The importance of biosecurity in the modern day hatchery

Hatchery managers share the common goal of producing the highest quality chicks for the least cost. Also of huge concern are biosecurity issues since nothing can disguise lax biosecurity or lack of biosecurity management.

Biosecurity starts at the farm and should be continued and maintained though the grow out.

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This article focuses on biosecurity from the farm (transport through to the hatchery) and the importance of cleaning and disinfecting.

Dirt can not be disinfected; this is why proper cleaning is at the very heart and soul of all biosecurity programs.

Hatchery design and the design of the HVAC systems are key areas which can be manipulated to avoid cross contamination or the spreading of contamination throughout the hatchery.

Hatcheries should be designed so that airflow is in one direction, clean to dirty, without any cross over or back flow of traffic or product. A shower facility for hatchery staff will help ensure staff do not carry in outside contaminants.

The best practice is to shower in and shower out, so as not to carry any contaminants into or out of the hatchery. Hatcheries should also furnish staff with clean uniforms from head to toe.

The major risk of lax biosecurity is the invisible enemy such as E. coli, Staph. aureus and streptococcus. The presence of these contaminants and others not mentioned will have a detrimental effect on hatching eggs and chicks.

How do these contaminants enter the hatchery?

Egg handling at the farm, from gathering, grading and traying, should be areas of observation and concentration. During this process it is easy to transfer contaminants from hands to egg shells since it is an invisible enemy.

Routine hand sanitation and washing will only improve biosecurity. Hygiene is foremost the start of a proper biosecurity program.

One area of contamination that is sometimes overlooked is the sanitation of transportation staff and vehicles. Care should be taken to clean and sanitise the delivery truck between deliveries and it should never visit multiple farms without a minimum of wheel baths or spray with some type of disinfectant.

Drivers should never be allowed into farm egg rooms without, at minimum, plastic boots and a new disposable coverall which should be left at the farm for disposal.

There is an increased possibility of contamination with careless delivery truck sanitation, not washing and disinfecting after every pickup and delivery, and not having wheel baths or sprays at the farm when entering and exiting.

Incoming air into the hatchery should be pressurised and flow from clean to dirty areas of the hatchery. Avoid leaving rooms open to the outside and doors that allow traffic to enter without being sanitised.

There are numerous ways to condition and sanitise incoming air, such as filtration and ultraviolet light. These systems work well and when utilised together will only improve biosecurity.

We must remember that all air entering the hatchery has the possibility of contamination.

Staff hygiene practices in the hatchery are also of utmost importance. Staff should be routinely trained and updated on the latest practices and procedures.

As on the farm, hatchery staff should shower into the hatchery and change into clean sanitised clothing, head gear and footwear. Also, a good practice is to shower out so as not to carry anything back out of the hatchery.

Hand sanitisers should be placed at the entrance of every room along with foot baths which should be changed routinely (depending on traffic).

Egg room staff should routinely clean and sanitise hands. Traffic throughout the hatchery should be limited and no cross over between clean and dirty. Different colour uniforms work well.

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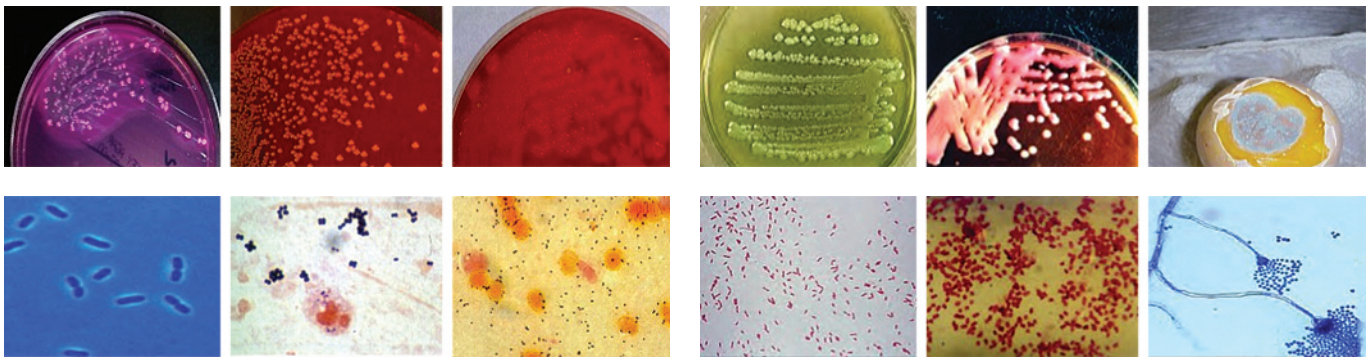
Typical hatchery bacteria – the invisible enemy. From left, E. coli, Staph. aureus, streptococcus, pseudomonas, klebsiella and Aspergillus fumigatus.



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Hatchery design is of the utmost importance for biosecurity. A poorly designed hatchery will place the manager at a disadvantage in controlling traffic of air and staff and they will struggle to maintain proper biosecurity.

What is a well designed hatchery?

Considerations when designing any hatchery are location, airflow, room size, staff access and limited outside traffic. The location of the hatchery should be away from high traffic areas with easy access.

Consideration should be given not to locate the hatchery near a residential area, feed mill, or livestock farm, which will only create additional issues with airborne contaminants and increase biosecurity risks.

Ventilation systems must take into consideration temperature, humidity and pressure. Airflow throughout the entire hatchery should be from clean to dirty.

A properly designed hatchery will have an egg room at one end and a chick room at the opposite end of the building. All rooms from the egg room (clean) to the chick room (dirty) will be pressurised to allow air movement in one direction. This will decrease chances of cross contamination from dirty areas to clean areas.

Temperature and humidity control are not only for machines, chicks and staff, but to also limit conditions for bacterial and fungal growth.

All rooms must be designed to accommodate the number of eggs to be hatched and chicks to be processed. Room sizes will also be determined according to amount of automation equipment utilised.

Again, design should take into consideration air movement (clean to dirty) and the movement of eggs from receiving to egg room into incubators through hatchers and finally into processing and holding.

A wash room should be adjacent to dirty areas with material moving back into clean areas after cleaning and disinfecting. There should be no cross over from clean to dirty including airflow.

Staff should access only through the shower and disinfect room. The office can be located so there is no entrance into the hatchery without going through a shower room.

Areas for consideration

Room size
- Adequate for process (egg receiving and storage, transfer, processing).
- Location.
- Staff room access.
- Outside access to shower.
- Flow (no cross over from dirty to clean).
- Easy access to support equipment service.

Location
- Away from farms.
- Away from heavy traffic.
- No residential areas.
- No feed mills close.

Disinfectants
- Break cycles of contamination.
- Sanitise drinking water.
- For residual germicidal action.
- As a protective shield.
- Hatchery specific.

Disinfectants are normally used in the hatchery after cleaning and to prevent or break the cycle of bacteria and fungi. Under optimal conditions (hatchery), a bacteria can divide every 20 minutes. In 24 hours (72 divisions), one bacteria can theoretically become millions.

A disinfectant is a chemical agent that kills micro-organisms, except for resistant bacterial spores. Proper use results in 100% kill of target bacteria, target viruses and target fungi.

Disinfectant selection criteria
- Registered documentation.
- Broad spectrum activity – bacteria, viruses, fungi.
- Speed of action.
- Surface compatibility.
- Quality and stability of manufacturer.
- Application.
- Personnel, safety in handling.
- Environmental, biodegradability.

Cleaning is essential to disinfection
- The success of disinfectant/sterilant efficacy is based on thorough cleaning.
- 85-90% of micro-organisms are removed in the pre-cleaning process.
- The goal is microbial control/reduction.

No disinfectant in the world, including formaldehyde, will minimise the error of improper cleaning!

What is the measure for cleanliness?
- Visibly clean: Supervisor/manager must check constantly and have unsatisfactory results corrected.
- Microbiologically clean: Monitor (direct contact swabs and air plates) to measure, maintain, and improve hygiene.
- Bioluminescence testing measures the presence of ATP. A higher ATP level indicates an unclean surface with organic matter present. This testing method gives instant results.

Chemical disinfectant types
- Phenolics.
- Quats.
- Iodine.
- Chlorine dioxide.
- Hydrogen peroxide.
- Peracetic acid.
- Hydrogen peroxide/peracetic acid combination.
- Glutaraldehyde.
- Formaldehyde.
- Quat/glutaraldehyde combination.
- Alcohol.
- Chlorhexidrine.
- Sodium hypochlorite.

The proper combination of 'inert' (not active) ingredients within a disinfectant can greatly enhance the germicidal activity:
- Iodine needs a certain % of acid (12-14+%) to keep the pH low for the iodine to remain active.
- Phenol compounds are not water soluble so they must be saponified with a high grade soap within the formulation to make usable.
- Quats need surfactants and chelating agents such as EDTA in the formula to synergistically improve the microbial activity, especially against Gram negatives such as Pseudomonas aeruginosa.
- Hydrogen peroxide and peracetic acid must be stabilised properly so that the hydroxyl radical is actively available.

Scientific data shows no evidence to support the myth of rotating disinfectants.

Resistant bacteria

Antibiotic resistant bacteria have become a legitimate health concern, due to large (ab)use of antibiotics. The fact is that using disinfectants over antibiotics is like using a sledgehammer to open a door instead of a key.

Antibiotics work by different mechanisms. Typical ones are single target and a specific mode of action. Interaction to micro-organism is similar to a lock and key mechanism to achieve its microbiocidal action. Just as a minor change in a lock can make a key useless, a single mutation in an organism can make it resistant to an antibiotic. For example, widespread use of penicillin began in 1945; within a decade resistance was detected.

Disinfectants have multiple targets and modes of action (oxidise, denature, rupture, attack in multiple ways). This makes the development of resistance much more difficult and would require much more than a single mutation. Many hatcheries have successfully used the same disinfectant for many years with no problem.

Individual hatcheries/companies should work diligently with their chemical supplier (who specialise in hatcheries and farms) when deciding on proper soaps and sanitisers for their requirements.

Good cleaning still remains the key. There is no substitute for scrubbing (elbow grease). Results have consistently demonstrated hatcheries with high standards of biosecurity will face less challenges from bacterial contamination and diseases.

This will increase productivity, reduce cost and increase quality. Chemicals can be expensive but, at the end of the day, a high standard of cleaning and disinfectants will more than overcome these costs. ■