

# ANTIMICROBIAL PROPERTIES OF BLACK SOLDIER FLY LARVAE PROTEIN EXTRACTS

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In recent years, a lot of attention has been paid to the search for alternative sources of antimicrobial substances, as the irrational use of antibiotics in livestock production caused the spread of drug resistance among bacteria and decreased product quality. Industrial insect farming can be an alternative and sustainable source for the enrichment of animal feed as insects have a high nutritional value and low environmental footprint [1]. Among such insects are black soldier flies (*Hermetia illucens*), they are known for their ability to efficiently process organic waste and can have about 50% of crude protein in the larva stage. It is known that the amino acid composition is similar to fish meal which is often used in livestock production. Besides promoting animal growth, black soldier fly larvae (BSFL) have antibacterial activity provided by antimicrobial peptides (AMP). These AMPs can have biocidal activity against pathogenic bacteria, such as *Salmonella* sp. and methicillin-resistant *Staphylococcus aureus* [1, 2]. Antimicrobial peptides have great potential as an alternative to antibiotics due to their activity against a wide range of bacteria and a lower tendency to induce resistance. However, research on how AMPs can replace antibiotics is still in the preliminary stages.

The aim of this work is to produce extracts from the BSFL proteins and evaluate their antibacterial and antifungal properties. Two types of protein extracts were obtained using acetic acid extraction. The inhibitory and biocidal effects against bacteria and yeast cultures were evaluated using microbiological methods.

The results of this study showed that in most cases the BSFL protein extracts have a higher antimicrobial activity against bacteria than yeast. Potentially pathogenic microorganisms, such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Sporobolomyces roseus*, and *Rhodotorula mucilaginosa*, are sensitive to tested protein extracts.

This study shows that BSFL protein extracts exhibit broad antimicrobial activity and may contribute to further research for alternative antimicrobial agents.

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[1] Xia, J.; Ge, C.; Yao, H. Antimicrobial Peptides from Black Soldier Fly (*Hermetia illucens*) as Potential Antimicrobial Factors Representing an Alternative to Antibiotics in Livestock Farming. *Animals* 2021, 11, 1937.

[2] Lee, K.-S.; Yun, E.-Y.; Goo, T.-W. Evaluation of Antimicrobial Activity in the Extract of Defatted *Hermetia illucens* Fed Organic Waste Feed Containing Fermented Effective Microorganisms. *Animals* 2022, 12, 680.