

HYGIENE & BIOSECURITY



TECHNICAL GUIDE

BREEDING FOR SUCCESS ... TOGETHER



LOHMANN
TIERZUCHT



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INTRODUCTION

Hygiene and biosecurity on a layer farm are among of the most important criteria to keep a flock healthy throughout the production cycle. Only a flock which performs well can ensure a reliable income for poultry operations. The reduction of medical treatment in layers should, from both an economical and an animal welfare point of view, be one of the most significant goals during the production. It is therefore important to prevent the occurrence of diseases in poultry. The slogan should always be: **prevention is better than cure!**

Disasters like the outbreak of epidemics are always a sign of inadequate biosecurity. Preventional measures restrict pathogens from getting in contact with birds on the farm.

Simple hygienic rules like changing shoes and washing hands before entering the barn can help to keep the hygienic status of a flock on a high level, i.e. provided these rules are strictly adhered to.

This Guide should help to establish good biosecurity practise in layer flocks, keep them stay healthy and be protected from all kinds of pathogens. Furthermore, some suggestions are also given as how to clean and disinfect poultry facilities in a proper way. It should help to make poultry operations be aware of critical points which have an important influence on the health status of a flock. These are often neglected and as such, have an impact on the performance of the flock.

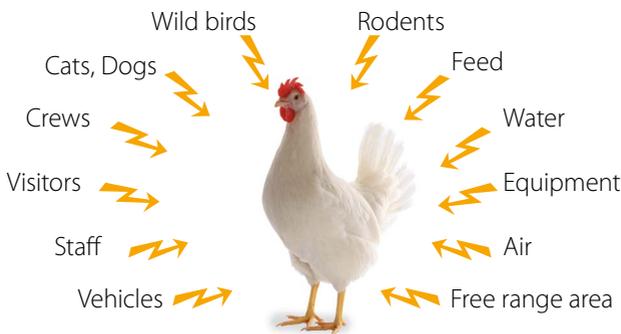
BIOSECURITY

- > Biosecurity is the most efficient and cost-effective method of disease prevention available.
- > Biosecurity initially begins with the physical layout of the farm and the production cycle.
- > The training of staff and visitors is a very important part of biosecurity. If somebody does not follow the rules, this will cause the whole system to fail.
- > Biosecurity should always involve the whole farm.
- > Disease management and eradication are difficult and expensive alternatives to a failed disease prevention program.

> Definition

Measures that strive to diminish a possible spread of disease causing organisms. So that pathogens are prohibited from coming in contact with resident birds on the farm.

Figure 1: Some ways how pathogens can reach the layers



THE POULTRY FACILITY

Planning and building of poultry facilities

- › Build the farm as far away as possible from other poultry facilities (at least 1 km).
- › The whole farm has to be fenced. Put an information board at the entrance to the layer farm.
- › Keep all buildings free of vegetation, bushes and trees. They will attract rodents and wild birds.
- › There should be a 2 m strip of road stone around each facility.
- › Entrance and pathways within the farm area have to be paved. These must be cleaned and disinfected regularly.
- › Walls and floors have to be free of gaps and cracks, otherwise they will provide shelter for all kinds of pathogens and vermin.
- › Open spaces such as those for ventilation systems etc. should be constructed in such a way so as to prevent other birds and rodents from gaining access into the poultry facility. Use a barb wire fence to segregate the area.
- › Dips in front of the vehicle access to the farm should be filled with disinfection dilution.
- › Ventilation: under optimal conditions, air should not flow from one poultry house to another. The transition of air should always be from the white to the black area (example of black and white area see figure 3 and 4).
- › Rendering containers have to be located on the outside of the farm.
- › Parking facilities have to be set-up outside the fenced area.
- › Make sure that no wild birds, rodents and other vermin have access to the farm area, especially to the food and water sources.

Figure 2: Two meter strip of road stone around the whole poultry house (left), fence with information signs (right)



BARRIERS

Every single poultry house on the farm has to have its own sanitation procedure which has to be applied if one intends to enter the barn (see figure 3). Generally, limit the number of visitors to a minimum as humans are one of the most common carriers of pathogens.

- > Every person who wishes to enter the facility, has to pass a sanitation procedure.
- > Divide the farm into clean (white) and dirty (black) areas (see figure 4).
- > Separate these compartments by physical barriers, e.g. showers or barriers which have to be crossed before entering farm area.
- > The type of the barrier depends on the wealth of the flock.
- > If there is no possibility to shower, there should always be the possibility to wash hands, change clothes and shoes.
- > There has to be two storage facilities, one for ordinary clothing and one for the farm's own clothing.
- > Farm clothes have to be changed and washed daily after use. These should be able to withstand hot washing.
- > Watches and jewelry have to be deposited in the black area.
- > Do not transfer working utilities from one poultry house to another. Every flock should have his own equipment.
- > Prepare and use a book for all visitors to record and guarantee the traceability of the facilities visited, including before the current visit.
- > Replace the disinfectant in the trays on a regular basis (consider the use of disinfectant dispenser).
- > Tidy the floor of the entrance area room regularly.

Figure 3: Simple sanitation procedure in a poultry facility

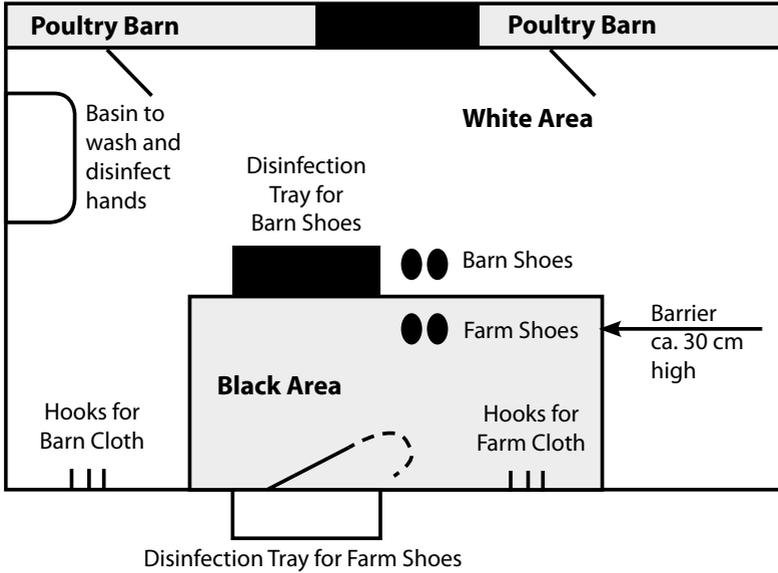


> Keep in mind

The best sanitation procedure is useless if it is not strictly applied.

BARRIERS

Figure 4: Plan for a simple sanitation area in a poultry facility



TRAFFIC CONTROL

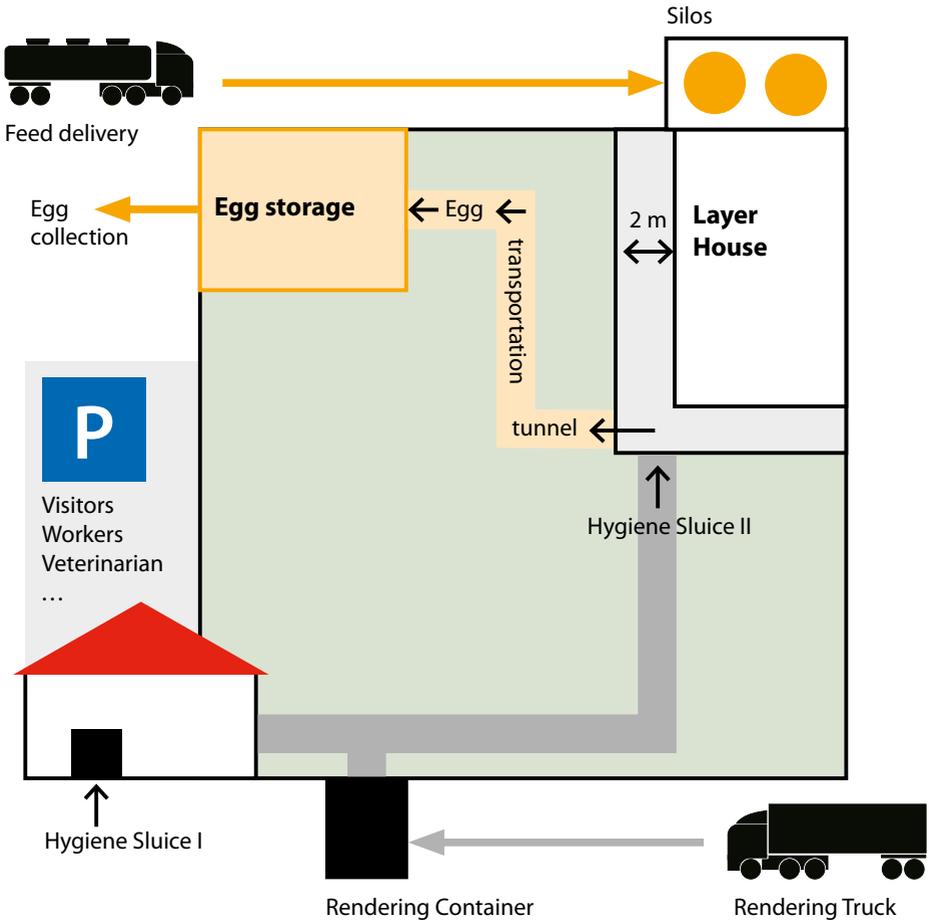
- Keep in mind: the most common visitors are usually the most dangerous ones. These includes veterinarians, consultants or feed suppliers who have mostly been at other poultry farms before.
- Signs keep everybody aware that one is close to a critical area (see figure 5).
- Trucks which deliver feed or collect carcasses, should not be allowed to enter the farm area (see figure 6).
- It should be possible to deliver the feed in an area which is on the outside of the fence.
- If it is not possible to exclude trucks from the farm, vehicles entering the farm should first carry out approved cleaning procedures so that at least the wheels are disinfected.

Figure 5: An example for a warning sign

**Valuable poultry farm!
NO ENTRANCE
for unauthorized persons!**

TRAFFIC CONTROL

Figure 6: Design of a farm in observance of biosecurity rules



SANITATION

Sanitation means the cleaning and disinfection of the poultry facilities during the service period. It also refers to the daily sanitation practice on the farm, which includes the following items:

- **Removal of dead birds:** dead birds should be transferred to the outside of the farm area as soon as possible.
- **Rendering container:** must be cooled and locked. They should be emptied, depending on the farm size, but at least once a week.
- **Spilled feed:** has to be removed immediately. It attracts unwanted rodents and parasites to the farm area.
- **Prevent water leaks or puddles:** these are areas where pathogens start to accumulate.
- **Disinfection dilution trays:** for shoes, trucks etc. have to be renewed at least once a day to ensure the effectiveness of the disinfectant (follow the instruction manual of the disinfectant).
- **Farm clothes:** have to be changed every day.

CLEANING & DISINFECTION

Cleaning and disinfection are important parts of a biosecurity program. As soon as the layers are depopulated treat the facility with insecticides. This has to be done as long as the barn is still warm.

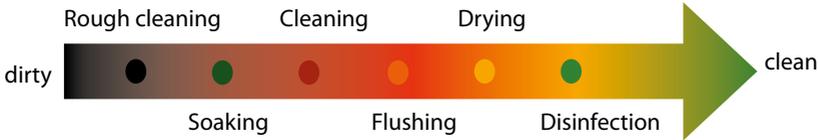
- If hens are kept in alternative housing systems like free range systems, lime the floor at least once a year.
- Keep the free range area for a downtime period of two weeks after liming.
- Do not forget to clean the water lines and balance tank. Water filters should be replaced for each flock.

CLEANING & DISINFECTION

Flexible equipment that can be moved should be brought to the outside of the layer house.

Afterwards the cleaning procedure can start:

Figure 7: The 6 steps of good cleaning procedure (DLG; 2010):



STEP 1 – Rough cleaning Treat house while it is still warm with an approved insecticide to eliminate mites, beetles and other harmful insects. Remove all litter and movable dirt out of the barn. Transfer the litter as far away as possible from the layer house (minimum 1 km). Also do not forget to remove the feed of the previous flock from the layer house.

STEP 2 – Soaking Soak the facility for several hours. Use enough liquid to soak. Tenside solutions help to combat stubborn dirt. A properly performed soaking can help to reduce the time of real cleaning.

STEP 3 – Cleaning Use a high pressure cleaner to carry out the cleaning of the shed. Do this either with hot or cold water, i.e. depending on the detergent you are using during cleaning.

STEP 4 – Flushing Rinse the facility with clear water after cleaning.

STEP 5 – Drying Let the facility dry properly. This is important as puddles of any kind will dilute the disinfectant to be used after drying.

STEP 6 – Disinfection During application of the disinfectant the house has to be sealed and the ventilation has to be switched off. Disinfection shall reduce the amount of infectious agents to a minimum. Use a minimum of 0.4 l/m² floor space. Disinfect from the end to the front of the poultry house, and from the ceiling to the floor. Do not work with a water pressure of more than 10 to 12 bar.

> Keep in mind

Disinfection without a proper cleaning has no effectivity. Increasing the concentration of a disinfectant is never a substitute for thorough cleaning.

CLEANING & DISINFECTION

All disinfectants are less effective in the presence of organic material.

> Keep in mind

Protein error: occurs if in an unclean barn the disinfectant reacts with faeces and other dirt before it can actually react with bacteria or other infectious agents.

Soap mistakes: Disinfectants can be inactivated if they react with residues of cleaning agents. Therefore, it is important to rinse the facility with clear water after cleaning and dry it properly.

- > Calculate the dosage of the disinfectant accurately (do not estimate the concentration); follow instruction manual of the disinfectant.
- > Comply with the exposure time.

Important: do not forget to clean and disinfect fan blades, louvers, lighting fixtures, curtains and walls!! Include the egg room, feed store and changing room in the cleaning and disinfecting procedure.

How to choose the right disinfectant

Disinfectants are chemicals that kill pathogens upon contact. The lethal action of disinfectants for various pathogens (viruses, bacteria, fungi) depends on the chemical composition of the disinfectant and the type of organism.

- > Generally, only use disinfectants which have been approved and verified to be effective by an independent institution.
- > Change the active ingredient from treatment to treatment. They should have a broad effective spectrum.
- > If extraordinary diseases break out in your farm facilities, please contact your veterinarian to help you choose the right disinfectant.
- > Choose the disinfectant that works within the temperature spectra you can realize in the layer house.

> Keep in mind

Temperature mistake: Some substances like Aldehydes do not work with temperatures which are below 10 °C. The activity of many disinfectants improves significantly, as the temperature rises.

Caution

Disinfectants are highly effective chemicals which are not only dangerous for infectious agents but also for humans. Follow label instructions and apply protective measures.



Table 1: Range of efficiency of some disinfectants

Disinfectant	Disease causing agent				Quickly inactivated by dirt
	Fungi	Viruses	Bacteria	Bacterial Spors	
Phenols	●	●			
Chlorine		●	●	●	●
Iodophors	●	●	●		●
Formaldehyd	●	●	●	●	
Hydrogenperoxid	●	●	●	●	

Control the effectiveness of the cleaning and disinfectant measures:

- > This should be done by your veterinarian, farm quality manager or an external specialist.

Table 2: Microbial contamination of surfaces before and after cleaning and disinfection (benchmarks)

Point in time	Cfu* / cm ² surface in animal house
Prior to cleaning	1.000.000.000 or 10 ⁹
After cleaning	1.000.000 or 10 ⁶
After disinfection	1.000 or 10 ³
After 2 nd disinfection	100 or 10 ²

*colony forming units

(Source: Lohmann Animal Health)

FEED

- › If you are producing your own feed, be sure to pay special attention to having the best quality of raw materials and to perform a quality monitoring program concerning nutrient content, microbial and probable mycotoxin contamination.
- › Ensure that all raw materials and supplements are stored hygienically. Bear in mind that the storage of fat and oil needs special attention.
- › When purchasing compound feed, only use feed suppliers which are certified and controlled.
- › Make sure that your feed supplier has appropriate processing control methods, i.e. cleaning and decontamination steps during feed processing in order to reduce the contamination of feed stuffs.
- › Heat treatment of feed during processing is a possible tool for feed sanitation; very high temperatures may impair the quality of the feed.
- › Pelleting is a standard heat treatment, with or without follow up crumbling. Monitor the cleanliness of the whole process, especially in the cooler. Avoid having too hard and sharp feed particles after this process.
- › Organic acids (optimal as liquids) are good tools to reduce bacterial burden and improve feed hygiene.
- › Use special supplements for salmonella control according to legal allowance.
- › Always keep the bill of delivery and retain sample of each delivery.
- › Keep the silo plate clean. Remove spilled feed immediately.
- › Always keep the silo clean from inside and outside. Use two silos for each layer house. This prevents the development of fungi, bacteria and other vermin.
- › Install the silos at a shady place to avoid heating of the feed. This will also prevent the multiplication of vermins. The silos should have an appropriate form of ventilation in order to get rid of humid air with high temperatures in the upper part of the silo.
- › Clean the whole feeding system after each production cycle.
- › If possible do not let the delivery truck for feed enter the farm area.

› Keep in mind

Clean feed can always be contaminated during transport and storage. Include the trucks delivering the feed into the biosecurity regime.

WATER

The distribution system or water itself are carriers for pathogens into the poultry facilities.

Therefore it is important:

- > to check water quality regularly. If the water is being supplied from an own well, make sure that samples of the water are submitted at least twice a year for analysis.
- > Nipple drinkers are preferable over open sources of water.
- > Make sure that water pipes are flushed at least once every hour in times of hot weather conditions.
- > Water lines have to be cleaned and disinfected regularly. This has to be done at least before and after each medical treatment.
- > Be aware of biofilm which is present in most of the water lines. Biofilms are good cultivation mediums for many kinds of pathogens.

> Definition Biofilm:

a thin layer of organisms adhering to the surface inside the water line. It harbours pathogens like Salmonella, E. Coli and others and impacts the effect of vitamins and medicine which are supplied using the water.

Ways to control the biofilm in water lines

Chemical free

With pulsed water and high air pressure produced in specific intervals in pipelines.

- > To be used during service period, before and after medication.

Use water lines in which the water is constantly in motion. This prevents the sedimentation of little particles.

Figure 8: Water line with (left) and without biofilm (right)



WATER

Chemical

Chlorination

is the most common method used to treat water against bacterial contamination.

- › It effectively eliminates bacteria and many viruses in the water.
- › Chlorine is most effective and more active in warm water (~ 18 °C).
- › Concentrated chlorine solutions can be run throughout the system and left for 24 hours if the birds are not present.

But: Be aware of the legal restriction of your country during the production cycle. Furthermore, the amount of chlorine can influence the potency of medication and vaccines. Be careful that the concentration is not greater than 5 % as this may result in the corrosion of metal equipment or destroy gaskets.

Chlorine dioxide

eliminates the biofilm, kills germs and other pathogens and prevents the sedimentation of iron and manganese.

- › There are no interactions known with medication nor is it known that it has a negative influence on the intestine of fowls.
- › Use a mixture of 20 ml / 1000 l water once a week, preferably on the day of manure removal.

Organic Acids

They reduce the pH-value of the water, this prevents proliferation of bacteria in the drinking water.

- › The following acids can be used: formic acid, citric acid, acetic acid, hydroxypropionic acid, propionic acid. If used regularly, i.e. 1 to 2 times per week, these will improve the intestinal health of the birds.
- › Use the right dosage. If the concentration is too low, this can enhance the growth of yeast and algae. If the concentration is too high, this causes a reduction in the water consumption of the layers as these will refuse to drink.
- › Example: use 100 – 150 ml citric acid / 1000 l water. Ensure that layers get used to it, otherwise they will avoid drinking.
- › Keep in mind: if the pH level of the water goes down to below 4, this will have a negative impact on the equipment and the water intake of the layers.

Ozone treatment

May be used to remove bacteria, taste and odour. Be careful, Ozone may also be corrosive to steel fixtures.

RODENT CONTROL

Rodents are attracted to poultry facilities by feed, water and the environmental conditions in the barn.

- > They contaminate poultry facilities with faecal excretion.
- > They are major vectors and reservoirs of pathogens, especially Salmonella.

To fight against rodents, please follow the rules:

1. Keep the interior and exterior of the building clean.
2. Remove spilled feed immediately.
3. Remove dead birds and broken eggs at least once a day and place them in secured containers.
4. Establish a professional control program to eliminate rodents from the farm.
 - > Non-chemical (e.g. mechanical traps) or chemical methods (e.g. baits or tracking powder) can be used to fight rodents.
 - > Place baits in bait stations to avoid damage of humans and non-target animals.
 - > It is advisable to consult specialists in rodent control, as rodents are very sensitive to baits and develop a behaviour called "bait shyness" if baiting is not done properly.

FLOCK MANAGEMENT

- > Use all-in all-out management. This helps to stop transmission of pathogens especially of vaccine strains by bird to bird passage.
- > Service period should be at least one week. The more valuable the flock, the more time has to be spent for the service period.
- > If multiple age groups cannot be avoided, treat them as separate units. Traffic should flow from the youngest to the oldest and from healthy to sick birds.



Consultation and diagnostics in all questions of poultry health through:

Veterinary-Laboratory

- > Diagnostics
- > Quality Control
- > Research and Development

Veterinary-Laboratory

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