Microban SilverShield protection

81

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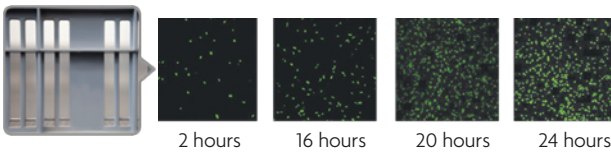
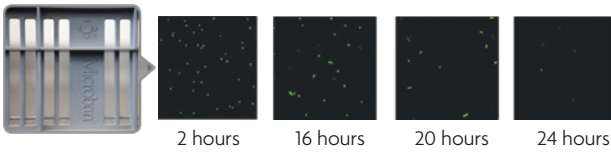
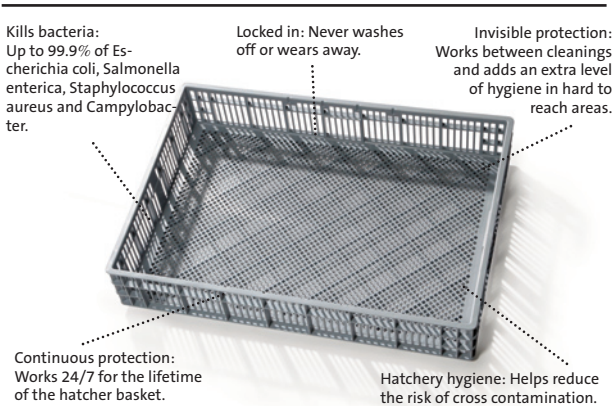
Hatcher basket – without Microban SilverShield protection



SmartBasket – with Microban SilverShield protection

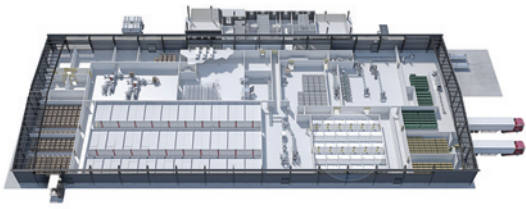




Bacteria species	Bacteria reduction (Log 10)	Bacteria reduction (%)
Salmonella	3.8	99.99
E. coli	3.7	99.98
Staph. aureus	4.14	99.99
Campylobacter	4.4	9.99

Antibacterial test analysis by Industrial Microbiological Services Ltd.
Test method: MOD JIS Z, 2801:2000, Contact time: 24 hours, Date analysed: 31.08.2016

Silver is constantly presented on the surface of the hatcher basket and ready to be released 24/7. This means that polymers with Microban SilverShield protection offer continuous protection against bacteria, thereby helping to extend the effectiveness of disinfectant chemicals well beyond the 120 minutes before bacteria regain their foothold with disinfectants alone.



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Nine reasons to choose SmartTray 82

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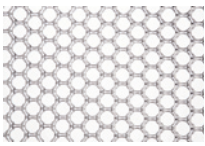
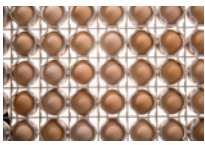
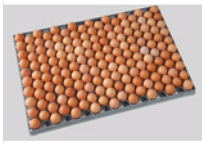


1. Supports hatching eggs at two levels:
One size fits all. Innovative design provides maximum protection for hatching eggs of all sizes with support points at two levels – and no hairline cracks



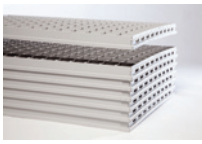
2. Open, spacious grid:
Promotes the free movement of air for more uniform heat and humidity distribution



3. Space saving honeycomb design:
Range of capacities includes SmartTray 162, for the highest number of hatching eggs per m^2

4. Superior construction:
Highly impact and temperature resistant. Ideal for automated hatcheries

5. Stable and self-centring:
Ideal for in-ovo vaccination. Self-centring egg positioning provides a stable, secure target for accurate in-ovo vaccination



6. Safe, secure stacking:
Blind-find bottom design for fast, safe and secure stacking

7. HACCP compliant:
Smooth finish for easy, thorough, fully HACCP compliant cleaning

8. Ergonomic design:
Lightweight, ergonomic design for ease and comfort in handling

9. Microban antibacterial technology (optional):
The only setter tray to incorporate Microban continuous antibacterial technology. Microban is a registered trademark of Microban Products Company

Designed to cradle hatching eggs of any size safely, the open construction of Pas Reform's SmartTray is proven to deliver a uniform airflow during incubation. This helps to create an optimal environment for the growing embryo, to promote day old chicks, turkey poults or ducklings of the highest quality.

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Checking and calibrating sensors

83

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by Dr Marleen Boerjan, Pas Reform Academy

We expect incubators to function 24/7 without disruption – and with the highest levels of accuracy from the sensors in particular, on whose outputs the hatchery manager relies for many years.

However, as a result of age or the accumulation of dirt, sensors do become less accurate over time and their read-outs need to be routinely checked against a control: a certified reference sensor. This reference check of the sensors installed in hatchery equipment is an essential component of good, preventive hatchery maintenance.

First line preventive maintenance includes cleaning the sensor and its hardware, such as sensor protection filters and boxes. Secondly, the output of the cleaned sensor should be compared regularly to the output of a certified reference sensor, which can be purchased or hired from the manufacturer. If the output during these routine checks deviates from the output of the reference sensor, a calibration procedure must be initiated.

The calibration procedure is part of approved good-practice hatchery protocols, which provide an assurance of:

- Standardised environmental (temperature, airflow, etc) conditions.
- Standardised physical position of both the certified calibration sensor and the sensor to be calibrated to optimise performance.

If, during calibration, the output of the hatchery sensor deviates too much from the certified reference value, then the sensor needs either to be replaced or returned to the supplier for validation. In a few cases, especially for sensors applied in pressure control systems, readouts can be adjusted using a 'zero adjustment knob'.

The reference sensor is highly precise, replicating output values within very narrow ranges of the input value every time. For example, if a temperature reference sensor is placed in a liquid precisely controlled at 37.8°C (100°F), the output of the reference sensor should be 37.8°C, +/- 0.05°C (0.09°F).

The accuracy of the reference sensor's readout is determined by an official, accredited certification body or institution. All sensors used for reference and calibration must be accompanied by the relevant official certification.

Steps for calibrating incubator sensors

Always take your time when calibrating incubator sensors and read the manufacturer's instructions carefully. Be aware that there could be several reasons for a difference between the readings of individual temperature, carbon dioxide and relative humidity sensors and their reference units.

To achieve accurate calibration, follow the advice below:

- Read the manufacturer's manual to establish whether factory calibration included the complete system or the sensor only. The output of most sensors installed in modern incubators is based on electrical signals (resistance, ampere or voltage) and, in fact, the sensors are part of a complete system, including wires to display boards.
- Clean sensors and sensor protection boxes/filters before starting the reference measurement or calibration procedure.
- Replace protection filters regularly as a routine part of your preventive maintenance protocol.
- Test whether air movement around the sensors influences output values and readings.
- Make sure that sensors are dry. Evaporating liquids, for example, will significantly influence the temperature measured by the sensor.
- Ensure that recommended stabilisation times are observed, to allow reference sensors to adapt to the ambient climate.
- Prevent too much fluctuation in measured values by placing empty trolleys in the incubators. After egg collection; do not place them immediately in the cold room. ■

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When the power supply fails

84

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by Maciej Kolanczyk, Senior poultry specialist, Pas Reform

In a contemporary hatchery all the parameters influencing incubation, such as temperature, humidity, ventilation and the turning of eggs, are based on using electricity. Stopping the energy supply means that the pumps and fans do not work, heating and cooling does not function and the air in the incubators cannot be refreshed.

In closed machines, eggs incubated for more than 9-10 days will tend to overheat – especially in a single stage machine. Embryos of 15 days or more may suffocate. This occurs quickly. In a non-running closed hatcher most embryos and chicks will die within 30 minutes.

A lack of electricity also means no light in the building, no air conditioning in the rooms and the malfunction of all auxiliary devices used for hatchery operations.

Today's modern hatchery cannot operate without electricity and as a power cut will happen sooner or later, staff must know how to deal with it. The only structural solution is the installation of an emergency power generator. An automatic starting device will immediately replace the power supply. This technical solution is effective and safe, but only if the generator functions properly.

Potentially huge losses resulting from a power cut justifies any investment in a reliable electricity back-up system. If the system works – no special action is needed. Regular maintenance and testing of the generator, including a regular check on the fuel reserve, are an essential part of the hatchery operation.

If there is no back-up system the risk related to the lack of an electricity supply has different grades and priorities depending on the incubation phase. The very first objective is to save the life of the embryos. The most urgent, immediate requirement of advanced embryos is respiration. The more advanced their development the more urgent the demand. The lack of cooling worsens the situation and leads to overheating.

The eggs in the hatchers are exposed to the most risk and deserve first priority. These relatively small cabinets are filled exclusively with embryos in their final stage, as well as hatched chicks. They need a lot of fresh air and must be attended to quickly.

Next, the setters containing mostly developed embryos, especially in a single-stage incubation system, should be attended to.

Embryos below 10 days of incubation can wait. Temporary, limited cooling down will mainly influence the incubation time but will not kill the embryos at this stage.

Advice

What do you do if there is no power and no back-up generator?

- Make sure the staff is prepared, instructed and trained. People on duty must know what to do rather than look for instructions in the face of an existing problem.
- If there is no UPS system backing up the computers and screens – have notes available documenting the load of the setters.
- Manual portable torches should always be in working condition and available from a fixed, easily accessible place.
- Give priority to hatchers and then setters with embryos at 15 days and more. Drive out trolleys and space them in the room between the machines or at other places, such as the chick handling room or even the dispatch room. OPEN ALL DOORS TO CREATE A NATURAL AIR FLOW IN THE BUILDING.
- For embryos at 10-15 days, just open the doors of the setter.
- For embryos <10 days: do nothing; keep the setters closed.
- Consider purchasing an emergency generator to be better prepared for the next time. ■

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In-ovo vaccination requires good hatchery management

85

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by Gerd de Lange, Senior Poultry Specialist, Pas Reform Academy

In-ovo vaccination is gaining popularity and is being used in an increasing number of hatcheries. A driving force behind this is the increasing number of vaccines that are suitable for this method, including vector vaccines, which offer early protection against more than just one disease, and immune-complex vaccines, which can be given in the presence of maternal antibodies.

Mass vaccination of individual embryos just prior to transfer from setter to hatcher is much less labour intensive compared to subcutaneous or intramuscular vaccination of day-old chicks, which means chicks can be placed on the farm much faster after they have been pulled. Fewer mistakes are likely to be made using in-ovo vaccination, as fewer people need to be trained and monitored than for spray or drinking-water vaccination.

Furthermore, conditions in the hatchery are easier to control. Successful in-ovo vaccination means good immune response and no reduction in hatchability. To achieve this, attention must be paid to a number of aspects of hatchery management.

Uniformity

The vaccine should be injected into the amniotic fluid or into the embryonic tissue itself. Generally speaking, this is best achieved by vaccinating on day 18 or 19 of incubation. However, biological age and uniformity of developmental stage of the embryos are more important than the incubation time itself. If embryos are vaccinated at a too young stage of development, the risk of injecting the vaccine into the wrong location (air cell, chorion-allantois or yolk sac) is too high. Embryos should be in the hatching position (head under right wing) and the yolk stalk should have started to enter the abdomen.

There should not be more than 2% externally pipped shells, as these cannot be lifted easily by the vacuum suction cups of the transfer equipment.

Hygiene

The importance of hygiene before, during and after in-ovo vaccination cannot be overemphasised. A dirty egg shell increases the risk of pathogens entering the egg on vaccination, even if good needle sanitation is practised. A rotten egg will contaminate the needle. The hole made by the needle is a breach in the natural protection formed by the cuticle, egg shell and egg membranes, and thus a point of entrance for bacteria and fungi.

Position of eggs

If eggs are not in an upright position on the setter trays, but for example are slanting to one side after having been turned in the setter, the needle might inject the vaccine at the wrong location or even kill the embryo if vital organs have been punctured.

Eggs accidentally incubated with the air cell down are unlikely to hatch at all after in-ovo vaccination.

Advice

- Ensure embryos are at the correct developmental stage at the moment of in-ovo vaccination; do not rely solely on incubation time.
- Bear in mind that rate of embryo development is delayed by:
  - Prolonged egg storage.
  - Incubation temperature being reached too slowly.
  - A low incubation temperature.
- Aim for uniform temperature in the setter as this will result in uniform embryo development; avoid cold spots caused by over ventilation and overactive humidifiers.
- Pay serious attention to egg hygiene: set only clean eggs and avoid eggs with hair cracks; avoid eggs getting wet as a result of 'egg sweating'.
- Use 'live embryo detection' technology prior to in-ovo vaccination; alternatively, remove potential 'exploders' manually.
- Keep transfer room and hatcher environment very clean to avoid contamination through the hole in the shell created by in-ovo vaccination.
- Ensure eggs are in an upright position with the air cell at the top. ■

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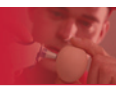

Reviewing incubation 86

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by Maciej Kolanczyk, Pas Reform Academy

The contemporary hatchery is a complex installation. The core part is the incubators, supported by the devices that facilitate their function and auxiliary machines that reduce the demand for manual labour.

Whatever the level of sophistication of the hatchery, its purpose remains the same: turning eggs into chicks in the most effective way.

The best moment to visit a hatchery is just before hatching so you can see all machinery at work for the different phases of incubation, and the newly hatched chicks too. Planning a visit at transfer time offers even more options.

A hatchery cannot improve the eggs it receives. It is easy to spoil eggs if procedures are not optimal, but good incubation can maximise the potential created on the breeder farm. A hatchery's efficiency depends on two factors: the quality of the programs and procedures it uses – and the accuracy of their execution. The programs and procedures are an intellectual product, created from people's knowledge and experience, and can easily be changed or corrected. But even the best program will only produce good results if it is followed closely.

Diagnosis

Questions to ask to diagnose problems:

- Do the incubators follow the programs accurately?
- During the entire process or just in certain periods?
- Can these periods be defined?
- Are the programs easy to execute or do they require high 'technical effort' (e.g. intensive cooling, heating, humidifying)?
- Do all machines perform consistently or only some of them?
- What do the hatcher climate graphs (mainly relative humidity) look like? Are they regular or artificially 'deformed' by changes in the set points?

In an optimum scenario, programs are followed closely all the time and the selected parameters can be achieved without much 'effort'. Once we know that the incubators are working correctly, it is time to verify the programs and procedures. That requires taking measurements during a visit and evaluating the hatchery's routinely collected records. In most hatcheries many batches of eggs are incubated sequentially using the same incubation program, so it is possible to check eggshell temperatures (EST) on different days of the process.

Hatch day

The hatch day is the moment to judge chicken quality and look at hatch waste: unhatched eggs and shells. The following questions are useful:

- What common defects do the chicks have: thick bellies, poor navels, red hocks, dehydration, poor uniformity, weakness or others?
- Can we relate defects to any known measurements, e.g. egg weight loss, EST, incubation time?
- What can we learn from the hatch waste regarding height of pipping, dryness of shells and unhatched embryos?
- Are there still many live embryos in the shells?
- On what day of incubation do most embryos die?

We can use the information obtained from these observations to evaluate the incubation process and draw conclusions.

Obviously, incubation is not the only responsibility of the hatchery. Mistakes made before egg setting and after chicken take-off are also a frequent source of losses, most of which can be detected by analysing waste or obtaining feedback from clients.

Advice

Short list of actions for a hatchery visit:

- Review the entire procedure from the egg receiving to chicken dispatch.
- Make sure that the machines are following the program.
- If not, check the reason for this.
- Measure the EST on several different days of incubation.
- If possible, evaluate other important data, e.g. egg weight loss and chick yield.
- Check and evaluate chicken quality and hatch waste.
- Only then correct the program and try it out on 1-2 machines. ■

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Sample size for egg break-out

87

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by Lotte Hebbink, Incubation Specialist, Pas Reform Academy

Egg break-outs are often part of the routine of a hatchery. As the procedure for these is time consuming, the findings are usually based on a limited sample size.

Suppose that a hatchery manager wants to test a new incubation program intended to reduce the percentage of externally pipped but not hatched embryos – called dead-in-shell embryos. The eggs are placed on a 150-egg tray and transferred to one hatcher basket after candling. During chick pulling, three hatcher baskets are randomly picked from a hatcher and the number of externally pipped eggs is counted. The sample size in this example would be 450 eggs (150x3). Suppose that the hatchery manager counts a total of nine dead-in-shell embryos during the break-out, which amounts to 2% of this sample. How sure can one be that this 2% within the sample is a reliable estimator for the whole hatcher?

Table 1 provides an overview of different sample sizes, showing the prevalence of a certain parameter of interest and the corresponding confidence intervals. Confidence intervals express the accuracy of the average that you obtain from your sample.

From the table you can see that using a sample size of three baskets with 2% prevalence of dead-in-shell gives a confidence interval of between 0.9% and 3.8%. If the hatchery manager wants to reduce the dead-in-shells by 1 or 2%, it becomes clear that a confidence interval from 0.9% to 3.8% is quite large in this case. If the sample size is 12 baskets, the interval will be reduced to between 1.4% and 2.8%, which provides a more certain indication that the real average of the whole batch is 2%.

Of course, before doing the break-out we do not know what the prevalence of the parameter of interest will be. Let us assume that the worst-case scenario is 5% (which amounts to 7.5 eggs per basket). Define your acceptable level of uncertainty in advance, for example ± 1%. Read in the table how many baskets you need; in this case it will be 12 baskets as this gives a confidence interval of 4.0-6.1%. If the prevalence turns out to be lower than 5% (for example 1%), then the confidence interval will improve to between 0.6% and 1.6%.

To conclude, the larger your sample size, the more confident you can be that your break-out data reflects reality. Bear in mind that the calculations in Table 1 are only an approximation of reality. The calculated confidence intervals do not take into account large biological variation for example.

Advice

- If possible increase the number of baskets used for the break-outs. This will increase the value of the data.
- Do not take all the baskets from just one hatcher dolly. If possible, try to sample from the whole hatcher. ■

Table 1. 95% confidence interval (Clopper-Pearson exact method). The calculations are based on 150-egg trays, which are transferred into 150-egg baskets. The homogeneity of samples was assumed, although this is not completely accurate because there is always a certain amount of biological variation.

Sample size	1% prevalence	2% prevalence	5% prevalence
3 baskets	(0.4;2.6)	(0.9;3.8)	(3.3;7.6)
6 baskets	(0.5;1.9)	(1.2;3.1)	(3.7;6.6)
12 baskets	(0.6;1.6)	(1.4;2.8)	(4.0;6.1)
24 baskets	(0.7;1.4)	(1.6;2.5)	(4.3;5.8)
48 baskets	(0.8;1.3)	(1.7;2.4)	(4.5;5.5)

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Too many clears? Break-out analysis needed!

88

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by Gerd de Lange, Senior Poultry Specialist, Pas Reform Academy

A hatchery's objective is to hatch a chick from every egg that is set. However, losses occur, one type being 'clears', which are identified during candling. Clears can have different causes, and a break-out analysis is essential for distinguishing between these.

Eggs can be candled before they are transferred from the setter to the hatcher. If data is correctly recorded, whether by candling all eggs or by random sampling, valuable information can be gathered on the percentage of 'clears' for eggs from different flocks in relation to flock age and duration of egg storage prior to setting. A too-high percentage of clears (whether based on analysis of historical data, experience, or compared with a standard) will result in reduced hatchability and corrective actions need to be made.

We look at the reasons for too many clears and the measures that can be taken to reduce these.

What are 'clears'?

'Clears' are often taken to mean infertile eggs, but that is not necessarily the case, as it is not possible to differentiate between true infertile eggs and 'very early dead embryos' (before the blood ring stage) by candling (whether done manually or using equipment). A break-out analysis of a reliable sample of clear eggs, done by well-trained and experienced staff, is the only way to determine the percentage of true infertility and early mortality. When there has been embryonic development, and thus sub-embryonic fluid formation, there will be a lighter yellow colour close to the embryo and darker yellow further away. The shape and size of the germinal disc also provide valuable information. It is easiest to distinguish between infertile eggs and very early dead embryos by candling at 10 days rather than at 18 days, and much more difficult to do if clears are only opened on the hatch day. To confirm true fertility problems, fresh unincubated eggs from the same donor flock can be opened for comparative analysis.

True infertility

If true infertility turns out to be the biggest problem, the cause has to be sought in the breeder farm and corrective actions undertaken there too. Points of attention include:

- Quality and percentage of males.
- Bodyweight of males and females.
- Poor spiking practices.
- Health.
- Seasonal effects (high breeder-house temperature).
- Stress factors (inadequate feed and water space).

Very early dead embryos

A high number of 'clears' may be due to an increase of very early dead embryos, sometimes called 'membrane stage mortality', when a blood ring has not yet become visible. One possible cause is that the optimal temperature for incubation has not been reached in the incubator. Another cause can be serious (local) overheating during the first days in the setter.
The most common cause, however, is sub-optimal egg management between laying and setting. Cooling down of embryos after oviposition may happen too slowly or too fast. Sub-optimal climate conditions (especially temperature fluctuations) during egg transport and egg storage will weaken the embryo. Other aspects that should be checked are rough egg handling (shocks and jolts) and poor fumigation practices.

Advice

- Candle a reliable sample of eggs regularly to monitor the percentage of clears in different flocks in relation to flock age and duration of egg storage.
- Perform a proper egg break-out to distinguish between true infertility and early dead embryos before deciding on corrective actions.
- Be aware that too many clears may be due to management problems on the breeder farm rather than in the hatchery.
- Ask your technical advisor for help or use a troubleshooting list to track down the most likely cause of increased infertility or early dead embryos. ■

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