

Effects of calcium, phosphorus and 25-hydroxyvitamin D3 on broiler leg health

E. VAN POUCKE and F. TUYTTENS

Institute for Agricultural and Fisheries Research - Animal Sciences - Animal Husbandry & Welfare, Scheldeweg 68, 9090 Melle, Belgium.

E-mail: els.vanpoucke@ilvo.vlaanderen.be

Reduced bone strength is a major welfare problem for broiler chickens as it may cause skeletal disorders and lameness. Ca/P is important for bone mineralisation and dietary Ca/P has been shown to positively affect the incidence of tibial dyschondroplasia. However, dietary supplementation with hydroxyvitamin D is suggested to be more effective. 1188 male 1 day-old broilers (Ross 308) were randomly assigned to 36 open topped floor pens (2.55 m²). Broilers had ad libitum access to feed and water, feed being provided as 3-phase feeding. During a two-factorial setup, simultaneously replicated six times, broilers were subjected to one of six treatments (N=198 per treatment). Factor 1 "Ca/P" consisted of three different Ca/P levels (+C: positive control, -C: negative control or Int: intermediate treatment). Factor 2 "25-OH-D3" was a dietary supplement of vitamin D3 (D) or a supplement of vitamin D3 combined with 25-OH-D3 (D-OH). On days 35 to 40, skin damage (condition of the breast, hocks and foot pads), leg weakness (by latency-to-lie test) and slaughter weight of five broilers per pen were determined (N=30 per treatment). Bone strength was evaluated on the boiled and dried tibiotarsi of three broilers per pen (N=18 per treatment) by three different measurements: bone weight/length index (WL), robusticity index (ROB) and 3-point bending strength. Data were analysed with linear mixed models (SAS, version 9.1). Treatments Ca/P, 25-OH-D3 and their interactions were included as fixed effects, replication was included as a random effect. There was no effect of the Ca/P*25-OH-D3 treatment on any of the measurements. The Ca/P treatment induced similar effects on the Int and +C broilers, with these broilers having higher slaughter weights (P=0.005), worse breast conditions (P=0.02) and higher bone densities (WL and ROB: P<0.001). This may indicate more sitting behaviour because of high weight despite having stronger bones. The dietary vitamin D treatment did not affect skin damage, leg weakness or slaughter weight. Only the robusticity index indicated (albeit not significantly) a higher bone density for D-OH broilers (P=0.06). Consequently, the suggested positive effects of hydroxyvitamin D on broiler leg health can be questioned.

Keywords: broilers, bone strength, calcium, phosphorus, hydroxyvitamin D