Hatching time and hatchability depending on egg storage temperature in Japanese quail lines divergently selected for shape of the growth curve

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Starosta and Hyánková (2011) analysing prenatal development and growth of the HG and LG lines confirmed that the genetic change of the postnatal growth pattern has a significant impact on the developmental rate of embryos already during the first 12 h of incubation. In addition, they revealed that increasing line divergence in the developmental rate resulted in a significant growth retardation of HG vs. LG embryos during prenatal periods (3-4d, 8-14d) when developmental changes leading to a more effective utilisation of nutrients occur. Thus, the developmental delay could be generally a key factor increasing the risk of embryo death, especially at early and late embryonic phases. To verify this assumption we analysed HG vs. LG differences in hatching time and hatchability depending on egg storage temperature, i.e. on an environmental factor that significantly influences hatching success.

HG and LG eggs (230 per line) came from 5 months old females of generation 39 the husbandry for which was essentially similar to that provided during selection (Hyánková et al., 2001). After morning collection, the eggs were weighed and within each line divided into two groups of equal size that were subsequently stored for 5 days at two temperatures (12±2°C or 30±2°C; 45% relative humidity). After storage, all eggs were weighed again, placed in the same incubator with automatic rotation of eggs and incubated at 37.5±0.2°C and 55% relative humidity. At 349 hours of incubation and every 4 hours thereafter, hatch time of newly hatched quail was recorded. Unhatched eggs were broken and fertility of eggs was verified.

The study confirmed that the genetic modification of the postnatal growth pattern is accompanied by a significant correlated response in hatching time. Irrespective of egg storage conditions, LG quail selected for early fast growth rate showed a considerably shorter incubation period than HG quail. The shorter incubation period of the LG vs. HG line under egg storage at 12°C was accompanied by a better hatchability of LG vs. HG fertile eggs. This was probably caused by a higher resistance of LG vs. HG embryos to the temperature fall during the preincubation period due to developmental acceleration of LG vs. HG blastoderms at oviposition time. However, the hatchability of the HG and LG lines were significantly changed when egg storage temperature increased to 30°C. In comparison with the foregoing situation, the incubation periods of both lines were significantly reduced and their shortening was associated with a lower hatchability of fertile eggs. The hatchability of LG eggs declined even so much that the previously observed differences in favour of the LG line entirely disappeared. These results confirmed that a slow rate of embryonic development during the egg storage period had generally a more negative impact on hatching success than the transient stopping of the developmental process in consequence of a low storage temperature.

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