

## 7 Summary

### **Prenatal development of endothermy in precocial birds, shown in the Muscovy duck (*Cairina moschata f. domestica*) and in chicken (*Gallus gallus f. domestica*)**

The influence of ambient temperature on body temperature and heat production was examined in Muscovy duck embryos (*Cairina moschata f. domestica*) from day 20 to 34 of incubation and in chicken embryos (*Gallus gallus f. domestica*) from day 12 to 21 of incubation.

The embryos were incubated at 37.5 °C and exposed to ambient temperatures between 28.5 °C and 39.5 °C for 3 hours during experiments. Oxygen consumption was measured continuously in an open system and was used for calculation of heat production. For analysis of the course of heat production depending on body temperature the  $Q_{10}$ -method, which is based on the van't Hoff rule, was adapted.

The evaluation of the results showed that all embryos of both species exhibited endothermic reactions during exposure to cold within the whole incubation period investigated, but because of the small effect of heat production they were not able to control their body temperature. In general there was a highly significant linear relationship between body- and ambient temperature. Two answering-types of heat production to lowered temperatures appeared: type 1 - transient increase in heat production, typ 2 - instant drop of heat production. The share of type 1 was higher in the duck compared with the chicken embryos and increased with embryonic age and smaller drop in ambient temperature. On last day of incubation there was a non significant absolut increase in heat production when ambient temperature was dropped by 1.5 K in duck and 1.0 K in chicken embryos, respectively.

Exposed to high ambient temperatures (39 °C) about 75 % of the embryos of both species showed an increase of heat production. This increase was up to 10 % in younger embryos and declined to the end of incubation.

This investigations have shown that in the examined species thermoregulatory changes in heat production due to altered ambient temperatures occurred before the last third of incubation time, which are adequate but less effective. It is probably that these reactions have a training effect on the thermoregulatory system and serve the organism to adapt to the future environment by epigenetic mechanisms.