The management of hatching eggs during hot weather

Summer weather brings a high level of complexity to managing eggs, from production through to hatch, due to increases in temperature and humidity.

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The first successful artificial hatch of eggs dates back hundreds of years and occurred in ancient Egypt, where the climate was that of a desert; hot and dry.

They understood that the egg shell temperature had a direct relation to the quality and survival of an embryo. The hatchery workers would measure the temperature of the egg shells by using their eyelids, as this was considered the most sensitive part of the body for temperature evaluation. They also counted on the fact that the dry desert weather meant low humidity in the air.

Nowadays, in many geographic areas around the world, the summer season presents two complex environmental factors which jeopardise proper development of the embryo: high temperature and high humidity. With some effort, hatcheries experiencing these factors can keep the shell temperature in a good range (99.4-100°F/37.4-37.8°C) but in many cases, the high humidity in the air is more difficult to control.

Egg quality begins on the farm

The effects of high temperature on an embryo begin before an egg is laid. Hot weather can cause effects to the physiology of laying hens that can also impact the eggs they will lay.

For example, laying hens tend to reduce feed intake during extreme heat, which means a reduction in the amount of calcium they consume. Calcium is an important component of egg shells.

In addition, hens pant as a way to cool themselves. This panting causes a lowering of CO_2 in the blood and produces respiratory alkalosis.

Alkalosis means the pH of the blood becomes alkaline and the availability of calcium for the eggshell is reduced.

This also causes increased calcium carbonate loss through the kidney making the issue that much more complex.

During the hot and humid season the likelihood that eggs will sweat, during transportation or movements inside the hatchery, increases.

It is crucial to avoid sweating as moisture on the shell surface provides an ideal environment for the growth of pathogens and facilitates the penetration of them through the pores of the shell.

Humidity and moisture loss

Proper moisture loss, or egg weight loss during incubation is important as it creates an adequate air cell inside the egg.

This air cell must be large enough, at internal pipping, for lung ventilation to begin.

During incubation, the amount of moisture loss is controlled by the difference in water vapour pressure over the egg shell and the conductance of the egg shell and its membranes.

It is not important at which moment during incubation the egg loses its weight, as long as the air cell reaches an adequate size before the embryo internally pips.

Several studies have shown that hatchability is optimal when weight loss of a turkey egg is between 10 and 14%.

If the humidity in the air of the hatchery is high, the eggs cannot lose enough water. Embryonic mortality increases when water loss is lower than 9.1%.

The greater the water loss through the shell, the larger the airspace.

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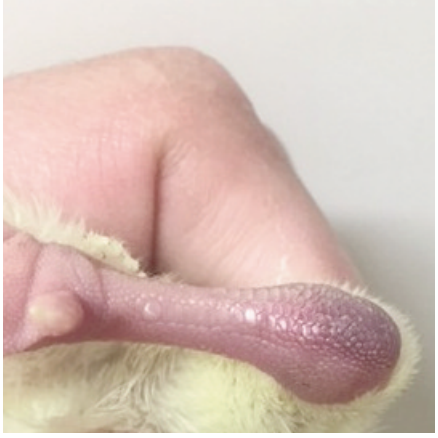
The greater the water loss through the shell, the larger the airspace. If the air space is too small, the poult's respiration will be affected and the young bird will have difficulty breaking out of the shell (below left). The lack of adequate airspace can also contribute to navel wicks (centre) or the presence of leg damage; such as red hocks (below right).



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The lack of adequate airspace can also contribute to navel wicks or the presence of leg damage; such as red hocks.

In addition to an increase in pipped, non-hatched embryos and culls, it has been reported that high relative humidity (75-80%) can increase mortality during the first 10 days of incubation.

How to minimise the impact of summer weather

At the farm

- Check feed composition to ensure the breeder hens receive an appropriate supply of nutrients.
- Help the birds to focus on feed and water consumption by keeping the nests closed for at least 1-2 hours after lights come on and 1-2 hours prior to lights going off.
- Ensure adequate air speed is directed at the birds for an appropriate cooling effect.
  – Whether using tunnel or natural ventilation with circulating fans, it is recommended to have air speed of 600ft/minute or 3m/second.
- Collect the eggs frequently from the nest and store around 60.8°F/16°C.

During transport

- Confirm that the temperature, in the truck during transport, is a little higher or the same as in the hatchery to avoid egg sweating.
- Minimise any temperature effects from the outside environment by getting the truck as close as possible to the reception door at the hatchery upon delivery.

At the hatchery

- Pre-warm eggs gradually.
- Check the egg shell temperature often during incubation. Remember that inadequate feed intake of the hens can alter the egg shell conductance.
- Decrease the relative humidity of the air that you bring inside the hatchery.
- If using a single stage incubator, open the dampers early to facilitate more moisture loss.
- Do not increase air speed with the intention of increasing the moisture loss. This will not work and rather could result in other negative effects.
- Monitor the hatch window closely and be aware that small poults have higher surface to body weight ratios, and are therefore more easily dehydrated than larger poults.
  – Dehydration has been reported to be associated with the higher mortality of poults from young breeders.
- After hatch, the rectal temperature of the poult should be between 103-104°F/39.4-40.0°C.

Upon placement on the farm

- Check that the floor and the air of the barn at placement are adequate.
  – Chilled poults huddle together to keep warm and do not eat and drink normally.
  – Blood samples taken on farm show an increased packed-cell volume in chilled birds, compared with birds brooded at warm temperatures.

Summary

As you can see there are external factors, especially during the summer season, that can impact the quality of a hatch. Heat and humidity are difficult to manage and if you let it get away from you, it can negatively impact the results of your hatch.

Measuring egg shell temperature during incubation gives a good indication of embryo development.

It is of utmost importance that if egg shell temperature and humidity are not optimal, that you make the necessary adjustments to ensure you get the best possible results every time. ■