Does a dual-purpose genotype differ from meat- and layer-type genotypes in terms of response to experimental nematode infections?

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We investigated whether a dual-purpose genotype (Lohmann Dual, LD) differs from the conventional, high-performing broiler- and layer-type chickens in terms of resistance and tolerance to mixed-nematode infections including *Ascaridia galli* and *Heterakis gallinarum*, the two common ascarids parasitizing the chicken host. In experiment 1 (E1), cocks of Ross-308 (R), Lohmann Brown Plus (LB) and LD, and in E2 hens of LB and LD genotypes were compared following experimental infections. Orally induced infections occurred with 500 and 1,000 eggs of the ascarids per bird in E1 and in E2, respectively. In E1, infections reduced feed intake in all genotypes, but growth was impaired only in R, indicating a lower tolerance to the infections in this genotype. Overall, *A. galli* burden was higher in R than in LB, whereas LD did not differ from R or LB. Susceptibility to re-infection with *H. gallinarum* was higher in LB than in both LD and R. In E2, infections reduced feed intake and increased feed conversion rate in both genotypes. Infections impaired laying performance in LB immediately after infections while it was much later in LD hens. The delayed impairment in performance of LD hens was associated with a strong increase in egg weight of this genotype over time, which was not the case with LB genotype. Burdens of the first generation worms were not different between the two genotypes, whereas susceptibility to naturally occurring re-infections was higher in LB than in LD hens. Our data collectively suggest that tolerance to nematode infections is associated with host performance level in a way: the higher host performance, the lower tolerance to mixed nematode infections. Resistance to the mixed-nematode infections is more complex and depends on both host genotype and the worm species involved. The complete study summarized in this abstract can be found in Stehr et al. (2019a, b).

Key words

ascarids; avian host; dual purpose chicken; egg quality; growth rate; host performance; multi-species infection; resistance; susceptibility; tolerance

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The importance of the prenatal and early postnatal environment for the behavioural and physiological development of chicken

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The perinatal phase, comprising the pre- and postnatal period, is a sensitive phase during which the environment can have a long-lasting impact on the individual phenotype. The long-term effects might be explained by epigenetic mechanisms, which are also involved in the transmission of experiences during (early) life to subsequent generations (GOERLICH et al., 2012). It is thus no surprise that a number of studies investigate how stressors during the perinatal phase affect the development of behaviour and physiology. To measure effects of stressors on an individual, several (non-invasive) techniques have been developed. Quantification of steroid hormones, for example, is meanwhile possible in eggs, faeces, and feathers, providing promising alternatives to blood samples. Several validated behavioural tests are available to describe individual phenotypes, in the lab and on farm. Further useful techniques include thermal imaging and (prenatal) heart rate measurements (GOERLICH-JANSSON et al., 2019). Nevertheless, potential welfare issues due to early life experiences remain unexplored.

In birds, the egg and its components (e.g. steroid hormones), and incubation conditions (e.g. light, noise) affect the development of the embryo. After hatching, the young chick is influenced by its physical and social environment, and nutrition. In the poultry industry, embryos and chicks are exposed to a variety of potential stressors during the perinatal phase. Management of parental stocks and maternal stress may affect egg composition, leading to prenatal effects on the chick's future phenotype. Incubation conditions often do not resemble natural conditions (e.g. incubation of eggs in complete darkness), potentially resulting in abnormal behaviour (FIJN et al., 2020). Processing and transport of chicks, or nowadays of hatching eggs, may lead to stress and long-term consequences thereof. A sustainable and animal welfare friendly management of poultry should thus ideally take into account knowledge on (grand)parental stocks, egg characteristics, prenatal and early life circumstances of a chick.

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Key words

adaptive capacity; animal welfare; digital egg monitoring; endocrinology; faecal hormone metabolites; infrared thermography; maternal effects; phenotypic plasticity; stress coping; transgenerational effects

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Larvae meal of the black soldier fly (*Hermetia illucens*) as a potential protein source for broilers

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Currently, alternative protein sources such as processed insect meals are in special focus of animal nutrition to replace imported feed proteins such as soybean meal (SBM). As a part of the multidisciplinary project "sustainability