EGG STORE

Analyzing egg handling with a thermal imaging camera

Thermal imaging cameras used to be large, heavy and very expensive. In the last few years smaller, much more affordable versions have become available, often as attachments for a mobile phone.

This has opened up new possibilities for investigating egg handling and holding conditions. Allowing hatching eggs to cool down promptly and evenly, and to stay cool, is very important if the eggs are to hatch well. Starting when eggs are collected from the nests, we need to make sure that embryo development is completely paused. Do we really know if all our fertile eggs are kept under ideal conditions? There may be thermometers or temperature sensors in a farm egg room or hatchery egg room that indicate temperatures in a limited number of locations, but we don't get a full picture of the thermal environment to which the eggs are exposed. Nor can we see how the cooling eggs interact with the environment.

Thermal imaging has proved to be a valuable tool for investigating not only the environment where the eggs are stored but also egg temperature in different locations within the trolley, egg boxes or pallet.

All objects emit infrared radiation (heat) that is invisible to the human eye, but can be captured by the thermal imaging camera. The camera software then converts the temperature into colors depending on the surface temperature. The final result is a picture where each color represents a specific temperature. Thermal imaging can be used to audit eggs handling practice and conditions in farms and hatchery egg stores.

Figure 1 shows uneven temperatures in between the eggs in a farm storage room. The dark blue spots show the coldest eggs, while the orange eggs are still warm. In this case we can see that very warm eggs are brought inside the room and are being stacked on the top of eggs that are already cold, which can be a problem – each additional layer of warm eggs will re-heat the eggs that have already cooled down. Just looking at the egg room (**Figure 2**) and the read out of the room thermometer, we would not be aware that the situation is occurring and the problem would only be detected when pre-incubation is seen when opening fresh eggs.

Thermal imaging can also be useful to show if the eggs are being boxed while they are still warm, which can also cause pre-incubation in the farm or during transport. Eggs should always be allowed to cool down before being boxed into cardboard boxes. Cardboard is an effective thermal insulator and will slow cooling of the eggs if they are put into the boxes still warm. **Figure 3** shows eggs that weren't allowed to cool down before being boxed. They arrived in the hatchery still warm. In the hatchery, the thermal imaging camera can be used to check that a delivery of eggs is at the correct temperature, and that all the eggs in the delivery are of a uniform temperature. Getting this stage right gives a better hatchability, because all the embryos will be properly cooled at the same time. It will also minimize the hatch spread within a batch of eggs.

Figure 1 *Thermal imaging of farm storage room.*
Figure 2 *Normal imaging of farm storage room.*
Figure 3 *Eggs still warm when arrived in the hatchery egg room after transport.*