

High Eggshell Temperatures: A Matter Of Life And Death Importance

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In practice, eggshell temperatures increase often at the end of the incubation process when greater heat production of eggs occurs. Problems with cooling and air velocity in incubators can be the reason for this increase in eggshell temperature. It is critical that eggshell and therefore, embryo temperature, is not too high.

Regulation of embryo or eggshell temperature during incubation can be beneficial in both practical as well as in scientific situations. Different studies have shown that high eggshell temperatures (38.9°C) compared with normal eggshell temperatures (37.8°C) from the first or second week of incubation till the end of incubation decrease embryonic development and chick quality in broiler embryos, expressed by a lower chick length, a lower yolk free body mass, a higher residual yolk and a poorer navel condition. One of the reasons for the impaired development with high

eggshell temperatures might be the reduced incubation time.

Few studies explain the mechanisms of action due to different eggshell temperatures that result in variations in chick characteristics. The use of nutrients during incubation might explain some of these differences. During the major part of incubation, fat is the main energy source. At the end of incubation, when the energy demanding hatching process starts, the embryo uses mainly carbohydrates. Our study compared broiler embryos incubated

at a normal (37.8°C) versus a high (38.9°C) eggshell temperature (EST) and showed that hepatic glycogen stores were lower in the high EST when compared with the normal EST at d 18 of incubation. However, at 12 and 48 h after clearing the eggshell, the differences in hepatic glycogen between EST treatments disappeared. Embryos incubated at a high compared with a normal EST may use less hepatic glycogen during the hatching process and the first hours posthatch. This might also explain the higher percentage of late mortality and the higher number of malpositioned embryos for eggs incubated at a high EST. On the other hand, gluconeogenesis from proteins might be higher in embryos incubated under high EST to provide additional energy for hatching. An indication of higher a protein degradation to

obtain energy was a tendency for a higher plasma uric acid concentration in chicks incubated at a high EST. In conclusion, our study showed that nutrient use is different between normal and high EST and may explain the differences in embryonic development and livability.

The difference in nutrient use during incubation due to different EST change hatchling characteristics, and also change subsequent performance. Different studies have shown that embryos incubated under high temperatures had a decreased body weight and an increased feed conversion ratio at slaughter age. In summary, controlling embryonic temperature is definitely a matter of life and death importance.