

TRUE NUTRIENT AND AMINO ACID DIGESTIBILITY OF BLACK SOLDIER FLY LARVAE DIFFERING IN LIFE STAGE USING THE PRECISION-FED CECECTOMIZED ROOSTER ASSAY

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Abstract

Edible insects such as black soldier fly larvae (BSFL) are alternative protein sources for animal feeds due to their high protein content and low environmental footprint. However, protein quality and amino acid (AA) content may vary across insect species and life stage. Our objective was to determine the effects of life stage on true nutrient and AA digestibility of BSFL intended for use in animal feeds using the precision-fed cecectomized rooster assay. All animal procedures were approved by the University of Illinois Institutional Animal Care and Use Committee prior to experimentation. Twenty-four cecectomized roosters (4 roosters/substrate) were randomly assigned to test substrates [BSFL0 = d 0 (day of hatch); BSFL11 = d 11; BSFL14 = d 14; BSFL18 = d 18; BSFL23 = d 23; BSFL29 = d 29]. After 24h of feed withdrawal, roosters were tube-fed 20g of test substrates. Following crop intubation, excreta were collected for 48h. Endogenous corrections for AA were made using 5 additional cecectomized roosters. All data were analyzed using SAS 9.4. True dry matter and organic matter digestibility were not different among substrates, but acid-hydrolyzed fat tended to be greater ($P<0.10$) for BSFL23 and BSFL29 than BSFL14 and BSFL18. Although all substrates had a high digestibility, BSFL0 and BSFL11 had the lowest ($P<0.05$) digestibility for most indispensable and dispensable AA. Digestible indispensable amino acid score (DIAAS)-like values were calculated to determine protein quality according to AAFCO nutrient profiles and NRC recommended allowances for dogs and cats. In general, BSFL18 had the highest and BSFL11 had the lowest DIAAS-like values for most indispensable AA. Threonine, methionine, and tryptophan were often the first-limiting AA. Our results suggest that BSFL are a high-quality protein and amino acid source, but life stage can affect the AA digestibility and protein quality of this novel protein source.