Cleaning and disinfecting critical surfaces in hatcheries

The biggest challenge to cleaning and disinfecting a surface is the presence of biofilm and organic matter, which can easily become the substrate for bacterial growth and the development of other microbiological challenges.

by Dr Ricardo Muñoz & Dr Mueez Ahmad, Neogen – Animal Safety.
www.neogen.com

Biofilm is the number one biosecurity risk simply because it cannot be seen. Biofilm accumulation becomes critical when it limits the effect that disinfectants have on a surface.

When it comes to battling biofilms, dry cleaning removes most dust and gross organic matter, but then wet cleaning truly removes the biofilm and any additional organic matter. If a biofilm is allowed to remain, it negatively impacts the performance of the disinfectants used after the cleaning stage of the cleaning and disinfecting (C&D) process. This allows surfaces, such as egg trays in hatcheries, to become future challenges.

Egg trays are critical surfaces to clean and disinfect in hatcheries that handle automatic tray wash equipment.

In a trial, 84 samples were taken from egg trays from two different hatcheries using swabs for AccuPoint Advance (Fig. 1).

The samples were taken before the hatcheries took corrective actions regarding how the detergent dilution was handled and mechanical action of cleaning egg tray surfaces was corrected.

The adenosine triphosphate (ATP) readings after the method and process was improved were lower and within specs (less than 300 RLUs).

Biofilm is a surface-coating layer made of a polymeric extracellular secretions and micro-organisms. It occurs in an animal production environment as secretions accumulate on a matrix over time. Biofilms act as a mechanical barrier that lessens the effectiveness of disinfectants. Acidic cleaners can prepare a surface for disinfection by penetrating the slimy layer of biofilm so that disinfectants can be used more effectively and efficiently.

Any cleaner/detergent program should be based on results from tools that provide numerical results, such as adenosine triphosphate (ATP) testing, which offer more specific, timely information which producers can use to adjust their cleaning processes before problems become visible.

For best biosecurity practices, cleaning is a very important step. Before disinfection can take place, producers must do the best dry clean and wet clean they can in order to reduce 90% or more of organic material and biofilms that act as barriers to disinfectants.

The main difference between cleaning and disinfecting comes from the level of reduction achieved against viruses and bacteria. Bacterial and viral reduction are expressed in logarithmic (logs) values.

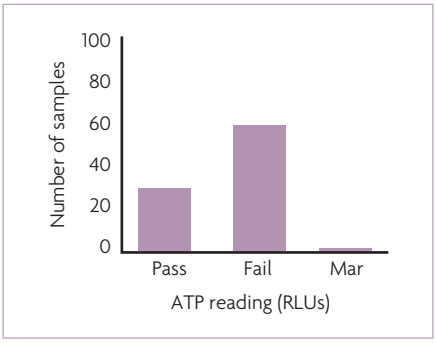
Cleaning reduces microbiological material by up to 99% (2 logs), and disinfection reduces it by 99.99% (4 logs). So then, after thorough dry and wet cleaning, the use of a disinfectant finalises the sanitation process, achieving the best decontamination possible in animal production facilities.

Other major challenges

Apart from biofilms, another one of the biggest challenges in sanitising surfaces comes from the type of surface being cleaned. Some surfaces are more continuous, with less porosity, meaning they are more easily affected by cleaners and disinfectants.

Another challenge is presented by hard water with a high concentration of minerals

Fig. 1. Trial involving hatchery plastic trays before corrective action was taken.



such as manganese, iron and calcium, which adds deposits of salt. That mineral content may have a negative reaction with the cleaning product.

Yet another challenge comes with the delivery of the cleaner itself. Proper mechanical action – the action of applying the cleaner, such as delivery and scrubbing technique – allows for the most adequate incorporation of detergent on a surface.

Aspects of delivery that must be considered: Is the proper equipment used? Is the pressure correct? These aspects and others, such as droplet size and coverage area, are easy to evaluate and adjust as needed. Besides using a suitable cleaning product, producers need to have a reliable mechanical program in place – one that uses the appropriate equipment and personnel trained to do difficult jobs.

Viruses and bacteria have different levels of sensitivity and resistance to cleaners and disinfectants. Viruses with lipid envelopes are more sensitive, because they can be destroyed with the action of their surfactants of their detergents. Gram-positive bacteria are more sensitive than Gram-negative bacteria, which have a structure that is naturally more resistant to disinfectants, partially because 90% of the dry weight of their cell walls are peptidoglycan. Peptidoglycan is easily affected by disinfectants. In contrast, that percentage for Gram-negative bacteria is just 10%. Endospores and mycobacteria are also more resistant to disinfectants.

Continued on page 25

Continued from page 23

Viruses can have two different varieties of external structures. Some are lipid, meaning they are more susceptible to disinfectants. Others are considered 'naked' and are more resistant. Circovirus, commonly associated with poultry, is an example of a fairly resistant virus. These types of viruses can easily become prevalent in animal production systems.

Water line structure

So far, we have addressed the surfaces in a production facility, but we should not forget indoor water lines, which are sometimes more than 10 or 15 years old. Biofilms and other accumulations inside of water lines can affect the quality and taste of water. This potentially reduces optimum water consumption in animals. When water consumption is optimal, it assures better feed conversion for the flock. Water line accumulation and the consequences that stem from it pose a risk because they can lead to bacterial contamination elsewhere in the farm and increase the pressure for water access.

Water intake is an important part of production. Animals should drink at least twice the volume of water as they consume of feed. If access to water is limited on a farm because the water's taste or quality are poor due to biofilms and/or bacterial contamination, feed conversion will be affected, limiting genetic production. Therefore, if water lines are not appropriately cleaned, production performance may be limited.

Biosecurity cannot stop at visible hard surfaces – it must continue into water lines, which often go without disinfection by standard surface disinfectants.

Five steps

The first of five steps in the cleaning and disinfecting process is the cleaning itself – a major, critical component. Dry cleaning must be done to remove organic matter and minimise dust. Then, before detergent is applied, the surface should be presoaked. Without the appropriate level of surface humidity, the wetting agents in the detergent formulation cannot work as effectively as they should. Just as a person does not enter the shower to apply soap and shampoo before even turning the water on, the same common sense and logic applies to cleaning and disinfecting a surface in a production facility.

Once presoaking is done, descaling must occur to remove the accumulation of scale. Then comes the rinsing stage, to remove the detergent. An additional rinsing and a second application of detergent is sometimes necessary (placing the acidic first, then the alkaline). After that, the surface should be allowed to naturally air dry, so that no water that might dilute the disinfectant is retained. The final step is disinfection, after the heavy work of cleaning has first removed at least 90% of contamination. Therefore, while disinfection is important, it is only the cap on the entire C&D process.

A quick hygiene evaluation of any critical surfaces, with the purpose of identifying how well the cleaning process was performed, is possible with the use of AccuPoint Advanced to measure ATP.

Before disinfectant is applied, AccuPoint Advanced can be used to evaluate how well the surface has been prepared for disinfection, allowing for the maximum virus and bacteria elimination — in other words, the efficacy of cleaning.

Monitoring and verification have become one of the key elements to move biosecurity programs from a descriptive format to a more systematic program.

In such a program, protocols could generate metrics rather than just qualitative-descriptive assessments.

As other farm processes, such as vaccinations and intestinal integrity, are evaluated, it is necessary and critical to start implementing numbers behind biosecurity protocols that could be evaluated in a continuous way. ■