



Animal Task Force
05th November 2014
Brussels

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Business Development

**Insect biotechnology :
an efficient & innovative way
to upgrade biomass into
feed, food & chemicals**



The
increase
of
population

A person wearing a full white protective suit, including a hood and mask, is walking away from the camera down a long aisle in a large industrial poultry farm. The floor is covered with straw bedding and is densely packed with thousands of young white chickens. On either side of the aisle, there are long metal troughs for feed and water, with orange plastic feeders hanging from them. The farm has a high ceiling with industrial lighting and structural beams. The overall scene depicts a large-scale, controlled environment for raising poultry.

leads to **great**
challenges
for
feedstock
industries

An aerial photograph showing a dense, dark green forest on the left side, which transitions into a vast, bright green agricultural field on the right. The forest edge is irregular, with some trees protruding into the field. The agricultural field has visible furrows and rows, suggesting it is a large-scale farm. The text "Upstream..." is overlaid in white on the forest area.

Upstream...



... and downstream



Insects

are

part

of the

solutions



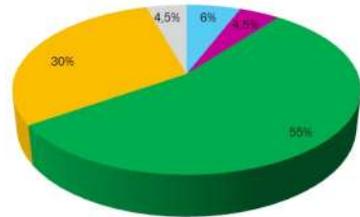
Insects are
1st worldwide
eukaryota
biodiversity



Insects are great Feed



Digestibility & Bioconversion



Composition



Use



Regulations



...And great Food!



Thaïlande



Cameroun



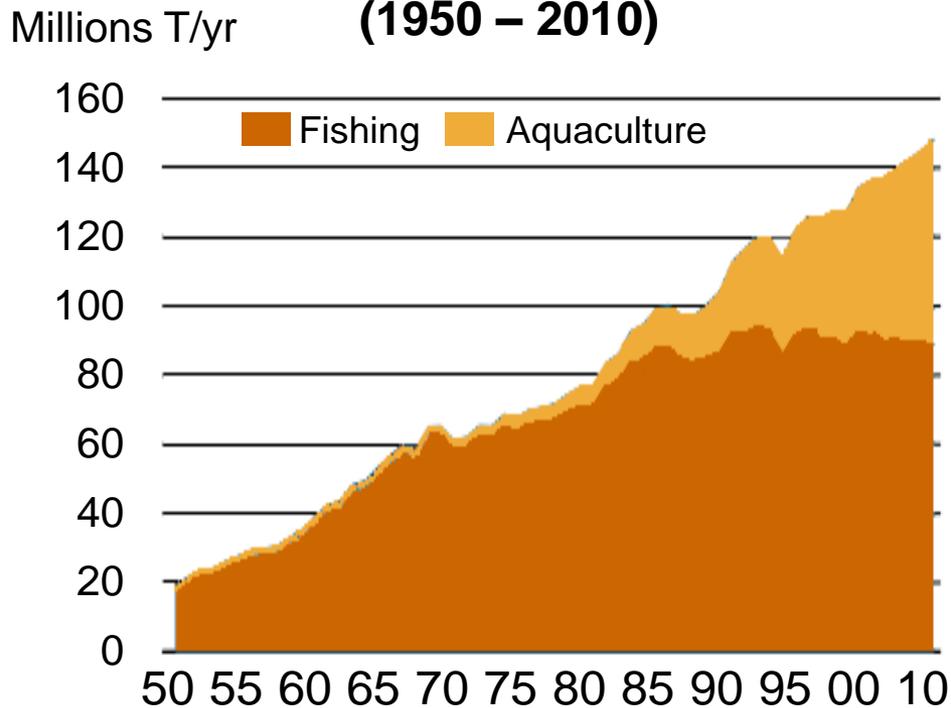
Mexico



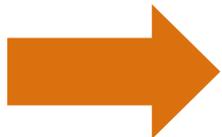
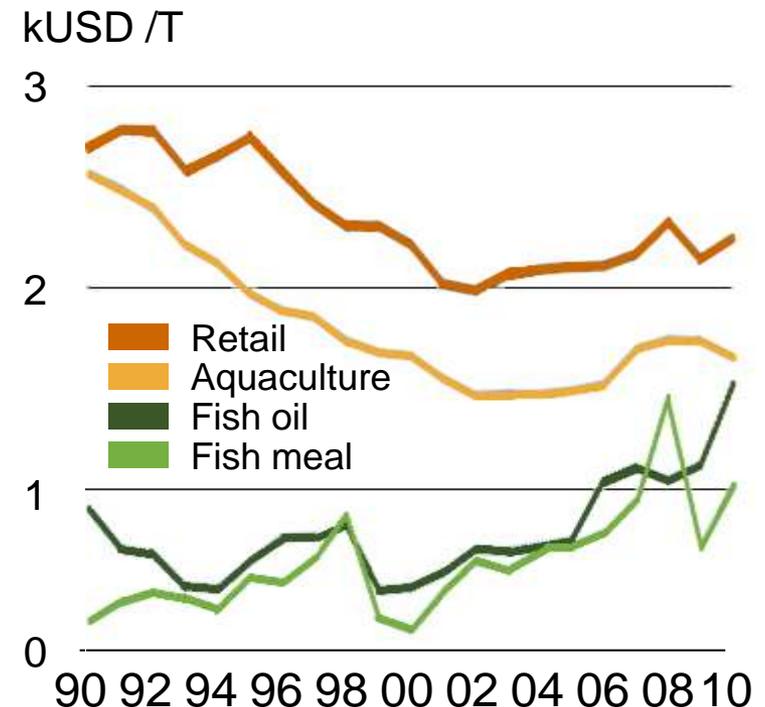
Australie

Ocean depletion boosts aquaculture & aquaculture feed prices

World fishing & Aquaculture production (1950 – 2010)



Fish & fish feed prices evolution (1990-2010)



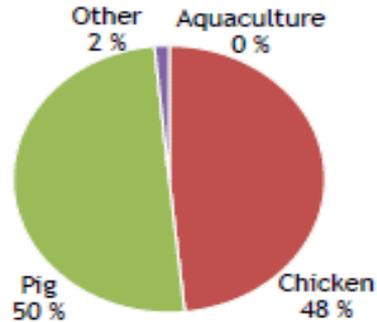
Urge to **optimise** aquaculture farm feed **formulation** towards **efficiency & cost**

Ocean depletion boosts aquaculture... and aquaculture feed prices!

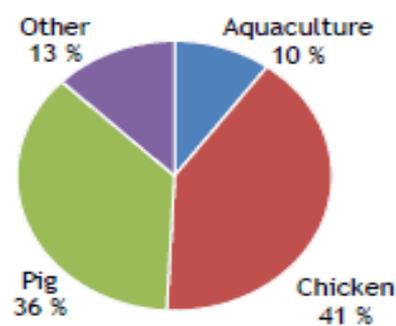


Figure 2.7: Consumption share development (IFFO 2010)

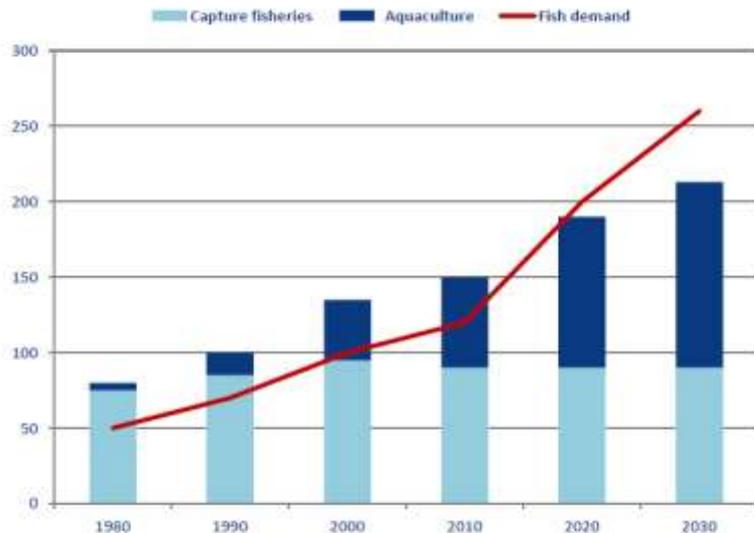
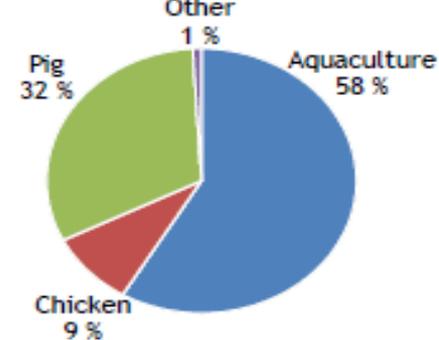
Fishmeal consumption 1960



Fishmeal consumption 1980



Fishmeal consumption 2008



Source: FAO Fishstat- Estimation of FI department

Fish meal and oil are mostly used in aquaculture. Wild catches won't be enough to supply the fish demands by 2020. Aquaculture market will grow and demand for protein and oil will increase.

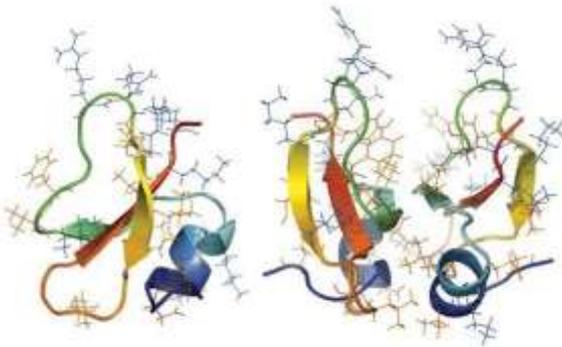
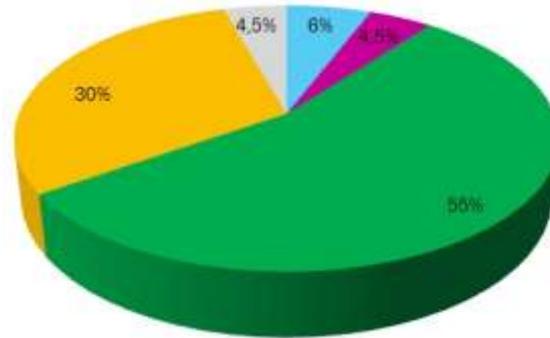
A product diversity for animal nutrition & health



Oil



Chitin fibers



Antimicrobial peptides



Protein meal

Insect protein & oil derivatives offer a wide range of nutrients of interest for **Feed, Food & Fuel industries**



Peptides

for Pet Food & Bioactive additives in Feed & Food
⇒ **Nutrition & Health** in Feed & Food



Proteins

for high digestibility meal with balanced amino acids profile
⇒ **Nutrition** in Pet Food, Fish & Monogastrics



Lipids

for biofuels, oleochemistry & Feed production
⇒ **Municipal biowaste valorisation** in Bioenergies

 Environmental
> High digestibility

 Health
> Antibiotics reduction



Main issue is technology



An observation : 2 major business constraints for feed markets



1 € / kg



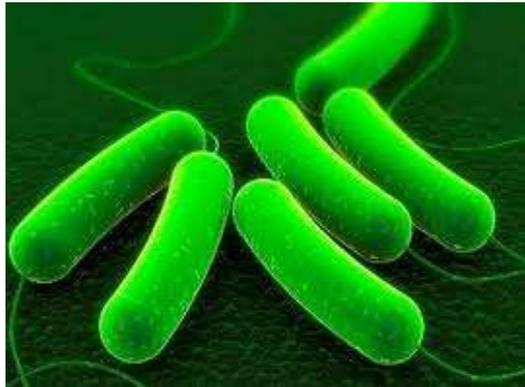
10 000 T / yr



50 000 T / yr

- Very low margins / Fierce competition / Picky regulation
 - Need for High Economies of Scale

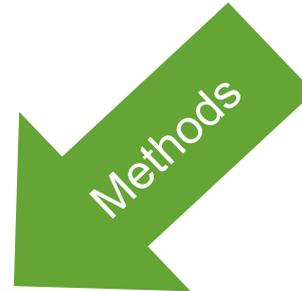
Know-how from other scales can address **technical obstacles of insect mass production**



Biotechnology



Zootechnics



X 1000

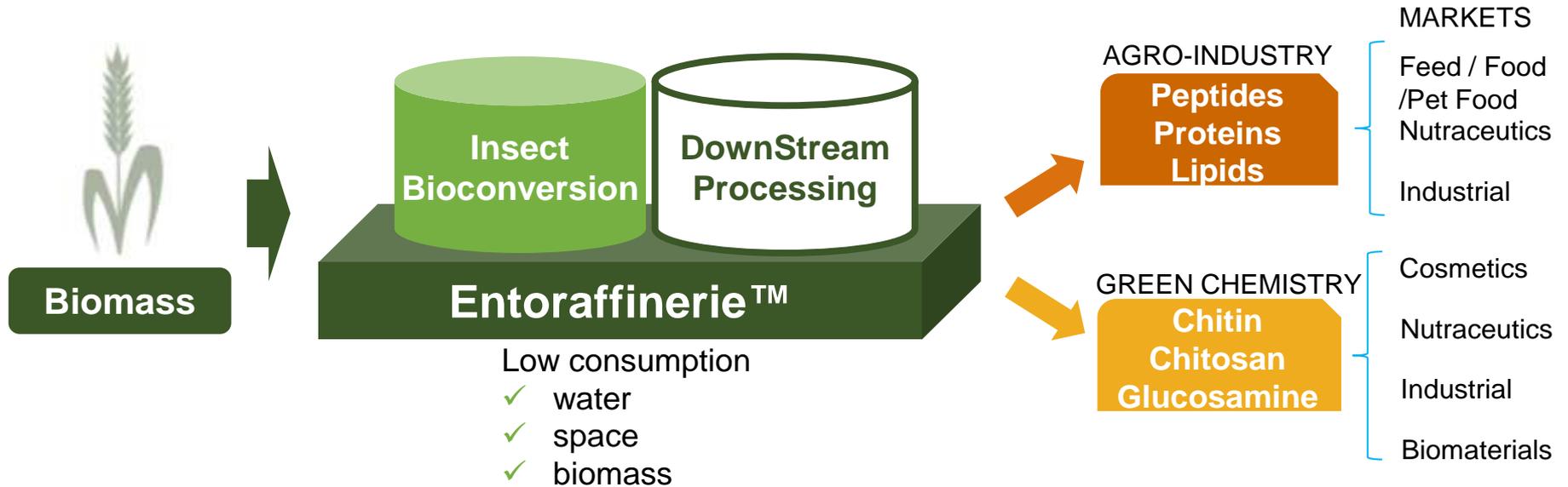


÷ 1000



Microzootechnics / Zootechnology

An unique tool to develop insect industry: the Entoraffinerie™



+ Flexibility

+ Scalability

+ Automation

+ Connectivity
(Quality control)

+ Co-valorization
(zero waste)

Insect meal shows very high qualitative composition that can replace partly fish meal



Whole mealworm meal

Composition	P1	Unit
Dry matter	93.44	g / 100 g
Ash	3.16	g / 100 g
Lipid	28.02	g / 100 g
Proteins	50.70	g / 100 g
Total carbohydrate	11.56	g / 100 g

Source : Ynsect 2013

Defatted mealworm meal

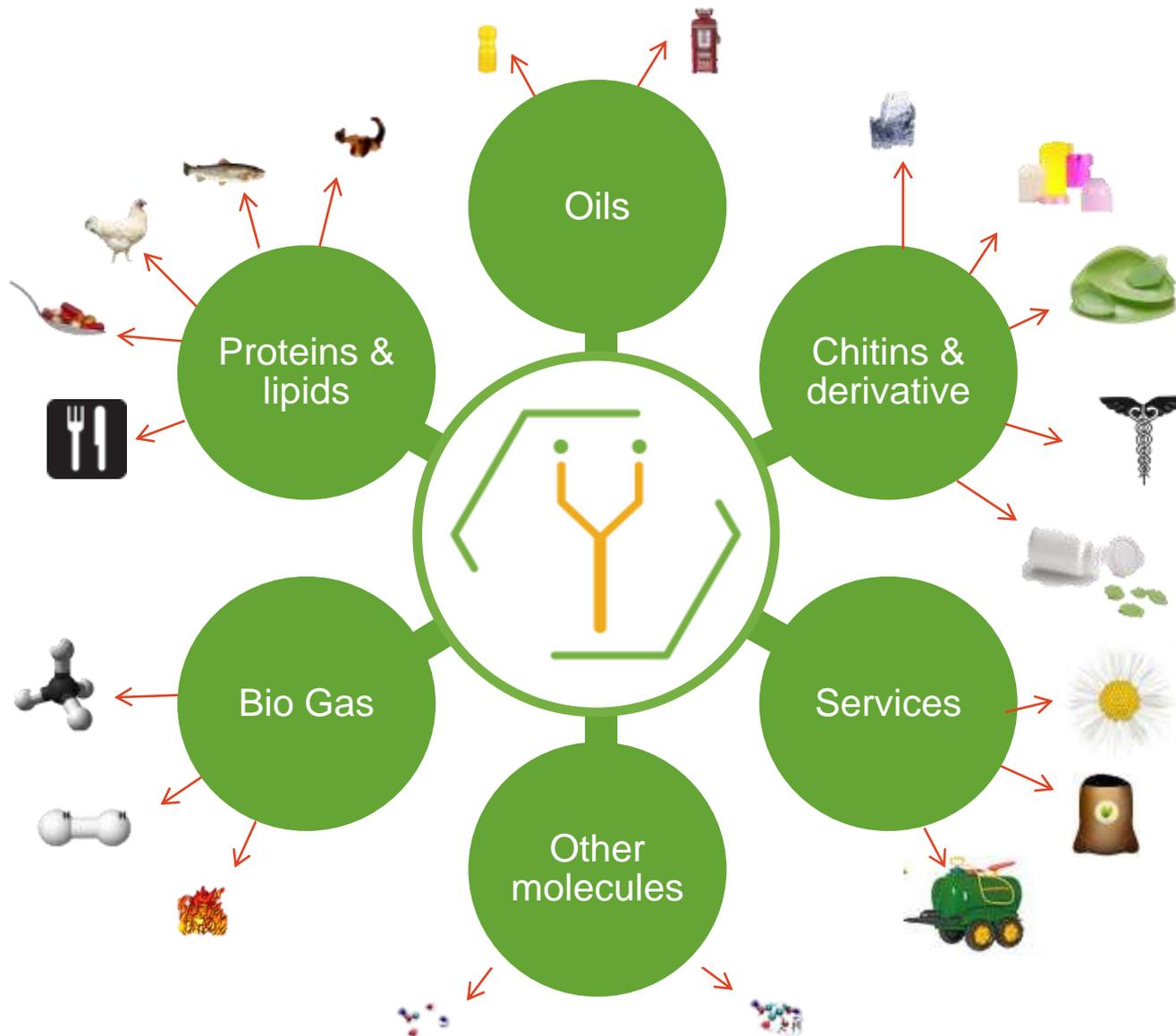
Composition	P3	Unit
Dry matter	91.90	g / 100 g
Ash	2.27	g / 100 g
Lipid	19.64	g / 100 g
Proteins	60.60	g / 100 g
Total carbohydrate	9.39	g / 100 g

Source : Ynsect 2013



➔ New mealworm meal currently developed with 70% protein & 10% lipid contents

Beside proteins, downstream processing of insects holds many **promising applications**





The Insect Company

Providing innovative
products & services

from insects www.ynsect.com



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