

Histometric changes in laying hens muscular tissue, as a consequence of the alternative husbandry systems usage

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Housing system modifications in laying hen husbandry and technology are aimed mainly at increasing the welfare of birds. The main goal of this study was to assess the dimensional changes in the skeletal musculature histology, of hens kept in certain versions of alternative husbandry systems, compared to those in the conventional system. The research comprised a flock of 1.731 “Lohmann Brown” hens, divided into four experimental groups: control Lc-conventional cages (500 cm²/hen), L1exp.-enlarged conventional cages (600 cm²/hen), L2exp.-enlarged conventional cages (1000 cm²/hen) and L3exp.-two kinds of conventional cages with opened front panels (500 cm²/hen in nesting+resting cage and 500 cm²/hen in feeding+watering cages). The L3exp. hens had access to free movement on the house floor. 60 individuals (15/group) were selected for muscular tissue sampling. Four pairs of muscles were sampled: Pectoralis superficialis, Biceps brachialis, Quadriceps femoris and Gastrocnemius lateralis and processed through paraffin impregnation and acid fuchsine-Evans blue coloration. The resultant smears were studied using a photonic digital microscope, measuring, via micrometry, the small, large and average diameters of the myocytes and of the 1st order muscular fascicles as well. Then, we calculated the cross-surface area of the myocytes and the ratio between the muscular and the connective tissue in muscles. Statistical computations were run, using the ANOVA single factor method. The muscular fibre thickness varied between 29.73±0.5μ-44.81±1.6μ (average diameter), respectively within the 687.48±13.2μ²-1559.8±17.48μ² limits. The thinnest myocytes were observed in the control group-Biceps brachialis muscles (conventional cages) while the thickest at the L3exp.-Pectoralis superficialis muscles (conventional cages with opened front panels). Due to the higher thickness of myocytes in the breast, a higher proportion of muscular tissue was observed in the Pectoralis superficialis muscles (62.74%, L3exp), while the lowest proportion was noticed in the Gastrocnemius medialis muscles (50.39%, Lc.). The histometric assessments allowed us to hypothesise that fowl with access to free movement were predisposed to myocytes hypertrophy generating, at the time of slaughter, carcasses with better musculature development. Besides this, the welfare status was improved, but the results must be correlated with egg yield and egg quality, in view of the primary purpose of these hybrids.

Keywords: laying hen, myocyte, diameter, muscular tissue proportion