

Some like it hot (but most don't....)

By Ron Meijerhof

Modern fast growing, high yielding broiler lines produce a lot of heat during incubation. If we measure the embryo temperature (egg shell temperature) at the end of incubation with an infra-red ear thermometer, we often observe values of 103-104°F, where we consider 100-100.5 °F as optimum.

Some of the effects of these high embryo temperatures are quite typical and can be observed relatively easy at hatch and during take off.

- Increased levels of dead in shells, late deaths
The high temperatures at the end of incubation are forming a risk for the survival of the embryo, and as a result the number late deaths and embryos too weak to hatch increases. When late deaths (>15 days) is over 3-4%, high embryo temperatures can be the cause.
- Weak chicks, difficulty standing on its feet
The chicks that did survive the high temperatures are weak because they got almost killed. Especially during take off, when the chicks are transported for instance on a moving belt, many chicks sit down or even lie down. Also when the birds are tipped over on their side or on their back, it takes them long to get up again. This is bad sign, as good quality chicks will tend to stand up and try to balance on the moving floor.
- Small, pale, underdeveloped chicks
At high embryo temperatures, embryos utilize less yolk for development and stay smaller. As the pigment for the feathers is stored in the yolk, this means that the feathers stay more pale.
- Poor yolk uptake, unhealed navels
The reduced yolk utilization leaves a bigger yolk in the chick. This means that the small, less developed embryo has to close the navel over a big yolk residue, which causes more navel problems. Too high temperatures cause black navels (button navels), too low temperatures are usually more associated with string navels.
- Blood in and on the shells, navel/yolk sac mortality
Due to the difficulties closing the navel properly, the chick is hatching with the navel still unhealed. This bleeding navel shows as blood in and on the shells, but it also allows bacteria to penetrate the body cavity after hatching, causing navel/yolk sac mortality.
- Full bellies, hard yolk sacs
The big yolk residues can be measured by opening the chick, but it can also be felt by gently squeezing the belly of the chick. A plumpy, full belly indicates a large yolk residue and is associated with high embryo temperatures at the end of incubation.
- Malposition “head over wing”, skew heads, cross beaks
The normal position of an embryo in the shell just before hatch is with its head under the right wing. In this position, the head is protected from the shell by the wing and the bird can use the wing to move through the shell. At high embryo temperatures, the embryo remains with its head on the wing and a high number of this malposition will be observed when doing a break out.
When the head is not protected by the wing, the right side of the head is pushed against the shell. As the bones are very soft at this moment, the skull will follow the shape of the shell and the head will be skew, with its left side more round than the right side. This can be observed during a break out but also just after hatch, as not all chicks in this malposition will be unable to hatch.

When the pressure is too severe, not only the skull will be skew but also the upper beak will be pushed away by the shell, resulting in a cross beak.

The embryo uses its wing to move through the shell, in order to pip it open. When the head is blocking the wing, the chick can't move and is stuck in one position. As it is then unable to open the shell properly, it has to pip a hole and force the shell to break from that single hole. This will result in an increased number of pips, as not every chick will be able to do so.

- Red spots on beak, dirty nostrils, red hocks
If the embryo can't move through the shell, it breaks the shell by forcing it with its beak. This will irritate the beak and create a little red spot on the top of it, just there where the comb starts. Also the nostrils will become dirty due to the difficult hatching process. As the chick uses its legs to free itself from the shell, and because the overheated chick will sit down more, the hocks will be irritated and red.

Many signs can indicate that the embryo temperature has been too high at the end of incubation. Although this problem is not always easy to solve, it is at least a starting point to recognize it.