Improving hatchability and quality between the breeders and hatchery

Collaboration is a key part of the success of any organisation, executed through a clearly defined vision and mission and based on transparency and constant communication – this quote by Dinesh Paliwal could not more accurately summarise what is required of the breeder farms and hatcheries to maximise both hatchability and poult quality within their operations.

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Information should flow unbiasedly and freely between both groups, regardless if it is within the same company or between companies. Biased or poor communication only hinders the potential of everyone involved.

Therefore, objective assessments and feedback must be developed and exchanged. One of these examples is the use of 'Quality Control Egg Audits' at the hatchery. 'Quality Control Egg Audits' can be a very powerful tool when utilised correctly. They can bridge the communication gap that is often present between the hatcheries and the breeder farms.

The intent of the egg audit is not to cast blame on either party, it is simply a means for the hatchery and the farms to work in collaboration with each other to resolve/identify issues, modify existing incubation parameters, and improve and maximise egg and subsequent hatchability and poult quality.

Since processes differ between companies and geographical regions, each organisation will need to customise its specific egg audit to make it relevant to its operation. Regardless of any operational differences, the basis of the audit is the same.

The Quality Control Egg Audit should be composed of four main categories:

- Egg sanitation.
- Egg handling.
- Gross appearance.
- Bacterial presence/load on the eggshell.

Egg sanitation

Eggs may be washed with various levels of chlorine and or quaternary ammonium, alkaline-based detergents and quaternary ammonium with a flat washer or brush washer. They may also be fumigated with formaldehyde, peroxide, glutaraldehyde/quaternary ammonium products in the egg houses.

Egg sanitation may impact cuticle thickness and integrity. The egg cuticle directly impacts moisture loss, hatchability, poult quality, and bacterial contamination. Its consistency is important with regard to optimising incubator and hatcher profiles as well as creating a narrow hatch window.

Cuticle thickness and integrity can be examined using a 395nm LED ultraviolet black light flashlight that contains more than 50 LEDs. The cuticle colour that fluoresces back will change and depends upon the types and concentrations of egg sanitiser used, fumigation used, and the age of the breeder hen.

When auditing this parameter, it is very important to wait at least 24 hours after the egg has been sanitised, as it takes a while for the colour change to occur. Due to operational differences in egg sanitation, each company will need to establish a target cuticle colour and use that as a benchmark. The consistency of the established target can be then evaluated using UV light.

When auditing, the points should be off on overall general appearance as opposed to individual eggs. There will be some natural variation in the cuticle colour between eggs, but it should not be stark: variation may indicate that sanitation was suboptimal.

Point deductions should be made for improper cuticle colour and consistency. The level of points deducted should reflect the severity of the deviation.

Egg handling

Eggs should be evaluated for air cell size, location, and any fine line cracks in the shell. The air cell is very small at first but increases in size with egg age and moisture loss. The purpose of the air cell is to give the embryo orientation.

Air cells are considered misplaced if the air cell does not touch the centre of the large end of the egg at all. If the air cell is misplaced, it may indicate improper cooling of the eggs or transporting the eggs too fresh.

It is advised the eggs are not shipped long distances until at least 24hrs post-lay. Eggs with misplaced air cells have an increased chance of having malpositioned embryos at the time of hatch. If the air cell is too small, the egg may not be able to lose enough moisture during incubation. If this occurs, the embryo may drown in its own fluid when pipping through the inner membrane into the air cell.

If the air cell is large, the egg contains less water. If the air cell is very large, the poult may end up with too little moisture at hatch, dehydrate, and get stuck in the shell. Air cell size will increase with egg age, which

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is why it is important to audit the eggs shortly upon arrival at the hatchery.

The goal is to receive flocks with approximately the same size air cell so the hatchery can design proper incubation profiles. Air cell target size is typically 2cm in diameter. Smaller air cells will be seen if the eggs are audited within the first two days of being laid. They may also indicate that the egg is gaining moisture (or not losing enough). Dehumidification should be used in on-farm egg coolers to maintain optimum humidity requirements.

Larger air cells can be an indicator of excessive moisture loss. Seasonal changes and subsequent outside humidity levels can greatly impact cooler humidity and therefore air cell size. This can be assessed using a small high-intensity flashlight. Point deductions should be made on a per-egg basis. Fine line cracks can be easily seen using a candling light as well, whether it be from rough egg handling or a body check from the AI tube during insemination. The older the crack the brighter the crack will be when candled.

The more specific you can be with the type or size of crack observed the easier it will be to address the issue, whether it be a farm or transportation issue. Cracks can lead to premature embryo dehydration and increase the chance of contamination.

These can be assessed using the same process as the air cells and point deductions should be made on a per-egg basis.

Gross appearance

The appearance of eggs can be tough to audit. It is important to keep in mind that these eggs were laid in a barn, and there will naturally be imperfections. However, eggs should be assessed for physical cleanliness, cull eggs that may have slipped through farm grading, as well as eggshell characteristics.

The greater the incidence of organic material the greater the risk of contamination. Litter and or straw that is small and easily flecked off is less risky than anything stuck on the egg. The greatest risk is faecal material. Smears and scratches create breaches in the cuticle. Smearing typically happens when debris is wiped off the egg when the cuticle is wet. A light feathery appearance that is created by the hen when the egg is freshly laid or accidental smearing during egg collection is normal.

This happens if the egg is picked up/laid very close to the collection time and the cuticle has not had time to fully dry or if the hen moves when the cuticle is still wet.

Debris on the shell should be easily flicked away, and evidence of doing so should be minimal. It is never acceptable to sand, scrub, or use a metal knife to scrape/clean eggs. Sanding, scrubbing, and scraping compromise the integrity of the cuticle and allow bacteria to easily enter the egg. These eggs tend to have higher amounts of

contamination and reduced hatch rates.

Shell quality is an indicator of egg quality and correlates with hatchability and poult quality. Shell quality can also be indicative of breeder flock health. This does not mean that eggs with suboptimal shell quality should be culled out, but it is a way of tracking trends and making necessary changes. For example, if one sees a trend in the number of eggs with calcium deposits, thinner shells, etc., it may be time to reevaluate the diet. Pimply eggs are often due to excessive air pressure in AI guns. These eggs very seldom hatch because they dry out too quickly. They easily facilitate the growth of mould and bacteria and should be removed.

Physical appearance should be evaluated by looking at individual eggs. They should be examined for cleanliness, debris, smears, scratches, and the presence of cull eggs. Eggs outside the accepted parameters should receive individual deductions. Shell quality should be assessed visually as well as by physically picking up the eggs and touching the eggshell. The poor texture is not always visually apparent. Deductions in this category should be based on individual eggs.

Bacterial presence/load on the eggshell

Eggs will not be sterile, but the microbial load on the eggshell should be minimal and void of specific harmful types such as E. coli, Pseudomonas, and aspergillus. Harmful bacteria or fungi on the surface of the eggs can lead to an increased number of rots and contamination of the hatchery.

Eggs may become infected prior to, during, or post-hatch. Bacteria or fungi that make their way through the shell may simply cause a rotten egg or more seriously hide out in between the inner shell membranes and infect the poult when they pip and begin to hatch.

Bacteria on the outside of the shell can lead to excessive poult mortality. When the poult hatches, the fresh navels may pick up any bacteria present on the eggshell as they move across the eggshells. This may subsequently lead to omphalitis and higher poult mortality. Microbial presence, type, and load can be evaluated by rolling eggs on various bacterial agars and incubated for a period of time. This evaluation does not capture any bacteria already drawn inside prior to being sanitised.

Using the four areas described, the audit can be used to quickly pick up on trends and address issues, it is recommended that each flock should be audited at a minimum of every other week. For the sake of consistency, the audits should be conducted by a designated person and done within 24-48 hours of the eggs arriving at the hatchery. Straying away from this structure can lead to inconsistent feedback due to colour changes and moisture loss associated with holding eggs.

Each audit should start out with 100 points and then any suboptimal observations/characteristics found should be deducted from there. To make the audit more meaningful, each of the large categories should be weighted based on the potential impact on hatchability and quality.

There should be maximum deductions for each category. Each observation should be tallied or tracked for informative reasons, but the maximum deduction should only be used for scoring purposes. For example, the auditor may tally 11 misplaced air cells but may only deduct five points in that category. Individual observations may be weighted in each category. Some observations may not be deducted and may simply be tracked.

Some observations may carry more weight than others, for example, 'Faecal Material' found on an egg may result in a 2-point deduction per egg. Even when deductions are made, that does not mean that the eggs should not be set, it simply helps to fine-tune and direct the process.

In addition, a score of 100 is not a realistic expectation. If farms are scoring the full 100 points, they are likely throwing away good eggs. A score of 90+ points is amazing, 80-90 points are good, 75-80 points are ok, and anything less than 70 points should elicit a phone call or conversation.

A very purposefully detailed audit is intended to give very detailed feedback to resolve issues easily and quickly. For example, one can say very subjectively that I do not like the quality of eggs coming into the hatchery and the grower does not have a clue as to what to investigate.

Or one can say very objectively that the eggs had 20 misplaced air cells. Based on that information, the grower should then look at how long the eggs are sitting before they are collected and cooled.

The observation indicates that the eggs were cooled improperly. Again, this audit tool is to help improve communication between the farms and the hatchery to ultimately improve hatchability and poult quality. The continual feedback, good or bad, helps the breeder farm fine-tune its processes and provide the hatchery with the best quality egg possible. ■