Good hygiene: a must for the modern hatchery

by Gerd de Lange, Senior Poultry Specialist, Pas Reform Hatchery Technologies.

Modern poultry production would not be where it is today, without developed hatcheries as an essential link between breeder operations and final production. Modern hatchery operations have enabled specialisation and the scaling up of processes, to deliver more cost effective production.

Hatcheries act as a 'funnel', taking hatching eggs from a limited number of breeder farms and delivering day-old-chicks to a much larger number of production houses. While this does increase the risk of disease transfer, this can be negated effectively by good hygiene practice.

Optimising the hatchery's hygiene status should not be underestimated. It is as fundamental a factor in incubation as temperature, relative humidity, ventilation and turning the egg.

Hatcheries are under constant threat of contamination by pathogenic micro-organisms such as bacteria, mycoplasma and fungi. Numerous factors, such as hatching eggs received from a single infected breeder house, persons, transport equipment, rodents etc can act as a vector for these pathogens.

Without proper control, pathogens will multiply and spread within the hatchery, potentially putting many if not all customers at risk, especially where contamination presents a health hazard for the consumer by foodborne infections, such as Salmonella enteritidis and campylobacter.

More common bacteria, like E. coli spp will cause increased seven day mortality, with suboptimal production and increased use of antibiotics. Ultimately, the hatchery's reputation may be jeopardised – and restoring the customer's confidence is much harder than maintaining it.

Optimised hygiene in the hatchery is dependent on three key areas:

- Preventing pathogens from entering the hatchery, ie. maintaining biosecurity.
- Avoiding cross-contamination or the transfer of pathogens within the hatchery.
- Inhibiting further pathogenic development in the hatchery ie. cleaning and disinfection.

Preventing pathogens

Prevention begins when designing a new hatchery project. The location should be carefully chosen, taking the position of other poultry farms and public roads in relation to prevailing wind direction into consideration.

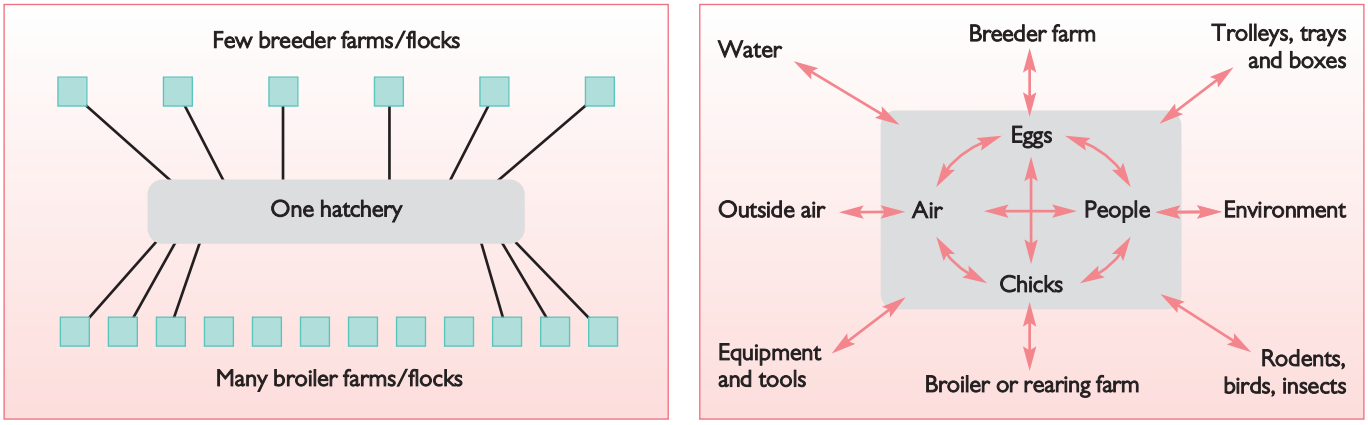
Air filters in the air handling unit(s) minimise the introduction of pathogens, often attached to dust particles, into the hatchery. Biofilters are often recommended if a higher level of protection is required, for example in the case of (G)GP hatcheries.

It is obvious that good hatchery design includes facilities such as changing rooms and showers for hatchery personnel. Any area accessed prior to the changing rooms and showers in a hatchery should be regarded as a 'dirty area', with the 'clean area' of the hatchery incorporating the setter room, candling and transfer room, hatcher rooms and chick handling and despatch rooms at minimum.

Technical areas, for example electrical installations or the boiler room, are located on the outside, so that engineers have no cause to enter the clean area of the hatchery. Similarly, offices for administrative personnel, canteens for truck drivers and meeting rooms for customers should be clearly and effectively separated from clean

Continued on page 13

Fig. 1. The central role of the hatchery in preventing disease transfer.



Continued from page 11
areas of operation. Strict rodent control, based on prevention and continuous monitoring, is also essential to keep these unwelcome visitors out of the hatchery.

One of the most obvious vectors for the introduction of pathogens are the hatching eggs and egg trays. Floor eggs and dirty eggs should not enter the hatchery under any circumstances, particularly because they are potential exploders. It is important that hatching eggs are well supported during transport, to avoid the formation of hairline cracks, which provide unchecked entry points for bacteria and fungi to get inside the egg. Once the shell – a critical defence mechanism – is breached, the result is not only loss, but also a serious breach in hatchery biosecurity. Purpose designed setter trays for on-farm traying are a perfect alternative to the single use of pulp trays. In any case, only new pulp trays should be used – and setter trays and farm trolleys should be cleaned and disinfected between each use.

Hatching eggs should be disinfected before entering the clean area of the hatchery. A common method is fumigation with formalin gas. The use of formalin is becoming increasingly restricted, due to its negative effects on human health and the environment and in some countries its use is no longer permitted.

Low volume misting, a technology by which a very fine mist containing droplets of no larger than10 microns is created, provides the means to apply a broader range of chemicals, including 'viscous' products based on the synergistic combination of quaternary ammonia compounds and glutaraldehyde. This method reliably covers the entire surface of each individual egg.

Vertical transmission, from breeder hen to day-old-chick by egg yolk contamination, of specific pathogens like Salmonella enteritidis and Mycoplasma gallisepticum can only be prevented by strictly monitoring the breeder flock. Monitoring for Salmonella spp. includes taking fluff samples from the hatcher from every specific batch of eggs. Yet still we should accept that chicks will hatch between the onset of a breeder flock being infected and the identification of this

infection, so continuous measures do need to be in place, to prevent cross contamination.

Avoiding transfers

To prevent cross-contamination, it is important to clearly demarcate the different hygienic zones in the hatchery: egg arrival area; setter room; candling/transfer room; hatcher room; chick handling and despatch room.

A well designed hatchery makes practical implementation of the rule 'clean should never meet dirty' easily achievable. For example, eggs being transferred to the hatcher do not cross the path of chicks just being pulled. After being washed and disinfected, hatcher baskets do not pass through the chick room or any area where processing takes place, on their way to the transfer room. Different coloured hatchery clothing and shoes, as well as tools like floor rubbers, greatly help to enforce hygiene responsible behaviour by hatchery personnel.

Exploders, often caused by Pseudomonas spp, are an important source of cross contamination between batches within the same setter. To reduce this risk, batches with an increased incidence of exploders should be transferred to the hatcher last. Potential exploders are often recognised by a foamy substance secreting from the pores in the shell; carefully try to remove them prior to transfer and dispose of them in a bucket filled with a disinfectant solution. Clean up the debris thoroughly and immediately every time an egg explodes.

Strictly applying the 'one batch per hatcher' rule, enabled by limiting the capacity of the hatchers, greatly prevents the risk of cross contamination, for example from older to younger batches.

In a well designed hatchery the number of hatchers per hatcher room is based on the daily production of chicks. This avoids recontamination after cleaning and disinfection, and thus minimises the risk of contaminating tomorrow's hatch. If a specific batch is known to be salmonella infected, the decision, often enforced by legislation, is either to destroy the eggs before they hatch, or to pull the infected chicks at the end of the hatch day.

Chick down is another potential contaminant – and easily airborne. Its movement must therefore be controlled to prevent cross contamination. The setter room should be maintained as the cleanest room in the hatchery: kept over pressure in relation to the hatcher rooms. The accumulation of down in air ducts is to be avoided, because this forms breeding grounds for moulds like Aspergillus spp. Air leaving the hatcher and preferably also the setter, should be brought directly into exhaust plenums which can easily be cleaned and disinfected. The use of air ducts should be restricted for clean, unused air only.

Inhibiting further development

Regular cleaning and disinfection controls the multiplication of micro-organisms effectively. Any person working in the hatchery knows what can be found on the floor of the setter after the eggs are driven out. The 'dirt' from an incidental broken egg provides all the necessary nutrients which, when combined with the ideal temperature in the setter, create the perfect environment for unlimited bacterial and fungal development.

Increased demand for improved hygiene status is a compelling rationale for converting to single stage incubation, which allows for the cleaning and disinfection of the incubators after each cycle.

Commercial hatchery studies by Mauldin in 2002 have shown that the number of contaminated eggs from a multistage incubator were significantly higher than in a single stage incubator.

All surfaces, fixings and finishes, in both buildings and equipment, should be designed to resist the accumulation of water, dirt and pathogens. For easy, thorough cleaning, the floor of setters and hatchers should be free

Continued on page 15

Continued from page 13
of obstacles. In the hatcher, condensation on the cooling surface is normal and the majority of fluff will be caught by this moisture if the surface is large enough.

The integration of cooling pipes inside the wall panels creates a large surface area that significantly minimises the risk of cross contamination, while at the same time greatly reducing cleaning time and promoting excellent disinfection results.

Sensors and other electronic parts need to be protected from malfunctioning due to accidental water damage, but at the same time, these should not compromise hygiene. A well designed drainage system eases the workload, avoiding re-contamination and the spread of micro-organisms.

In combination with a good foam-detergent, excellent cleaning results can be achieved with relatively low water pressure. Depending on the hardness of the water, it is sometimes necessary to alternate with a descaling soap, to remove calcium deposits. After proper cleaning and thorough rinsing, the disinfectant can be successfully applied.

While working with chemicals, it is important to follow the manufacturers' instructions, especially with regard to dilution rates and handling the substance safely. Chemicals should be chosen with care, taking into account the compatibility of selected disinfectants with detergents, safety for personnel and suitability for the materials and surfaces to be cleaned.

Ease and thoroughness of cleaning is an important selection criteria when choosing setter trays and hatcher baskets.

Sharp corners where dirt can accumulate should be avoided and the materials used should withstand high wash temperatures, while also being resistant to strong disinfectants.

To minimise the risk of omphalitis, it is important that hatching baskets are thoroughly cleaned, disinfected and dried prior to egg transfer. For this, a predominantly closed basket is preferable, such that maximum water pressure can be directed to remove dirt and shell particles effectively, yet with sufficient drainage holes to ensure thorough drying.

A new development is the inclusion of an antimicrobial agent into synthetic materials, such as the polystyrene and polyethylene used for setter trays and hatcher baskets.

Disinfectant is effective in the short term, but cannot prevent the growth of micro-organisms once the surface dries and the disinfectant has evaporated. Bacteria double every 20 minutes, resulting in logarithmical growth that within just seven hours, will multiply a single bacterium into over 1,000,000 bacteria!

Including an antimicrobial agent in a synthetic material provides continuous antimicrobial protection between cleaning and disinfection.

So when the micro-organism comes into contact with the agent's surface, for example the setter tray or hatchery basket, the bacterial cell wall is penetrated, allowing the antimicrobial agent to disrupt key cell functions so that the microbe cannot function, grow or reproduce.

Combat invisible enemies

For reasons of economic impact and its positive effect on food safety, maintaining high levels of hygiene in the hatchery should be a priority at all times. Developing and maintaining successful hygiene practice is largely dependent on the attitudes and conscientiousness of hatchery personnel. But because micro-organisms are not visible – it is not difficult for standards to slip.

In the modern hatchery, it is the task of the hatchery manager to create good hygiene awareness among all personnel – and to provide training, to ensure that procedures are fully and correctly implemented.

Discussing the results of microbiological monitoring and showing agar plates with and without microbial growth is an excellent way to bring this 'unseen adversary' out into the open. This kind of regular attention to hygiene matters will enhance understanding and increase everybody's motivation to maintain a constant vigil against the invisible enemy. ■

Smart, clean and protected

SmartPro was specifically designed to meet the stringent hygienic requirements of the modern hatchery. With compartmentalised sensors, modular hatchers to prevent cross contamination, the incorporation of Microban antibacterial protection into hatcher baskets and integrated cooling pipes in aluminium hatcher walls, the time required to clean the incubator thoroughly is the shortest in the industry.

- Modular hatcher control prevents cross contamination from older to younger batches, because eggs of different ages need not be mixed.
- Hatcher baskets incorporate Microban technology for the most effective, continuous antibacterial protection. Patented antimicrobial agent penetrates the cell wall of unwelcome micro-organisms on contact, disrupting normal cell function to prevent the multiplication and spread of bacteria.
- Surround Cooling. Integrated cooling pipes inside smooth-walled 'food safe' aluminium hatcher wall panels significantly improve the effectiveness of cleaning, minimise the risk of cross contamination and greatly reduce cleaning time.
- Securely placed and compartmentalised sensors in a central operating console allow for high pressure cleaning without risking damage to sensors.
- All surfaces, fixings and finishes are designed to resist the ingress of moisture and bacteria, preventing the creation of dirt traps.