

Big eggs give big chicks, don't they...

By Ron Meijerhof

In the field we often see that the chick quality coming from old breeder flocks is not as good as we would like it to see. Although the chicks are big, we often see problems with viability of the chicks, yolk sac absorption, unhealed navels etc. Together with that, we can also see a decreased hatch of fertiles, and then especially as a result of an increase in late deads.

If we think about it, it's a bit strange why bigger eggs from older flocks should give more problems. Genetically the embryos are the identical to the embryos the same flock produced 20 weeks ago. We should expect the embryos to develop more or less in the same way, as they probably will not notice that they are in a bigger egg until the end of incubation, when they fill up the entire egg. An issue could be the decreasing shell quality of older flocks, but even flocks with good shell quality tend to give more problems with chick quality when the breeders get older.

One of the big problems we are facing with bigger eggs is the actual temperature of the egg during incubation.

The temperature inside the egg is the result of the balance between heat production on one side and heat loss on the other side. Bigger eggs containing bigger embryos will produce more heat, simply because there is more embryo mass in there. On the other side, bigger eggs have more problems of losing that heat. Eggs lose heat from the surface of the shell to the environment, like the radiator in a car. Bigger eggs have more total shell surface, but per gram of egg the shell surface is reduced, making it more difficult for the eggs to lose heat. Besides that, bigger eggs are more "packed together" in an incubator, especially when they are in a turned position. This blocks the air flow over the eggs, and air flow is one of the most important aspects in cooling the eggs.

Due to this, bigger eggs normally have a higher temperature, especially when the temperature of the machine is not adjusted but set on an "average" egg size.

When embryos are experiencing higher temperature, they have more problems with using the yolk and converting it into body tissue. The yolk residue remains big, and the "real" chick (chick without the yolk) is relatively small. If we weigh the chicks, we do not notice this effect, as we are weighing chicks including their residual yolk sac. If we take out the yolk and then weigh the chick, or if we measure the length of the chick as an indicator for its development, we see that bigger eggs give bigger total chick weight, but that a lot of the weight is contributed by the yolk. The actual real chick (without the yolk) is not as big as we expect and is sometimes even smaller than the chick from a breeder flock 10 or 20 weeks younger.

Small chicks with large residual yolks have more problems closing their navels over that big yolk, resulting in bad navels and navel-yolk sac infection. The late deads are increasing, as the high temperatures will kill some of the embryos. The embryos that were not killed had at least a hard time during the last days, resulting in a reduced vitality.

To overcome these problems, we must give the embryos in the bigger eggs the same temperature as the embryos in the smaller eggs. If we incubate all the eggs at the same machine temperature, bigger eggs will have a higher temperature resulting in a reduced quality. To control this, we have to adjust the temperature profiles, giving embryos in bigger

eggs the same temperature inside the shell as smaller eggs. That means that we have to increase the heat loss from bigger eggs in the second half of the incubation period, either by dropping the temperature more severe or by increasing the air flow over the eggs.