

Effects of storage time on incubating egg gas pressure, thyroid hormones and corticosterone levels in embryos, and their hatching parameters. Poultry Science

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Abstract

Incubating eggs (1,800 total) produced by a commercial flock of Cobb broiler breeders were used to determine the effects of storage duration (3 and 18 d) on gas partial pressure, thyroid hormones, and hatching parameters. Partial pressure of oxygen (pO₂) and carbon dioxide (pCO₂) were measured on d 18 and at internal pipping (IP) during incubation. Blood samples were collected for determination of triiodothyronine (T₃), thyroxine (T₄), and corticosterone concentrations in the embryos at IP and in newly hatched chicks. From 464 to 510 h of incubation, eggs were checked individually every 2 h to determine the timing and duration of IP, external pipping (EP), and total hatching time. At 18 d of incubation and at IP, pCO₂ was greater in air cell of eggs stored for 3 d compared to those stored for 18 d ($P < 0.05$), but pO₂ was greater in eggs stored for 18 d. At IP, T₃ and corticosterone levels were higher in plasma of the embryos of eggs stored for 3 d compared to those stored for 18 d, but it was the reverse in newly hatched chicks ($P < 0.05$). Embryos from eggs stored for 18 d required more time to complete IP compared to embryos of eggs stored for only 3 d ($P < 0.05$), whereas the duration of EP was not affected by storage. The overall longer incubation was, however, not only due to prolonged IP but also to later occurrence of IP. It was concluded that prolonged IP as a result of long storage may be related to the late increase in corticosterone level, which may be a necessary stimulus for higher T₃/T₄ ratio, late increase in pCO₂ level, and decrease in

pO₂. The effect of long storage was a delay in hatching and a continuous increase in T₃ due to higher corticosterone levels between IP and hatching, which may be an indication of the more stressful event of hatching of embryos from eggs stored longer. Differences in pCO₂, pO₂, T₃, T₄, and corticosterone levels in the incubating eggs may be manifestations of these changes culminating in altered hatching parameters and consequently differences in chick quality and growth potentials.