



Powering a circular and sustainable food system : the role of insects

26 of April 2022

Why Does the World Need Insect Ingredients ?

The Environmental Challenges Facing Global Agriculture

Food security

2

ZERO HUNGER



- As world population increases (~10bn by 2050) and food demand doubles, a **global nutrition gap is approaching**

3

GOOD HEALTH AND WELL-BEING



- With a ~60Mt protein deficiency expected by 2030, next generation **agricultural methods must be utilized**

Sustainability

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RESPONSIBLE CONSUMPTION AND PRODUCTION



- ~20% of **global carbon emissions** come from the food industry, creating a pressing need to cut our footprint

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CLIMATE ACTION



- Agricultural emissions will need to reduce by 70% by 2050** in order to meet 2015 Paris Agreement targets

Biodiversity

14

LIFE BELOW WATER



- Biodiversity continues to worsen**, with current agriculture practices threatening to exacerbate this further

15

LIFE ON LAND



- The **593m hectare global land gap** places sustained pressure on land-intensive agricultural practices to evolve

The Solutions Presented by Insect technology



“Giving insects back the role that they play in nature is a powerful lever to increase sustainability in the modern food system”

**Clément Ray
Co-Founder**

Sources: The State of Food and Agriculture: Climate change, Agriculture and Food security, 2016, FAO; Sustainable Development Goals, United Nations; UNESCO; ABAgri Associated British Agriculture; Alternative Proteins market study, 2013; Sarena Lin, president of Cargill's feed and nutrition business; World Resources Institute

Insect technology is recognized as one of the most promising technology to improve the sustainability of our food system

Insects are powerful upcyclers with the ability:

- 1 to turn **low-grade food waste...**
- 2 **...into valuable high-end ingredients...**
- 3 **...on a very efficient way and with minimum impact**

One of the most promising **source of ingredients to invest in** to solve the 21st century food challenge

Upcycling byproducts...



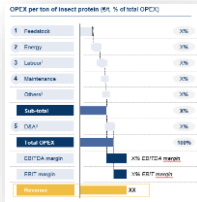
... into sustainable nutrients

- +30% of arable lands required to ensure Europe's sufficiency in soy production
- Massive amount byproducts available
- Increase demand on circular production

- Vertical farming model
- Reduce arable land required
- Lower environmental footprint (climate change, fossil resources, biodiversity)

To fulfill its sustainability potential insect technology requires competitive production models & high performing products

Competitive offer for sustainable insect ingredients



Competitive Production models



High performing products

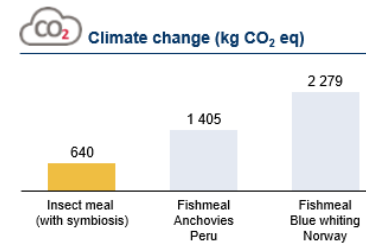
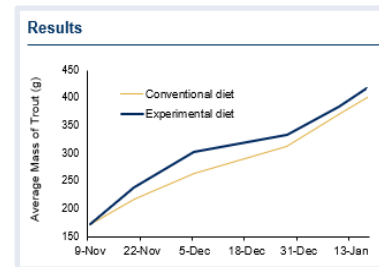
Process Scalability

Cutting edge Technology

Industrial symbiosis

Zootechnical performance

Environmental performance



Focus of today's discussion

A unique production model to produce competitive high-quality ingredients with the lowest environmental footprint

A unique industrial symbiosis in the insect industry

Our production site is collocated with a **feed player** supplying agricultural by-products and an **energy player** powering our facility

Direct conveying of bran and stillage from starch manufacturer through a branch pipe

Supply of waste energy, through a conveying rack



57 000 T

Of CO2 emission saved per year

200 000 T

of fish can be fed with the protein produced

150 000 T

of monogastric can be fed with the oil produced

Competitive advantages

Direct conveying of wet byproducts to feed the larvae

- 12k+ trucks avoided on the roads each year

Supply of 100% clean energy

- 60% of energy needs from waste energy captured
- 36% energy cost reduction thanks to connection synergies

Use of existing infrastructures

- E.g. use of Tereos water treatment plant

Sources: Quantis LCA analysis

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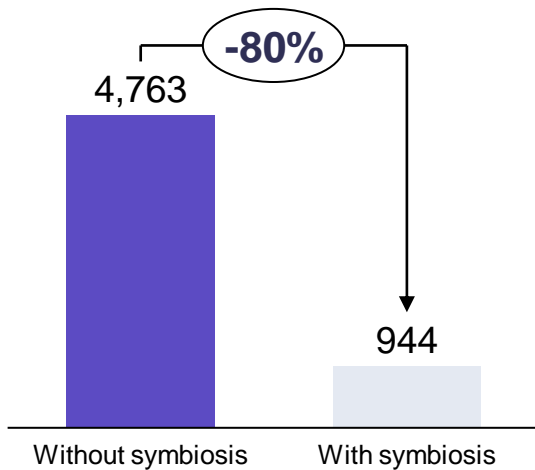
As a result, InnovaFeed's insect ingredients display the lowest environmental footprint on the market vs alternatives

InnovaFeed's insect ingredients

-80%

Reduction of environmental impact thanks to symbiosis

CLIMATE CHANGE IMPACT
(KG CO2 EQ, 1 FU)



InnovaFeed's insect meal

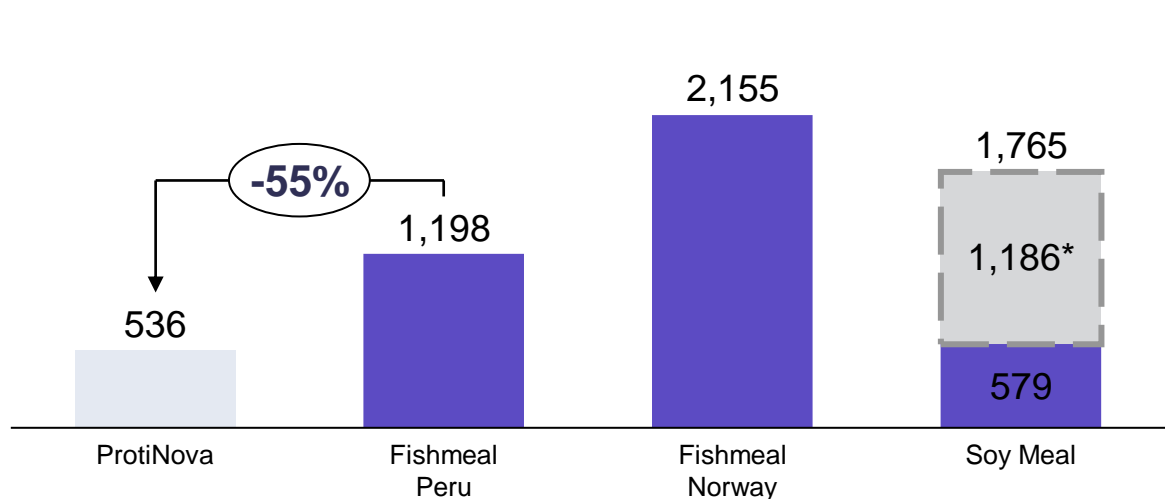
0 impact
of deforestation

+

0 impact
on marine resources

CLIMATE CHANGE IMPACT
(KG CO2 EQ, 1T OF INSECT MEAL)

Up to -75%



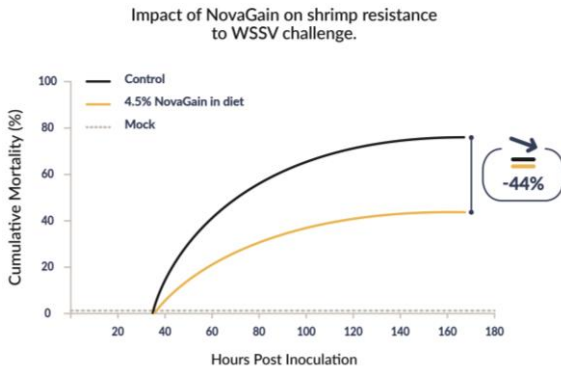
To know more, download the [Life Cycle Analysis of InnovaFeed](#)

FU = 1T of IM, 350kg of IO, 7T of frass

Insect ingredients can enable to produce more with less, therefore improving food systems' sustainability

Improved health

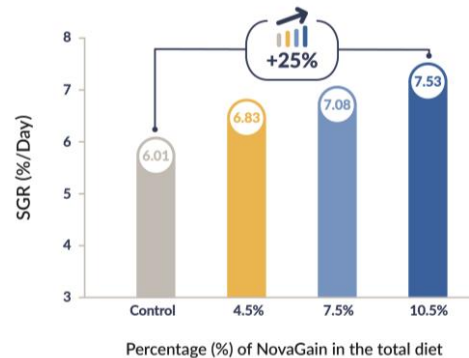
- ✓ **Improvements of shrimp health resilience** demonstrated with disruptive pathogens in challenged conditions



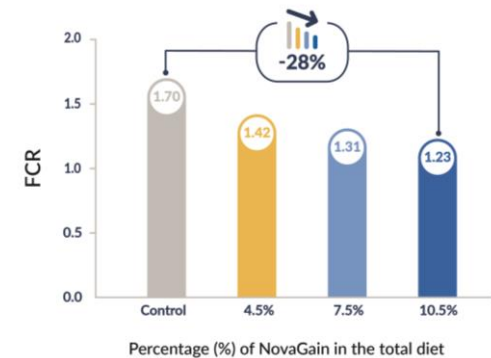
Improved zootechnical performance

- ✓ **Consistent NovaGain performance gains (SGR and FCR)** demonstrated across several shrimp species and life stages (leading to the publication of scientific article)

Impact of NovaGain on shrimp growth at different inclusion rates in feed.



Impact of NovaGain on shrimp feed conversion ratio at different inclusion rates in feed.



Partners:



Results published: "Effect of a Black Soldier Fly Ingredient on the Growth Performance and Disease Resistance of Juvenile Pacific White Shrimp (*Litopenaeus vannamei*)"
<https://www.mdpi.com/2076-2615/11/5/1450>



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* Additional impact of deforestation

Building on these pillars, we can create insect powered sustainable value chains – eg Auchan's Insect fed Trout

In December 2018, we launched the first insect-fed trout in the world



Major French retail group to roll out “insect-fed” trout across stores

News by editorial staff - 10 December 2018

First “insect fed” trout now available in France’s Auchan markets

Live value chains since December 2018

- **52+** supermarkets selling insect-fed trout
- **50%** replacement of fishmeal by insect protein

Direct and transparent communication to the consumer

- **200+** fish mongers trained in supermarkets
- Development of a specific “insect-fed” label
- **www.insectfed.info** : Launch of website to explain the approach to consumers

Strong and positive media coverage

- 100+ articles at launch

In December 2018, we launched the first insect-fed trout in the world

Building on the success of the insect-fed trout, this value chain was reinforced in Feb. 2020:

- **Insect meal** replace 50% of fishmeal
- **Micro-algae oil** added to replace part of the fish oil
- Remaining of fish oil and fishmeal sourced from **trimmings**

As a result: the “insect-fed trout” became the “sustainable trout” with **0 impact on marine resources**



Today, several value chains demonstrate insect ingredients' ability to power sustainable food systems



In conclusion – the role of insects in powering a circular and sustainable food system at a global scale

Creating environmental and economic value by upcycling large-scale deposits of agricultural byproducts across the globe



Corn



Wheat



Palm



Bringing novel sustainable ingredients to our food systems

PERFORMANCE & COMPETITIVITY

- Competitive production models
- Demonstrated zootechnical performance and health benefits enabling to produce more with less

SUSTAINABILITY

- Circular production models with no additional impact on natural resources
- Quantified environmental benefits vs conventional alternatives