

Effect of Lighted Incubation from Set till Hatch on Hatch Moment and Chick Development

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In a commercial practice, eggs are incubated in complete darkness. In nature, a hen leaves the nest regularly, exposing the developing embryo to light. A darkness-light rhythm has previously been shown to influence embryonic brain development, circadian hormonal release, and embryonic development, and it may be speculated that it will influence several other aspects of embryonic development. The data presented here is part of a larger experiment on the effect of light during incubation on bone development.

The aim of this part of the experiment was to investigate the effect of light schedules throughout incubation at a constant eggshell temperature (EST) on the hatch window and quality and development of broiler hatchlings.

188 Ross 308 eggs of a 40 week old breeder flock were incubated from day 0 of incubation until hatch using 1 of 3 light schedules: continuous light (24L), continuous

darkness (24D), or a 12 hours light, 12 hours darkness daily rhythm (12L:12D). Hatching was monitored every 3 hours to assess the hatch window. Hatched chicks were marked and sampled 3 hours after hatch to determine yolk free body mass (YFBM), navel score, and chick length as measures of chick quality, and heart, liver, stomach (proventriculus and ventriculus), and intestine weight as measures of chick development.

24L chicks hatched earlier than 24D and 12L:12D (-8 and -10 hours, respectively; $P < 0.001$) and had a wider hatch window than 24D and 12L:12D (standard deviation +6 hours for both; $P < 0.001$). Chick length, navel score, and YFBM did not differ between treatments (all $P > 0.19$). Liver weight, corrected for YFBM, was higher for 12L:12D than for 24L (-0.05 g) and 24D (-0.03 g; $P < 0.001$). Intestine weight, corrected for YFBM, was higher for 12L:12D than for 24L (-0.18 g) and 24D (-0.15 g; $P < 0.001$). Heart ($P = 0.11$) and stomach ($P = 0.74$) weight did not differ between treatments.

To conclude, continuous light during incubation (24L) from set until hatch resulted in an earlier and wider hatch window than continuous darkness (24D) or a 12 hours of light, 12 hours of darkness rhythm (12L:12D). However, although the 24L chicks hatched earlier, they were not smaller or of lower quality than the 24D and 12L:12D chicks at 3 hours post-hatch, suggesting their embryonic growth rate may have been increased without a negative effect on day old chick quality. Liver and intestine weight was increase in the 12L:12D group suggesting favourable effects of light/darkness rhythm on internal development.