

Bringing the eggs up to temperature

Many hatcheries pre-heat their eggs prior to setting them in the incubators. Sometimes it is done in a special pre-heating room, although it is also not uncommon to just leave the eggs for a period of time in the corridor in front of the machines. Most modern single stage machines have a special pre-heating program, at which the eggs follow a specific temperature pattern after which the incubation process automatically starts.

Although pre-heating is more or less a common practice in a majority of the hatcheries, the results are not always consistent. Not every hatchery is having the same positive experience and in some situations it even seems to work more negative than positive.

To understand what can be the possible reasons for this variation in experiences, we have to look a bit closer into the process, and ask ourselves what we try to achieve with it.

One thing what is good to realize is that the embryo is probably not expecting to be put into an incubator. After many millions of years, it expects to be incubated by mother hen together with 10 or 15 brothers and sisters, and not necessarily to be placed in an incubator tray together with 100.000 other eggs. Although the incubator is working quite well, we have to realize that there are some differences between what the embryo expects and what we provide it with.

If mother hen decides that there are enough eggs and that the time has come to start the incubation process, she warms them up through contact temperature as by sitting on them she brings them in contact with her breast. This means that the warming up goes relatively quickly and uniform. In our situation however, we have to bring up the temperature of a big mass of eggs by means of transferring heat by air. Its easy to understand that this process will be much slower. After all, if we put 100.000 eggs of 70 g in a machine, we are dealing with 7000 kg of egg mass. While eggs have more or less the thermal properties of water, it is as if we trying to warm up 7 m³ of water, a small swimming pool!

Not only will take the warming of this amount of egg mass a long time, but it is also not so easy to do it in a very uniform way. The air velocity as well as the local evaporation of water from humidifiers determine to a large extent the speed of the warming process, and this will not necessarily be uniform for every egg.

If we store eggs for a longer period, we reduce the storage temperature. This means that the machine has to work hard to warm up all the eggs. If we preheat the eggs, it is understandable that we make it easier for the machines to warm up the eggs to incubation temperature in a faster and more uniform way, as the temperature gap that the machine has to cover is simply smaller.

But why is this procedure not giving the same results in all types of machines? If we have multi stage machines that are using a tunnel principle, we move the air from the further developed eggs towards the fresh eggs. In such a situation, preheating will not give much benefit, as the machine itself is already warming up the eggs very effectively. If we have a multi stage machine with rack setting, we bring in trays of fresh eggs between trays with eggs at different stages of incubation. If these fresh eggs are very cold, the eggs that were placed 3 days will be cooled as well. And one thing that the embryo doesn't want is to have its temperature dropping in the first days of incubation. So without proper preheating, the number of early deads will increase in this type of machine.

In single stage machines we have more heating capacity, but at the same time we bring a much bigger number of fresh, cold eggs. So in these machines preheating will normally have a positive effect. However, some machines have a more uniform air flow with more heating capacity than other machines, so also in single stage machines we see differences in results, especially if the eggs are stored long and at low temperature.

The embryo starts to develop above a temperature that is called the “physiological zero”, approximately 25-26°C. Once the embryo gets above this temperature, it assumes that incubation has started, and for the first days after that the temperature should not drop anymore. That means that if we preheat the eggs to a level above a temperature of approximately 27°C, we shouldn't stop the process anymore. If we preheat too warm and then bring the eggs to a cold machine, the temperature of the eggs actually drops again, and the results of the preheating will not be as positive as expected, or even negative. This is why most modern single stage machines have a standard preheating procedure programmed, to make the preheating as uniform as possible and to avoid mistakes.

Proper preheating can have a positive effect on embryo survival and chick quality, but it is a process that needs to be controlled well, to maximize results and avoid mistakes.