

Aus dem Institut für Tierschutz und Tierhaltung
des Friedrich-Loeffler-Instituts (FLI) Celle
und der Professur für Verhaltenskunde
der Agrar- und Umweltwissenschaftlichen Fakultät

Thesen der kumulativen Dissertation

**Enriched housing conditions in rearing male chickens differing in
growth performance: Effects on animal behaviour and animal welfare**

zur Erlangung des akademischen Grades
Doktor der Agrarwissenschaften (doctor agriculturae (Dr. agr.))

an der Agrar- und Umweltwissenschaftlichen Fakultät
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vorgelegt von
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Objectives of research

To date, meat chicken husbandry offers no structure in its environment to provide additional elements for acting out species-specific behaviour. At a young age chickens are already motivated to use elevated structures to explore their environment or to rest on higher level (McBride et al., 1969; LeVan et al., 2000). Offering three-dimensional elements in a captive environment may improve the natural behaviour and thus to a better animal welfare. To support natural behaviour like locomotion, perching and roosting, rest and sleep, and exploration, elevated structures has to be chosen shape and height whose are in accordance with the phenotypical characteristics of growing chickens and, thus, their ability to use environmental enrichment. In order to assess the effects of enrichment elements on animal behaviour and animal health, animal-related indicators such as walking ability and locomotor activity, also leg and footpad health and plumage cleanliness can be used. Especially walking ability is a welfare issue in fast-growing meat chickens. Assessment methods for the walking ability like the common gait score system indicated some weakness in objectivity as this system strongly depends on the observers' assessment and can lead to wrong conclusions. The walking ability is closely linked with the motor coordination of the body system. The rotarod test, which is a common test for motor coordination in rodents, probably can be used to assess walking ability in meat chicken. The first aim of my thesis was to develop and validate an appropriate objective method for assessing the walking ability. We developed a suitable rotarod apparatus for chickens and evaluate the relation to the gait score system. This new objectively methodology could be used in one of the studies in this thesis. The second aim of this thesis was to further design and validate elevated structures as environmental enrichment for chickens differing in growth rates. Firstly, the preference of the shape (perch or grid) and height were analysed depending on strain, age and daytime. Secondly, based on first study, in the successive study, only grids in three different heights were provided in half of the available compartments to deal with two objectives. This study focussed on the height preference and possible effects on animal behaviour and animal health. In respect of all aims, three different strains were used for the following studies (slow-growing: Lohmann Brown Plus/Classic; medium-growing: Lohmann Dual; fast-growing: Ross 308).

Main results

Modification of a rotarod test for chickens in order to assess objectively their walking ability (Published in: *Animal Welfare*, 2019)

- The walking ability of all three strains could be tested with the rotarod test
- Duration on the rotating rod correlated positively with the gait scores
- Provide an alternative objectively method for assessing the walking ability with fine-scaled measurements

Evaluation of suitable elevated structures that differ in shape and height in accordance to strain, age and daytime (Published in: *Poultry Science*, 2018)

- Use of elevated structures differed in growth performances – lower use in fast-growing chickens compared to slower growing chickens
- Strains differing in growth performance preferred grids in comparison to perches regardless of age and daytime

Evaluation of suitable elevated structures differing in heights with animal-related indicators in comparison to conventional housing systems (Published in: *Frontiers in Veterinary Science*, 2019)

- Slow- and medium-growing strains preferred higher level of elevated structures at the end of the observation period, fast-growing chickens used more the lowest provided level
- Tendency to higher activity through offered elevated structures in fast- and medium-growing chickens
- Improving of walking ability in medium-growing chickens with enriched compartments compared to control compartments

Conclusion

To conclude, a modified rotarod test for chickens afford an objective easy method for assessing walking ability in chickens and provide fine-scaled measure of an animal welfare indicator. High-level grids are suitable as elevated structures for slow- and medium-growing chickens. In fast-growing chickens, grids are preferred but the access need further research in terms of ramp, angle and space. Also, the effect on animal-related indicators of environmental enrichment should be subjected to further investigations. Providing elevated structures can enrich and improve the environmental structure of growing chickens of different growth performances. Natural behaviour like locomotor activity, perching and roosting or exploration of chickens can also be supported.