Can Moisture Content Affect the Growth, Bioconversion Performance and Nutritional Quality of Black Soldier Fly Larvae Reared on Different Substrates?

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Black soldier fly larvae (BSFL) are a potential feed ingredient, because of their high protein and fat contents. Considering the critical impact of substrate moisture content (MC) on BSFL production, the effect of substrate MC on performance and nutritional quality of BSFL reared on various substrates was evaluated. This study was composed of two experiments (Exp.1 & Exp. 2). In Exp. 1, BSFL were reared on five substrates; layer chicken feed (control), cattle manure, poultry manure (PM), swine manure, and vegetable waste (VW), and four MCs; 45%, 65%, 75%, and 85%. Based on the bioconversion performance of Exp. 1., two optimum substrates; VW and PM, and two optimum MCs; 75% and 85% were selected for Exp. 2. Subsequently, five substrate compositions (0%VW+100%PM, 25%VW+75%PM, 50%VW+50%PM, and 75%VW+25%PM, 100%VW+0%PM) were prepared. Two MCs (75%, and 85%) were maintained to evaluate varying MC on different substrate compositions for rearing BSFL. Both experiments were conducted as two-factor factorial, completely randomized designs (Three replicates/treatment and 80 BSFL/replicate). Based on the results of Exp. 2, the bioconversion of substrates by BSFL and total pre-pupal weight per replicate were higher ($P<0.05$) in 85% MC than 75% MC for all substrate combinations except 0%VW+100%PM. Despite the lower amount of provided total nitrogen through the substrate, a higher ($P<0.05$) nitrogen conversion ratio was reported for 100%VW+0%PM. Based on the results, the optimum substrate composition and MC for BSFL production were 100%VW+0%PM and 85%, respectively. Hence, this operation would be most profitable to be practiced in a vegetable-livestock integrated farming system allowing the utilization of VW to produce a valuable protein source for feeding animals.

Keywords: Bioconversion, Black soldier fly larvae, Crude protein, Moisture content, Substrate compositions

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