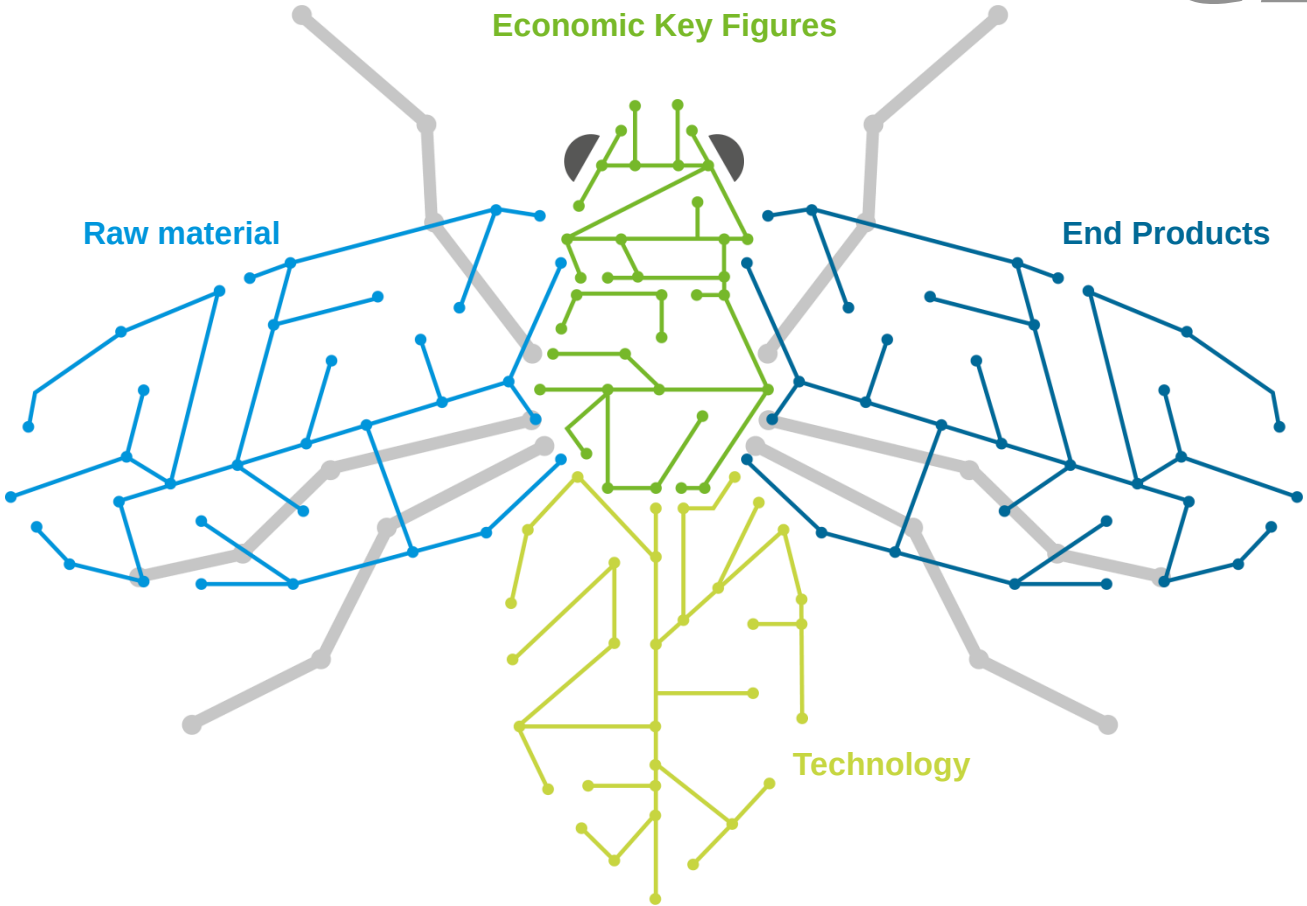
Processing of Insects

A new competition to Fish Meal ?

STEFAN KIRCHNER, EUFISHMEALCONFERENCE DUBLIN, 2017

engineering for
a better world

Executive Summary



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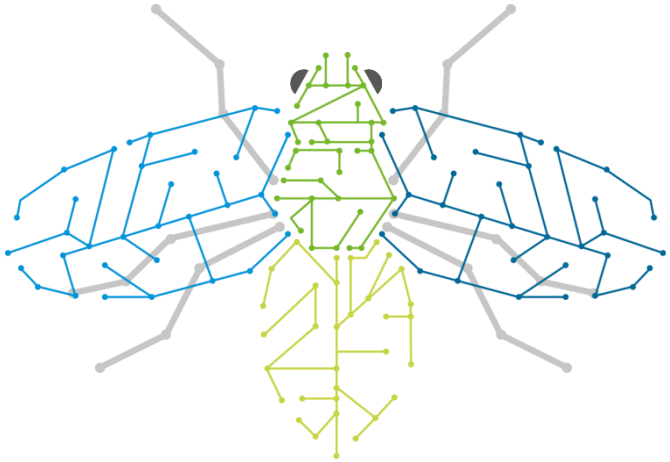
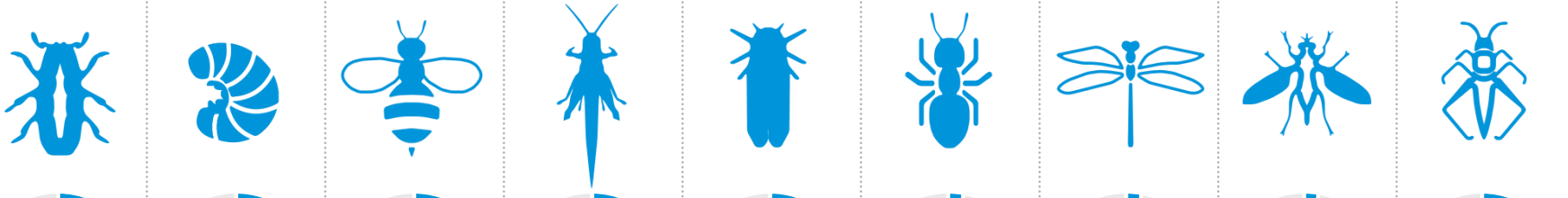


- **Introduction**
- Insects for meal production
- Process description
- End products
- Economic Aspects
- Outlook

Introduction

Direct Food/ Food Processing



Beetles	Cater-pillars	Bees, wasps and ants	Grass-hoppers, locusts, and crickets	Cicades, plant-hoppers, scale insects and other true bugs	Termites	Dragon-flies	Flies	Other orders

Popularity in % by order, **Source:** Food and Agriculture of the United Nations

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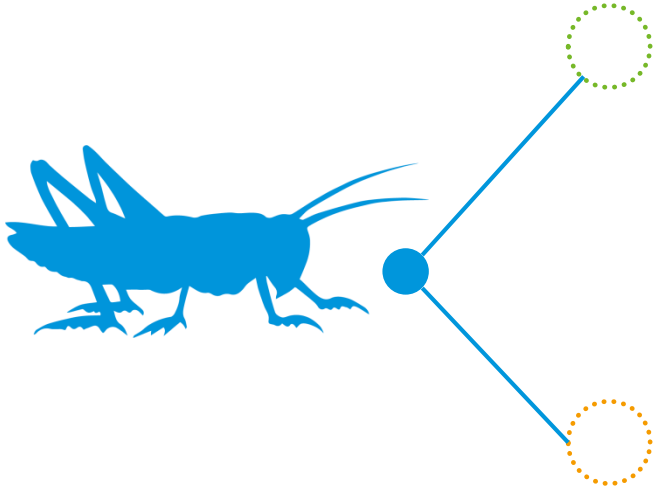


Direct Food/ Food Processing

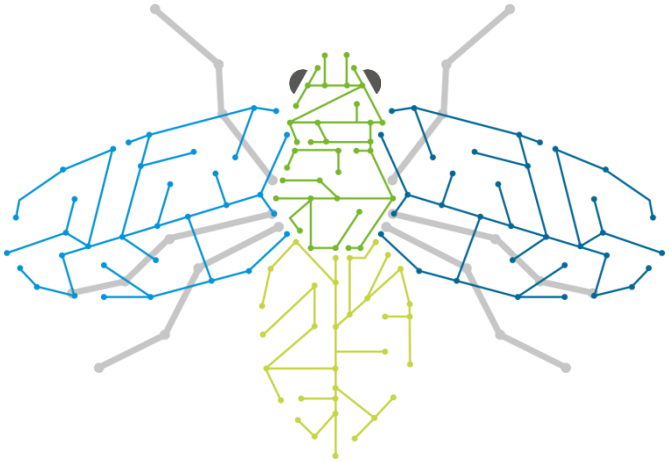
- long tradition world wide
- leagal within the EU and most of the countries

Fractionation of Insects

- new application
- not approved yet in the EU for food grade (approval expected soon)
- approved for feed purpose (EU) 2017/893)

Direct Food/ Food Processing

Content



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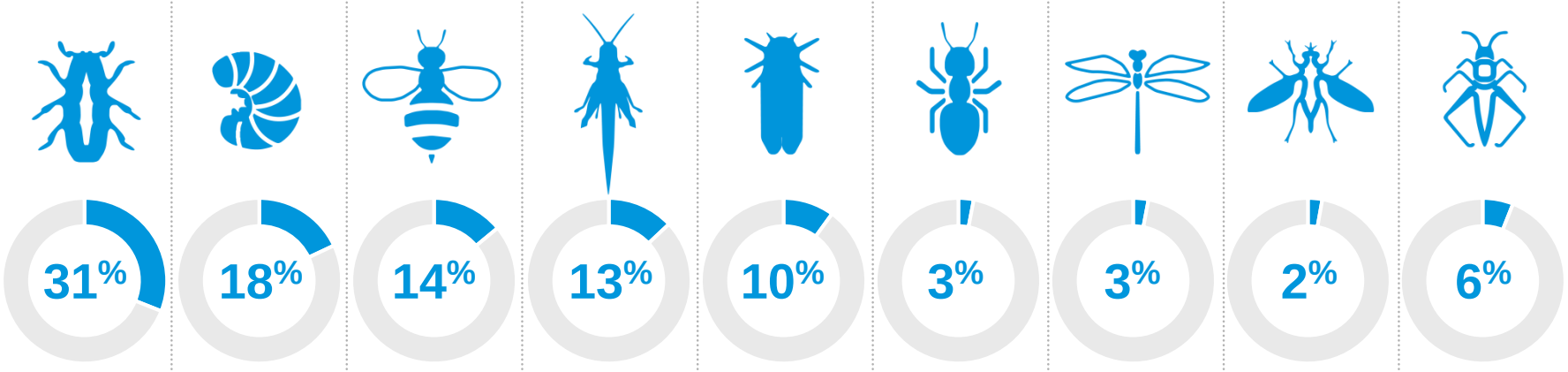
Insects for Meal Production



Popularity in % by order, **Source:** Food and Agriculture of the United Nations

Insects for Meal Production

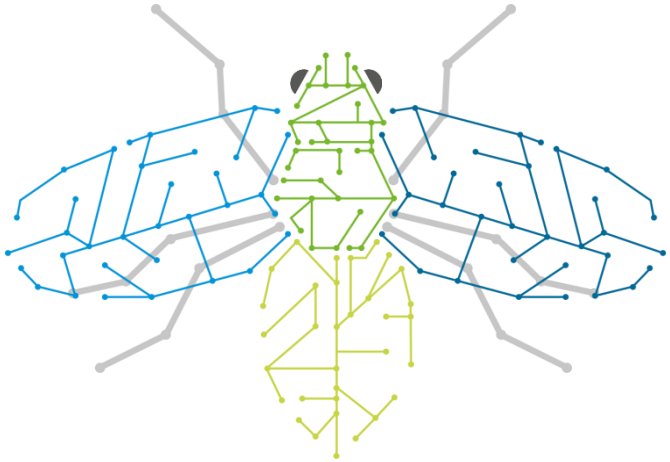
Black Soldier Fly (BSF)

Hermetia Illucens

Lesser Mealworm (Little Beetle)

Alphitobius diaperinus

Content



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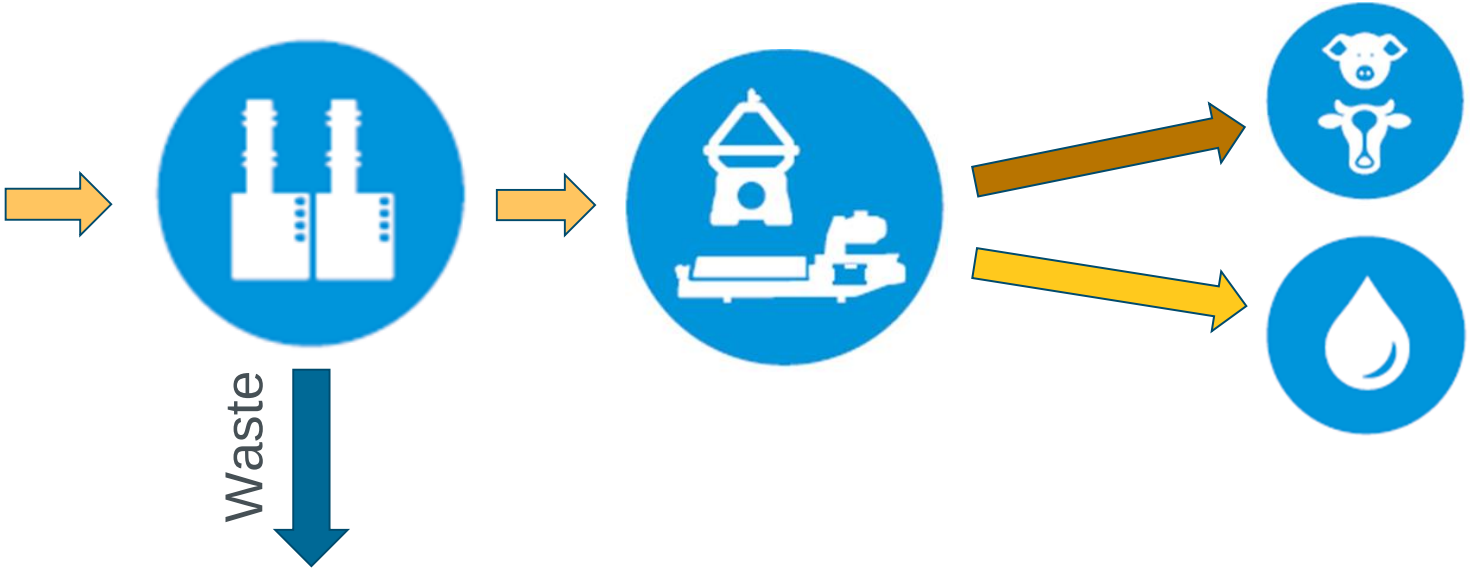
Insects for Meal Production

Feed-Management

Breeding & Rearing

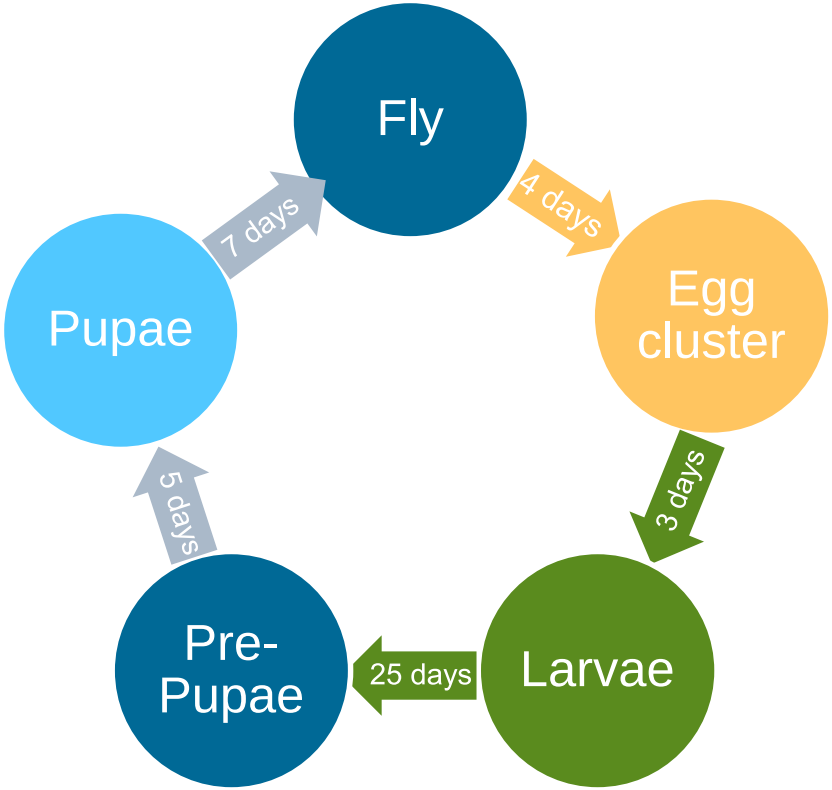
Processing

Distribution of Final Products



1. Breeding and Rearing

Live Cycle of BSF (estimations):



Breeding: **5 days**

Rearing: **20 – 30 days**

- feeding with organic material

Life cycle 25 – 35 days

365 day/a production

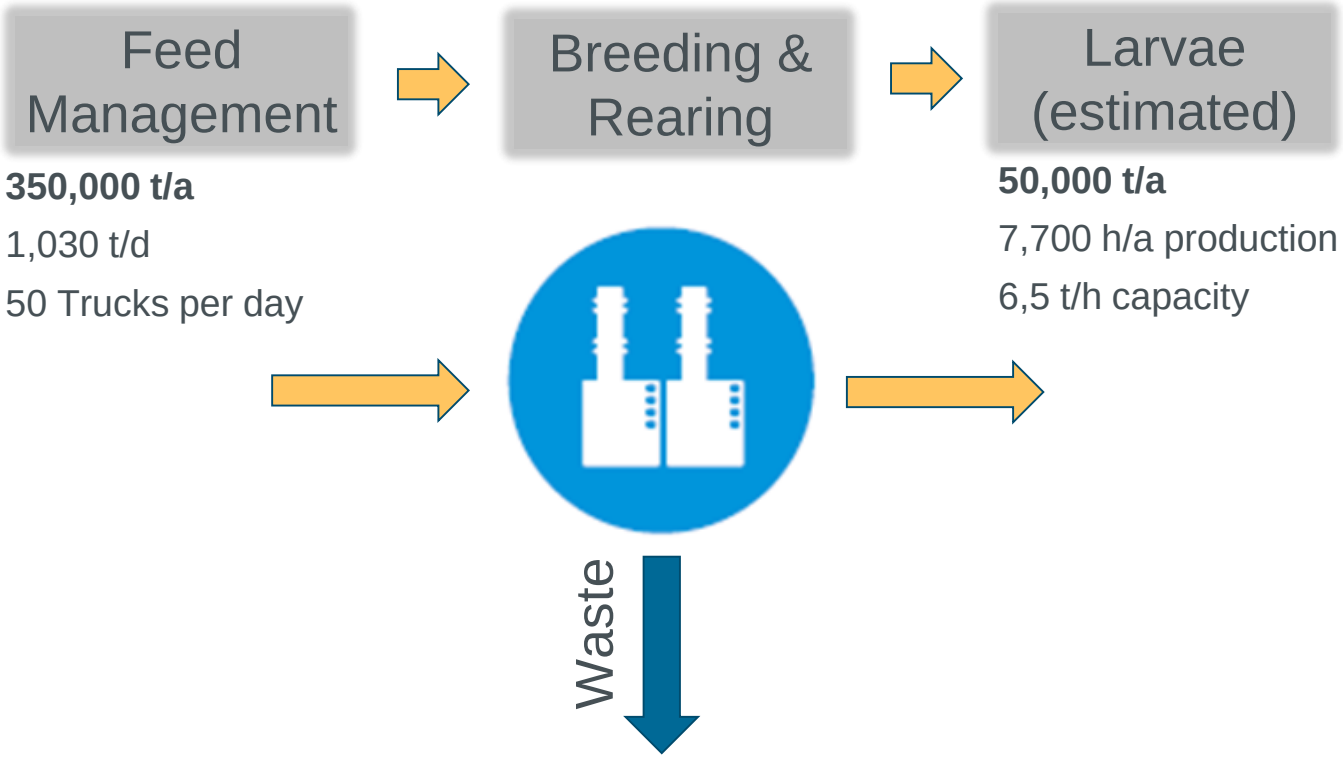
7 kg of (wet) feed for 1 kg larvae

Foot Print of 20,000 m²

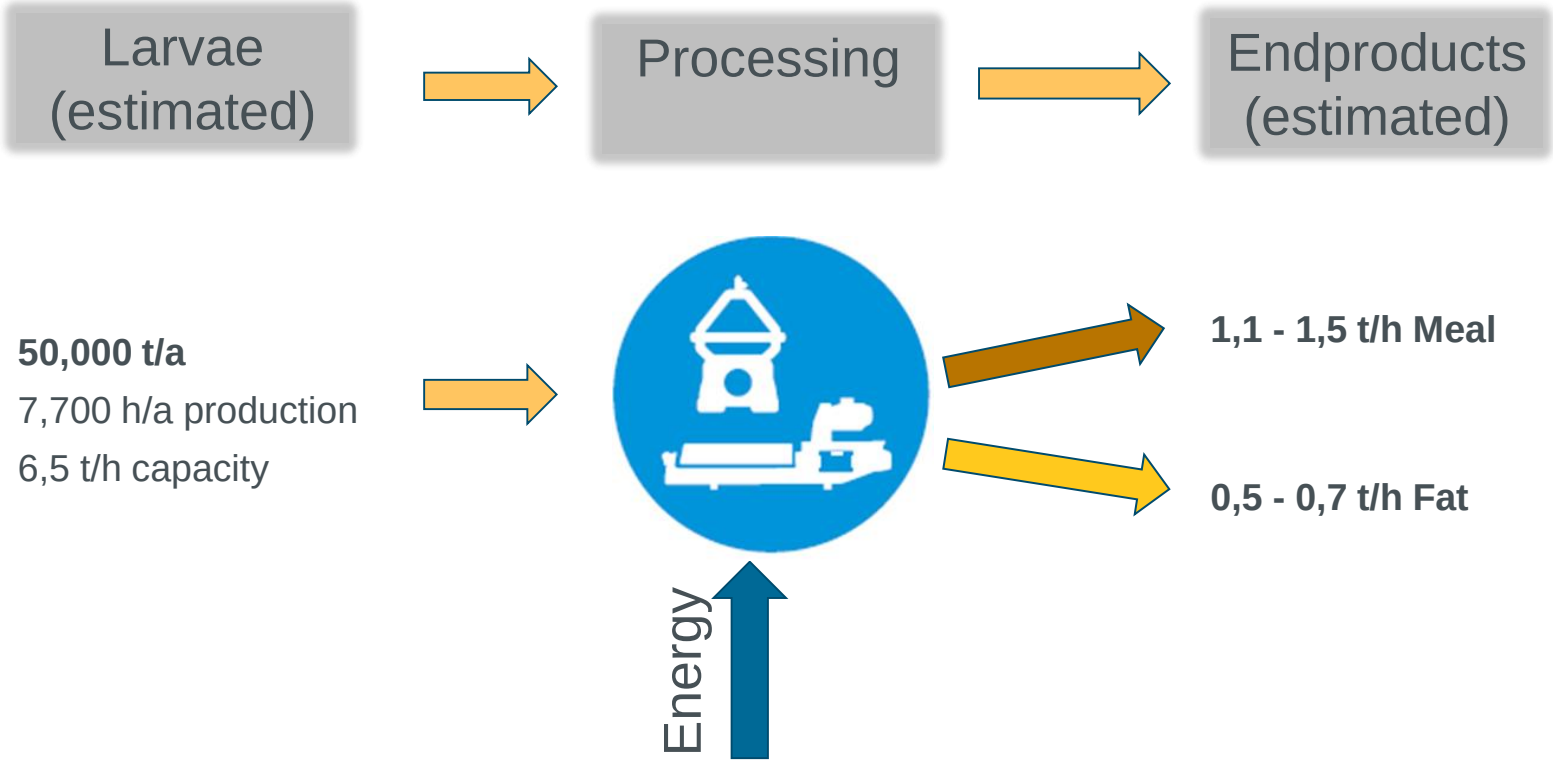
for 50,000 t/a

Investment of 10 – 30 Mio €

1. Breeding and Rearing



2. Processing



Insects for Meal Production

Feed-Management

Breeding & Rearing

Processing

Distribution of Final Products

350,000 t/a

1,030 t/d

50 Trucks per day

Waste

8,500– 11,500 t/a

1,1 - 1,5 t/h Meal

3,800 – 5,400 t/a

0,5 - 0,7 t/h Fat

2. Processing

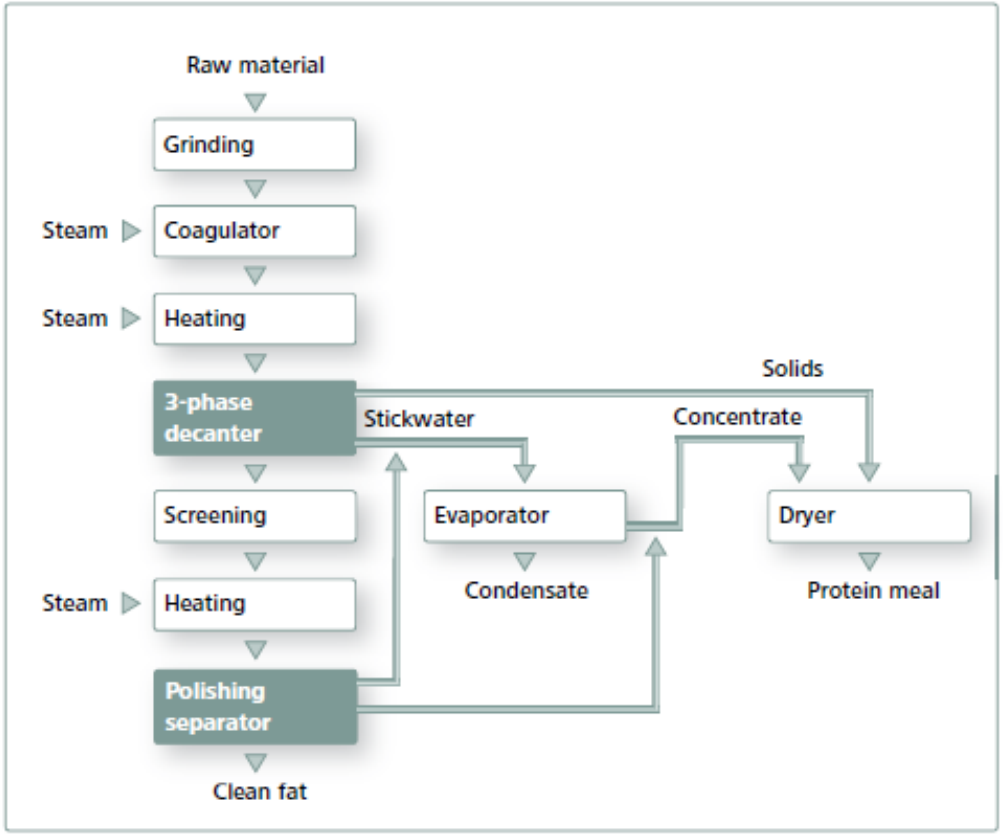
Composition	BSF	Salmon (H&BB)
Dry Substance	28 – 30 %	28 – 30 %
Fat	9 – 11 %	16 – 25 %
Protein	10 – 12 %	9 – 11 %

2. Processing

Process	Feed Grade	Food grade
Whole Fish/ Wet rendering	yes	yes
Dry Rendering	yes	-
Hydrolyse	(yes)	yes

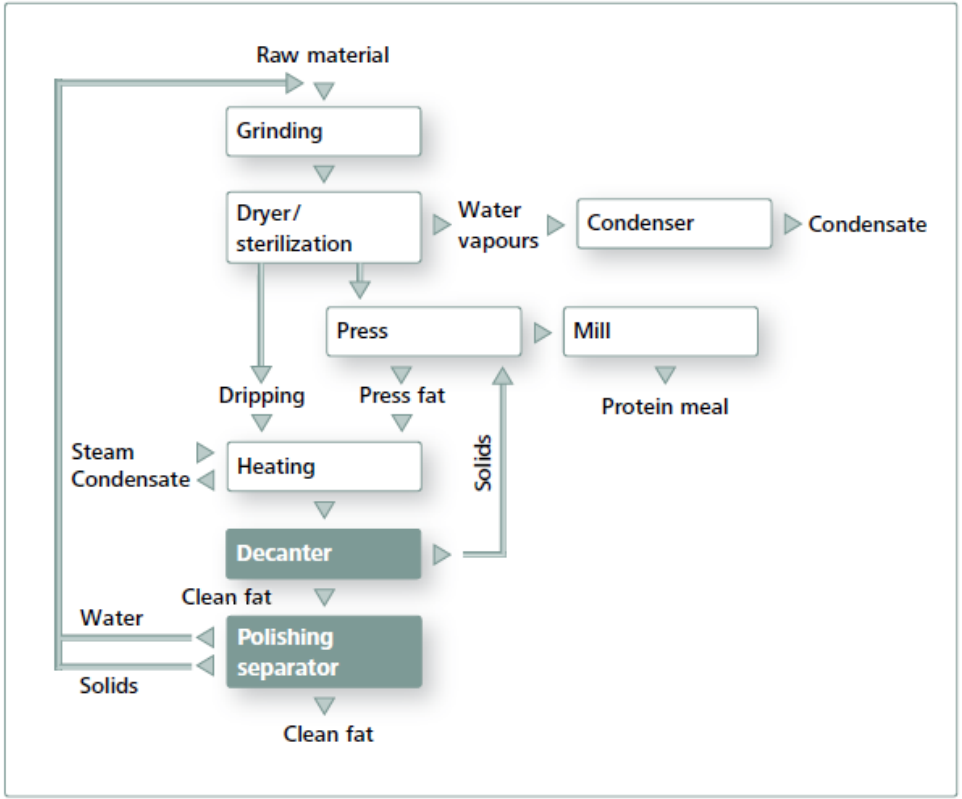
Spin test: BSF Salmon

Whole fish proces



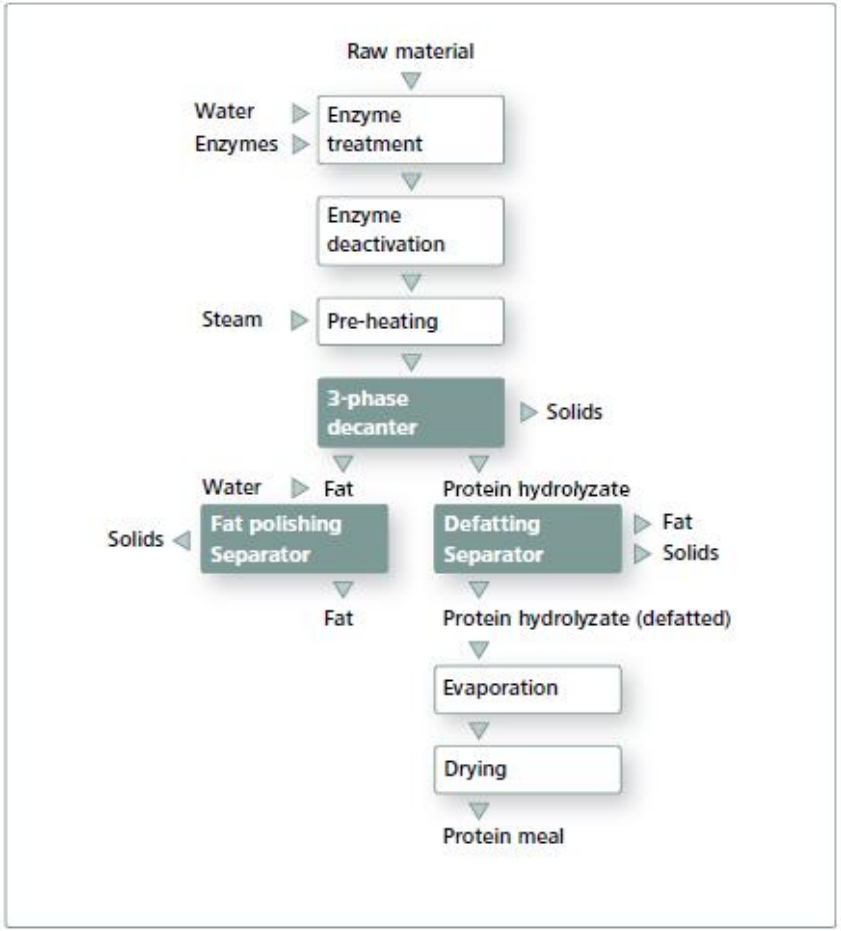
Wet rendering/ without press

High Temperature Rendering

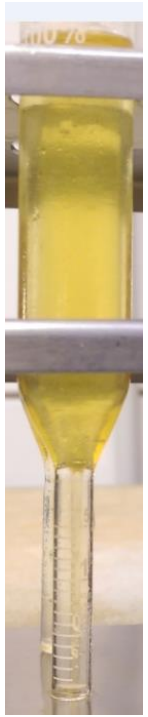


Screw press process (dry rendering)

Enzymatic Hydrolysis Process



Example 2: Recovery of Protein and Fat from Larvaes



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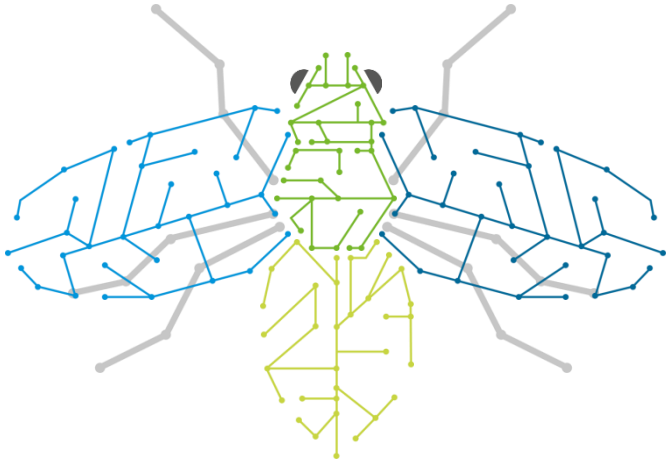

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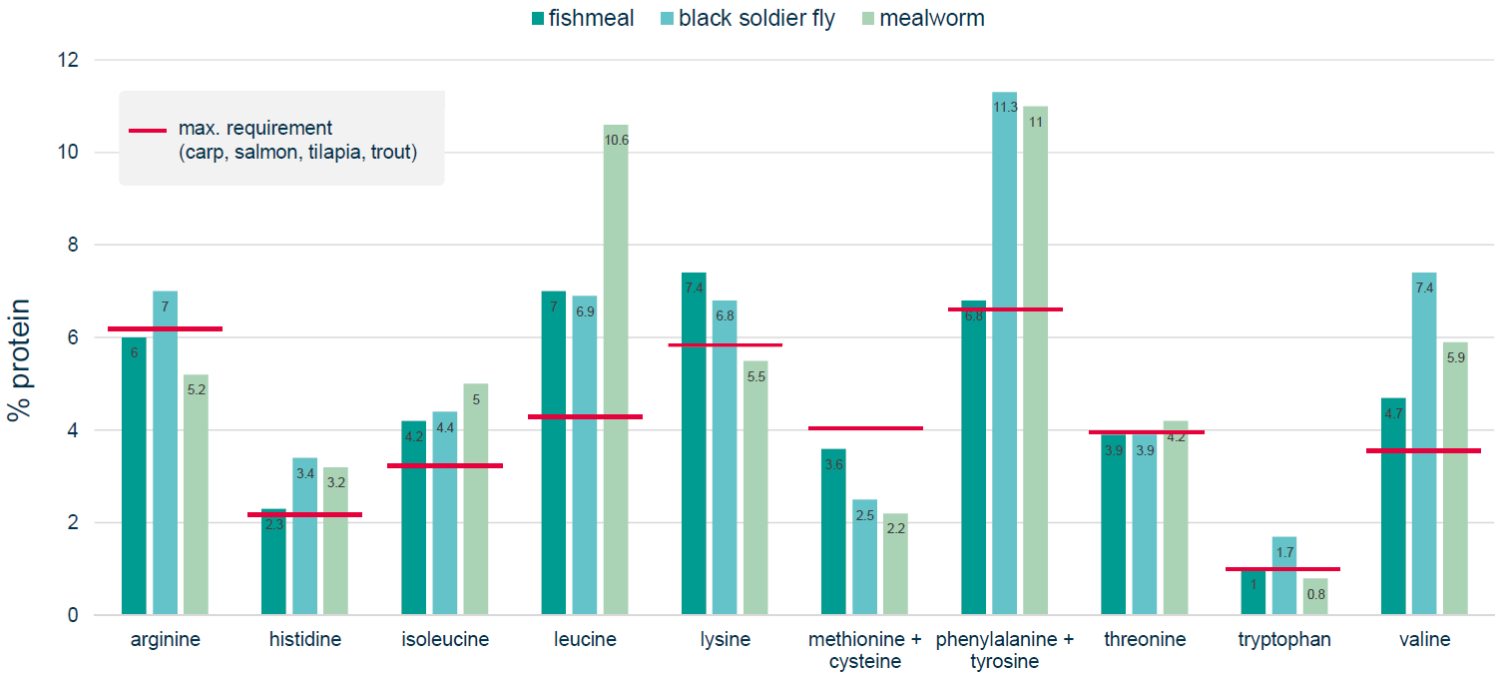
BSF Meal

Composition	Fish Meal	BSF Meal
Moisture	6 – 10 %	6 – 10 %
Protein (on DS)	60 – 72 %	54 – 64 %
Fat (on DS)	8 – 12 %	8 – 12 %

Composition and quality are strongly reflect to the quality of feed!

BSF Meal

Nutritional value of insect proteins



Source: Bühler, Networking days 2016

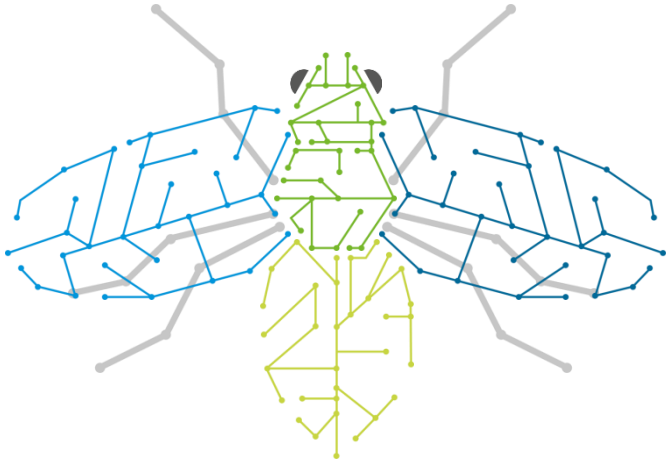
BSF Fat

Fat from Black Soldier Fly:

- low in unsaturated fatty acids
- nutty taste and smell

Composition and quality are strongly reflect to the qualty of feed!

Content



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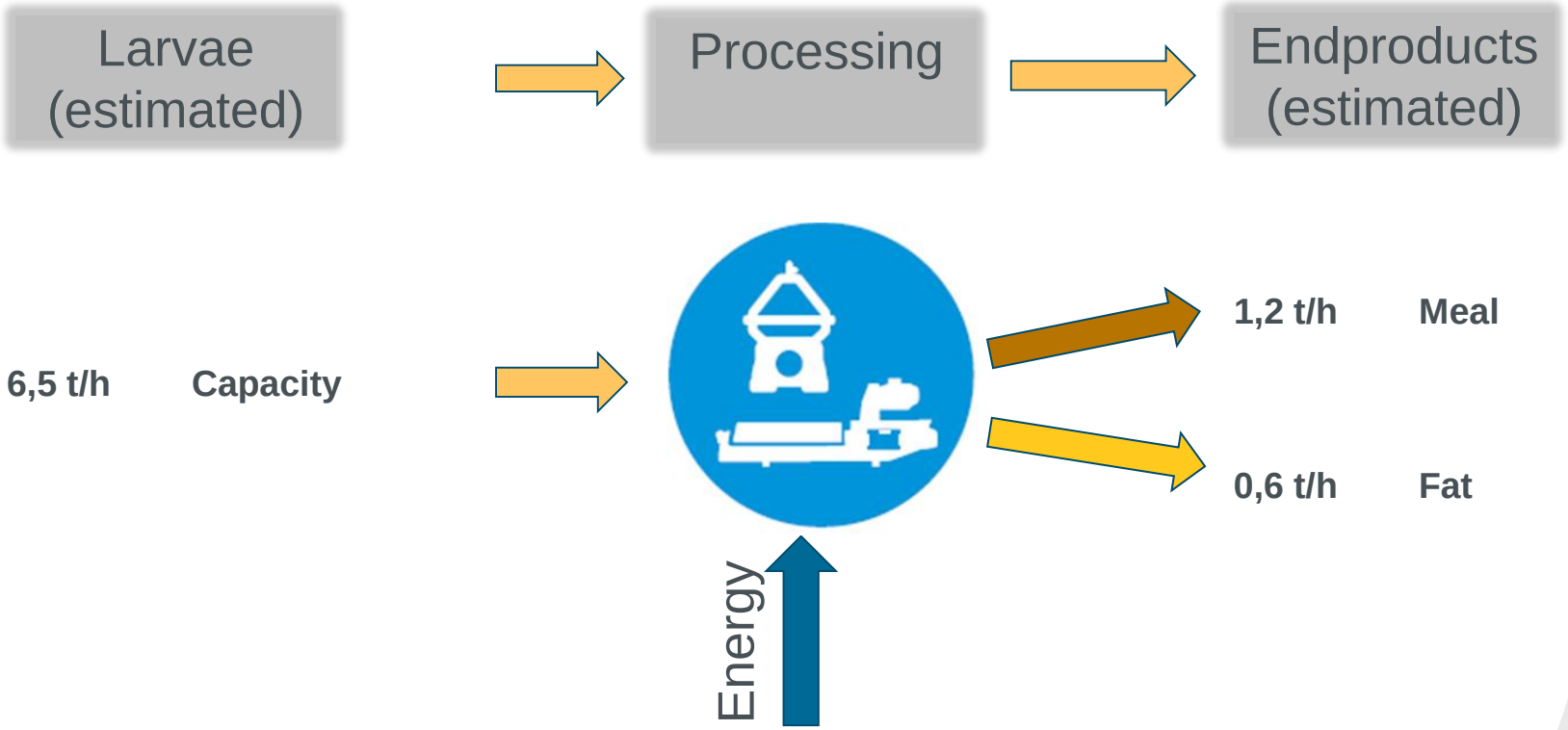
2. Processing



1. Breeding and Rearing

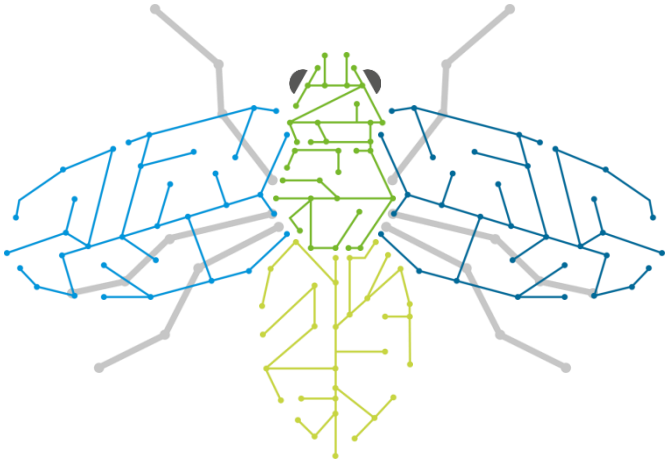
Feed Management → Breeding & Rearing → Larvae (estimated)

350,000 t/a
1,030 t/d
50 Trucks per day

Breeding & Rearing Plant
20,000 m²

50,000 t/a
7,700 h/a production
6,5 t/h capacity

Content



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Outlook

Pros:

- Availability (365 d/a)
- Amino Acid profile
- Sustainability
- Waste to feed transfer

Cons:

- Low value of the fat
- New application

Outlook

PROTIX

Aquaculture partners: developing Protein X, Lipid X and Chitin X as core ingredients for salmonids

EWOS Innovation · Universitas Bergensis · NIFES · University of Stirling · NMBU · AQUAFLY · Bioforsk

AgriProtein
Repairing the Future

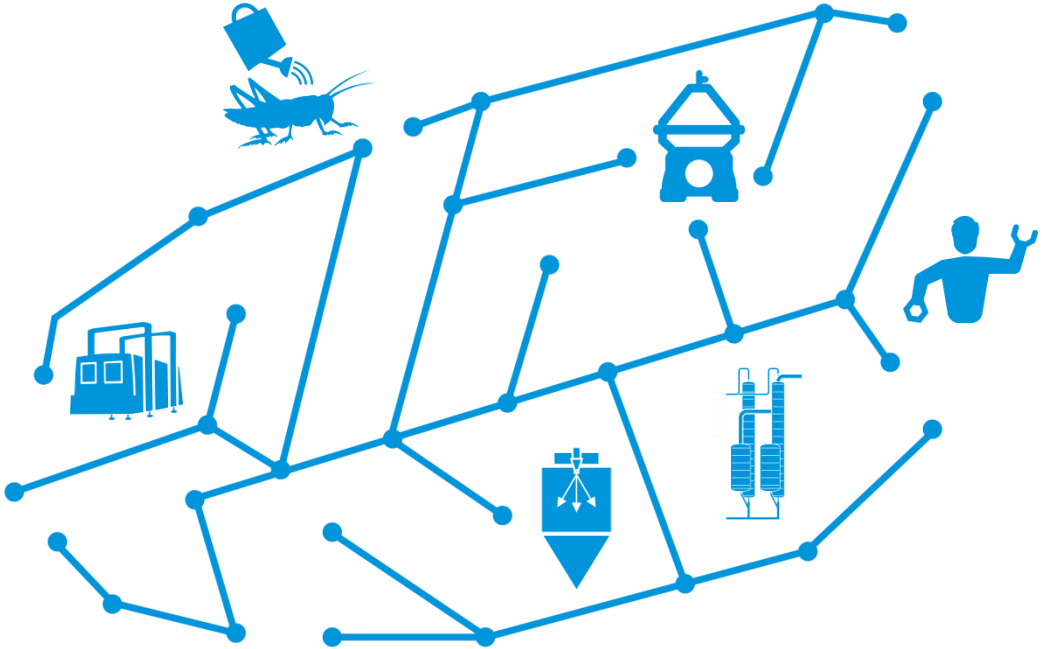
AGRIPROTEIN TO BUILD 20 FLY FARMS IN US AND CANADA

AgTech pioneer sets up North American team to bring insect protein into mainstream of animal feeds

San Francisco, Tuesday March 28 2017

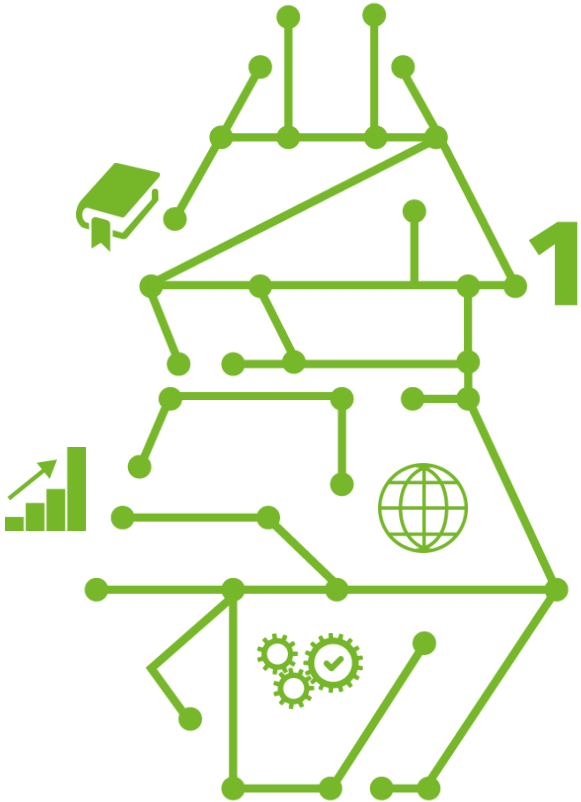
Summary: Raw Material

- Raw material has been selected



Summary: Technologies

- Breeding process has been developed
- Process for meal production can be adapted

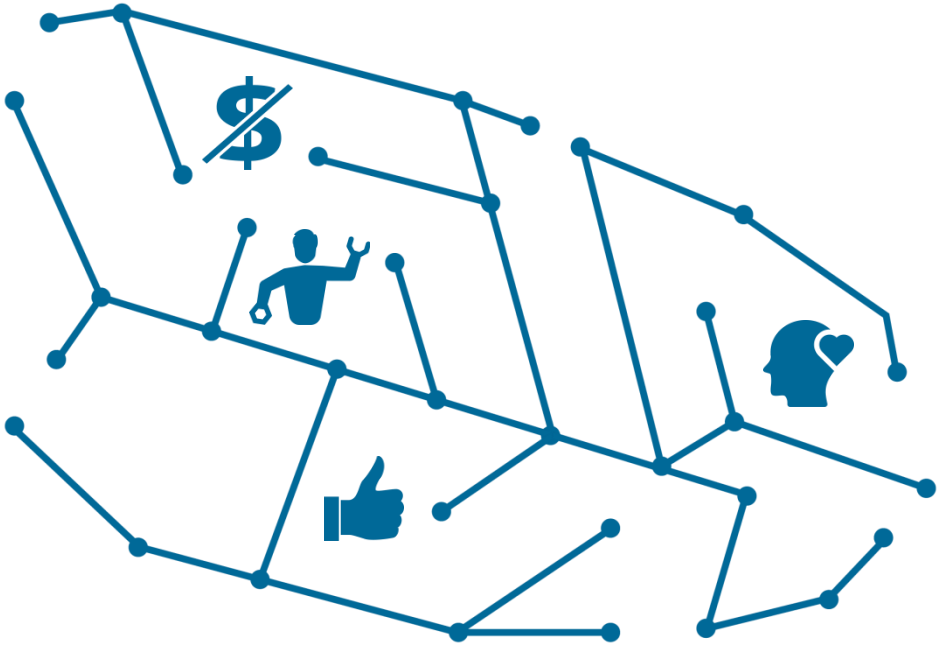


Summary: End Products

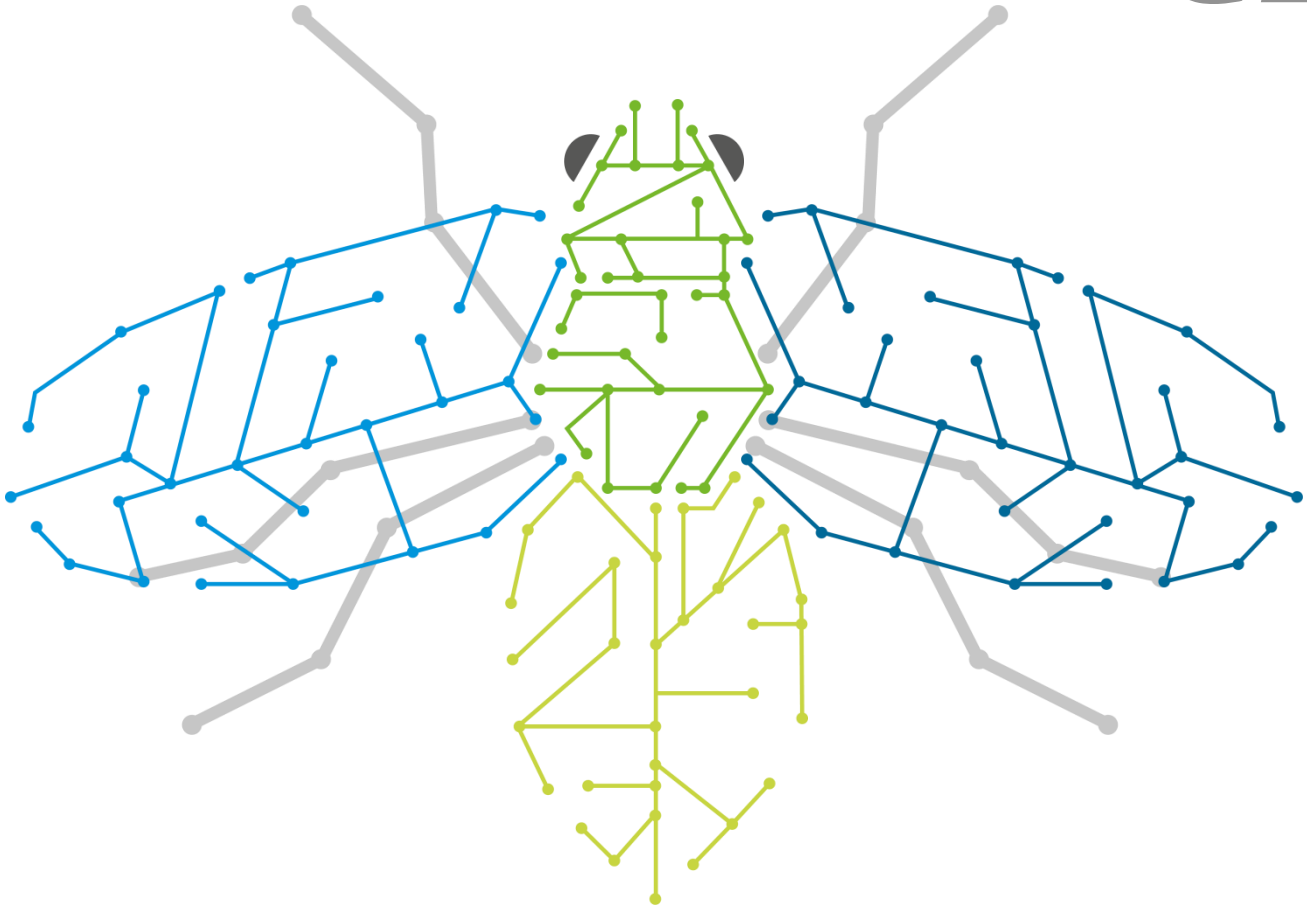
- Market for end products has been identified

Summary: Economy

- Cost for feed supply chain not clear yet
- Processing cost for Breeding are available
- Processing cost for meal production similar to fish meal



Thanks for your attention



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