

the larvae are matured for harvesting. The larvae will pupate immediately after this stage. NB: The troughs can be built with concrete and can have different sizes depending on the scale of production.

NB: Do not allow larvae to pupate except when you are producing brood stock. The pupae are not good for feeding because they have high amount of chitin which is not very digestible and is nutritionally poor.



Plate 8

Harvest the larvae by carefully removing the top of the substrate, layer by layer. Larvae are mostly found covered by the substrate (Plate 8). Pour the larvae onto dry saw dust and allow it to stand

for about 2 hours. This is to purge/clean the larvae by allowing them to empty their guts.



Plate 9

Separate the purged larvae from the saw dust using sieve or by hand (Plate 9). Immobilize the larvae by briefly dipping them into hot water for about 1-2 minutes. Live larvae are likely to escape when drying

especially when using solar dryer. Dry the larvae using solar dryer, gas or electronic oven. Drying temperature should not exceed 60°C in order not to denature the proteins.



Plate 10

Package for storage by placing in appropriate polythene bags and store in a cool dry place away from vermin and contaminants.

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Contributors

Affedzie-Obresi Siegfried, Boafu Arwoh Hettie, Nkegbe Emmanuel K., Adu-Aboagye Gabriel, Clottey Attuquaye Victor, Karbo Naaminong, Duah Agyemang Solomon, Wallace Amponsah Paul, Bebanaayele Frederick, Ampomah Deborah and Azasime Enyonam



CSIR-Animal Research Institute
Insects as feed for West Africa (IFWA) project
P.O. Box AH20, Achimota, Accra, Ghana
Contact: 0302 2912178



CABI West Africa Centre, CSIR Campus
No. 6 Agostino Neto Road, Airport Res. Area
P.O. Box CT 8630, Cantonments, Accra, Ghana
Tel: +233 302797202 | westafrica@cabi.org



IFWA

Insects as Feed in West Africa

GUIDELINES FOR THE PRODUCTION OF BLACK SOLDIER FLY LARVAE



Introduction

Feed cost is one of the major challenges to the competitiveness of poultry production in Ghana. Proteins remain the most expensive ingredient in poultry feeds. The supply of conventional proteins for poultry production is becoming unsustainable necessitating the quest for alternatives. Insects have contributed immensely to indigenous poultry production. Scavenging poultry survive on insects such as termites, cockroaches and crickets. The Black Soldier Fly has been found to be appropriate for the sustainable supply of larvae meal protein. The Black Soldier Fly larvae meal has been used successfully to replace soybean and fish in feeds for cockerels and broilers. The larvae contain antimicrobial polypeptides (AMPs) capable of controlling bacteria in the litter on which they are raised. It is more beneficial to use the larvae in poultry and livestock feeds rather than the pupae. Insect larvae that have been safely and economically produced can go a long way to reduce the feeding cost and competitiveness of poultry under environmentally friendly condition.

Nutritional Information of Black Soldier Fly Larvae Meal	
Nutrient	Black Soldier Fly Larvae Meal
Metabolizable Energy (MJ/kg)	20 - 24
Crude Protein (%)	38 - 60.4
Crude Fat (%)	9.0 - 26.0
Crude Fibre (%)	1.6 - 8.6
Digestibility (%)	89 - 90

This manual shows the processes involved in the production of black soldier fly larvae meal using waste products. Where possible, little explanation is provided to clarify the procedures. It is anticipated that readers of this manual may find it easy to follow and practice in order to generate larvae and more importantly manage their farm waste.

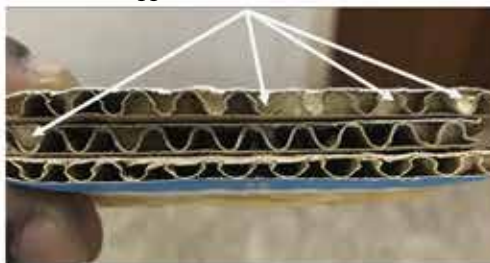
The procedures for producing black soldier fly larvae meal are as follows:

Plate 1: Adult rearing of BSF to obtained eggs



Raise adult black soldier flies in love cages (as seen in Plate 1) to mate and lay eggs.

Plate 2: Eggs (arrowed) laid in cardboards



NB: Eggs are laid on dried leaves or in holes of cardboard paper (Plate 2) placed in the love cages.

Plate 3: BSF egg mass (arrowed) exposed by removing top layer of cardboard



Exposed eggs mass from cardboard holes to harvest (as in Plate 3).

Plate 4: Eggs placed on substrate (e.g. brewery waste as in this picture) in bowls



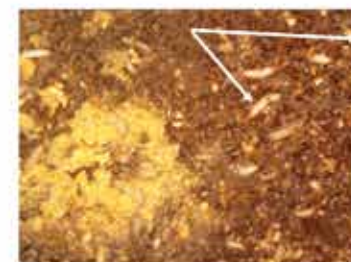
Harvest the eggs with the help of clean stick onto substrate. Place about 0.15g of eggs on paper and place on 200g substrate (eg wheat bran, brewers spent grain, animal dropping, fruit waste etc.) in incubation bowls (Plate 4).

Plate 5: Incubation boxes with eggs ready for storage



Cover the incubation bowls with net and store securely at room temperature for about five (5) days to allow eggs to hatch (Plate 5).

Plate 6: Hatched egg shells (yellow mass) and young larvae (arrowed) feeding on substrate



NB: Eggs hatch by the end of the 5th day. The newly hatched larvae migrate from the paper into the substrate and can be seen moving and feeding in the substrate (Plate 6).

Plate 7: BSF larvae being grown in larger troughs on substrate



Transfer the content of 3 incubation bowls into 7kg substrate in larger bowls or troughs (Plate 7). Allow the larvae to feed on the substrate for 8-10 more days. At this stage