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Cécile Berri, Christophe Praud, Estelle Godet, Thierry Bordeau, Michel Jacques M.J. Duclos. Effect of dietary vitamin D source (25OHD3/D3) on breast muscle properties of chicks from flock supplemented or not with 25OHD3. 22th European Symposium on the Quality of Poultry Meat - 16th European Symposium on the Quality of Eggs and Egg Products, May 2015, Nantes, France. World's Poultry Science Journal, 71, supplement 1, 190 p., 2015. hal-02739134

HAL Id: hal-02739134

<https://hal.inrae.fr/hal-02739134v1>

Submitted on 2 Jun 2020

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[pmB-02]: *Biological Basis* (ID: 100150)

[France]

Effect of dietary vitamin D source (25OHD3/D3) on breast muscle properties of chicks from flock supplemented or not with 25OHD3

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Little information is available regarding the effects of vitamin D status on muscle development. Recent studies suggest, however, that improvement of vitamin D status with 25OHD3 positively impacts skeletal muscle development in Chicken and Pig. In a first experiment, we demonstrated that replacing dietary vitamin D3 by 25OHD3 maintained cell proliferation in the chicken Pectoralis major (PM) muscle until 7-days of age, and delayed differentiation. The objective of the present study was to evaluate the effect of dietary vitamin D source (25OHD3 vs. D3) on muscle properties of chicks issued from parent flock supplemented or not with 25OHD3. Chicks were issued from 2 parent stocks (PS) that receive no supplement, i.e., vitamin D was supplied as vitamin D3 (PS#D3) or that were supplemented during 2 months with 25OHD3/vitamin D3 (PS#25OHD3). Twelve male chicks by PS origin were sacrificed on the day of hatch and their PM muscles were dissected, weighed, and frozen for further molecular or histological measurements. Remaining male chicks of each PS origin were assigned to one of the two post-hatch dietary treatments, i.e., a control feed (D3) containing only vitamin D3 or an experimental feed (25OHD3) containing 25OHD3 and vitamin D3 as source of vitamin D. At day 6, 12 chicks per treatment were sacrificed and processed as above. Day-old chicks of PS origin #D3 were heavier ($P < 0.001$) than those of PS origin #25OHD3. At day 6, the body and PM muscle weights were higher in groups fed with 25OHD3 than in groups fed with D3. No interaction between diet and PS origin was observed. Quantification of the expression of several genes involved in myogenesis or vitamin D metabolism, and of satellite cell activity measured by immunohistochemistry is underway to provide new insights on the role of vitamin D on early muscle development in chicken.

Keywords: nutrition, 25OHD3, muscle growth, chicks