Successfully closing the hatch window

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Let us start with some basics. What do we mean by the 'hatch window'? It is simply the time between the hatching of the first and last chick. Why then do people get so excited about it? Because chick quality is influenced significantly by when the chick hatches and, therefore, how long it spends in the hatcher until take-off.

We are told by the breeding companies that early chick growth is crucial – a chick must be four times its initial weight at seven days. As a general guide this means an average of 160g or more at seven days.

Not all chicks then hatch on the 21st day. Even in the best run hatcheries something like 24 hours can elapse between the first and last chick hatching. In some hatcheries hatch time is considerably longer than this, leading to dehydration in the early hatched chicks and poorly finished ('green') late hatching chicks.

What can be done at the practical level to improve this situation?

Firstly, we must recognise that variation exists in all aspects of chicken production. If there was no variation the geneticist would have no material from which to make his selection for the next generation.

There are two types of variation – natural and man-made.

We can express variation mathematically by use of the 'normal distribution' or what is commonly referred to as a 'bell graph'.

We use this for example, when weighing broiler breeders in the rear to give us a measure of uniformity in the flock.

Factors which affect hatch time can be grouped into 'before lay' and 'after lay'.

If we take a batch of eggs and select out all those weighing say, 60g and then incubate them as a group we will find that hatch time of this selected group will still show variation – not as much as the unselected batch of eggs, but variation nevertheless.

The causes of variation

Variation occurs during egg formation in the oviduct. The embryo (or blastoderm) takes about 26 hours during its passage down the oviduct.

If the hen decides to hold the egg over until the following day before laying then there could be a further 12 hours added to development time. So, when an egg is laid the embryo could be between 26 and 38 hours old – a gap which will remain throughout incubation and hatching.

Our 60g eggs may all weigh the same but they may have quite different shell structure. This is important in facilitating gaseous exchange with the developing embryo and, therefore, rate of growth, hatch time and chick quality.

Man-made variations are factors under our control, but commercial pressures mean we often overlook them.

These include:

- Egg size. Large eggs need more heating at the start of incubation and cooling at the end.

They take longer to incubate (allow an extra 30 minutes to incubation time for each 2.5g above 50g) and they restrict airflow in the setter leading to hot spots in the centre of the tray.

- Egg age. Eggs held in store take longer to hatch than fresh eggs. one day's storage at 16°C adds one hour to incubation time.
- Breed differences. There are certainly differences between broilers and layers, and small discrete differences between different strains of broiler
- Pre-warming. The expected advantages of pre-warming can be lost if it is not done properly. This means that all the eggs within the trolley must be heated uniformly otherwise there will be a range in egg temperatures at setting which will have a direct effect upon hatch time.
- Position of eggs in the setter. Some eggs in the machine may be subjected to cold spots due to the effect of sprays, coolers or draughts. There may also be hot spots due to poor ventilation.
- Type of setter. If we consider the temperature profiles from a multi-stage setter (see Fig. 1) we find regular dips in temperature as a result of loading and unloading eggs.

These interruptions to incubation extend both incubation time and hatch time – factors which can be avoided with single-stage setting.

Single-stage gives more precise temperature control during the setting period (see Fig. 2).

- Transfer. During the transfer operation it is not uncommon for eggs to become chilled either due to trolleys of egg left out of the machines too long or because the eggs are transferred into wet baskets and/or wet hatchers.

It is also not uncommon to find eggs loaded into wet hatchers with closed dampers (to raise the temperature more quickly).

In this case the embryos suffer a double whammy – a drop in temperature and restricted oxygen supply at the time when their oxygen requirement is fast approaching its maximum

Conclusion

There are many factors affecting hatch time.

Some of these are outside our control, as in the case of natural variation, but there are many important factors under our control which can have a major influence upon the 'hatch window' and subsequent chick quality, livability and seven day growth rate. ■

Fig. 1. Typical temperature plots – multi-stage setter.

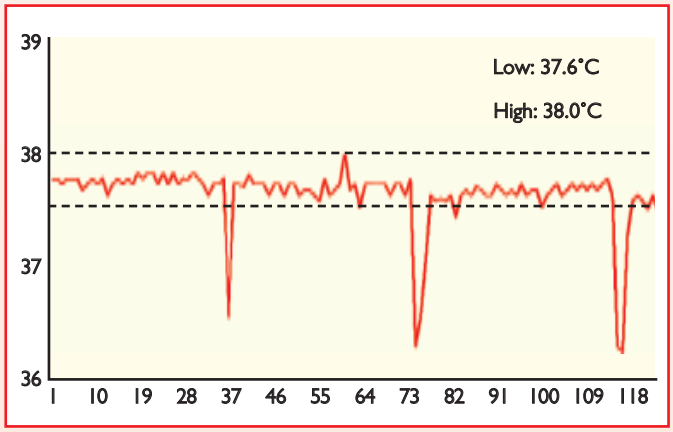

Fig. 2. Typical temperature plots – single-stage setter.