Intelligent disinfection of breeder farms: the key point of profitability

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In the current economic and legislative context, intelligent biosecurity management in poultry breeder farms is a key factor, because it represents an essential tool in order to ensure maximum performance, while maintaining the commitment of animal welfare required today.

Biosecurity can be defined as a comprehensive range of clear procedures aiming to minimise the possibility of introduction and dissemination of undesirable micro-organisms into a poultry operation. Disease challenge by viruses, bacteria, fungi and coccidia presents a major threat to profitable poultry production.

Many organisms can persist outside the host for a considerable period of time, especially in the presence of organic matter (see Table 1).

Disease agent	Survival time
Avian influenza	Days to months
IBD (Gumboro)	Months
Coccidiosis	Months
Fowl cholera	Weeks
Coryza	Hours to days
Marek's disease	Months to years
Newcastle disease	Days to months
Mycoplasma	Hours to days
Salmonellosis (Pullorum)	Weeks

Table 1. Survival of disease causing agents in the environment (Food and Agriculture Organisation of the United Nations).

Intelligent disinfection

A keystone of biosecurity management is the implementation of an effective and complete sanitation program that comprises the cleaning and disinfection of the facilities, equipment, vehicles, and disinfection of hatching eggs, etc.

Cleaning can be defined as the physical removal of organic material such as litter, feed, dust, droppings, secretions and blood residues, usually using pressurised water and appropriate cleaning products (detergents). On the other hand, disinfection refers to the inactivation of micro-organisms.

The success of a cleaning and disinfection program depends on:

- Fulfilment of a proper cleaning before the disinfection.
- Choice of the optimal cleaning and disinfection products.
- Choice of an adequate cleaning and disinfection procedure.

All disinfectants have in common that they will not work if they do not come into contact with target organisms. This is the main reason for carrying out an exhaustive cleaning process before disinfection: pathogens are often protected by organic matter and it is necessary to eliminate it in order to facilitate the contact of the disinfectant product with the organisms.

All-in/all-out management allows simultaneous depopulation of the facilities between flocks and it gives time for periodic clean-up and disinfection to break the cycle of the pathogens. Before a new breeder flock is introduced to the farm, it is vital to ensure that the premises undergo a thorough terminal cleaning and disinfection procedure to prevent the carry over of pathogenic organisms. A suitable regime would comprise the following:

- Removal of equipment and dry cleaning: remove organic matter and dirt. Use a broom, brush, shovel, rag or compressed air.
- Wet cleaning: apply a suitable detergent to remove the grime without damaging the materials. It is important to soak the area and scrub to remove remaining organic material. Cleaning should be carried out from top to bottom and from the back to the entrance.
- Clean down and rinse with water.
- Dry (if the surfaces are still wet the dilution of the disinfectant will increase).
- Disinfect.
- Rinse (only when it is necessary) or allow drying.

The cleaning and disinfection process between batches should include the whole facilities: houses (floors, walls), surrounds, egg stores, equipment, amenities, feed bins, shavings stores, etc. Special attention should be paid to awkward places such as air inlets/outlets, feed equipment and water systems.

It should be noticed that water is part of the overall nutrition concept, and usually, animals intake twice as much water as feed. However, drinking water can be a potent source of micro-organisms that may affect health of the animals and reduce farm profitability. One of the main risk factors regarding microbiological quality of water is biofilm.

This layer of organic matter that covers the inside part of the elements of the water distribution system may contain a large amount of micro-organisms. Moreover, it has been demonstrated that the micro-organisms that develop on biofilm can be much more resistant to disinfectants than the free-living micro-organisms. So that, in order to carry out effective water management, during the period while the farm is empty, it is necessary to perform specific operations to guarantee a complete cleaning and disinfection of the water distribution system, including header tanks and pipelines.

The most common disinfectants commercially available are based on quaternary ammonium compounds (QAC), aldehydes (formaldehyde, glutaraldehyde), chlorine compounds (sodium hypochlorite, chlorine dioxide, etc), iodophors, phenols and peroxyacetic compounds (hydrogen peroxide, peracetic acid).

Continued on page 15

Continued from page 13

Choosing the right disinfectant is essential in order to guarantee the success of the sanitation program. The ideal disinfectant should show these characteristics:

- Rapid action.
- Wide biocidal spectrum.
- High penetration level even working with difficult materials.
- Effectiveness regardless of working conditions.
- Total destruction of micro-organisms: no risk of developing microbial resistance.
- Non-corrosive.
- 100% biodegradable.
- Rinsing unnecessary.
- Economically feasible.

As shown in Table 2, the disinfectants where the formula is based on peroxyacetic compounds are those that meet a higher number of advantages. Hydrogen peroxide and peracetic acid have satisfactory antimicrobial activity in the presence of organic matter and, at the same time, they decompose to non-toxic sub-products. They are effective at high and low temperatures and when they are stabilised, at usual dosages the risk of corrosion does not exist.

On the other hand, disinfectants based on peroxyacetic compounds are able to eliminate the biofilm existing on water tanks and pipelines, being the best option to disinfect the water distribution system.

These are the main reasons why Grupo OX (a leading company in biosecurity management) supports the use of OX-VIRIN, a 100% biodegradable disinfectant where the main active ingredients (hydrogen peroxide and peracetic acid) have been stabilised by the inclusion of the specific OX-VI CORE (masterful chemical formula that guarantees its stability and complete biocidal efficacy).

The bactericidal, fungicidal and virucidal activity of OX-VIRIN has been tested in external accredited laboratories according to the European Standards: UNE-EN 1276, 1650, 13697, 1656, 1657, 14675, 14476.

Moreover, the efficacy of OX-VIRIN against coccidian oocysts has been widely demonstrated.

Biocidal active ingredient	Biocidal spectrum	Effectiveness in presence of organic matter	Effectiveness in a wide range of conditions (temperature, hard water)	100% bio-degradable	Risk of corrosion
QAC*	+	+	+	No	No
Aldehydes	+++	++	+	No	No
QAC* +aldehydes	+++	+++	++	No	No
Chlorine	++	+	+	No	Yes
Iodophors	++	+	++	No	No
Phenols	++	++	++	No	No
Peroxyacetic compounds	+++	+++	+++	Yes	No

*QAC: quaternary ammonium compounds

Table 2. Comparison of different disinfectants regarding their main biocidal active ingredients.

Coccidiosis is a parasitic disease caused principally by Eimeria spp. This parasite needs no intermediate hosts for its development. What is more, its high resistance to environmental conditions, fast and intensive multiplication, as well as easy transmission through different vectors make it difficult to control and stop its spreading.

The infection is usually caused by swallowing infectious oocysts present in the birds' environment. Lack of efficient chemoprophylaxis, too late diagnosis and permanent presence of the parasites leads to the preservation and increase of weight deficiencies, decrease of feed use indices, and hence huge financial losses.

The basic prophylactic method is to make it impossible for the coccidian oocysts to develop and spread. This may be obtained by using a biocidal product with demonstrated efficacy against coccidian oocysts (such as OX-VIRIN) in order to maintain proper hygiene conditions and, at the same time, decreasing the oocysts' survival rate and their possibility to transform into invasive forms.

Optimised disinfection at the breeder farm preserves the quality of the eggs and the embryos. However, improper disinfection is one potential reason for embryonic mortality during the first 48 hours of incubation. Some disinfectants, especially formalin, can diffuse into the egg during cooling, which may kill the embryo.

OX-VIRIN has demonstrated its efficacy, and also its non-toxicity, and does not affect the survival of embryos.

Conclusions

The requirements of producers and the concerns of the end users regarding food poisoning and residues in the meat and eggs are growing quickly. In this context, preventive measures have assumed a key role in any production system and thus a well designed biosecurity program can be the difference between the success and the complete failure of a breeding company.

The best results can be achieved when cleaning and disinfecting procedures are carefully planned and carried out in a proper way.

Last, but not least, a biosecurity program is not a static plan. In fact, it is a rather dynamic instrument that helps the breeding companies to achieve their goals and therefore it has to be constantly revised and, if necessary, updated. ■