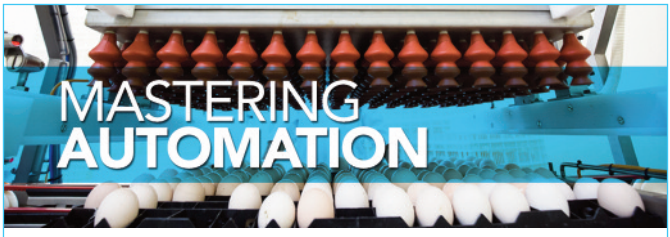

08 IN THE HATCHERY: KEEPING IT CLEAN

Most hatchery owners would claim they understand and follow simple hygiene standards of keeping clean and dirty areas separate. However, there are some basic principles that can help to prevent the possible cross over of contamination, which can have dramatic effects on hatchery performance.

For the modern hatchery, prevention of contamination cross over usually starts with managed air pressure for different areas. Clean areas include egg reception/fumigation storage, incubation and transfer. Dirty areas include hatcher rooms, chick handling and chick dispatch.

There is variation in positive (clean) to negative (dirty) air pressure across the main rooms of the hatchery. Those areas with a greater sensitivity to contamination have higher positive air pressure to prevent ingress of dirt. Regular testing is recommended to ensure air flow is kept at the correct levels.

The greatest areas of risk involve the movement of people through the hatchery under normal working conditions, particularly movement from egg reception to the transfer room and from transfer room to chick processing and washing areas. A good starting point is always to have two separate changing rooms for clean and dirty areas.

Automation in modern, well-designed hatcheries not only improves the efficiency by better quality of the handling and less labour, it also helps enormously in respecting the workflow to help design out potential cross over. These design elements break down into two broad areas, firstly the movement of eggs, chicks, boxes, baskets and waste and, secondly, the movement of people.

The flow of dirty boxes and baskets to wash areas and their subsequent movement to clean areas needs careful control, as does waste management. Good design will manage these issues.

Good practice could include footbaths at every room entrance, no potential short cuts avoiding controls and, in some hatcheries, the use of different coloured clothing and boots to give a strong visual reference for clean and dirty areas – ensuring any inappropriate movement of people is obvious. Sticking to good hygiene discipline should be incorporated within staff performance appraisals to help keep it a top priority for everyone within the hatchery.

However, one area sometimes overlooked is the movement of staff for maintenance. Clearly maintenance should be possible without compromising the airflow to sustain the right air pressure. However, we would also recommend specific guidelines and monitoring of the movement of technicians and their tools to ensure no movement from dirty areas to clean areas occurs without appropriate cleaning – a dirty spanner is just as effective at transferring contamination as dirty boots!

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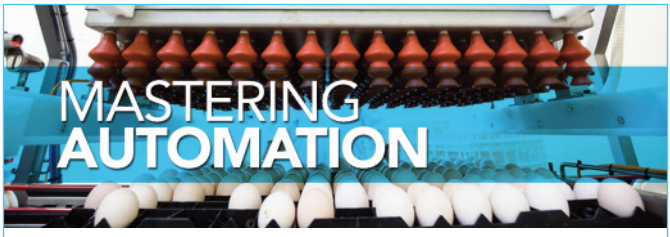

09 DISEASE PROTECTION: VACCINATION

Vaccinations provide protection from the spread of serious viruses and infectious diseases, with widespread vaccination programs being in operation since the 1960s. Today, the global implementation of modern animal welfare standards makes effective vaccination programs more necessary than ever before. In addition to a raised level of awareness of the risks of spreading pathogens such as avian influenza (AI), responsibly raised free-range birds live longer and therefore require a higher level of vaccination.

As part of the Ceva Group, Ecat-iD is working alongside Desvac to deliver vaccination programs through the automated process.

The scale of modern hatcheries makes it impractical to administer vaccines individually. For many years, a variety of different methods have been used to administer these vaccinations at a hatchery level. Methods such as in-ovo, coarse spray, aerosol and droplets are common place in most hatcheries.

However, with the increase of disease pressure, it is essential to ensure the proper administration of vaccinations, but ideally without slowing the speed of the hatchery.

Desvac's Duo administers a coarse spray suitable for the treatment of day old chicks. This system has been designed to be adaptable and work with any hatchery conveyor configuration, making it suitable for retrofitting to existing chick processing systems. Furthermore, the sensor system will match the conveyor speed and detect crate movement, triggering the spray automatically.

The Desvac Duo is also equipped with an unique gel dispensing system capable of evenly dropping vaccine suspended in a gel on day old chicks.

One of the key benefits of using this gel system is that it does not reduce the body temperature of day-old chicks like a normal water spray does. It is also possible to apply products such as vaccines in relatively small volumes of gel which makes the birds less wet; they dry faster and are soon ready for transport.

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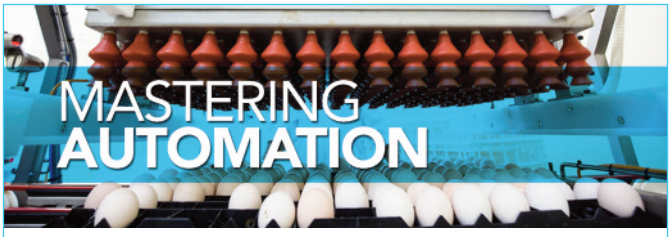

10 THE FUTURE OF IN-OVO VACCINATION

In this age of modern animal welfare standards, an effective vaccination programme is absolutely essential for egg hatcheries large and small. Progress in vaccination technology has taken great strides in recent decades with in-ovo vaccination taking the lead in the battle against serious diseases such as Marek's, Gumboro, Newcastle and Avian Influenza. The next generation of in-ovo vaccination technology is Egginject from Ecat-iD.

The innovative, patented dual pressure system within Egginject guarantees an accurate vaccine to every single embryo, regardless of egg size or flock age. And with a processing speed of up to 60,000 eggs per hour, there is no compromise on productivity at the expense of accuracy.

Safety and biosecurity

With biosecurity of the utmost importance, high sanitary status of the eggs and equipment disinfection is vital to the success of a hatchery, minimising the risk of cross-contamination. Egginject performs the safest and most accurate in-ovo injection. In a double disinfection process, both egg shells before injection and needles after injection are disinfected.

Negligible damage to egg and embryo

Excessive intra-embryo perforation increases the chances of injury to the chick so an error-free vaccination process is imperative. The high pressure technology used in Egginject is applied to a very small area so the incidence of egg shell breakage practically disappears. Changing to low pressure once inside the egg, the injection depth is adapted to each embryo, thereby minimising damage from excessively deep intra-embryo injection.

Improving productivity and reducing labour costs

Ecat-iD is constantly looking for ways to help hatcheries improve performance in order to maximise productivity and profit. Even in a small hatchery, automating the process improves efficiency and chick welfare without compromising on speed and consistency. With vast expertise in hatchery automation, Ecat-iD helps businesses to introduce new technology to improve productivity.

Customised for large, medium or small facilities, its reliable systems (standalone or fixed to an existing line) are compatible with all types of incubation trays. Extensive R&D ensures exceptional ease-of-use and reduced labour costs as fewer operatives are required.

Conclusion

Poultry businesses face the constant risk of disease and viruses decimating the profitability of their production. New in-ovo vaccines and the cutting-edge Egginject technology to administer them offer a brighter and safer future for the industry.

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11 THE LEADING LIGHT IN EGG CANDLING

It is a clear fact that egg contamination is the greatest threat to productivity that a modern hatchery faces. It also stands to reason that good quality chicks are produced from high quality eggs. Hatcheries that invest in technologies to tackle contamination and improve hygiene are winning the battle against poor egg quality and chick health, thereby reaping the rewards in efficiency and profitability.

Dirty eggs = poor chick quality

Contamination is introduced from faecal material, rotten eggs and dead eggs. If a rotten egg explodes, it spreads contamination and is a particular risk during the in-ovo vaccination process. Contaminated eggs impact negatively on hatchability and cause a higher percentage of low quality chicks. In fact, there is a direct link between egg sanitation and chick quality, with dirty eggs producing 1.3% low quality chicks than clean eggs.

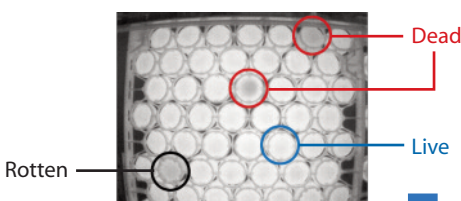
Floor eggs (laid out of the nest), washed eggs and faecally contaminated eggshells produce a higher rate of embryo mortality. These eggs are also more likely to include explosive rotten eggs. Cross-contamination can occur between eggs, between chicks or via hatchery machinery that is difficult to clean efficiently.

Automation technology can, if properly engineered, help improve the biosecurity of a hatchery in a number of different ways. For example, through effective candling, it is possible to detect and remove dead embryos and contaminated eggs.

Ecat-iD invests heavily in the research and development of the very best candling technology. Laser Life combines laser technology and an infra-red camera to measure the heat emission of live exothermic embryos – identifying contaminated, clear and dead eggs which emit different heat levels. With more accurate identification, the contaminated eggs are removed at transfer time, to allow hatcheries to comply with the highest biosecurity and safety standards. Compared to traditional candling devices that only identify clear eggs, Laser Life is 100% reliable to identify and remove three risky categories of non-viable eggs; clear eggs, rotten eggs and those with dead embryos.

Through advances in reliability, the new Laser Life candling technology from Ecat-iD gives modern hatcheries the edge by reducing waste, increasing efficiency and overall profitability.

Fig. 1. Thermic processing of eggs.



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12 TAKE THE PRESSURE OFF VACCINATION

The constant demand of increasing productivity in the egg hatchery sector is clear, but how do modern hatchery owners achieve this while maintaining the highest quality standards? In ovo vaccination is well known for offering economical and practical benefits to the process and has seen a booming increase worldwide in recent years. But how well do we understand the advantage impact of the in ovo process on the longer-term quality of the chick flock?

With high bird density and the continuous evolution of pathogens, both the technology and control of vaccinations has to keep pace and constantly advance.

In ovo vaccination = healthier chicks

In ovo vaccination offers many valuable advantages to egg hatcheries – improvements in biosecurity, increased productivity, better chick quality and the obvious reduction in diseases. It has been shown that early vaccination of the embryo stimulates a faster, and stronger, development of the chick's overall immune system.

When compared with subcutaneous vaccination, in ovo allows for vaccination to be constant, accurate and with less room for human error. As such the day-old chicks are less stressed after hatching and, because the day-old chick processing is faster, they have quicker access to food and water. Therefore, a robust in ovo vaccination programme improves hatchery process flow and performance.

The latest development for in ovo success

As in ovo vaccination has become more popular, the technology has developed to address various issues such as excessive intra-embryonic injection and egg breakage, which all too often resulted in embryo mortality. The outcome of Ecat-iD's heavy investment in research and development is the innovative, patented, Dual Pressure technology within its Egginject in ovo vaccination system. This guarantees an accurate vaccine for up to 60,000 eggs per hour, regardless of egg size or flock age.

During the injection, the high pressure is applied to a very small area of the egg so the incidence of shell breakage is negligible. Changing to low pressure once inside the egg, the injection depth is adapted to each embryo, thereby minimising damage from excessively deep intra-embryo injection compared to traditional systems.

Egginject, with its innovative Dual Pressure system, inspires confidence in the in ovo vaccination method as it offers the safest, error-free, way of protecting chicks and improving the health of the flock.

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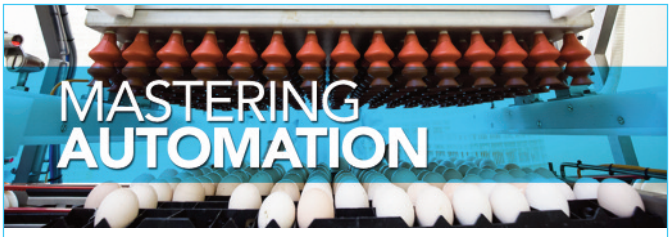

13 UPWARDS TREND

According to farm business consultants Anderson[1], production of poultry has increased by 25% in the UK between 1997 and 2015. The trend in other parts of the world, apart from China, shows similar increases in production. With a presence in hatcheries in six continents, Ecat-iD, a truly global business, is well placed to comment on these trends.

Research completed by Ecat-iD shows clear evidence of a new wave of hatchery construction taking place around the world to satisfy the global increasing demand for poultry. The most common size of new projects is around 1 million eggs per week. In addition, around 80% of the new hatcheries plan to run at a production speed of 90,000 eggs per hour.

The growth of large-scale hatcheries, reaping the benefit of economies of scale is due mainly to the early adoption of the latest technology by the poultry industry. Automation and complete systems are the best way to guarantee safe and efficient operations at this level of throughput.

Modern hatchery automation systems help to consolidate the processes, therefore reducing production time and cost, while at the same time they can help to manage risks efficiently by reducing the number of incidents caused by human error. Human interaction with the eggs and chicks is reduced to a minimum. For example, automated stacker and destacker machines offer a 0.05% egg breakage incidence at transfer compared with up to 3% egg breakage with manual operations.

The equipment and technology required to run a smaller or medium-sized hatchery does not differ substantially from the systems needed for larger operations. Most hatchery automation systems are designed with a capacity to run at higher levels of throughput. Larger hatcheries, with high throughput rates, can make better use of these capabilities.

Another important factor is an improved level of biosecurity in larger hatcheries. Automatic monitoring and preventative maintenance ensure that all hatchery equipment is kept hygienically clean and unplanned downtime is avoided as much as possible.

With the trend to larger scale hatchery operations, as seen by Ecat-iD all over the world, increased automation of hatchery equipment makes business sense. Proven reliability of the technology and the option to increase throughput, gives hatchery owners a distinct competitive advantage over companies relying on older equipment and a higher ratio of manually operated processes.

[1]http://www.andersons.co.uk/images/Publications/Outlook2017.pdf

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14 MAXIMISING HYGIENE TO REDUCE DISEASES

The recent rise in cases of avian flu across Europe is a great cause for concern in egg hatcheries. But what can be done to reduce the risk of flu and other pathogens decimating a flock, resulting in substantial economic losses for the hatchery?

Meticulous attention to hygiene and sanitation is crucial in the fight against infection and disease. However, with every area of the hatchery holding the potential for bacterial growth and transfer, maintaining a clean, hygienic environment is a challenge. There is no substitute for stringent hygiene and biosecurity measures, including thorough cleaning and disinfection programmes – the most cost-effective solutions to disease prevention within the hatchery.

Before even entering the hatchery, attention should be paid to the hygiene credentials of the whole supply chain and the age of the breeder's flock – eggs from older flocks have weaker shells and are more likely to become infected. Floor and dirty eggs must be removed and eggs from different suppliers should always remain separate. An ideal hatchery layout should consider product flow (no crossing of eggs and chicks); people flow (from the clean egg zone to the dirty chick zone); air flow (positive pressure in the clean zone with no air intake near a dirty zone exhaust); and waste water flow (separate drains for clean and dirty areas).

The movement of people through the hatchery creates the greatest risk to sanitation. Good practice includes footbaths at every entrance, no short cuts that avoid controls and the use of colour-coded clothing and boots to distinguish clean and dirty areas. In multi-stage setters, the use of regular spray or mist disinfection is essential, exploded eggs and debris must be removed. The well-managed use of automated equipment greatly reduces the risk of cross-contamination through human error and offers improved accuracy and consistency within vital hatchery processes. Potential areas of cross-contamination can be 'designed out' to improve hygiene and productivity.

Automated washing systems, for example, are more effective at deep cleaning, have a higher wash capacity and are more energy efficient. Ecat-iD offers a wide range of reliable automated washing solutions for cleaning trays and boxes, with all equipment designed to maximise water run-off and aid the cleaning process. The flow of dirty boxes and baskets to and from the wash areas can also be carefully controlled, along with waste management.

So, when looking for a fail-safe system for eliminating pathogens in the hatchery, take into account where the eggs have come from and how they are transported, adhere to the strictest hygiene standards and utilise the latest automated equipment wherever possible. Implementing basic principles of cleanliness leads to a hygienic, infection-free hatchery and the addition of automated equipment brings great benefits in consistency and accuracy of sanitation.

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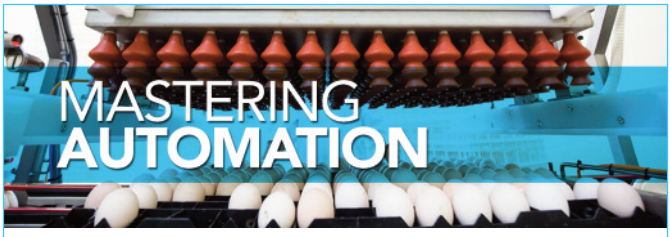

15 IN OVO ISSUES SILENCED BY HI-TECH SOLUTIONS

In ovo vaccination has revolutionised the war on diseases that can wipe out poultry flocks and have a devastating impact on the industry, but the innovative process is not without issues. Technology is constantly evolving and the latest generation of in ovo vaccination equipment addresses many of the common issues, making the process more reliable and accurate without compromising productivity. An issue of early in ovo technology is injection depth. When fixed, it can cause a negative impact on particularly small eggs or in embryos at the upper limit for vaccination. Excessive intra-embryo injection can cause injury or fatality, severely reducing hatchability.

With a commitment to minimise or eliminate the common risks associated with in ovo vaccination, Ecat-ID has invested heavily in research and development. The result is the innovative Egginject in ovo vaccination system. The patented Dual Pressure System within Egginject delivers an accurate dosage of vaccine to the target embryo with negligible impact on hatchery performance thanks to the adaptability of the injection depth. High pressure is applied to a very small area to perforate the egg shell. Once the needle is inserted, the pressure is adjusted to automatically define the injection depth depending on the embryo position and size, regardless of the egg size. Ecat-iD's research has also led to the inclusion of a needle that is less sharp than in traditional systems, reducing the risk of embryo injury still further.

Another key issue for in ovo vaccination is the transference of contaminated material via the needle into the embryo. With biosecurity of the utmost importance in the modern hatchery, high sanitary status of the eggs and equipment disinfection is vital to the success of the in ovo process, minimising the risk of cross-contamination. Egginject has a double disinfection system whereby the egg surface is disinfected with a peroxide-based sanitiser prior to injection, then needles are disinfected with a chlorine-based sanitiser after each injection. Dual disinfection maximises the hygiene conditions and minimises the risk of cross contamination.

Egginject can be installed as a standalone piece of equipment in the hatchery or combined for ultimate effectiveness with Laser Life, Ecat-iD's egg candling equipment. Laser Life identifies and removes dead, clear and rotten eggs before they reach the vaccination stage. Egg candling and in ovo vaccination work together to achieve the greatest benefits. With Laser Life, up to 99.9% of fertile embryos can be accurately identified at 18 days of incubation and with a throughput speed of 60,000 eggs/hour, Egginject guarantees correct and precise vaccine to each embryo.

Controlling hatchery equipment still further, Ceva's C.H.I.C.K. Program assists hatchery management through regular monitoring and training. When teamed up, these pieces of equipment are a force to be reckoned with, providing unbeatable productivity and chick health.

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