Dr. Anissa Dudde

„The effects of selection for egg yield on the behaviour of laying hens"

University of Bielefeld
Friedrich-Loeffler-Institut
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Summary

Chickens (*Gallus gallus* forma *domestica*) are one of the most abundant and important livestock animals in the world and have been intensively selected for meat or egg production in the last century. This intense selection for productivity traits has been discussed to cause undesirable side effects, whereby productivity is potentially compromising animal welfare. Existing studies indicated that the strong selection for high egg yield may lead to resource trade-offs, e.g. changes in behaviour traits due to limited metabolic resources. However, these studies could not clearly distinguish between the actual effects of selection for egg laying and possible phylogenetic influences of different chicken lines. Hence, there is still a considerable need to comprehensively understand the relationship between intense selection, the effects on behaviour and the implications for animal welfare.

Therefore, the aim of the research in my thesis was to provide a more systematic and experimental approach to investigate the effects of selection and phylogenetic origin on specific behavioural traits in laying hens. Thus, I worked with a four-lines model. This chicken model consists of four domesticated chicken lines in a two-by-two crossed design, originating from two distinct phylogenetic branches and selected divergently for egg productivity traits. I investigated their specific behaviour on an individual level regarding social behaviour, fearfulness and cognitive performance. I furthermore tested their motor abilities in interaction with their environment. The main hypothesis was that if selection for egg yield has a major effect on the behaviour of the hens, the two high-productive chicken lines would perform similarly in the tests, independent of their phylogenetic background. Furthermore, I assumed that if resource trade-offs due to high investment into egg laying would appear, the high-selected laying hens would possess less energy demanding behaviour strategies, e.g. show lower social motivation or worse learning performance.

In summary, I reveal that there are strong differences in social behaviour and motor abilities caused by intense selection for productivity traits. Both behaviour traits are limited in high productive laying hens compared to the moderate productive hens. Other differences caused by selection where found in the learning performance, but contradicting the initial assumption performed the high productive laying hens

better in this task. Differently to those results was the fearfulness of the hens mainly affected by the chicken's phylogeny.

These behavioural changes seem not to be generally caused by resource trade-offs, but by other modifications in behavioural strategies. Certain changes in behavioural traits, such as social behaviour and motor abilities, seem to be the result of specific trade-offs, while the cognitive abilities in the learning paradigm were altered, but not in the way a resource trade-off would suggest. Other traits such as fearfulness are mainly affected by the specific history of the chicken line.

With those results, this thesis provides new insights into the effects of high selection for egg-laying capacity and the consequences on the individual hens' life. Through that, the studies can be important for welfare considerations and practical solutions for future chicken breeds. Furthermore, this thesis contributes to the current body of knowledge and raises novel research questions that can help to gain a deeper understanding of the interplay of selection, individual chicken behaviour, and welfare standards.