood how diseases spread, then practices at a farm need to be modified. There are many myths and misconceptions about disease spread.

A strategic and scientific approach has consistently been shown to be effective. Many experienced poultry farmers concur that if you have a comprehensive biosecurity program in practice, you may not eliminate the possibility of a disease outbreak, but the probability is greatly reduced for a farm or integration.

Biosecurity is based on 2 fundamental principles (Figure 1):

1. Preventing the introduction of a disease agent onto a farm- referred to as 'bio-exclusion'.
2. Preventing the spread of a disease agent on a farm- referred to as 'bio-confinement'.

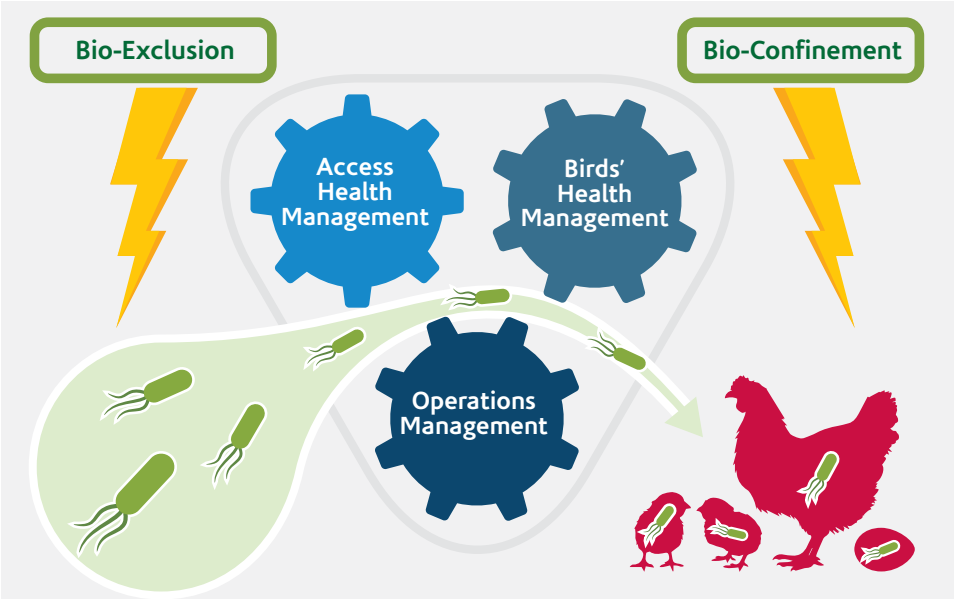


Figure 1: Principles of biosecurity

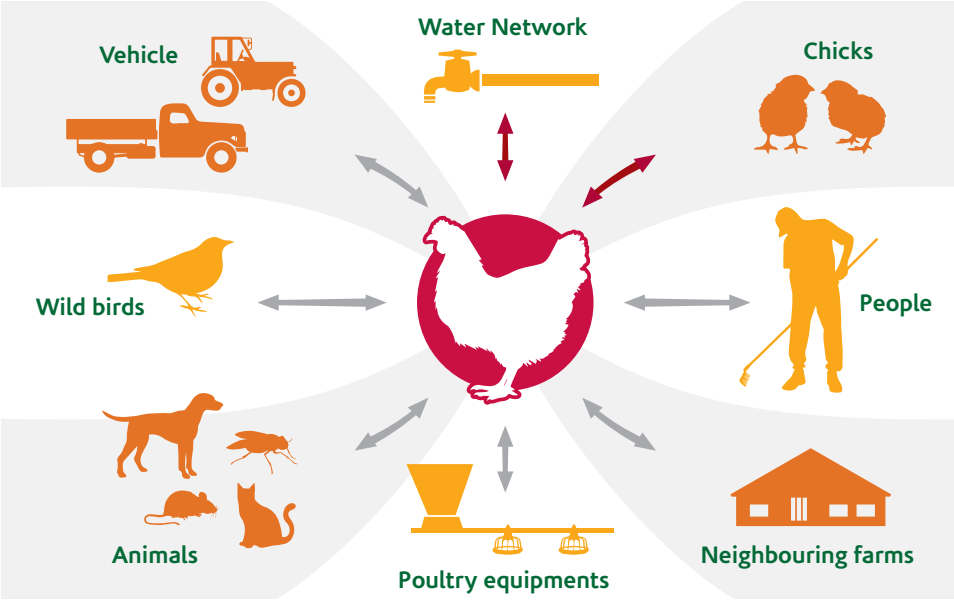


Figure 2: Sources of contamination on poultry farms

PORTALS OF ENTRY OF DISEASE AGENTS

There are many ways in which disease agents may gain entry into a farm (Figure 2). Disease agents can enter a farm on living (biological) and nonliving (fomites) carriers. It is important that the most significant means of transmission be understood so that efforts at biosecurity can be prioritized on the highest risk factors. It is well documented that the vast majority of diseases are carried onto a farm by contaminated people, equipment and vehicles. It has been stated that likely over 80% of diseases are brought onto the farm by these means. Thus, attention needs to be focused on these factors. Diseases can also be brought in through contaminated water, chicks, litter and pests such as wild birds and rodents.

Many poultry farmers commonly refer to airborne transmission; however, this has not been shown to be a significant means of disease spread if farms are even 1 to 2 KM apart!

LOCATION, HOUSE DESIGN AND CONSTRUCTION MATERIALS FOR BIOSECURE POULTRY FARMS

Location:

When a site for a poultry farm is being considered, biosecurity is rarely included in the planning. More often price of the property or proximity to the feed mill, for example, are primary considerations. However, for long term success, biosecurity must be a factor in the selection process.

When deciding on a location, the standards dictated by the regulatory specifications should be considered (Order of the Minister of Agriculture and Water Resources of October 21, 2006 approving the specifications and setting the standards to farm buildings and equipment):

1. Choose a location distant from other poultry farms to prevent spread of disease agents. A minimum of 500 meters is suggested.
2. Consider the direction of the prevailing winds to take advantage of ventilation. Consider location of housing for younger birds, including the hatchery, so they are not downwind from housing with older birds.
3. Avoid building in lowlands that are prone to flooding such as flood zones, waterways and wetlands.
4. Avoid construction in wetlands frequented by migratory birds that are known carriers of catastrophic diseases such as Avian Influenza and Newcastle. Also avoid stagnant waters.
5. Construct poultry houses away from main roads that may be used by poultry transport vehicles. A minimum of 300 meters from a road is suggested.
6. Farms should not be located close to hatcheries, feed mills or processing plants. Isolation of the facilities is a major factor in preventing disease spread.

Poultry house design:

- Poultry houses with different ages of chickens should be as far apart from each other as possible to prevent transmission of disease agents. With different ages in close proximity, diseases will cycle from house to house since the area is not depopulated to 'break the cycle'. A minimum of 30 meters between houses with different ages is suggested.
- The farm should be fenced to prevent entry of unauthorized people and other animals such as dogs, cats, backyard chickens, etc. An entryway for people and vehicles must be designed so proper decontamination procedures can be practiced.
- The area around the poultry house should be keep clear of debris and vegetation keep short. It is ideal to have a cement apron around the poultry house perimeter when possible as this facilitates cleaning and disinfection. Inside the house, the walls, ceilings and floors should be smooth to permit cleaning and disinfection. Cement floors are desirable but are often not economically feasible (Figure 3).

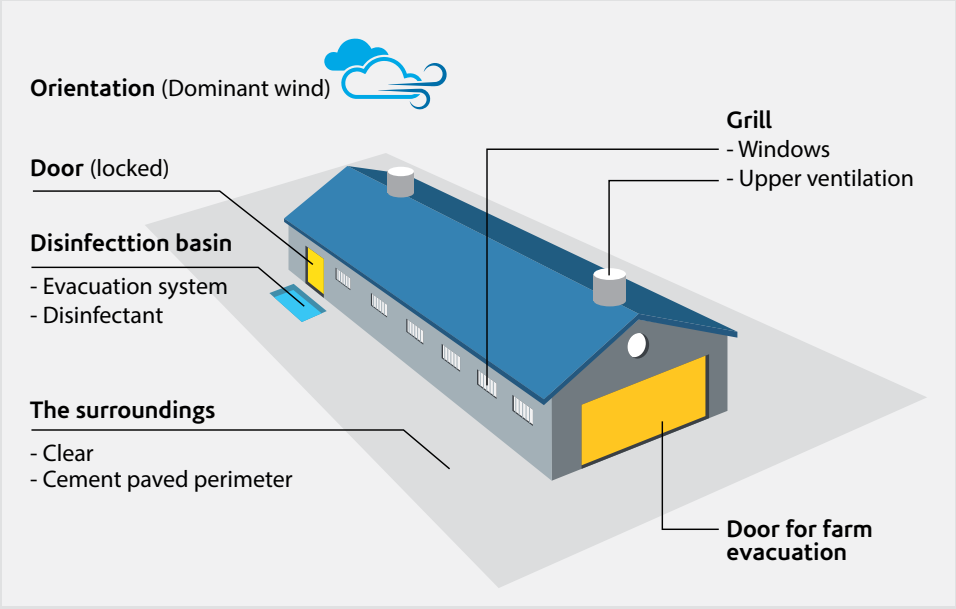


Figure 3. Design of a poultry house

- Provide a one-way flow of traffic on the farm from the least contaminated to the most contaminated areas. Avoid backtracking of people, equipment and vehicles on the farm.
- It is suggested to cull sick and injured chickens in the houses and avoid use of hospital or quarantine pens. These animals suffer, will not make it to processing in good condition, and can serve as a source of contamination for the entire farm.
- The openings into the houses should be fitted with screen to prevent entry of insects.
- There should be a single entry point onto the farm which is equipped with disinfection equipment for all vehicles, people and equipment that are brought onto the premises. NO EXCEPTIONS!
- The entrance to each poultry house should be equipped with well-maintained cleaning and disinfection basins which all workers are trained in how to properly decontaminate on entry and exit from the house.
- Access to the poultry houses must be through a compulsory compartment where cleaning and disinfection can be conducted. This area provides a physical separation between the clean area and dirty area. Clean cloths should be provided for anyone entering the houses. In many companies, mandatory showers are installed. Farm managers and veterinarians must ensure that all staff is trained in how to use the facilities correctly.
- Dead chickens on the farm must be disposed of daily in an appropriate manner. Options include sending dead chickens off site to a distant location or incinerating, composting or burying in a sealed container onsite.
- The floor of the poultry houses should be sloped so rainwater and waste water can be directed away from the houses to prevent stagnant water and to prevent recontamination.
- Feed storage site should be designed and maintained so to provide good conditions. Control of temperature, humidity, ventilation and sanitation are critical to ensure quality feed is fed to the birds.

Selection of construction materials:

Materials used for the construction of poultry houses must be resistant and easy to clean and disinfect. Selection of material must take into account the local climatic conditions.

Vehicle disinfection pit

Foot bath

Vehicle Disinfection System

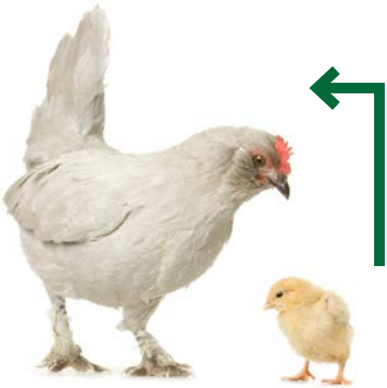
Restrict Access to farms

CONTROL MOVEMENT OF VEHICLES, PEOPLE AND PESTS TO PREVENT DISEASE TRANSMISSION AMONG FARMS

A program to control the movement of vehicles, people, equipment and pests must be implemented.

Vehicles:
Vehicles are recognized as a major risk factor for the spread of diseases among poultry farms. Many vehicles must enter the farm: chicks brought from hatchery, feed from mill, bedding from depot, gas cylinders from supplier, processing trucks from plant, servicemen from company and other farms,… As these vehicles often visit other sites where poultry are present, they serve as a means of disease spread. Thus, only absolutely necessary vehicles should be permitted to enter a farm and these must be decontaminated on entry and exit. Properly maintained disinfectant pits and arc disinfectant stations are helpful. A strict rule of only allowing absolutely necessary vehicles onto the farm must be enforced!

People:
There is no doubt that people are the most important factor in the spread of diseases. Thus, only people who are absolutely necessary should be permitted onto a farm. People that must enter the farm should be decontaminated. Notices should be placed at entry points to inform that only authorized people are permitted access.



Visit younger flock first

The movement of people within the farm must be controlled and some workers should be restricted to specific areas when possible.

It is common practice to visit the youngest birds first. If visit a sick flock, do not visit other flocks without decontamination. Have stations to change clothing and decontaminate boots prior to entering each house.

All visitors, at the very minimum, should be required to wear dedicated clothing and footwear. These include:

- Coveralls
- Boots or plastic cover
- Head cover
- Gloves

Properly maintained footbaths at the entry to the farm and then to each house is mandatory. These need to include a station for cleaning and removing organic materials and then a station for disinfection. All workers need to be taught how to use them correctly.

Mandatory work clothing

Access to poultry houses must be through a sanitary area. This is to serve as a barrier between clean and dirty areas (Figure 4). The sanitary area must be designed so that it can be cleaned and disinfected as needed.

The sanitary area must be equipped with:

- A change room with lockers
- A washbasin with hot and cold water and soap
- A disinfectant station
- Controls for lights, temperature, ventilation, etc.
- Farm records for current and prior flocks.

All people entering the premises must be trained in proper technique and be monitored. Notices about biosecurity requirements should be on display. The area must be properly maintained so it will not become a source of contamination!

The level of biosecurity varies among poultry companies. Some companies require showering and changing into clothing provided for access to all sectors of the integration while others only require changing of clothing and footwear.

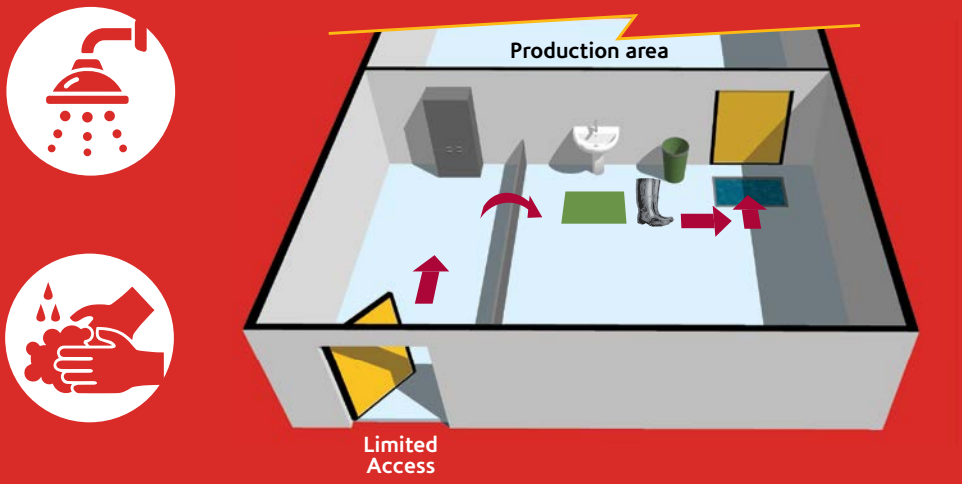


Figure 4. The sanitary room

Pests:

The fight against pests is a never ending battle in a poultry farm. Common pests include wild birds, mosquitoes, flies and rodents. These pests annoy and stress the birds and may serve as carriers of disease. In some cases the pests are simply mechanical vectors. However; in other cases, such as Salmonella in rodents and wild birds, they serve as biological vectors. Some pests can travel between poultry houses and even between farms.

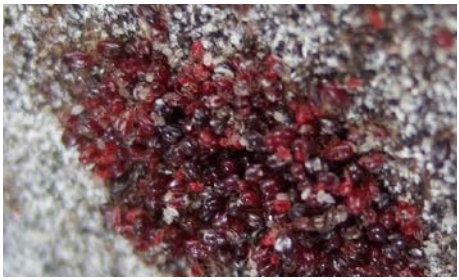
Wire mesh siding is suggested at all openings into the poultry house to prevent entry of even small birds and rodents.

The presence of insects in the house annoys the birds leading to nervousness and even pecking. These can also serve as mechanical carriers of infectious diseases agents.

In some areas, mosquitoes are present in large numbers and attempts at control include both netting and insecticides. Identifying breeding areas and eliminating them, when possible, is also beneficial.

Darkling beetles are very common in poultry manure and very large numbers can develop. In addition to damaging the structure of the poultry house and contaminating the feed, they can serve as carriers of poultry diseases.

Darkling beetles- adults and larvae



Red mites in droppings

Repair cracks on walls and roofs where insects and rodents can use as passages and shelters.

Rodents are particularly dangerous to poultry farms since they are common, reproduce rapidly and carry many diseases that may affect chickens. The damage caused by rodents includes:

- Contamination of feed by feces, urine and hair.
- Damage to equipment and cables increasing risk of fires and power failures. Loss of ventilation can be catastrophic in a short time.
- Consumption of feed and attacking young chickens.
- Transmission of numerous diseases including Salmonella, Pasteurella,…

Rodent control is a never ending battle and must be monitored closely. Measures to be included in rodent control are:

- Keep the area around the poultry houses clear of clutter and the grass cut short.
- Repair and seal any holes or openings that would permit passage by rodents.
- Install traps and keep poison baits (rodenticides) in designated places such as around feed storage bins, poultry houses, and sanitary areas and under cages in layer houses. The baits and traps must be monitored and maintained.

Several kinds of rodenticides may be used: baits, traps,…

IMPORTANCE OF CHICK QUALITY

A quality chick is one free of defects and free of infectious diseases. To ensure a quality chick, attention to chicks, pullets, laying hens and replacement parent stock is required.

Proper healing of the navel is essential

When evaluating a chick for quality, it is important they are free of abnormalities, the umbilicus is properly healed, there is an absence of diarrhea, and they have the recommended body weights and uniformity.

It is essential they are free of infectious diseases which can be egg transmitted such as mycoplasma and Salmonella.

IMPORTANCE OF FEED AND WATER QUALITY

Chickens must be provided high quality feed and water to achieve performance goals. Maintaining quality through the production cycle is essential.
The quality of the finished feed depends largely on the quality of the raw ingredients and adherence to the basic rules of hygiene during the manufacturing process (HACCP application, heat treatment,…)

Feed must be protected during shipment so feed delivery vehicles must be maintained and disinfected before and after each delivery.

Feed stored in bags should be in a clean, cool and dry area

On delivery to farm, feed should be inspected before being loaded into silos that have been cleaned and disinfected.

Feed vehicles should be cleaned and disinfected before and after delivery

Excellent water quality is critical to achieve the desired performance. Water is used for several functions during poultry production such as cleaning, disinfection, drinking and mixing with medicine and vaccines.

The physiochemical quality standards of drinking water are listed below in table 1.

Criterion	Recommended value
pH	5.5 to 6.5 °
Hardness (TH) (Calcium level)	10- 15°TH 1°TH=4 mg calcium/ liter
Nitrates	<50 mg/ liter
Iron	<0.2 mg/ liter
Sulfates	<300 mg/ liter
Chlorine	<250 mg/ liter

Table 1: The physical and chemical characteristics of poultry drinking water (source ITAVI).

Maintaining water quality:

- Install filters to reduce suspended solids.
- Regular water treatment: chlorination and acidification.
- Routine analysis (physiochemical and microbiological) of samples taken at different points along the line: 1) central reservoir, 2) beginning of pipes, 3) entry into house, 4) at drinker level…
- Use of rapid tests (strips and kits) offers immediate information of some parameters of poultry drinking water such as pH, chlorine level, hardness,…

Installation of a water filter at the beginning of the main line reduces organic matter and sediment.

DECONTAMINATION: CLEANING, DISINFECTION, DOWN TIME AND MONITORING

Poultry houses provide an environment that facilitates the growth of pathogens such as bacteria, viruses and parasites. Within houses, there are live chickens, manure, and favorable temperature and humidity. If houses are not cleaned and disinfected and left vacant between growing cycles, disease organisms will persist and infect incoming flocks.

Farm disinfection is a critical part of the decontamination process. It must be done correctly to kill disease organisms. This would include washing the farm and area around the poultry houses thoroughly. This is followed by applying the disinfectant according the recommendations of the manufacturer. Finally the house needs to remain empty for 2- 3 weeks prior to reintroducing chickens. Simply applying disinfectant to dirty surfaces will not effectively kill the diseases organisms.

Workers need to be trained in how to use the decontamination products and be aware of safety and health hazards when in contact with the detergents and disinfectants.

Cleaning:

Cleaning should be started as soon after departure of the flock as possible. A well-defined protocol should be followed.

1st a thorough cleaning

This should be started as soon as possible after removal of the flock. The poultry and storage areas should also be cleaned.

Remove remaining feed from feeders and silos and water from lines

Dismantle equipment

1. Remove all equipment that can be disassembled from the house and storage areas.
2. Protect the motors and electrical components.

Remove dust and dry clean

Cover electrical components and lubricate to protect from water during decontamination process.

Remove dust from all surfaces including ceiling, walls, and non-removable materials.

Use vacuum to avoid blowing dust.

Remove litter from premises

Use insecticides to kill insects.

Scrape the floor

Scrape cement floors to remove any adhering manure. If dirt floor, remove soil from the floor.

Washing is done in 4 steps

1. Soaking with low pressure water.
2. Pressure washing.
3. Using a detergent to wash and remove oils and adhering dirt.
4. Rinsing with clean water.

Repairs should be made to walls, ceiling, windows and floor at this time. Cracks and holes should be repaired and sealed.

The cleaning process, when done correctly, will eliminate 70- 90% of the contaminants. This process must be done to prepare for the disinfection.

Litter removal

Pressure washing ceiling

Fumigation canister

Disinfection of equipment

Water disinfection

Cleaning of poultry equipment

Disinfection:

REMEMBER: Disinfectants are not for cleaning but for 'disinfection'! Thus they can be applied only to cleaned surfaces.

All surfaces in the poultry house should be disinfected. It must be emphasized that disinfects will work only on clean surfaces and that the quality of the water used can have a detrimental effect on their efficacy.

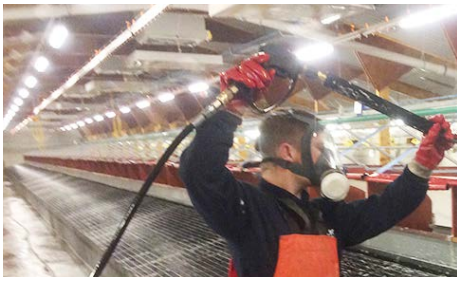
It must be ensured that the water is in the correct pH range, must be free of organic materials, and hardness must be low. These factors can reduce the efficacy of the disinfectant.

Water used for cleaning and disinfection must be of good quality:

Water contaminated with pathogenic organisms will recontaminate the cleaned and disinfected surfaces.

Equipment:

- Washing area should be on a concrete surface.
- Equipment should soak for at least 30 minutes to several hours.
- Rinse using clean water.
- Clean and brush equipment to free adhering materials before disinfecting.
- Spray on disinfectant and allow it to dry onto surfaces.
- The feed silos, which have been cleaned, can be disinfected with spray or formalin fumigation if permitted.



Cleaning of poultry equipment

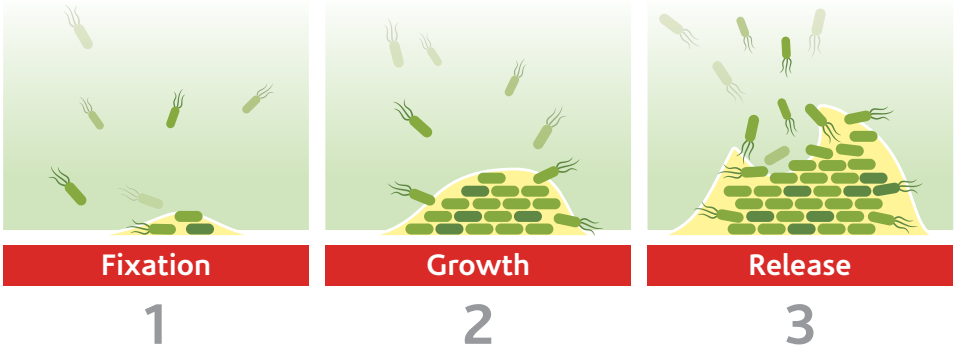
Water system

Cleaning, descaling and disinfection of water lines are conducted to remove biofilms and mineral deposits formed during the growing cycle.

Biofilms consist of accumulated organic material that forms on the inner walls of the water lines and provides a protective environment for a variety of microorganisms. Bacteria are released from these films and contaminate drinking water.

Risks associated with biofilms include:

- Permanent source of the contamination of water.
- Can inactivate drugs and vaccines.
- Facilitate the development of antibiotic resistant bacteria.
- Obstruct passage of water through lines leading to leaking of lines and wet litter.



How a biofilm forms in a water pipe

Accumulation of biofilms in pipes and nozzles

The removal of a biofilm in water lines includes:

1. Add an acidic compound to dissolve mineral accumulation.
2. Apply a strong base to dissolve the organic compounds.
3. Pass water under high pressure to flush out debris.

Water can be treated with a disinfectant during the production cycle to prevent buildup of biofilms using chlorination, chlorine dioxide, peroxidation and others.

The buildings

There are several methods to apply disinfectant to poultry houses. Application by spray is the most common method. It covers all the surfaces (floor, wall, ceiling, equipment) of the house, the sanitary room and feed storage area.

1ST DISINFECTION INSIDE THE BUILDING

Quaternary Ammoniums + Glutaraldehyde

Proceed from top to bottom

The most commonly used disinfectants in poultry are shown in Table 2.

	Virucide	Bactericide	Eggs and Larvae	Activity in the presence OM	Active with detergent	Corrosive effect	Footbath Basin
Caustic Soda	+	+ + +	+ +	-	-	+ + +	+/-
Bleach	+ + +	+ +	-	-	-	+ + +	+/-
Chloramine	+ +	+ + +	+	+	+	+/-	+/-
Iodine	+ + +	+ + +	+	+/-	+ + +	+ + +	+ + +
Formaldehyde	+ +	+ + +	+/-	-	-	+ + +	-
Quaternary Ammoniums	+	+ +	-	-	-	-	-
Phenols	+ +	+ + +	+ +	+ + +	+ + +	-	+ + +

Table 2: Comparison of the effectiveness of the key chemical disinfectants used in poultry.

NOTE: Use only disinfectant products that are included in the list of approved disinfectants for use in poultry by the Directorate General of Veterinary Services

A second disinfection is recommended 24 to 48 hours prior to arrival of chicks. The protocol follows:

Surface whitewashing with lime

The floor, walls, doors, windows, and entryways should be whitewashed with hydrated lime to a thickness of ~0.5 cm or can use spray disinfection and fumigation.

Spreading the litter

Use insecticide to kill larvae and adult pests. Apply to floors and walls prior to replacing litter.

Brushing the floor with lime milk mixed with soda

Installation of equipment

Second disinfection can be conducted using thermal fogging. Seal building tightly to give disinfectant a chance to work. Ventilate before arrival of chicks. The dirt or cement around the periphery of the building can be disinfected by spreading a layer of lime at 50 kg per 100 square meters.

Spreading lime outside the building perimeter

The sanitary waiting period

The poultry houses should be cleaned and disinfected as soon as possible after removal of chickens. Following disinfection, it is suggested that houses be kept closed and vacant for at least 10- 15 days. This period, from completion of disinfection until arrival of chicks, is referred to as 'down time'.

This time period has proven to be very valuable in providing the disinfectants time to act, drying the building, and allowing microbes and parasites to diminish.

Second disinfection using fogging

Assessment of cleaning and disinfection program

Once the cleaning and disinfection is complete, monitoring of the premises is conducted to evaluate success.

Evaluation includes a visual assessment of the cleaning (the absence of dust and adhering organic material) and bacteriological assessment using media to determine quantity of bacterial organisms that persist.

Microbiological assessment is done on different surfaces by swabbing and wipes on agar and by contact plates.

Sample collection for microbiological assessment following cleaning and disinfection.

2nd treatment for insects

If there is a proliferation of insects, especially during the season of maximum activity, it is recommended to administer an insecticide a 2nd time before arrival of chicks.

Be sure to ventilate houses prior to chicks' arrival.

EGG MANAGEMENT: COLLECTION, DISINFECTION AND STORAGE

Hatching Eggs

The objective is to send clean and viable eggs to the hatchery for incubation. This will result in improved hatchability and chick quality.

Collection

Eggs should be collected 4- 8 times per day. This will lessen the chance for contamination of eggshells from nesting materials and hens. It will also ensure a minimal and uniform level of pre-incubation.

The eggs should be place in new egg treys or in plastic treys that have been disinfected.

Eggs laid on the floor, even if appearing clean must be considered contaminated. These eggs are not recommended for incubation. If a decision is made to incubate them, they should be set in a separate machine to prevent cross contamination.

Egg Disinfection

Eggs selected for incubation, should be disinfected promptly following collection.

There are several spray disinfectants available. However, formaldehyde fumigation, when permitted, is superior. Key points for formaldehyde fumigation:

- Disinfect eggs promptly after collection.
- Fumigate at a temperature above 25C and humidity of %80.
- Use 40 ml of %30 formalin, 20grams per m^3 of volume potassium permanganate or 10 grams of formaldehyde power.

Egg Storage

Eggs for incubation should be stored at 15- 18C and a relative humidity of 80%. Lower storage temperatures can be used for eggs stored for longer periods of time.

It is recommended to store eggs for less than 1 week to avoid increased early embryo mortality.

The measures related to egg collection for table eggs are similar for similar hatching eggs. Eggs should be collected promptly and sorted.

Table eggs collected should be placed on new egg treys or plastic flats disinfected after each use. It is also important to store eggs at optimal temperature (2- 4C) and humidity above 75%.

MANAGEMENT OF POULTRY MORTALITY

Poultry mortality and culls must be removed from the premises daily as they can serve as a source of contamination. The dead chickens on the premises attract rodents and insects and can even stimulate pecking which may lead to cannibalism. If mortality is temporarily held on the farm, it should be refrigerated or frozen until removal. Mortality can be incinerated or buried on site in a sealed pit, located away from the buildings housing chickens. It is advised to cover with a layer of quick lime over the dead chickens each day.

DISEASE PREVENTION AND MONITORING DURING PRODUCTION CYCLE

The prevention of disease is a never ending task. Disease organisms linger and wait for the opportunity to gain entry to the houses and infect the chickens. Thus biosecurity efforts must be enforced at all times.

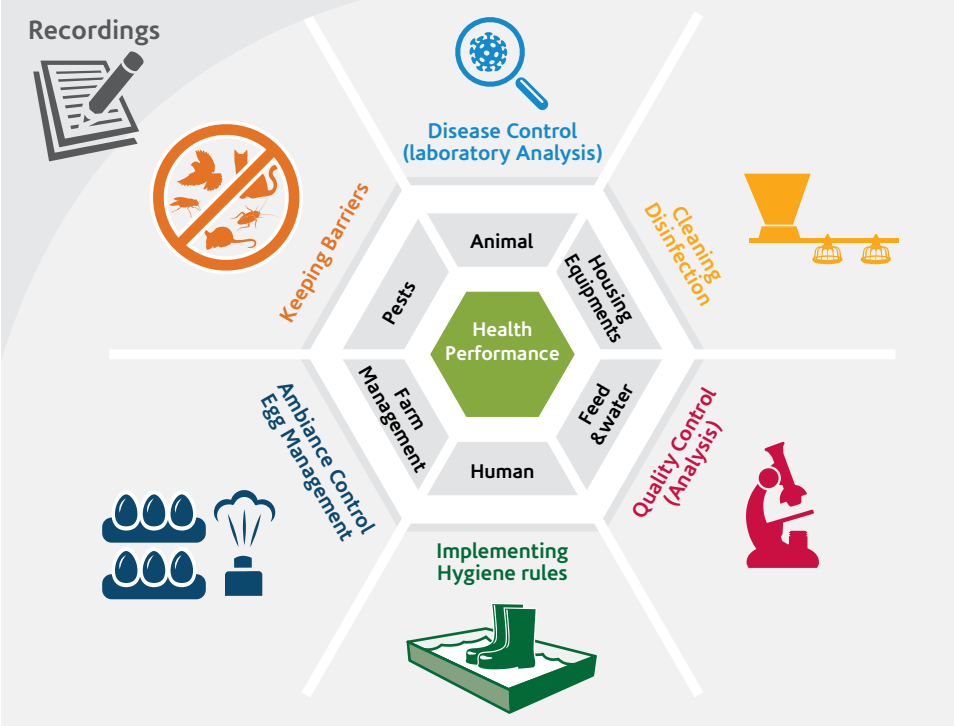


Figure 5: Biosecurity measures during production

Biosecurity is much more effective in farms when a single age of chickens is housed--all-in and all-out. If diseases enter the farm, it is possible to break the infection cycle when the chickens are marketed (Figure 5).

Routine monitoring for flock health is essential to identify diseases as early as possible. Early treatment will limit losses and reduce likelihood of spread to other farms. Monitoring should include necropsy of daily mortality and morbidity and serological, bacteriological and mycological testing. Testing is often required for official control or part of an in-house control program.

Monitoring of flocks can assist in identifying the cause of a problem.

It is important that good records be maintained to allow laboratory data collected to be analyzed.

Today there are computer programs that help in creating databases for farms and permits improved traceability.

Blood samples collected and sera removed for serologic testing program

COMMITMENT TO BIOSECURITY EFFORTS

Commitment is a concept that is well entrenched in the human medical field. This is increasingly being applied in animal husbandry. This aims to assess the degree of agreement between the behavior of an individual and the medical recommendations.

Biosecurity is a tool that helps to identity where and how errors are committed by the farmer, technician, veterinarian,… and provides a roadmap on how to resolve the problem. In working with performance problems with commercial poultry, many people state that it is easy to solve a problem. The hard part is to figure out what the problem is! Due to the extreme complexity of the modern poultry industry, it is often difficult to identify the actual problem. With good and organized data and stringent biosecurity, this is made easier.

Different systems can be tried to better identify and characterize the problem. These include audits, questionnaires, observations and cameras (visible and hidden).

BIOSECURITY AND CONTINUING EDUCATION

All people involved with poultry production must be trained and constantly reminded about the importance of biosecurity.

Continuing education and oversight are required to ensure that no breaches are occurring either through lack of knowledge or neglect. Workers at all levels need to be constantly trained on the importance of biosecurity from the company owner to the people in the field.

Workers, who understand the goals of the biosecurity program and understand why actions are being taken, more likely follow through on a day to day basis even when no one is observing. They are also an extra set of eyes to ensure others follow prescribed protocol.

It is essential to inform and train all poultry staff about the importance of biosecurity through training sessions.

It is also import for the farmer to record the necessary data. He must receive training on a regular basis so that when a disease enters his farm or is in farms nearby, appropriate action can be taken to limit losses.

EXAMPLES OF POOR BIOSECURITY

Poultry farm without fence

Presence of livestock near houses

Water tank outside building

Vehicle entering farm with no decontamination

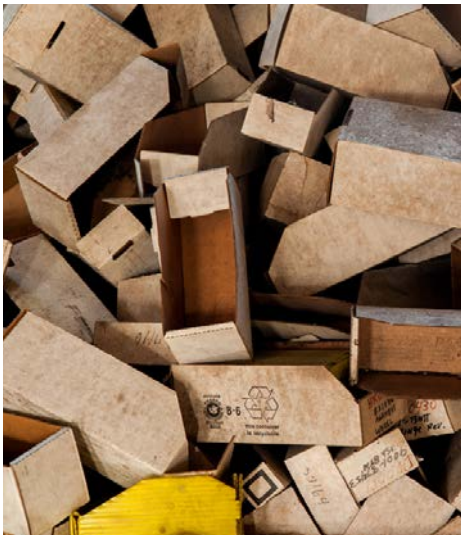
Stagnant water near farm

This is not a disinfection pit!!!

Litter stored near poultry house

Debris around poultry house

Neglected footbath



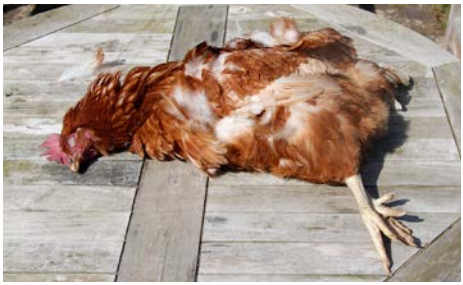
Chick delivery boxes

Presence of rodents inside footbath

Poorly designed footbath

Visitor without footbath or dedicated clothing

Mortalities next to gas cylinders



Carcasses of dead chickens

Open skylight without wire covering

Wild bird nesting in ceiling of poultry house

Feed storage area with loose chickens

Torn wire covering

Wet litter

Cluttered storage area

Wild and pet birds on premise

Dirty feeder

Down time and doors are open

GLOSSARY

Acidification: Water treatment with acid solutions to lower pH.

"All in all out" system (single batch): A farming system of raising poultry of the same age, entering the same day, maintained for a period and leaving the same day.

Bacteriology: The study and research of bacteria.

Bait: A feed placed to attract a pest we want to trap or kill.

Bio-confinement: Practices to prevent the introduction of pathogens to poultry.

Bio-exclusion: Practices to prevent the spread of diseases already present in the production farm.

Biofilm: Microorganisms (bacteria, fungi, algae or protozoa) adhering to a surface and protected by a secretion of an adhesive matrix. Biofilms are formed in water or in an aqueous medium.

Biosecurity: The set of sanitary and hygienic measures which can limit the entry and spread of pathogens.

Chlorination: The treatment of water with chlorine.

Cleaning: The removal of dirty, dusty and harmful residues of feed, fat or any objectionable matter.

Cleaning cloth: A sampling cloth used in the research of micro-organisms and/or assessment of the cleanliness and disinfection of surfaces (walls, floors, ceiling...) or production material.

Commitment: Evaluation method of the degree of agreement between the behavior of an individual and the medical recommendation.

Darkling beetle: Black insect (beetle) and larvae inhabiting poultry buildings.

Decontamination: Actions aiming at the removal of the sources and reservoirs of pathogenic contaminants.

Detergent: A chemical compound having surfactant properties, which enables it able to remove dirt.

Disinfectant: A physical or chemical that kills or inactivates microorganisms.

Disinfection pit: Any system used to clean and/or disinfect the tires and wheels of vehicles that may have been contaminated by pathogenic organisms.

Downtime or sanitary period: The time between the first disinfection and the arrival of the new flock, during which the building must be locked.

Flow control: Controlling the movement of everything that can access a poultry farm (vehicles, people, and pests).

Footbath: Any temporary or permanent arrangement for the cleaning and disinfection of the of shoes or boots that may have been contaminated by germs or undesirable materials.

Fumigation: Action producing vapor containing active substances in the disinfection or treatment of diseases.

HACCP: The System of hazard analysis for the establishment of critical points where it is possible to control and to predict, eliminate or reduce to an acceptable level any biological, chemical and physical threat that can affect the safety and foodstuffs.

Homogeneity or uniformity of the flock: An assessment of the degree of homogeneity of the flock. Involves weighing individual birds and determining uniformity. For example, determine if %90 of the birds weighed are within a range of plus or minus %10 from the average.

Monitoring Decontamination: The process used to remove or destroy any factor presenting a health hazard to poultry.

Pathogenic agent: Any factor that can cause injury or cause disease (disease process).

Pests: Any animal (birds, mosquitoes, flies, rodents...) which can present a health risk or stress to animals.

Poultry farm: A poultry group managed as a distinct population.

Poultry house: Any structure housing poultry.

Poultry: Any type of bird raised or kept in captivity for its production, for the production of eggs or meat for human consumption.

Rodenticide: The active substance or preparation having the property of killing rodents that are considered harmful to poultry.

Sanitary barriers: Measures, actions and behaviors that prevent the entry and/or slow the spread of pathogens.

Sanitary Room: A sanitary unit composed of two separated areas; the dirty area and the clean area, which include several elements such as, a clothes change room, a sink, dedicated clothing, a production record and a trash basket...

Serology: A laboratory test requiring the use of blood serum.

Spray: The technique of using the disinfectant in the form of droplets > 100 µ.

Thermal fogging: The technique that utilize the disinfectant as micro droplets (5 to 15 µ).

Visitor: Any person visiting the farm other than the responsible staff for the daily production in the farm.

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