Effect of cold incubation temperature and cold ambient temperature at start on performances, body temperature and health criteria in fast-growing broiler chickens

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Program and Abstracts

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High performances of broilers are associated with high sensitivity to their climatic environment. Rearing birds under low temperatures has severe economic and welfare consequences, such as decreased feed efficiency (particularly for chicks) and an increased occurrence of ascites syndrome in finishing broilers. Several strategies were proposed to increase the adaptive capacities of birds and consequently their robustness, especially regarding thermal exposure. Thermal manipulation during specific phases of embryogenesis was previously reported to decrease ascites occurrence posthatch and may be a way to improve the cold tolerance and robustness of broilers.

The objective of our study was therefore to explore the effects of the interaction of cold incubation temperatures and cold ambient temperatures during the first 21 days of rearing on performance and selected health parameters. Ross 308 eggs were incubated either in control conditions (37.7°C, C) or with cyclic cold stimulations (6h/d at 36.7°C from day E10 to E18 of embryogenesis, A1), or with two short acute cold stimulations (30 min at 15°C and 80% relative humidity at days E18 and E19 of embryogenesis, A2). These treatments were followed by postnatal exposure to standard rearing conditions (S, from 33°C at hatch to 21°C at 21-day-old) or continuously lower ambient temperature (L1, from 28°C at hatch to 21°C at 21-day-old) or exposure to cyclically lower ambient temperature (L2, oscillating between both previous thermal regimes). Chickens were reared 4 per cage until 3 days of age and individually until 21 days. Thereafter chickens were transferred to a single floor pen in standard conditions until 35 days of age. Treatments A1 and A2 did not alter hatchability as compared to control eggs with 94.8%, 95.1% and 92.3% of fertile eggs, respectively, or body weight or chick quality at hatch. Male body temperature at hatch was higher in A1 than in C ($P < 0.05$) whereas for females body temperatures were not different between groups. A higher occurrence of leg disorders was observed with the continuously lower ambient temperature (L1), whatever the incubation condition or the gender. No effect of incubation or postnatal treatment was observed on body weight at 0, 11 and 21 days in males. Ambient temperature L1 affected females by reducing body weight at 21 days, which was compensated at 35 days once transferred to standard rearing conditions. At 21 days, there was an interaction between incubation temperature and postnatal thermal conditions on feed conversion ratio (FCR) measured in males. In females, both A1 incubation and L1 postnatal temperature increased FCR.

In conclusion both cold incubation and cold ambient temperature at start changed performances and health of broilers, the effects depending on the gender.

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