

Influence of Temperature Stimulation during the Last 6 Days of Incubation on Hatching Results and Later Performance in Pekin Ducks

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In Germany per capita consumption of poultry meat was 16 kg in the year 2000 and rose up to 18.9 kg in 2011. Per capita consumption of 0.9 kg meat originated from ducks in 2011. Recent research shows that incubation climate may have a long-lasting influence on poultry. The most important climatic incubation factor is the incubation temperature.

Therefore, the following study was carried out to investigate our hypothesis that short-term variation in incubation temperature during the last days of incubation can improve hatching results and have long-lasting effect on performance, also in Pekin ducks. The aim of the study was to make a complex investigation of the influence of a mild short term; increases or decreases in incubation temperature at the end of incubation (Day 23 up to hatching) on hatchability; secondary sex ratio, and quality of the hatched ducklings, as well as performance of a large sample of males and females of a high yielding duck breed until age of slaughter. In this regard our main objective was to find out if thermal manipulation during the end of incubation has a different influence on performance until slaughter age in male and female Pekin ducks.

In 3 incubation trials and following 3 growing trials the influence of temperature manipulation at the end of incubation on hatching results and performance in Pekin ducks (49 days) was investigated. 1730 eggs were incubated (days 1 to 22) under normal incubation conditions (37.6°C) and then sorted into two hatch incubators (37°C: control; 38°C, 2 h daily: short-term warm stimulation–Trial 1; 36°C, 2 h daily: short-term cold stimulation–Trial 2; 3). The short-term warm stimulation reduced percentage of hatched ducklings, short-term cold stimulation didn't change hatching results. In growth Trial 1, feed intake and weight gain for warm stimulated ducks was statistically lower than for control (day 1-21). In Trial 3 (sex sorting), feed intake of male ducks was decreased, in female ducks increased, and body weight gain was significantly higher in the cold stimulated group (Trial 2) and also in female ducks (Trial 3) in the first three weeks. Short-term cold stimulation improved feed to gain ratio in male ducks. Ducks from cold stimulated group reached statistically higher crude protein content in the breast meat compared to control.

Keywords: Pekin duck, incubation temperature; hatchability; growing performance

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The Effect of Temperature Elevation during Early Incubation on the Broiler Phenotype

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In amphibians and reptile ambient conditions (e.g. temperature) has a major effect on sex determination while in chicken sex determination is genetic. However, observations conducted on the Australian bush-turkey reveal an effect of ambient temperature on the hatching chick's sex ratio. Moreover, it is well known that hormonal manipulation during the chicken sex determination results in changes of the sexual phenotype post hatch. Since sexual differentiation in the domestic chicken (*Gallus gallus domesticus*) occurs until embryonic day (E) 6, the hypothesis of this study was: elevating temperature during the first days of incubation will affect the chick's sex ratio, phenotype and performance.

Fertile Cobb eggs (± 2.5 g) were divided into 4 treatments: temperature elevation to 38.1°C between E0-E5 (inclusive); between E0-E2 (inclusive); between E3-E5 (inclusive); and control eggs that were incubated at 37.5°C and 56% RH throughout incubation. The temperature elevated groups were transferred to control conditions immediately after the treatments were terminated.

Temperature elevation resulted in earlier hatch by 3 (treatment E3-E5) and 6 hours (treatments E0-E5 and E0-E2) without negative effect on hatchability. No difference was found in sex ratio, however, changes in the chicken phenotype were found on day 35 post-hatch in treatments E0-E5 and E3-E5 in males and females. These changes expressed a significant increase in the relative weight of the comb, wattle, testicles and ovaries. A possible explanation is a significantly higher level of plasma testosterone found in males and females exposed to these treatments. Moreover, in both sexes, relative breast muscle weight was significantly higher in the treated chickens compared to control with the exception of E0-E2 treatment, emphasizing the importance of embryonic days E3 till E5 as a time window to manipulate the chicken phenotype. It can be concluded that temperature elevation during the time window of incubation corresponding to sex determination results in elevation of plasma testosterone, altering secondary sex characters and muscle growth.

Keywords: incubation, temperature elevation, secondary sex characters

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