7 Summary

Comparative investigations on thermoregulatory processes in embryos of the Muscovy duck and chicken under different prenatal temperature experiences

Embryos of the Muscovy duck (*Cairina moschata forma domestica*) and the domestic chicken (*Gallus gallus forma domestica*) were incubated at a low temperature of 34.5°C from day 27 and day 17 of incubation, respectively until hatch. Heat production as well as body temperature at constant and acutely changed ambient temperatures were measured daily until the last day of incubation. These results were compared with another study of JANKE (2002) at normal incubation temperature (37.5°C).

Low incubation temperature led to developmental changes in comparison to the normal incubated ones in both the species:

1. Incubation time was extended by two days.
2. Heat production was increased, mainly prior to hatch. This increase was clearly observed during the acute drop of ambient temperature. During the drop of ambient temperature, duck embryos stabilized or slightly increased their heat production earlier in development when compared to the chick embryos. And also the duck embryos stabilized or increased their heat production for a longer time during the acute drop of ambient temperature. But, the chick embryos showed a smaller decrease of heat production during a three hour challenge at the decreased ambient temperature.
3. Body temperature showed a clear dependency on ambient temperature. Cold incubated embryos had a lower body temperature than the normal incubated ones. Embryos of both the species were not able to keep their body temperature at the drop of ambient temperature (not even by increasing their heat production).

The changes in heat production of the embryos caused by low incubation temperature are adaptive because they enable the animals to survive in the postnatal expected cold environment. These changes were induced already prenatal during a so-called critical phase of development. Therefore and with respect to their adaptive character, they

represent an epigenetic adaptation process. The thermoregulatory set-point of the animals was decreased; probably it could be a long-term decrease.

It would be an interesting question for future investigations to study the long-term character of epigenetic temperature adaptation.