Muscovy duck fed black soldier fly larvae meal: effects on blood parameters and antioxidant status

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Introduction. Black soldier fly (*Hermetia illucens*, BSF) represent a promising alternative protein sources for poultry [1, 2, 3]. Aim of the study is the evaluation of dietary partially defatted BSF larvae meal inclusion on blood parameters and antioxidant status of female Muscovy ducks.

Animals, material and methods. A total of 192 3-day-old female broiler Muscovy ducks were assigned to 4 experimental treatments (6 replicate/treatment; 8 birds/pen) with increasing dietary BSF levels (0, 3, 6, 9%, BSF0, BSF3, BSF6, BSF9, respectively) in substitution of corn gluten meal. At 51 days of age, after 12h of feed withdrawal, 12 ducks/treatment (2 birds/pen) were slaughtered, blood samples were collected and prepared for further analysis. The total red and white blood cell counts, serum protein, lipid and minerals, liver and renal function serum enzymes were then evaluated. Plasmatic concentration of glutathione peroxidase, total antioxidant status, methylglyoxal, malondialdehyde, 3-nitrotyrosine were evaluated. The collected data were tested by one-way ANOVA using polynomial contrasts to test the linear and quadratic responses to increased levels of BSF inclusion in the diet (significance at $P<0.05$).

Results and discussion. Red and white blood cell, as well as the serum proteins were not affected by dietary treatments ($P>0.05$). Serum lipids was affected by dietary treatment, showing a linear response (minimum for BSF9 group) for triglycerides and cholesterol levels (-30.23% and -23.86% compared to BSF0, respectively; $P<0.05$). Among serum minerals, Ca and P were not affected by treatments, while Mg and Fe showed a linear response to increasing dietary BSF levels ($P<0.05$). Regarding liver serum enzymes, only alkaline phosphatase showed a linear decrease with a minimum for BSF9 (-8.61% compared to BSF0; $P<0.05$). Renal serum enzymes were partially affected by dietary treatment. Indeed, uric acid serum levels were similar among groups, while creatinine showed a linear decrease (minimum for BSF9, -16.67% compared to BSF0; $P<0.05$). Finally, the results related to the antioxidant status showed a linear decrease with a minimum for BSF9 for malondialdehyde and nitrotyrosine (-9.19% and -59.26% compared to BSF0, respectively; $P<0.05$).

Conclusion. The obtained results showed that the dietary inclusion of a partially defatted BSF larvae meal could be suitable in Muscovy duck nutrition, with unaffected haematological traits and liver and renal function. Moreover, a significant reduction of serum cholesterol and triglycerides and an improvement of the antioxidant status were observed, showing a positive effect on the health status of birds.

References: [1] Dabbou et al. (2018) J. Anim. Sci. Biotechnol. 9: 49; [2] Gariglio et al. (2019) J. Anim. Sci. Biotechnol. doi: 10.1186/s40104-019-0344-7; [3] Barragan-Fonseca et al. (2017) J. Insects Food Feed. 3: 105–120.