

Looking out of the hatch window

By Ron Meijerhof

The time between the first and the last chick hatching is called the hatch window. We normally consider a hatch window of 24 hours optimal, although 36 hours is frequently observed. And often, when a hatcher is opened at 19 days, the first hatched chicks can already be found.

A large hatch window is not what we want, as it means that the first chicks have to stay in the hatcher for a long time. In this period, there is a risk of non-optimal body temperature and dehydration if the conditions in the hatchery are not carefully controlled. And this control is difficult, as the hatched chick wants another environment than the hatching egg, and it is also difficult to get the conditions everywhere in the hatcher equally distributed, especially the temperature and the air velocity.

Another reason for trying to obtain a short hatch window is that we want our birds as soon as possible after hatching on feed and water, to get them started quickly.

In order to get a short hatch window, we have to know how this hatch window is influenced.

Embryo temperature

The speed of embryo development is determined by the temperature in the egg. This temperature is the result of the heat production of the embryo and its heat loss. Due to differences in especially air velocity and water evaporation in a setter, this egg or embryo temperature can differentiate substantially between different places in an incubator.

Differences as high as 3-4 °F in egg temperature of eggs at equal stage of incubation but at different places in the machine are not uncommon. Even on one tray, differences of 2-3 °F can occur, as both research and practical experiences have shown.

As the temperature in the egg drives embryo development, it is obvious that a difference in temperature will give different rates of development. Embryos in warmer eggs in the set will develop and hatch quicker, where embryos in cooler eggs will be slowed down, adding to the hatch window.

Egg size

We would expect a small hatch window if we have a uniform embryo temperature. This is not necessarily true. If we have all the eggs on the same internal temperature, the development of the embryos will be at the same speed, as this is driven by that temperature. But if we have a difference in egg size, it will take the embryos in the larger eggs a longer time to hatch. After all, the embryo's don't know that they are in a bigger egg until a very late stage, and as long as their temperature is equal, they will develop according to their genetic potential, which is more or less equal for all eggs in the set. As a result, an equal embryo temperature for all eggs will not result in a small hatch window if we have differences in egg sizes, as these embryos need different times to fill up the egg and hatch.

Embryo temperature versus egg size

In general, bigger eggs have more problems losing heat as they obstruct the air flow and have relatively little egg shell surface compared to their egg mass. As a result, the embryos in the bigger eggs will experience a higher embryo temperature and their development will go faster, in this way reducing the time needed to fill up their bigger eggs. As this means that the development of the embryos in the bigger eggs will go faster than the embryos in the smaller eggs, an increase in embryo temperature with increasing egg size will reduce the hatch window.

However, this reduced hatch window means that some eggs get overheated and some eggs get undercooled. This might result in a smaller hatch window, but the resulting chick quality will not be what we want. And the negative effects of non-optimal temperature on chick quality and chick performance are probably bigger than the effect of the hatch window itself, especially if we control the conditions in the hatcher well.

Does this mean that we should accept a large hatch window? No, but we should first of all strive for a uniform embryo temperature and embryo development. If that means that due to a non-uniform egg size the hatch window is still not as small as we want, then we have to work on the egg size, as an optimal temperature for the embryo remains the most important factor for its chick quality.