

The yolk sac as lunch box

By Ron Meijerhof

A main energy source for development of the embryo is the yolk sac. As the embryo grows, yolk is utilised for energy supply and reduces in size. It simply means that yolk is converted into embryo, and the more embryo development we get during incubation, the less yolk quantity will be left over at hatching. We know from experience that day old chicks can have a yolk residue of 2-3 grams at hatching, but also of 12-13 grams, depending on the incubation conditions that we create. This 10 grams difference is a lot if we compare it with the total chick weight, but especially when compared with the original yolk weight. As the original yolk usually weighs 20-25 grams, a difference of 10 grams in yolk residue means that twice as much yolk is used for development. As we are aiming for a well developed day old chick, the remaining yolk sac at moment of hatching is consequently limited. Besides the effect on development of the embryo, this has the advantage that it is easier for the embryo to close the navel over the yolk, as compared to the total body the size of the yolk is small.

However, yolk is used by the new born chick as food supply for the first few days. After about 4-5 days, the yolk is completely utilised. Day-old chicks have to learn where to find food and water, and the energy in the yolk helps them to overcome this learning period. Therefore it is often assumed that a increased residual yolk sac at hatching would be beneficial for the survival chance of the young chick. embryo. The better its lunch box is filled, the more change it has to survive these first difficult days. This would suggest that a small residual yolk sac decreases the survival chance.

When we place chicks in the field, we normally find a peak in mortality around 3-4 days. At first sight, this could indicate that the chicks are indeed lacking energy, as this is normally the moment when the yolk is completely consumed. However, if we open up these chicks, we find that almost all of them, if not all, still contain rather large amount of residual yolk sac. We often find the navels and yolk sacs of these birds inflamed and contaminated, and bacterial examination often shows contamination with e-coli. This indicates that these chicks didnt die because of lack of yolk, but it seems almost as if they died because they failed to take up the yolk.

If we feed day old chicks during transportation, we find that they take up their yolk quicker and better. We know from physiology that to be able to utilise the fat in the yolk, the chick needs carbohydrates. This means the birds has to have some nutritional reserves left over after hatching to utilise the yolk, or it has to eat something before it can start digesting the fat in the yolk. In both cases it is important that the incubation process is optimal to give the bird maximum capacity to get started, that they hatch in good condition and that we give them an optimal start. Birds that are stressed during incubation or hatching, hatch with an poorly closed navel or that find non-optimal conditions upon arrival at the farm (especially brooding temperatures) will have a hard time finding feed, will not be able to uptake the yolk properly and will finally die of navel yolk sac infection. A large amount of residual yolk will not help these birds to get started. They do have a big lunch box, but they cant find the key to open it and eat.