

ORAL ADMINISTRATION OF CORTICOSTERONE REDUCES BODY WEIGHT AND FEATHER GROWTH

Camila Lopes Carvalho¹, Patricia Soster de Carvalho^{1,2}, Imad Khan¹, Bassem Khalifi³, Kobe Buyse^{3,4}, Wout Verbeure², Annelike Dedeurwaerder², Maarten De Gussen⁵, Frank Tuyttens^{3,4}, Gunther Antonissen¹

¹Department of Pathobiology, Pharmacology and Zoological Medicine, Faculty of Veterinary Medicine, Ghent University, 9820 Merelbeke, Belgium.

²Poulpharm Bvba, Izegem, Belgium.

³Department of Veterinary and Biosciences, Faculty of Veterinary Medicine, Ghent University, 9820 Merelbeke, Belgium

⁴Flanders Research Institute for Agriculture, Fisheries, and Food (ILVO), 9090 Melle, Belgium.

⁵Vetworks Bvba, Aalter, Belgium.

camila.lopescarvalho@ugent.be

Abstract

Corticosterone is an important hormone in poultry that plays a crucial role in modulating physiological responses after stimuli, making it a key indicator to understand avian stress. Nonetheless, taking blood samples can be invasive and stressful and may influence plasma corticosterone levels. This stress hormone elicits various responses, including the disturbance of normal feather growth. Assessing feather morphology could present a less intrusive, albeit indirect, alternative for blood sampling. This study aimed to investigate broiler chicken feather morphology in response to different levels of supplemented corticosterone. Sixty male Ross 308 broilers were randomly distributed across six floor pens, each containing ten broilers. The experiment included six treatments: T1 (0 mg/kg), T2 (1 mg/kg), T3 (2 mg/kg), T4 (3 mg/kg), T5 (4 mg/kg), and T6 (5 mg/kg) of orally administered corticosterone from day 1 to 42. At day 42, the broilers were euthanized, weighed, and the left and right first primary feathers were analyzed for length of the rachis, depth (outer and inner vanes), length of barbs (outer and inner vanes), and angle (outer and inner vanes) using Image J (National Institutes of Health, Bethesda, USA). We found an inverse linear relationship between corticosterone dosage (T1 to T6) and average body weight ($p<0.001$; $R^2 0.68$). Body weight was positively correlated with rachis and barbs length ($p<0.05$), suggesting that decreased weight corresponds to shorter lengths. Adding bodyweight as covariate, increasing corticosterone dosage had a negative effect on rachis length ($p=0.003$) but no effect on barb length ($p=0.098$), indicating a decrease in length with increasing dosage. Corticosterone doses nor body weight had a discernible effect on the other feather measures. These findings of a stunted feather growth not only advance our understanding of the nuanced relationship between corticosterone exposure, broiler weight, and feather morphology but also contribute valuable insights into stress hormone impacts on avian physiology, particularly within the context of feather development.