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BROILER CHICKENS FED DIETS WITH *TENEBRIO MOLITOR* INSECT INCLUSION: HISTOLOGICAL AND MORPHOMETRIC INVESTIGATIONS

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Introduction: Insects are considered a novel and suitable protein source for poultry feeding. Dietary modifications have been reported to affect intestinal morphology and mucin composition in broilers, but no studies related to insect meal utilization are currently available. The aim of the present study was to investigate histological findings and gut morphology and mucin composition in broilers fed with insects.

Materials and Methods: A total of 160 male broiler chickens were divided into 4 dietary treatments (control feed and 5%, 10% and 15% *Tenebrio molitor* inclusion). Birds were distributed over 5 replicates for each dietary treatment. Diets were isoenergetic and isonitrogenous. Two birds for replicate were slaughtered after 53 days and submitted to anatomopathological investigations. Spleen, thymus, bursa of Fabricius, liver, glandular stomach, intestine, heart and kidney were collected, fixed in 10% buffered formalin solution and paraffin embedded to obtain 5µm histological sections stained with Haematoxylin & Eosin. Histopathological alterations were evaluated using a semiquantitative scoring system as follows: absent or minimal (score 0), moderate (score 1) and severe (score 2). Intestinal morphology was assessed through morphometric measurements of villus height, crypt depth and villus height/crypt depth ratio on duodenum, jejunum and ileum. Small intestine and caecum were also stained with PAS, Alcian Blue pH 2.5 and Alcian HID to discriminate among neutral, sialylated, and sulfated acidic mucins. Mucin staining was determined semiquantitatively as follows: absent (score 0), mild (score 1), moderate (score 2) and marked (score 3).

Results: Histological findings and intestinal morphology and mucin composition were not significantly influenced by dietary *Tenebrio molitor* inclusion. Different degrees of lymphoid system activation (ie. white pulp hyperplasia/depletion in spleen, cortical depletion in thymus, follicular depletion with intrafollicular cysts in bursa of Fabricius and lymphoid tissue activation in liver) and higher duodenal and jejunal morphometric indexes compared with ileum were observed in both control and insects feed. Neutral and acidic mucins stained similarly in all the treatments. Mucin staining was also more intense in the crypt base and midsection than tip and distally increased along the duodenal-ileal axis.

Conclusions: Lymphoid system activation observed could be related to the stress occurrence in modern poultry rearing operations (ie. rapid growth rate and overcrowding). Morphometric and histochemical findings are in agreement with the literature. Dietary insect meal inclusion does not affect histological findings and gut morphology and mucin composition of the broilers, thus suggesting no negative influence on animal health and intestinal development.