What happens when eggs are set small end up?

Hatching eggs are set with the small end downwards in the setter tray, with the air cell facing upwards.

As the embryos finish their final three days of incubation in the hatcher baskets, they will naturally maneuver into hatching position and gravitate toward the end of the egg that was placed upward in the setter tray. Unfortunately, if the egg was set with the small end up, there will be no air cell to pip into, and a significant proportion of the chicks will not hatch.

Our expectation of the losses due to incorrect orientation date from many years ago; recently, the Aviagen hatchery at Stratford on Avon in the UK ran two trials to investigate whether our expectations remain correct.

In both trials, five trays of eggs were set small end up, with the position of the air cell identified by candling.

The remaining eggs were set small end down, as recommended. The embryos in Trial 1 were in ovo vaccinated at transfer, while chicks in Trial 2 were vaccinated after hatch. On the day of hatch, the number of clear and unhatched eggs were counted, and the unhatched eggs broken out. The number of chicks, culls and non-living on tray chicks were also recorded, and the overall appearance of the chicks assessed and noted.

Trials reported in the literature lead us to expect that if eggs are set small end up, one in five of the transferred eggs will not produce a live chick. Results from these two trials, shown in Fig. 1, were slightly worse than this, especially when in ovo vaccination was used. Hatch of transferred eggs was lower by 25.5% (vaccinated in ovo) and 22% (vaccinated post-hatch).

In about half of the unhatched eggs, the embryo was malpositioned upside down. There were also more embryos with malposition of head to left and simple late non-living embryos. However, the increase seen in the culling rate of 4-5 times was unexpected. The reasons for culling included button navels, scruffy down and very late emergence (still wet). Even more surprising, the chicks that were supposed to be first quality were also poor – inactive, weak, and visibly later to hatch than the chicks hatched from eggs set correctly.

In conclusion, eggs set with the small end down will lose 22-25% of their potential hatchability, have 4-5 times as many culls and chick quality will be generally poorer. Automatic egg packers usually achieve accurate orientation, however if eggs are packed by hand, training staff on the consequences of incorrect orientation is critical. It is also important to supply a suitable candling torch so the air cell can be located quickly and easily. QA staff should be checking for incorrectly oriented eggs in each batch picked up from the farm and informing farm managers of any problems.

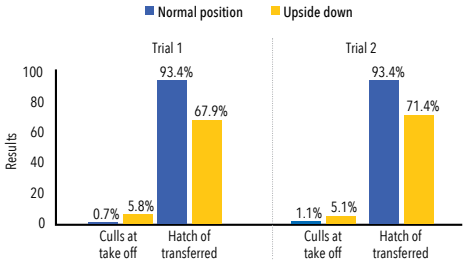

Figure 1 *Results of Trial 1 (in ovo vaccinated at transfer) and Trial 2 (vaccinated after hatch).*