

INSECTS AS FEED INGREDIENTS, IN DIET FORMULATIONS, FOR GROWTH AND HEALTH OUTCOMES

Live black soldier fly larvae as dietary supplementation for laying hens: towards sustainability for high-quality eggs

A. Cattaneo^{1,2*}, E. Sezzi³, M. Meneguz², R. Rosà¹, D. Santori^{3,4}, S. Cucci³, P. Solovyev⁵, L. Bontempo⁵, F. Grosso², S. Mercandino², R. Roccatello¹, V. Zambotto⁶, A. Trocino⁷, G. Xiccato⁷ and S. Dabbou¹

¹University of Trento, Center Agriculture Food Environment (C3A), Via Mach 1, 38098, San Michele all'Adige (TN), Italy; ²BEF Biosystems srl, Strada di settimo 224/15, 10156, Turin (TO), Italy; ³Istituto Zooprofilattico Sperimentale delle Regioni Lazio e Toscana, Strada Bagni 4, 01100, Viterbo (VT), Italy; ⁴University of Tuscia, Agro-Food and Forest Systems, Via S.M. in Gradi 4, 01100, Viterbo (VT), Italy; ⁵Fondazione Edmund Mach, Research and Innovation Centre, Via Mach 1, 38010, San Michele all'Adige (TN), Italy; ⁶University of Turin, Department of Veterinary Sciences, Largo Paolo Braccini 2, 10095, Grugliasco (TO), Italy; ⁷University of Padova, Department of Agronomy, Food, Natural Resources, Animals and Environment, Viale Università 16, 35020, Legnaro (PD), Italy; *arianna.cattaneo@unitn.it

This study evaluated the effect of live black soldier fly larvae (BSFL) supplementation on egg quality. 108 Lohman hens were housed (16-34 weeks age) into 27 cages (9 replicates/treatment, 4 birds/pen), assigned to 3 groups: control (commercial diet) and 2 groups fed commercial diet plus 15% or 30% (on the expected daily feed intake (DFI), as fed basis) of live BSFL. Egg physical traits were assessed each month; eggs chemical composition, nuclear magnetic resonance (NMR) metabolites, yolk fatty acid (FA) profile were evaluated at the beginning, half, end of the trial. Data were analyzed with R software considering the effects of diet, time, their interaction. Live BSFL supplementation did not significantly affect egg physical traits, whereas the FA profile of eggs' yolk and the proportions of most FAs significantly changed. BSFL hens' eggs had higher saturated FA and polyunsaturated FA (PUFA, $P < 0.05$), lower monounsaturated FA ($P < 0.001$), increased rates of C18:2n6 ($P < 0.05$) and C18:3n3 compared to the control ones ($P < 0.001$), without significant differences in the ratio n-6 and n-3 PUFA. Hens' age impacted the eggs physical traits, chemical composition, metabolites of egg white and yolk, yolk FA profile ($P < 0.05$). A supplementation with live BSFL up to 30% on DFI may be safely used in laying hens feeding programs without impairing egg quality.