

Incubation research: What do we know and what do we need to know?

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In 1990, Tullett suggested that the basic principles of artificial incubation were well understood and that poultry hatcheries were generally getting good results; future studies would just be a fine-tuning the process. The major change since 1990 has been the understanding that the requirement for incubation needs to be defined at the level of the egg rather than the incubator. The environment for an incubator needs to ensure that the eggshell temperature is maintained at 37.8°C and the eggs lose 11 – 12% of their fresh egg weight due to water loss by the day of transfer. More recent studies have also shown that carbon-dioxide levels should increase up to mid-point of the incubation period and thereafter decrease, although further studies are needed to confirm this.

A second development in incubation research since 1990 is the understanding that the incubation environment does not only impact on hatching success but also the post-hatch performance of the broiler chick. In the last 5 years there has been a significant rise in the number of papers published on incubation and to a large extent this research has looked at the effect of incubation on post-hatch performance. Sub-optimal incubation temperature has been shown to depress subsequent broiler growth and resulted in changes to the development of the heart, skeletal, gut and immunological systems. The economic consequences to the poultry industry of poor broiler performance are many fold greater than the effects of hatch performance and as a consequence of the new research the industry is placing a greater emphasis on optimising the incubation environment.

In addition to showing that sub-optimal incubation can adversely impact broiler performance, other research is suggesting that targeted short-term changes to the incubation environment can have a permanent and positive effect on the development. Short periods of high incubation can improve the abilities of broilers to withstand heat stress later in life, while cool temperatures can improve resistance to ascites. In turkeys, high and low temperatures mid incubation have been shown to alter the number fibres in the muscle suggesting a possible long term effect on meat quality. The possibility that the incubation process can be used to modify the broiler in a positive way so that it is better adapted to its environment or produces a better product for the consumer is a truly exciting development and will be a growing area for future research.

References:

TULLETT, S.G. (1990) Science and the art of incubation. *Poultry Science*, **69**: 1 – 15.