

# **Assessing the commercial potential of Insect Proteins**

Antoine Hubert, President of the International Platform of  
Insects for Food & Feed (IPIFF) – 27 April 2016

## 1. Introducing IPIFF

2. Global challenges

3. Insect industry

4. Commercial potential of Insects as feed



# 1. INTRODUCING IPIFF

## What is IPIFF? ‘International Platform of Insects for Food & Feed’

- International alliance of key players in the insect industry across Europe & abroad
- Represents the interests of the insect value chain at European level
- Originally founded in 2012 and formally established in 2015

## IPIFF objectives - ‘building up a responsible sector ‘

- Promoting insects as top-tier source of animal proteins for food & feed
- Developing shared standards & best practices
- Encouraging cooperation and effective risk management procedures along the insect value chain
- Consolidating dialogue with EU public authorities & advocating for appropriate legislative frameworks

# 1. INTRODUCING IPIFF



## IPIFF MEMBERS 2016



# 1. INTRODUCING IPIFF

## IPIFF MEMBERS PROFILE

- Mainly **European members**, but also non-EU companies targeting at the EU market.
- Insect producing companies (farming & processing) , other **firms in the insect value chain** (e.g. equipment, distribution) & **'knowledge sharing'** members.
- All producing for **feed & food consumption**, some of them producing also for other markets e.g. biological control, green chemistry and plant nutrition.



1. Introducing IPIFF

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## 2. GLOBAL CHALLENGES

### ECONOMIC FORECASTS

Global growth in population - **9 billion people in 2050** – and increased welfare levels lead to fast **increasing demand** for high quality foods

- 72% increase in global meat demand (2000 vs 2030)
- 50% in aquaculture (2010 vs 2030)
- 60 MT proteins forecasted to be missing by 2030 in order to meet the expected demand (FAO)

**Increased dependency on proteins imports** for animal feed use puts the economic viability of the EU feedstock & livestock sector at risk

- soybean meal (of which 70% of EU consumption is imported) prices increased over 100% over the 5 past years
- fishmeal (of which 65% of EU consumption is imported) increased 4-fold.

## 2. GLOBAL CHALLENGES

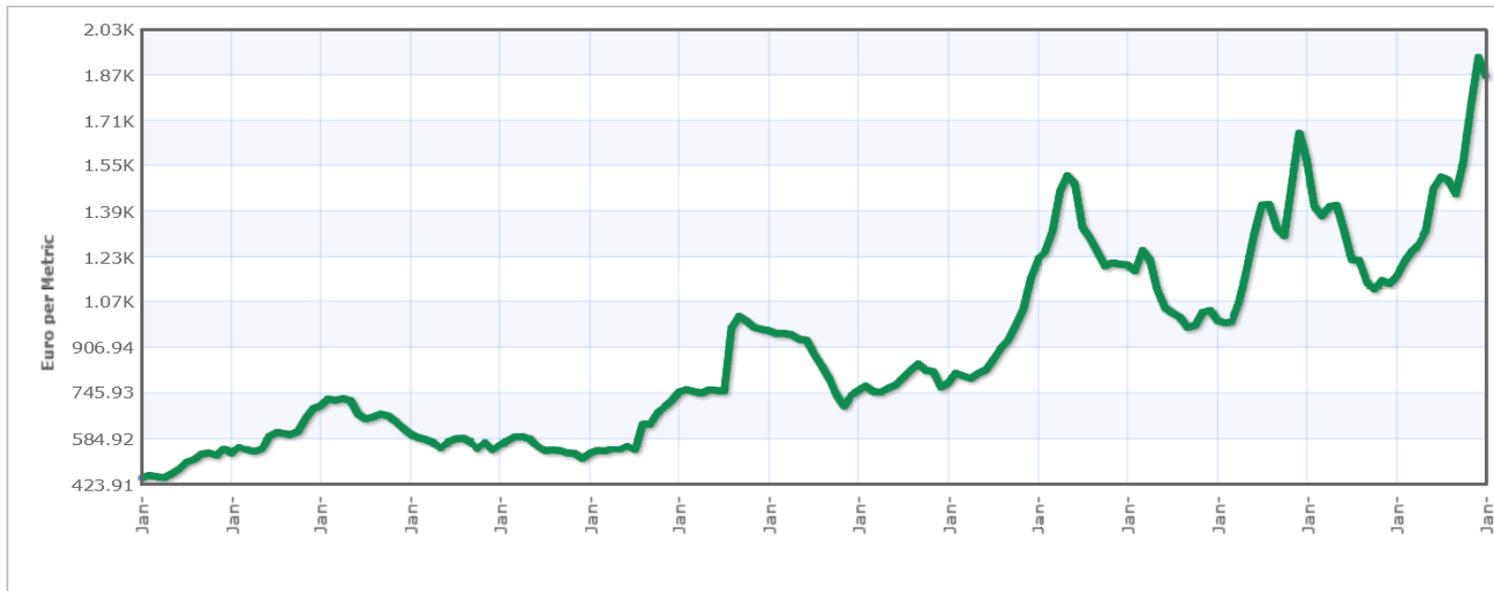
### ECONOMIC FORECASTS

Increased of demand leads to protein meal constant price rising, in particular fish meal.

Fishmeal Monthly Price - Euro per Metric Ton

Range 6m 1y 5y 10y 15y 20y

Jan 2000 - Jan 2015: 1,425.098 (319.37 %)



**Description:** Fishmeal, Peru Fish meal/pellets 65% protein, CIF, Euro per Metric Ton

**Unit:** Euro per Metric Ton

## 2. GLOBAL CHALLENGES

### GLOBAL SOLUTION – INSECTS

- Insects are part of the **staple diet of around 2,5 billion people** in large areas of the world
- Insects are an important part of the **natural diet of widely consumed animals** (e.g. trouts, poultry )



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### 3. INSECT INDUSTRY

#### PROFESSIONALIZING THE INDUSTRY



From “hobby”  
style



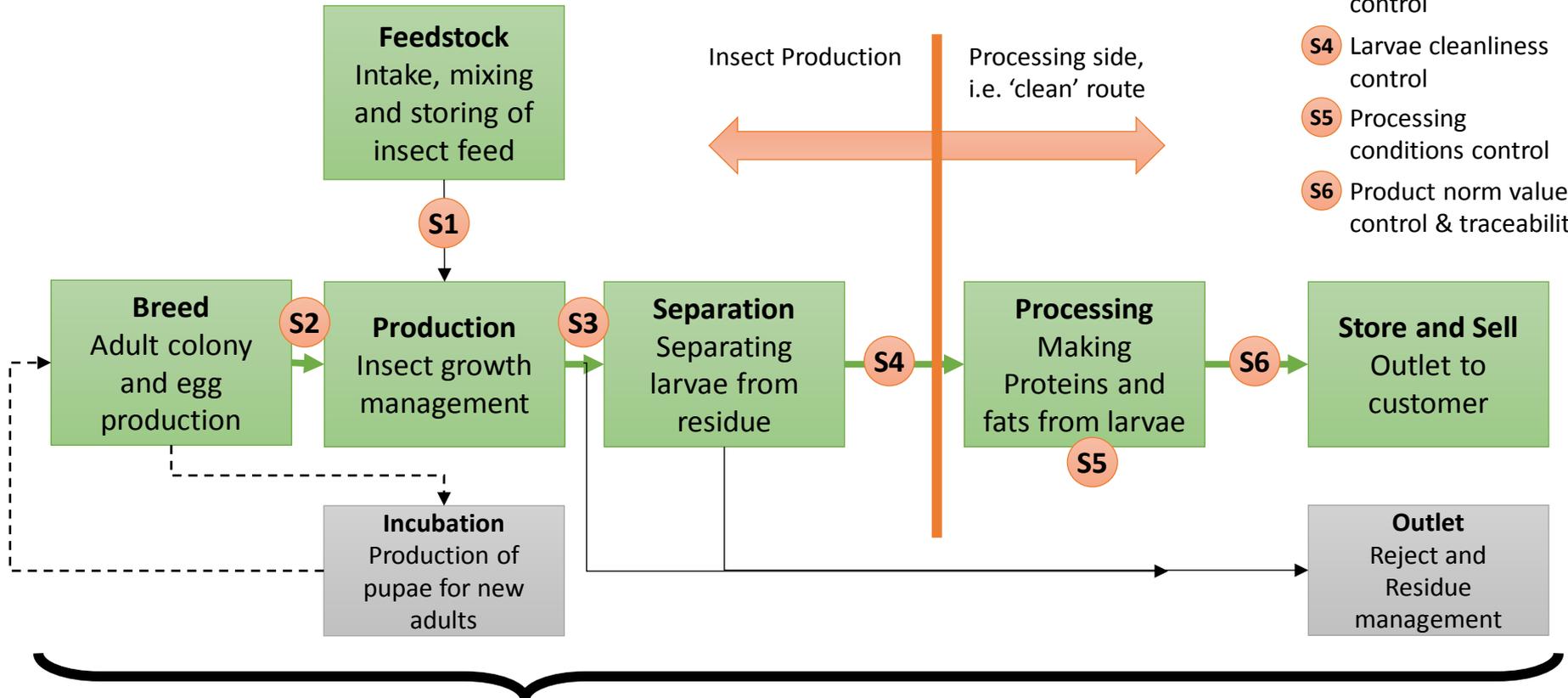
to industrial scale  
& process control

# 3. INSECT INDUSTRY



## HYGENE, HACCP AND CONTROL PRINCIPLES IN PRODUCTION PROCESS

- S1** Feedstock control & traceability
- S2** Fly escape control
- S3** Life larvae quality control
- S4** Larvae cleanliness control
- S5** Processing conditions control
- S6** Product norm value control & traceability



Tracking & Tracing principles apply to whole process and sub-processes.

**Main process**

**subprocess**



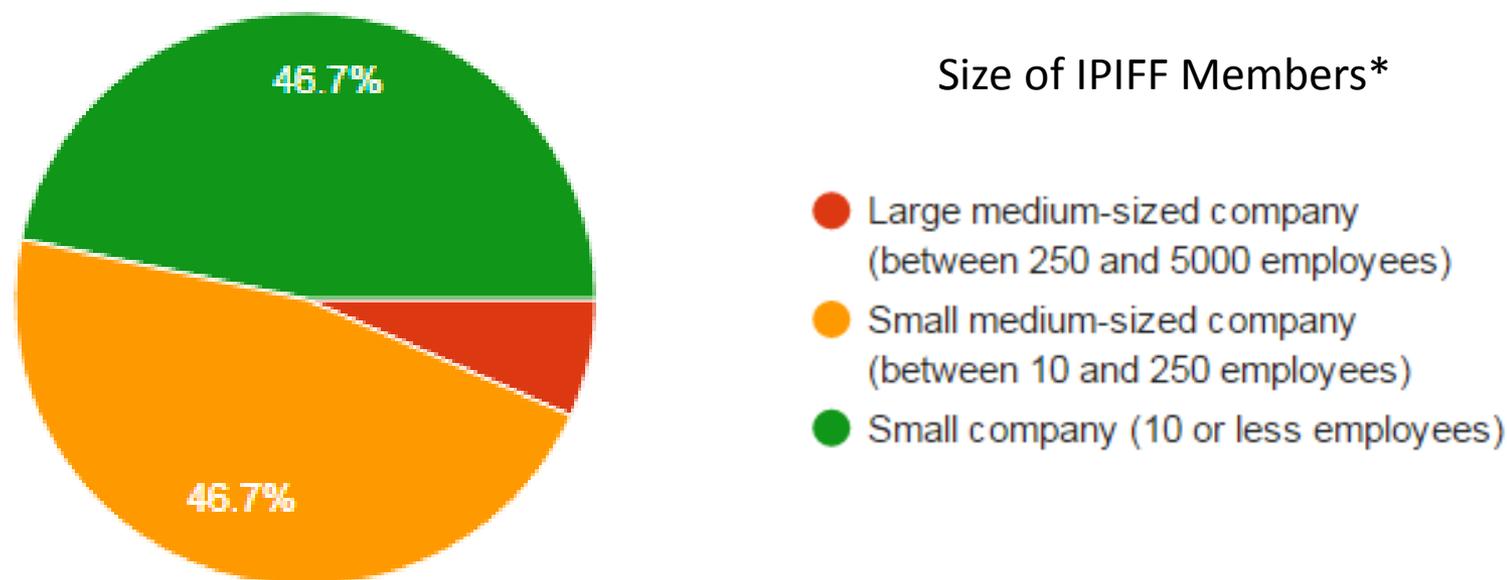
### 3. INSECT INDUSTRY

#### GENERAL OVERVIEW OF THE INSECT FARMING & PRODUCTION SECTOR (1)

- Sector exclusively composed of **SMEs & Start-up companies** with limited production capacities so far.
- Most companies are **‘exclusively’ dedicated to insect production** and fully **‘integrate’ all production steps**: from farming up to delivery of insect meal or oil.
- Potential for up scaling & **significant production volumes increase** (accessible worldwide fish feed market equivalent to 2 million tons of insect meals).

### 3. INSECT INDUSTRY

#### GENERAL OVERVIEW OF THE INSECT FARMING & PRODUCTION SECTOR (2)

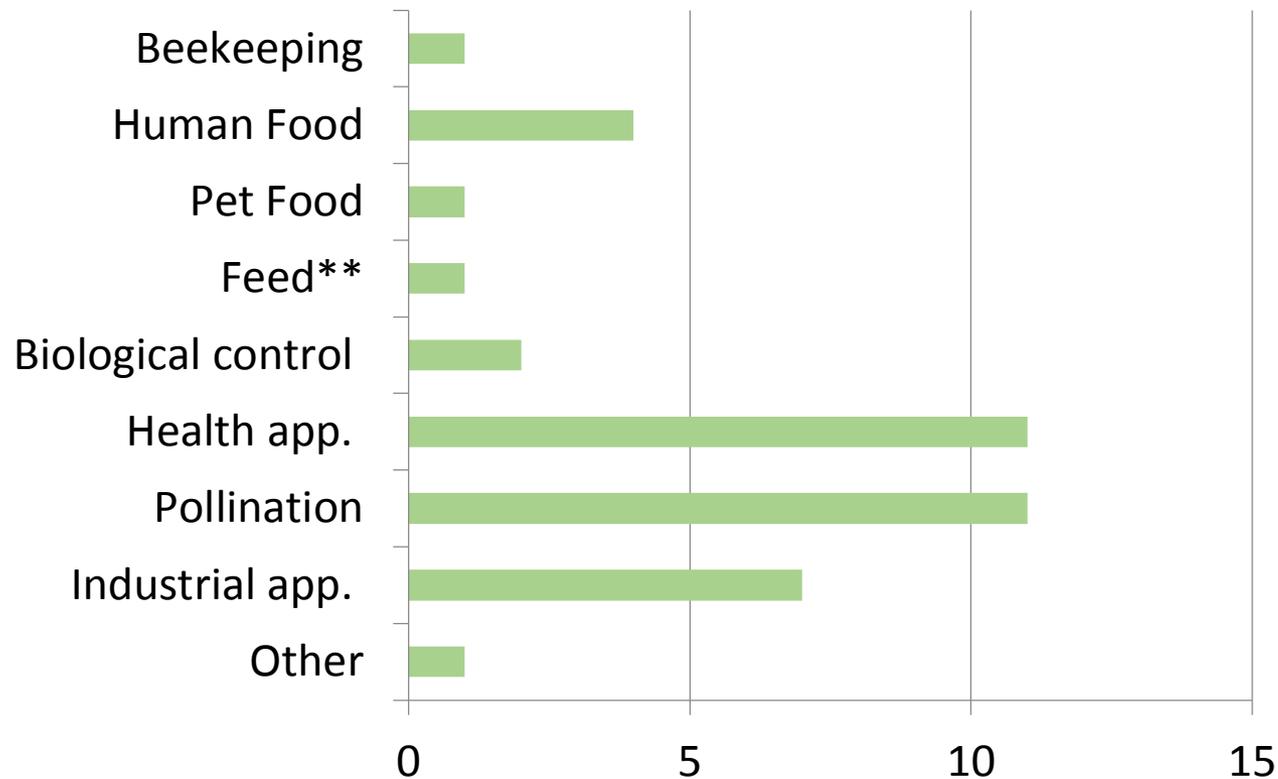


\* Source: IPIFF questionnaire: Overview of the insect professional sector & production practices

### 3. INSECT INDUSTRY

## GENERAL OVERVIEW OF THE INSECT FARMING & PRODUCTION SECTOR (3)

### IPIFF Members' core business\*



•Source: IPIFF questionnaire: Overview of the insect professional sector & production practices

•\*\* Includes data on commercial activities (e.g. insects fats) or R&D activities

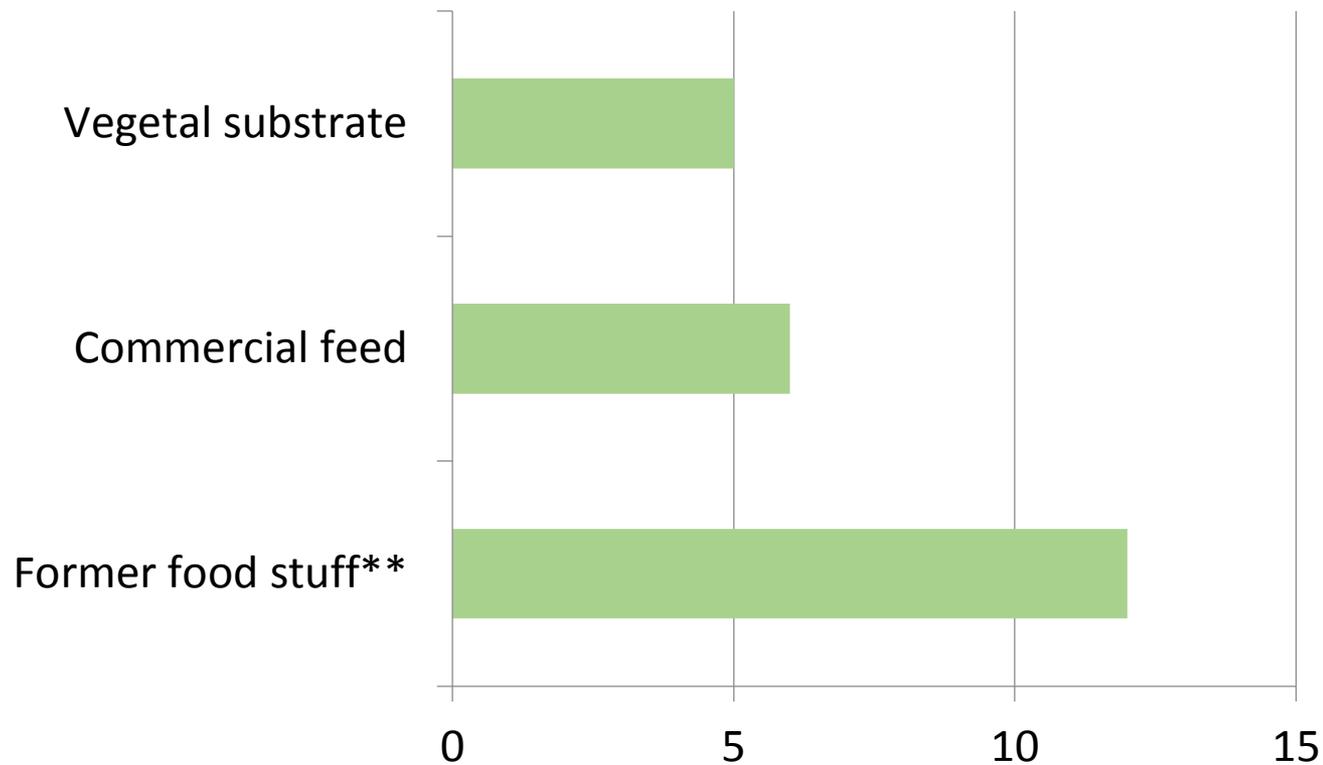
### 3. INSECT INDUSTRY

#### GENERAL OVERVIEW OF THE INSECT FARMING & PRODUCTION SECTOR (4)

- Operators engaged in **‘commercial activities’** (e.g. PIPs for pet food & fats for pigs & poultry markets) but also producing for **R&D purposes** (lab- and pilot-scale).
- **BSF, Mealworm or lesser mealworm** are among the most promising insect species for commercialization as feed.
- Operators using **exclusively vegetal substrates** for commercial production of animal feed.
- **First sales have started** in Europe this year (i.e. proteins in pet food, fat in poultry)

## GENERAL OVERVIEW OF THE INSECT FARMING & PRODUCTION SECTOR (5)

### Growing substrate used by IPIFF Members\*



\*Source: IPIFF questionnaire: Overview of the insect professional sector & production practices

\*\* Containing food originating from vegetal plus dairy and eggs

1. Global challenges
2. Introducing IPIFF
3. Insect Industry

## **4. Commercial potential of Insect products**

## 4. COMMERCIAL POTENTIAL OF INSECT PRODUCTS FOR ANIMAL FEED



CURRENT MAIN PRODUCTS INCLUDE PROTEIN MEAL AND INSECT OIL



### GENERAL FIGURES

- Insects represent **up to 70%** of natural trout diet
- On average, insects can convert **2 kg of feed into 1 kg of insect mass**, whereas cattle requires 8 kg of feed to produce 1 kg of body weight gain
- **Protein** levels in insect meals vary **between 55% & 75%** (levels comparable to animal proteins - i.e. meat and bone meal - and fish meal sources)
- Feed incorporation rates range **betw. 5 % and 40% for aqua & broilers feed**

### DATA SHEET INSECT MEAL – AVERAGE VALUES FOR SEVERAL SPECIES (1)

#### *Hermetia Illucens meal*

Properties	Total %
Crude Protein	50-65
Fat	10- 20
Fiber	8-15
Ash	0-10
Moisture	5-15
Caloric value	400- 500 kcal/100g
Energy value	1750 - 2000 KJ/100g
<b>Amino acid</b>	
Lysine	1,5 – 2
Methionine	0,75-1
Cystine	0,25- 0,5

### DATA SHEET INSECT MEAL – AVERAGE VALUES FOR SEVERAL SPECIES (2)

#### *Tenebrio Molitor meal*

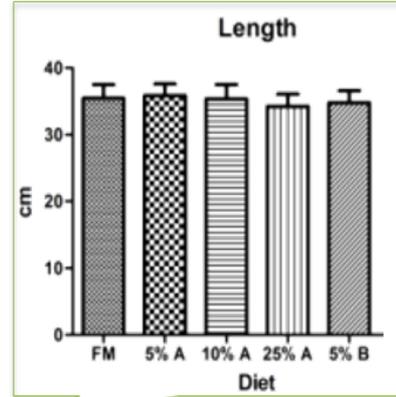
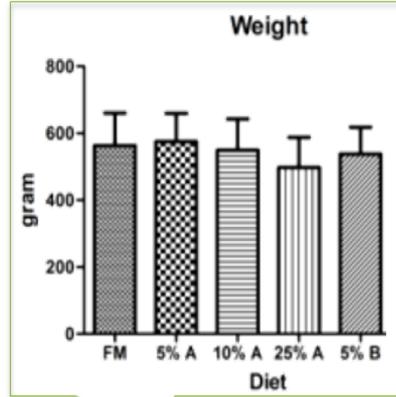
Properties	Total %
Crude Protein	65-75
Fat	10-15
Fiber	5-10
Ash	0-5
Moisture	10-15
Caloric value	2250 - 2500 KJ/kg
<b>Amino acid</b>	
Lysine	3– 3,5
Methionine	0,75-1
Cysteine	0,5 -1

# 4. COMMERCIAL POTENTIAL OF INSECT PRODUCTS FOR ANIMAL FEED



## EXAMPLES OF TEST RESULTS

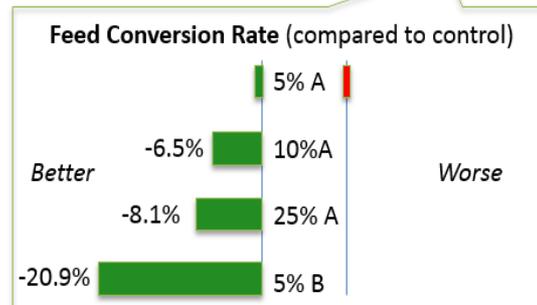
Fishmeal can be replaced in Atlantic salmon diets between 50-100% without negative impact on end-weight or taste, texture and odor of the meat. FCR improved at every insect meal inclusion level.



	End results (after 3 months)						
	Weight		Length		Gain fish (g)	Feed eaten (g)	FCR
Control	563	100%	35	100%	23394	29079	1.24
5% A	575	102%	36	103%	26667	32973	1.24
10% A	549	98%	35	100%	25912	29948	1.16
25% A	498	88%	34	97%	21355	24361	1.14
5% B	525	93%	35	100%	16630	16290	0.98



← 50% fishmeal replacement  
← 100% fishmeal replacement



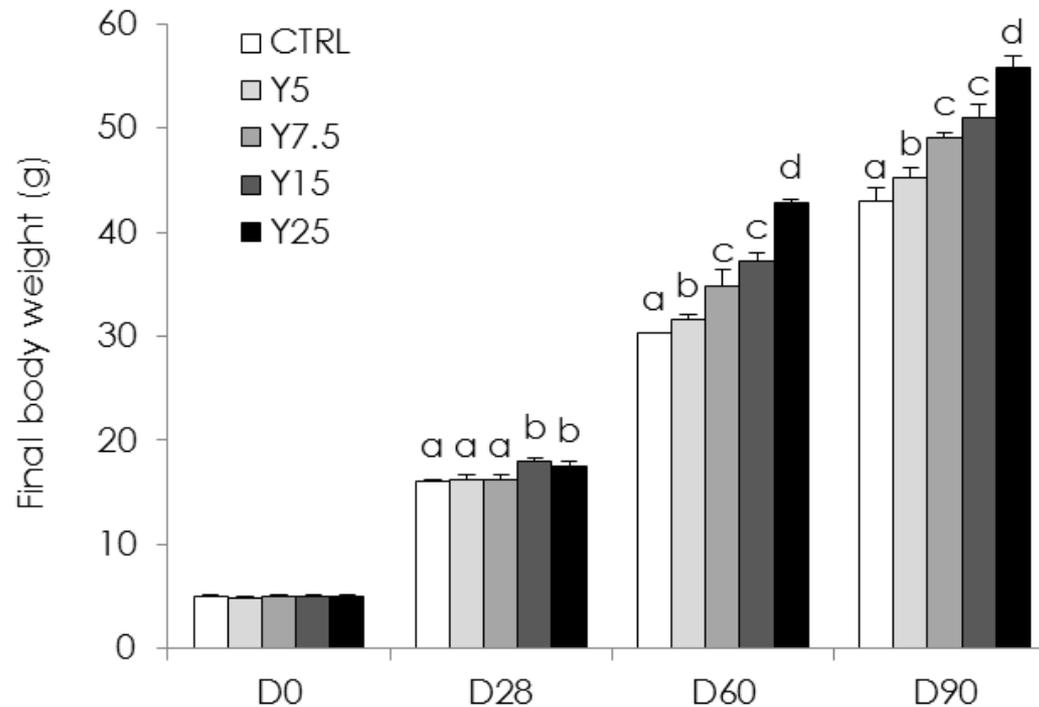
## 4. COMMERCIAL POTENTIAL OF INSECT PRODUCTS FOR ANIMAL FEED



### FEED FORMULATION

Ingredients, %	CTRL	Y5	Y7.5	Y15	Y25
Fishmeal LT70	25.00	20.00	17.50	10.00	
Krill meal	3.00	3.00	3.00	3.00	3.00
Squid meal	5.00	5.00	5.00	5.00	5.00
Ynsect meal: TMP-Y465		5.00	7.50	15.00	25.00
Soy protein concentrate	14.00	14.00	14.00	14.00	14.00
Wheat gluten	9.05	9.25	9.40	9.65	10.10
Corn gluten	8.20	8.20	8.20	8.20	8.20
Soybean meal 48	7.50	7.50	7.50	7.50	7.50
Whole peas	6.15	5.75	5.40	4.75	3.70
Fish oil	11.50	11.50	11.50	11.50	11.50
Rapeseed oil	6.00	5.80	5.70	5.40	5.00
Vitamin & Mineral premix	1.50	1.50	1.50	1.50	1.50
Soy lecithin	1.00	1.00	1.00	1.00	1.00
Guar gum	0.20	0.20	0.20	0.20	0.20
Antioxidant	0.20	0.20	0.20	0.20	0.20
Sodium propionate	0.10	0.10	0.10	0.10	0.10
DL-Methionine	0.30	0.30	0.30	0.40	0.50
<b>Proximate composition</b>					
Dry matter (DM), %	93.4 ± 0.0	93.1 ± 0.0	93.2 ± 0.1	95.0 ± 0.0	93.2 ± 0.0
Crude protein, %DM	48.5 ± 0.0	48.5 ± 0.1	48.5 ± 0.0	48.5 ± 0.0	48.5 ± 0.1
Crude fat, %DM	22.7 ± 0.2	22.7 ± 0.1	22.6 ± 0.2	22.7 ± 0.2	22.7 ± 0.2
Ash, %DM	9.4 ± 0.0	8.8 ± 0.0	8.7 ± 0.1	8.1 ± 0.0	7.4 ± 0.0
Total phosphorus, %DM	1.4 ± 0.0	1.4 ± 0.0	1.4 ± 0.0	1.4 ± 0.0	1.4 ± 0.0
Gross energy, MJ/kg DM	23.2 ± 0.2	23.2 ± 0.0	23.2 ± 0.0	23.2 ± 0.1	23.2 ± 0.1

## RESULTS: GROWTH PERFORMANCE



**Strong influence of TMP-Y465 on growth performance**  
**30 % of weight gain in comparison of Fish meal**

Bars are means  $\pm$  standard deviation (n = 3)  
Bars different superscripts differ significantly (P<0,05)

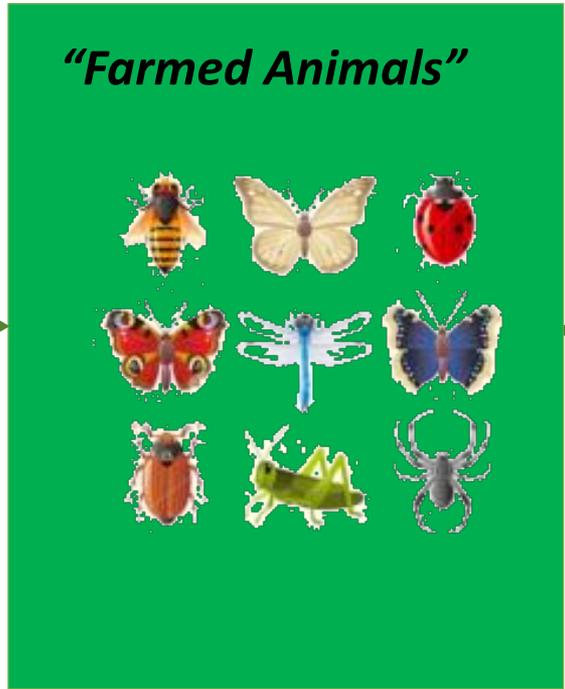


# 4. COMMERCIAL POTENTIAL OF INSECT PRODUCTS FOR ANIMAL FEED – REGULATORY ASPECTS

## Feed stocks

- ✓ Vegetal origin
  - ✓ Former Foodstuffs incl. dairy and eggs
  - ✗ Former Foodstuffs incl. meat and fish
  - ✗ Slaughterhouse products
  - ✗ Catering waste
  - ✗ Animal faeces
  - ✗ ...Others
- 1069/2009**  
**767/2009**

## Insect production



## Target species

	<i>Protein*</i>	<i>Fat</i>
	✓	✓
	✗	✓
	✗	✓
	✗	✓

**999/2001**

Not yet allowed to be fed to fish (whereas poultry & pig protein meal are) "slaughterhouse requirement" for insects

\* Non-hydrolysed protein (if classified "hydrolysed", all markets would be allowed)

# 4. COMMERCIAL POTENTIAL OF INSECT PRODUCTS FOR FOOD CONSUMPTION

## 2,5 BILION PEOPLE ALREADY EATING INSECTS

- Traditionally in SE Asia, Africa and Central America
- Huge growth in demand in **Europe** and USA
- Insects as healthy food (high quality protein, unsaturated fats, vitamins and minerals)
- Natural food source (paleo)
- Commercial large scale farms in Europe (with huge investments)
- High demand high protein food (elderly, children, sick people)
- Applications: protein bars, pasta, special meals



### IMPLEMENTATION OF REGULATION 2015/2283 ON NOVEL FOOD

#### SIMPLIFICATION

- Support the establishment of a simplified & shorter EU procedure for authorisation
- Reduce administrative burden for the preparation of applications

#### COOPERATION

- Ensure a smooth transition between the 'new' and the 'old' Regulation
- Implementation of the transitional period for 'products lawfully placed on the market'.
- Facilitate possibilities for 'joined applications'

#### GUIDANCE

- Requirements for applications should take account of 'sectors specificities'
- Clarity as to implementation of the data protection rules & the scope of applications.



**THANK YOU!**

## IPIFF

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