

DEAD IN SHELL YOUNGSTERS

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With breeding now in full swing I receive regular calls from fanciers that fertile eggs are failing to hatch i.e. that the embryos these eggs contain are dying through the incubation time. Many fanciers immediately think of Salmonella when they see this, when in fact all infections together including Salmonella account for less than 5% of all dead in-shell youngsters.

And so just why do these youngsters die? Most youngsters that die in the egg usually die either in the first few days of incubation, or alternatively the last few days of incubation. In the first few days embryo death is usually due to either inadequate incubation leading to too low a temperature to keep the chick alive, excessive jarring of the egg that either fatally damages the chick or yolk, or alternatively, a genetic problem affecting the chick which is incompatible with life.

Towards the end of incubation, chicks usually die as a result of problems associated with hatching. As incubation ends the chick has to shift from getting its oxygen through the membranes that surround it, to breathing air and also re-absorb its yolk sac (which supplies it with both food and immunity). If the temperature or humidity is incorrect at this time these processes fail to occur correctly and the chick can die.

Between the beginning and end of incubation the chick is essentially just growing and it is here that nutrition and infection become more important. If the young chick is lacking a nutrient it needs for growth or becomes infected it dies.

This year has been a particularly good breeding season for me in that I have not failed to wean a single fertile egg i.e. every egg that was fertile has hatched and been weaned. I have now weaned 50 youngsters. Although pleasing this situation is unusual despite the best of care. I did however, have one fancier mention to me last week that he had had 30% of all fertile eggs fail to hatch. He did not seem overly concerned and appeared to think that nothing could be done. This is far from the truth. An embryo fatality of 5% could be regarded as normal. Anything more than this should arouse suspicions of a problem.

For those of you having a problem with dead-in-the-shell youngsters, let's have a look at the potential problems that can arise with each of these periods of incubation in more detail, so that hopefully the problem can be solved.

Embryonic Death At The Start Of Incubation

Deaths early in incubation can be detected by opening the egg and seeing that it is in fact fertile, but that the embryo is only poorly developed. As mentioned earlier, the usual cause is poor incubation leading to the egg becoming cold after

development has started. Possible causes include improper nesting material, over interference by the fancier, inadequate control of nest bowl mites or pigeon flies, failure to provide second nest bowl for next pair of eggs, too many birds in a section, older arthritic birds, poor nest box design, competition with other birds within the loft, poor parenting, nest box too hot or too cold or poorly ventilated, disturbance outside loft etc. Also as mentioned earlier, eggs are very vulnerable to vibration type injuries early in incubation. Shaking or jarring can kill the developing embryo either directly or by rupturing the yolk. This is of particular relevance when eggs are being transferred for fostering. The effect of thunderstorms is a total myth. Embryos that are unlucky enough to have genetic abnormalities usually also die early in incubation. Genetic problems are more likely to occur with in-breeding.

Deaths From Day 4 To Day14 Of Incubation

This is the longest period through incubation and yet is the time when least deaths occur. The embryo is simply growing. The growing chick receives its nutrition from the yolk and deaths here can reflect nutritional problems in the hen. Hens that are correctly fed produce nutritious yolks that support healthy embryos. The effect of stock bird nutrition is very underrated. By simply feeding a blend of 2-3 grains and grit it is not possible to prepare the stock hens well for breeding. Fanciers who believe they can do this often accept an elevated embryo death rate or several weak chicks in the nest, as normal.

Although embryos can die of infection at any time through incubation, it is at this time of growth that they are most vulnerable. Certainly there are some infections that can be carried by the hen such as Chlamydia and Salmonella, that can infect the ovary. These can be incorporated into the egg at the time of its formation, and subsequently infect and kill the embryo as it grows. Infection can also pass through the oviduct wall into the egg. These types of infections, that enter the egg prior to laying, are in the minority however. Most infections that embryos develop are caught after hatching in the nest. Nests that are dirty, poorly ventilated or excessively humid lead to egg- shell contamination and movement of infectious agents into the egg. Egg quality is also important here. Cracked, thin, mis-shapen, rough eggs allow easier entry of infection and are more subject to trauma. Poor eggs can be due to oviduct disease, but are more often associated with a nutritional deficiency in particular calcium deficiency. Some fanciers will have noticed eggs with translucent clear lines running around the outside of the egg, showing the eggs rotations, as it was passing down the oviduct. These thin areas can be an early sign of calcium deficiency.

Embryonic Deaths At The End Of Incubation

Through incubation a membrane called the chorioallantois develops around the chick. The chorioallantois acts a bit like a human placenta, in that it delivers air to the embryo after it diffuses through the shell. At the end of incubation the chick must swap from a chorioallantoic respiration to breathing air. It does this in two stages. First it internally pips. This involves cutting a small hole into the air

chamber at the end of the egg and starting to breath the air it contains. At this stage vibrations can be felt in the egg and chick will sometimes vocalize. After another 12-24 hours the chick then cracks the shell and breaths external air. While this is happening the last of the yolk sac (the chicks nutrition during incubation) is drawn into the navel (and eventually ends up as a tiny sac in the wall of the small intestine called Merckels diverticulum which lasts the whole life of the bird). Interestingly, during this time, the chick also drinks the clear fluid around it called the amniotic fluid. This amniotic fluid, and also the yolk sac contain the antibodies that protect the chick from infection in the first few weeks of life.

While all this complex physiology is going on the chick is vulnerable to problems. Too high or low temperature or humidity during this time will adversely affect the chick. The usual problem, is however, too high a temperature, or too low a humidity. This combination causes the shell and shell membrane to become hard and dry. This can lead to even a healthy chick becoming exhausted. In addition to this, the chick quickly becomes dehydrated. I am sure many of you, myself included, have helped these chicks hatch only to find them dead later. These chicks die because they are dehydrated. Such chicks if given small drops of water will often suck them down greedily and survive. These dehydrated chicks are called sticky chicks because of the way they stick to the dry shell membranes. They are often found dead after hatching $\frac{1}{4}$ to $\frac{1}{2}$ the way. If removed from the shell they often have unabsorbed yolk sacs and there is often dry, gluggy albumen still in the egg. For consistently high hatch rates, it is vital the stock birds have access to either rain or a bath around this time. If not possible the underside of the hen and also the eggs can be lightly misted with water from a spray bottle. Ideally the nest box should have a temperature of 20-25 degrees celsius, and a humidity of 70%. If unsure, a thermometer and hygrometer can be placed in the nest box.

In summary, in most lofts hatchability can be dramatically improved by three simple steps:

Improving stock bird nutrition in the months prior to breeding.
A fresh nest bowl for every round, and ongoing nest box hygiene.
Access to rain or a bath around hatching.

If attending to these matters does not help, your avian veterinarian will usually want to test the hen for infection, or alternatively do an egg autopsy.