



# BSF Recycling Solution

From waste to feed and  
fertilizers

Presentation made by Waste Eco  
Solution.



# The Black Soldier Fly Recycling Project:

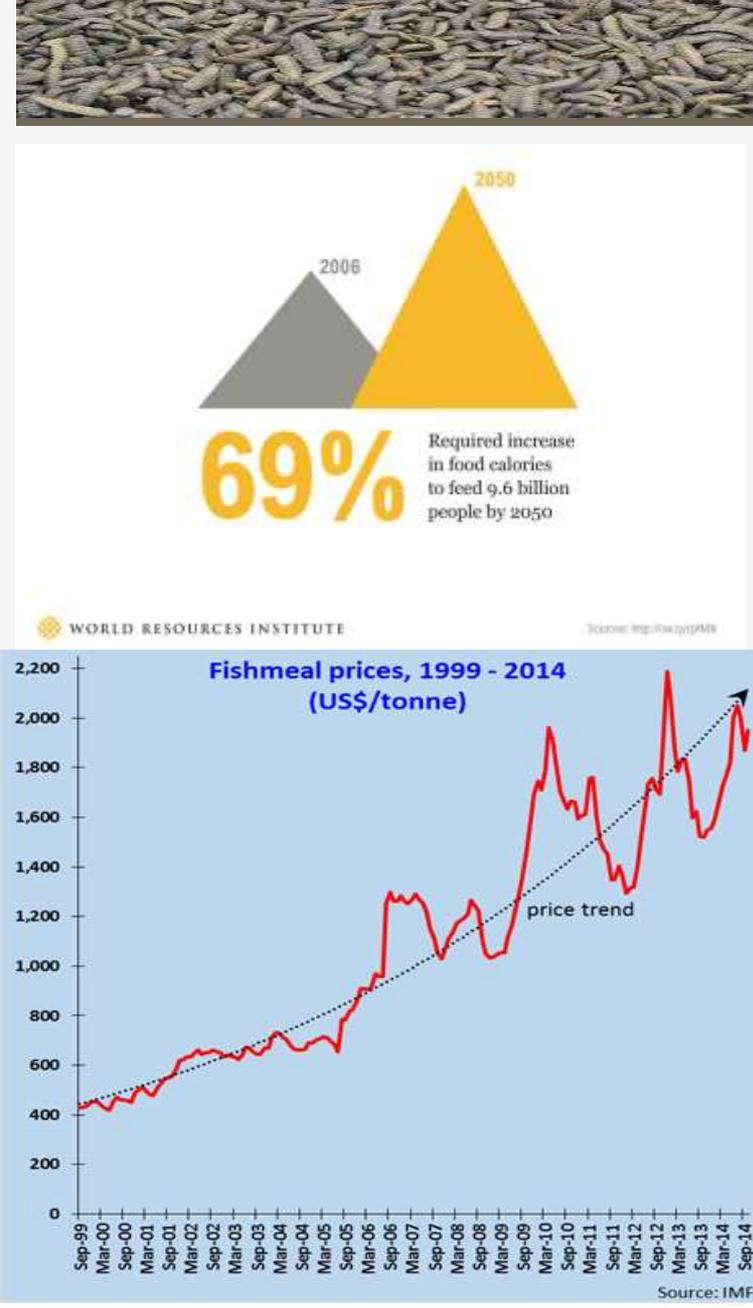


- Insect-meal production is aimed to take place in Vientiane, based on availability of a large and affordable waste stream from the Beer Lao factory on one hand, and on the other, the growing needs from the local market (Laos/ Thailand/Vietnam), for a sustainable source of protein and organic fertilizer.

# At stake:

- World population will increase to 9 billion by 2050
- Demand In food calories will rise by 69%
- Protein demand for human consumption will double
- Price of animal protein meal for feed industry is shooting up
- Feed industry is looking for alternatives

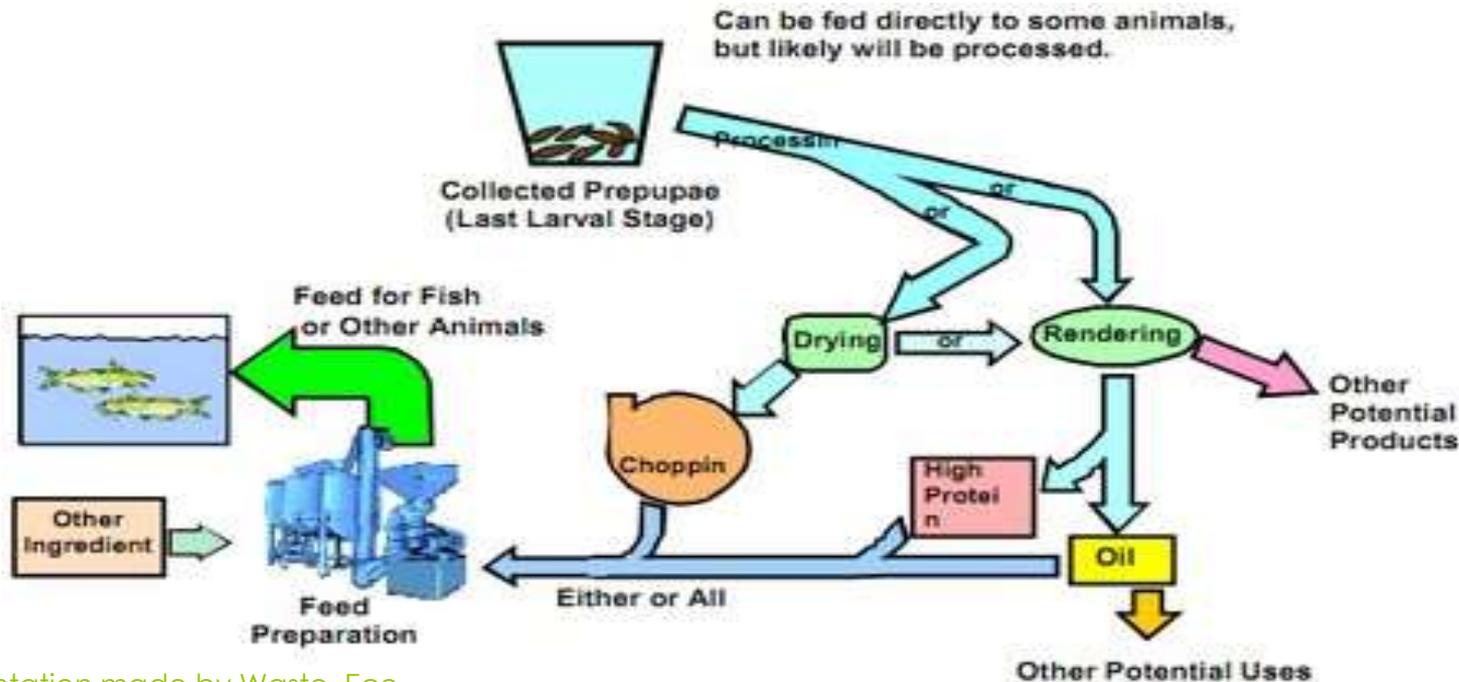
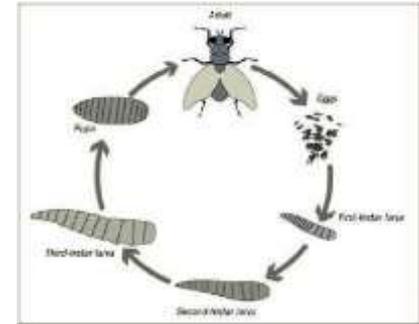
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# How it works

- Within a 10d growing cycle from hatching eggs to pre-Pupae, BSF Larvae will transform 1Mt of organic waste into 200kg of fresh Larvae, that can be used fresh as a feed complement or be further processed into a high protein meal. 100 kg (dried) of organic fertilizer will also be collected at the end of the process.





## Lao Agritech Solution Ltd:

- In October 2015, a decision was taken between partners to create the Lao Agritech Solution Ltd, and invest in a BSF Experimental Platform (1Mt waste /d - Operational today)
- First results are very encouraging since they confirm our capacity to produce sufficient volume of BSF eggs, show a good conversion ratio and quality of final product.
- They also highlight big challenges in terms of environment control, foot print, and flux management.
- Our next step is to build up an industrial prototype that will handle 50T/d of waste.

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# The Products:



## Dried Larvae

### Product Specifications



Dried Larvae Product

Description:	A dry ( $\leq 10\%$ moisture), whole or milled product, derived from larvae of the Black Soldier Fly ( <i>Hermetia illucens</i> ). No stabilizers, preservatives or other additives are added.
Intended use:	A source of crude protein and fat for use as a feed ingredient for pet foods, aquaculture and poultry production.
Chemical Analysis:	Protein: 40% (min guaranteed 34%) Fat: 40% (min guaranteed 32%) Ash: 7 to 8% (max 10%) Carbohydrates: 10% (max 15%) Energy: 2,200 kJ/100g
Physical Standards:	Color Light: Medium tan Texture: Free flowing dried larvae (whole) or free flowing powder (ground) Odour: No foreign odours Moisture: 5 to 10% (w/w)
Microbiology:	Total Plate Count: $\leq 100,000$ cfu/g Yeast: $\leq 1000$ cfu/g Mould: $\leq 1000$ cfu/g E.coli: Negative/25 g Salmonella: Negative/25 g
Storage:	The product is to be stored in a cool dry area.
Target Species:	Salmonids: Max. 15% of total protein in diet Tilapia: Max. 30% (dm) of "as fed" diet Catfish: Max. 30% (dm) of "as fed" diet Poultry: Max. 30% (dm) of "as fed" diet

## Maggot Meal

### Product Specifications



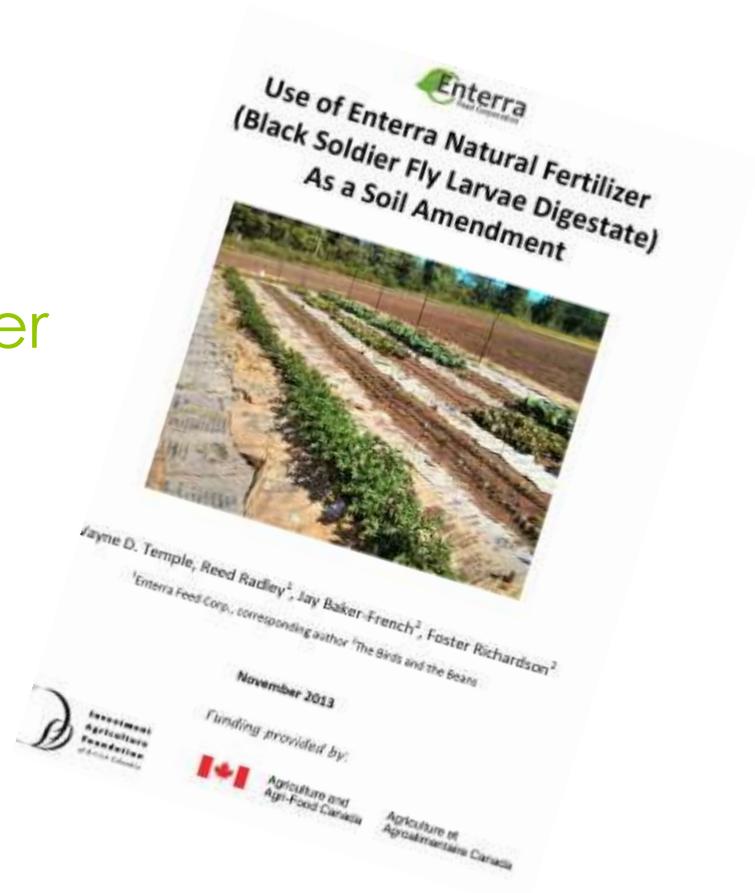
Description:	A dry, powder product derived from larvae of the Black Soldier Fly ( <i>Hermetia illucens</i> ).
Intended use:	A source of crude protein and fat for use as a feed ingredient in aquaculture, poultry feed, and other animal feed.
Chemical Analysis:	Protein: 60% Fat: 15 % Ash: 10 % Carbohydrates: 15% Energy: 1,800 to 2,200 kJ/100g
Physical Standards:	Colour: Light to tan Texture: Free flowing powder Odour: No foreign odours Moisture: 8-10%
Storage:	The product is to be stored in a cool dry area.

# The Products:



## Organic Fertilizer

- An important by-product of our activity is an organic Fertilizer (Larvae dejection-Organic Matter Min 80% )
- Our experimental platform can produce between 100 and 200kg per day (Product comes out at 35% to 40% humidity, that can be dried below 10%)
- At Full scale, we will have a daily output of 5 to 7 Tones.



Fertilizer Type	Fertilizer NPK Analysis (%) DW Basis			% Available of Total		
	Total N	Available P <sub>2</sub> O <sub>5</sub>	Soluble K <sub>2</sub> O	Total N	Available P <sub>2</sub> O <sub>5</sub>	Soluble K <sub>2</sub> O
ENF	4.66	2.40	3.00	34	85	100



# Our Challenges

- Scaling up to industrial size is the biggest of our challenges.
  - The technology we use is innovative. There are very few industrial size set ups in the world, and no sharing of information.
  - We are applying for financial support from EU Research and Innovation department to help us build our industrial prototype.
- Our product being also very new, another big challenge is to assess our market.
  - Here we hope to use the output of our BSF Experimental Platform, and proximity with local farms and actors of Lao Organic market to test and get a feedback on our products.

# Who we are:

## Waste Eco Solution Cp.,Ltd (WASECO)

- WASECO is a Singapore company, aiming to develop green and innovative waste management solutions.
- They are 3 Major share holder in WASECO:
  - Mathieu Vassal. Entrepreneur living in Laos, lately involved in lao feed Industry, he is the one who spotted the BSF opportunity and initiated the project
  - Tamim Bouganmi, Head of Lao Industrial Solution," (Brings high tech solutions to Lao market) . Tamim as been running business in Laos for more than 25 years, he is the "how to do" guy, with a very "hands on " approach on challenges linked with Industrialisation, in Laos .
  - ENTOFOOD Ltd. They are the "insect rearing experts" (with 5 years of pilot activity on BSF in Malaysia) They bring the project the technology so we can have sufficient and healthy insect population to recycle our waste stream



## Born2B Agritech Ltd

- B2B Agritech is a Lao company, specialized in recycling Spent Grains from Beer Brewery, Plastic and aluminum.
- B2B has an exclusivity contract with beer Lao Group, to handle 100% of their spent grains.



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