Getting the incubation process right

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Good incubation results are not solely due to the results of the proper operation of the incubation equipment. Under ideal circumstances the best quality eggs will produce the highest number of best quality day olds if they are incubated under the correct environmental conditions in good quality, well maintained machines.

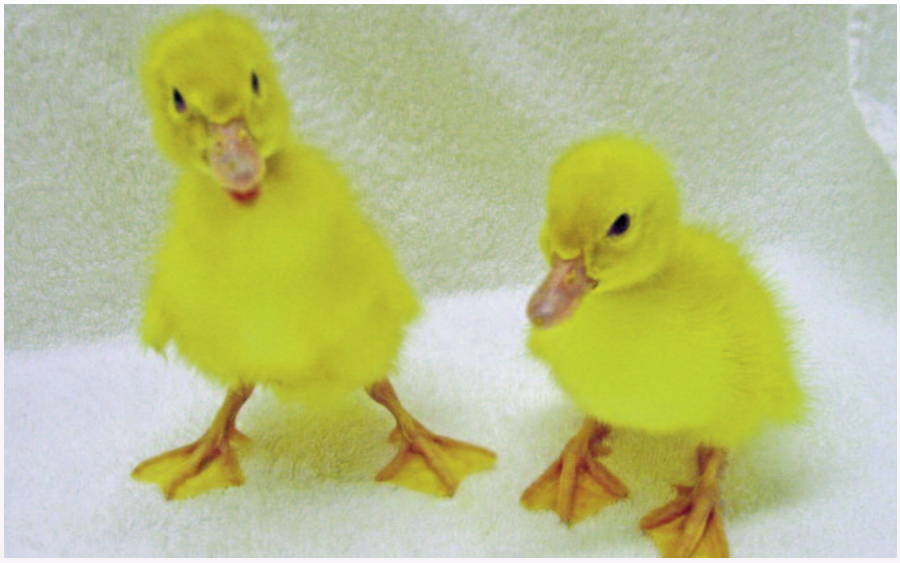
Unfortunately, there are many reasons why hatchability can fall below expectations and there are areas of the incubation process that should be considered if results are below standard.

Good hatchability does not start at the hatchery but at the breeder farm. The highest fertility should be delivered by the laying stock and egg quality should be as high as possible in terms of size, shape and cleanliness. The best hatchery in the world cannot hatch infertile eggs and so it is up to breeder farm managers to ensure that fertility is not an issue.

Influencing factors

Factors that influence how well individual eggs fare during incubation vary but size and shape are very important. Eggs that are too small, compared to the average, tend to experience excessive weight loss during incubation and so dehydration is often the cause for failure to hatch or poor chick quality.

Poor egg shape is a reflection of the conditions under which an egg forms – birds under stress often produce odd shaped eggs



and so, again, the responsibility for resolving the problem falls on the breeder farm.

Particularly large eggs, or those with poor shape (too round or too long), often get damaged when they are set on the setter trays and cracked eggs do not hatch.

Finally, setting eggs incorrectly can significantly affect their chances of hatching. Setting them upside down lowers the chances that a day old chick will hatch properly, if at all. Failure to ensure the highest egg quality reduces hatchability, even before the eggs arrive at the hatchery.

In all of these cases good training of staff at the breeder farm in the selection and setting of eggs can make a real difference to the results of a hatchery.

Egg handling

Egg handling, particularly during transport is another area of concern. Eggs can easily get cracked or experience adverse environmental conditions, which reduces their chance of hatching. People handling eggs at any time between collection and setting require proper training so that they handle the eggs with the due care that they deserve.

Pre-incubation storage is important in maximising embryo viability. Whatever conditions are used they should be consistent from the time of collection through to pre-warming before incubation. Temperature fluctuations do not serve embryos well and can damage vulnerable individuals preventing their normal development during incubation. Jarring of eggs can cause damage that only becomes apparent after incubation has started. Keeping eggs at low temperatures (15-18°C) ensures that the embryo is not allowed to start developing prematurely.

A high humidity (75%RH) prevents excessive weight loss during prolonged storage. Irrespective of the type of egg the shorter the storage period the less effect storage will have. Ideally, duck eggs should be stored for between 3-4 days. Hatchability falls as storage increases after seven days although some strains can be more vulnerable to storage effects than others.

Therefore, where an egg comes from and what happens to it before incubation can be critical in determining whether it will hatch or not. All too often problems with hatchability are laid at the door of the hatchery when there is nothing wrong with the hatchery process.

Before setting the eggs they should be pre-heated at a temperature of 24°C for at least six hours after which time the incubation process starts in earnest. Increasing egg temperature prior to setting helps with minimising condensation ('sweating') associated with placing cold eggs in a warm, humid

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environment and reduces the time taken for the eggs to reach incubation temperature.

The incubation process for duck eggs takes approximately 28 days (660 hours) dependant upon strain and egg age. The process can be broken down into three stages – development, growth and hatching.

From the early stages of the single stage incubation process the eggs require a slightly warmer temperature setting because they do not generate any of their own metabolic heat, along with a high humidity (90-95%) to avoid weight loss.

We can help achieve this by keeping the damper closed and allowing the carbon dioxide level to rise (about 1.5%). After around 50% of the incubation period the embryo begins to grow inside the egg and starts to produce a lot of waste metabolic heat.

The temperature should then be reduced in stages over the remaining days to ensure that egg temperature does not rise to deleterious levels.

The humidity setting should also be staged down to reflect the transfer target but more importantly to allow for the required weight loss of 12-14% and again to help achieve these targets the damper is opened accordingly and the carbon dioxide level is allowed to drop.

Good practice

Over time it is good practice to develop setting programmes that can be used to compensate for higher or lower embryonic heat production than that expected within the incubator because of high or low hatchability or in cases when the incubator has not been filled to capacity.

It is also good practice to candle six trays of eggs per machine and record all findings as flock code, upside down, cracked, infertile and early dead.

These trays must be identifiable throughout the incubation process and the data kept for future reference at hatch.

A setter room in the high health status hatchery containing Petersime Airstreamer AS12 setters.

At transfer all the clear eggs (infertile and early dead embryos) should be removed to allow for extra airflow in the hatcher baskets during hatching. Initially the hatcher temperature and humidity will be in line with the setter set points for temperature, humidity, vent position and carbon dioxide.

On the first day after transfer any low weight loss can be partially rectified by keeping the vent open for up to 10 hours before reverting back to the programme.

Halfway through the hatch stage the temperature should be lowered by 0.5-1.0°C, the humidity raised to 92-94%, and the vent closed with the carbon dioxide set point increased to 1.2-1.5%.

The increase in carbon dioxide will encourage the chicks to pip creating a humidity burst (natural high humidity due to pipping), which is maintained by the high humidity setting so the newly hatched day olds do not dry out too quickly.

The pattern of all this activity over time is known as the hatch curve and it is good hatchery practice to aim to achieve the hatch curve as close to the day of pulling the chicks as possible.

When the hatch curve has reached its peak the humidity should naturally begin to fall and it is at this point the humidity is lowered down to 90% along with the carbon dioxide, which can be lowered to 0.7%.

The vent set point needs to be set at 50% minimum to help achieve this but more importantly allow greater airflow though the chicks.

This provides them with fresh air, which is important for providing oxygen but also for cooling the birds.

Keep a record

On the day of take off the six baskets that were candled at 10 days should be taken off separately and the number of reject and first quality day olds per basket recorded. All unhatched eggs must also be recorded and the findings listed as dead in shell, pipped or contaminated.

This information along with the 10 day data is an easy way of ascertaining if the hatch is up to standard and will help identify problems during the incubation or hatch process. It is important to make sure that the holding areas where the day olds are kept before despatch is properly ventilated and the room temperature is held at 24-27°C.

Insufficient air flow or high temperatures can result in the chicks becoming too hot in the delivery boxes increasing their stress, which can ultimately lead to high early losses on farm.

One final thing to consider, which is quite often inadvertently overlooked, is the stocking density of the day olds when they are in the delivery boxes. This must be 21-25cm^2 per day old. ■