

G Summary

Investigation of the structure of reticulate scales from the foot pads of heavy-breed turkeys and the influence of different biotin levels under field conditions.

Skin samples of reticulate scales from the metatarsal and digital foot pads from heavy-breed Big 6 turkeys were macroscopically, light microscopically, histochemically, transmission and scanning electron microscopically as well as biochemically examined. Additionally, a field trial investigating the influence of variable, economically justifiable biotin levels on the development of foot pad lesions was conducted and statistically analysed.

In its basic structures, the reticulate scale epidermis of fattening turkeys is comparable to that of broilers. Nevertheless, the results presented here suggest that there are differences within the bird population and that an age dependent maturation of the skin as a whole occurred.

The results on the epidermal lipid metabolism of the reticulate scales are contrary to any previous investigation in birds and emphasises the need of further investigations of the mechanism and structure of the avian permeability barrier. Based on my results, the permeability barrier in turkeys is solely maintained by the interdigitation of glycolipids located within the lipid cell envelope of neighbouring sebocorneocytes. In birds these glycolipids originate from lipid bilayer residuals of the broken down multigranular bodies, rather than their limiting membrane as in mammals.

The observed foot pad lesions are the consequence of a progressive inflammatory reaction. In severe cases an ulcer is formed. With increasing age these ulcers can heal, leaving visible scar tissue behind. The occurrence of foot pad lesions is associated with a decrease of epidermal ω 6-fatty acids and a change in the hydroxy fatty acid pattern.

It was not possible to demonstrate an influence of the different biotin levels on the structure of the reticulate scales from the examined turkeys. An influence of biotin on the epidermal fatty acid pattern and the macroscopic evaluation of the foot health was detectable only in positive environmental conditions. None of the applied biotin levels compensated for the negative environmental influences or prevented the development of foot pad lesions. A positive effect on the healing of existing foot pad lesions was detectable using high biotin levels in the last seven weeks of fattening. The skin from the various turkeys examined had an individually varying affinity to develop foot pad lesions and also, a genetic factor cannot be excluded. Consequently, exclusion of affected chicks from the breeding program should be considered.

Avoiding a decrease of biotin levels during the last seven fattening weeks under optimal environmental conditions seems advisable to improve foot health in male fattening turkeys. Without a doubt, foot pad lesions are an issue concerning animal welfare and should attract more attention.