



How to Solve Food Security with Good ESG... and Insects.

Part One in a Two Part Series. ([Link to Part 2](#))

The Problem of Food Waste

The global food supply chain is vast, resource intensive, and unfortunately wasteful. While [more than 1/3 of food produced is lost](#), the majority of solutions today ignore the waste problem and instead focus on “Future Food”, which is typically based on monocropping or lab-grown ingredients.

But there is a present-day solution to both the waste and calorie challenges which also supports the Environmental, Social, and Governance (ESG) principles at its core: **Insects!**

Various six-legged species, and in particular Black Soldier Fly Larvae (BSFL, soldier grubs), can be used to solve the food waste problem AND the issue of food insecurity, irrespective of the reasons: supply chain breakdown, poor soil health, smallholder challenges in production, climate change difficulties, etc.

Such a broadly applicable solution may sound like a mythical form of agricultural alchemy, but it is very real and happening today all around the world.

BSFL AS THE BRIDGE BETWEEN FOOD WASTE AND FOOD SECURITY

While BSFL have been known to a niche community for many decades, it has only been since the [FAO's 2013 report on insects as feed and food](#) that they've truly begun to be implemented and studied at scale. In recent years it has become clear that BSFL are useful in upcycling food waste and are a valuable source of protein and nutrients - but how does this support ESG and the low-carbon economy specifically, and what should investors and corporations have as their expectations with soldier grubs?



(Black Soldier Fly Larvae nearing the pupae stage - Image courtesy of [Unique Biotech](#))

BSFL IN RELATION TO THE FUNDAMENTALS OF ESG

Environmental

While the species is *Hermetia Illucens*, or Soldier Fly (it does come in other colors besides black!), it's actually the pre-pupae stage grubs who do most of the work in terms of environmental benefits.

The flies, in fact, do very little other than hatch, mate, lay eggs, and return to the earth after a few days as natural fertilizer. They do not eat (their mouths can only drink water), they do not bite or sting, there is no risk of zoonotic transmission, and they are not a pest like many other types of flies.

Their larvae, however, are voracious eaters of nearly all organic matter, including fruits, vegetables, meat, dairy, bread, agro-industrial waste of most types, and even manure. They consume 5x their body weight in just 13-15 days, meaning that for every 1 ton of live larvae produced, 5 tons of food waste will have been cleaned and removed.

How this helps with environmental issues is simple to understand, as rotting food waste gives off a massive amount of greenhouse gas emissions (GHGe). [Larvae have numerous enzymes in their stomachs which allow them to process and remove harmful bacteria which could otherwise cause disease or foul odors.](#) ([Also See Here](#))



(Soldier Flies Mating - Image Courtesy of: [Unique Biotech](#))

Because the process takes place quickly - in just days, rather than weeks or months - the amount of GHGe released into the atmosphere is greatly minimized compared to other systems of food waste management or composting.

Thus the first environmental benefit comes from the INPUT side of the BSFL equation, that of cleaning the food waste which would otherwise become a gaseous rotting material. It is through this removal process - also called Upcycling - that the grubs are able to grow rapidly and become a source of value-added components on the OUTPUT side.

Organic Fertilizer

Before we even get to the various parts of the grubs themselves there's an output which deserves the spotlight, taking into account today's global fertilizer shortages. The geopolitical instability in Russia and Ukraine have made access to raw ingredients difficult, while changes in governance in various countries related to chemical and organic fertilizer have led to a perfect storm of supply shortage.

Now, the excrement of the grubs (known as frass) that was once just a waste product has suddenly become as valuable as the larvae themselves.

[BSFL frass contains the only plant-digestible form of chitin](#), which naturally produces antimicrobial peptides when under environmental stress (Sistrunk, 2016) acting as a protective barrier.

In NPK terms it is an excellent source of nitrogen along with other minerals vital for plant health, and has been shown to contribute to a more optimal pH range in soil, benefiting plant growth and production.

For every ton of live larvae produced, in general it is expected to achieve the same tonnage in frass, which can be used alone or mixed into other biofertilizers.

Animal Feed

The biggest ESG potential with BSFL is of course as animal feed. Soldier grubs, in defatted meal, oven-dried, and even live larvae forms are a viable replacement to environmentally damaging fishmeal and soymeal, which together amount to over 450 million tons per year.

Within the larvae themselves, there is a significant amount of protein, what most people think of first when insects are mentioned as an ESG solution. But nutritionally they're much more than just protein! BSFL are a nutrient-rich food source containing omega fatty acids including omegas 3, 6, and 9. [They also contain the highest amount of lauric acid besides coconut oil, along with minerals such as phosphorus \(P\), potassium \(K\), calcium \(Ca\), sodium \(Na\), manganese \(Mn\), magnesium \(Mg\), and iron \(Fe\).](#)

Additionally [they contain important enzymes and antimicrobial peptides](#), which have been [shown effective at improving gut health in piglets and poultry among other potential medicinal uses](#).

Soldier grubs also help deliver a better feed conversion rate (FCR) across livestock types, from aquaculture to poultry to waterfowl to swine. [Researchers are also currently looking into utilizing BSFL as a feedstock for cattle.](#) What they discover could result in a significantly lower carbon footprint for livestock production.

As expected, grubs are high in protein, typically between 40-55%, although percentages in the high 60's have been achieved. The nutritional make-up can be varied by adjusting the inputs, in order to increase or decrease the fat and protein levels for the desired end use.

For example, dog food brands may prefer to use grubs with higher protein and lower fat, while a feed formulator for piglets may be looking for a higher lipid content. It is this controllable variability in the nutrient content of grubs which makes them so valuable as an animal feed.

Additional Outputs

The usage of grubs goes much further than just feed. Lipids have been used in [award-winning clean-beauty cosmetics such as Point Six Eight](#), and can also be used as a replacement for palm oil in many products ranging from pizza dough to laundry detergent. [BSFL oil is also being researched as a potential source of biofuel.](#)

The exoskeleton of the grubs is high in chitin, typically harvested from shrimp or crab shells. Utilizing the chitin from BSFL in order to extract chitosan for cosmetics, pharmaceuticals, and biodegradable manufacturing presents the opportunity for additional industrial-scale applications with improved sustainability.

Thanks to the myriad uses for every component of the black soldier fly larvae, the result is a zero-waste system which upcycles waste material and creates highly sustainable, beneficial outputs.

Everything is utilized and BSFL production can be structured in many different ways, as a single module within a broader regenerative agriculture system or as a stand-alone large-scale waste management solution focused on industrial-use outputs (biodegradable manufacturing, biofuels, fertilizer mixtures, etc) or specific animal feed.

In the end, the black soldier fly larvae pull double-duty for the environment by cleaning up food waste and upcycling it into valuable and highly sustainable outputs for animal feed, biofertilizer, eco-friendly manufacturing, and more.

BSFL are true eco-champions at the foundation of a low-carbon ESG model!

(Check back for [Part 2](#), where we will look at the positive impact that black soldier fly farming can have on the Social and Governance aspects of ESG.)

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More about Josh Galt...

Josh Galt is an insect industry professional with experience in all facets of the supply chain from farm to fork. As the original [Entovegan](#) he spent 3 years testing the efficacy of insect protein on his own body, and he has presented on insects as food and feed at various universities, expos, and startup events. Along with creating the [award-winning Point68 Insect Beauty brand](#) Josh has been a consultant and held executive roles with international associations, NGO's, and startups related to insects as a core component of ESG strategy. He divides his physical time between SE Asia and Latin America, and can be reached digitally at [LinkedIn.com/in/JoshGalt](https://www.linkedin.com/in/JoshGalt)