

GENETIC TRENDS OF EGG YOLK AND WHITE WEIGHTS AND HATCHABILITY AS CORRELATED TRAITS IN TWO BREEDS OF LAYING HENS

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The aim of the investigation was to check if the routine selection for egg production traits in two commercial-hybrid parental breeds of laying hens influences the egg composition. In several studies genetic variability of egg constituents contents, including yolk, albumen and solids (Washburn, 1990), have been reported. Such differences between random bred and selected or commercial populations reflect their selection history and circumstances. Hartmann *et al.* (2000) showed, that it is possible to alter the proportion of yolk to albumen ratio directly, with the classical selection means. The egg composition is important for both consumption and reproductive qualities, and a problem arises if such changes could be beneficial for both functions. The results concerning the relation between increasing yolk and/or albumen weights with hatchability were not unanimous. Sewalem *et al.* (1998) found decreased percentage of hatchability of set eggs in the White Leghorn line selected for increased egg weight while positive trend was observed in the line selected for egg number. Studies reviewed by Washburn (1990) have shown that large egg size, with its greater percentage of albumen, is not compatible with high hatchability, though the relationship is usually curvilinear. Hartmann *et al.* (2002) concluded, that within the range of values for egg composition in their study, selection for an increased egg dry matter should not impair reproduction.

The problem was studied across nine generations of Rhode Island Red (RIR – 3869 birds) and Sussex (SX – 2908) breeds maintained in 3-tier cages. The applied selection criterion included five traits – laying rate, egg weight, age at first egg, residual feed intake, and shell strength, in both breeds. The eggs for studies were collected twice – at 33 and 53 weeks of age, for three consecutive days each time. The statistical classification for evaluating the variance components (REML) and BLUPs for genetic trends of the studied traits, accounted for additive animal and permanent environment random effects and environmental fixed effects. Egg weight was fitted as covariate for yolk and egg white weights, to observe the problem within a standardized egg weight.

The heritability estimates for both yolk and albumen weights were of moderate magnitude (0.26 – 0.27), while the genetic correlation between them was naturally high and negative (tab. 2). This confirms the finding of Hartmann *et al.* (2000) that the ratio of yolk to albumen can be affected by selection.

The heritability of hatching rate (tab. 3) was, depending on breed, moderate to small. There was, however, a clear indication that, within eggs of equal size, eggs containing more yolk and less albumen were more suitable for hatching. The genetic correlation of hatchability rate was positive with yolk weight and negative with albumen weight in both breeds. In the studies of Hartmann *et al.* (2002) genetic correlations between hatchability of fertile eggs and egg weight, albumen weight, yolk weight, yolk/albumen proportion and albumen dry matter were -0.22, -0.30, 0.28, 0.52, and 0.26, respectively.

Key words: laying hens, yolk/albumen weights, hatchability, selection
