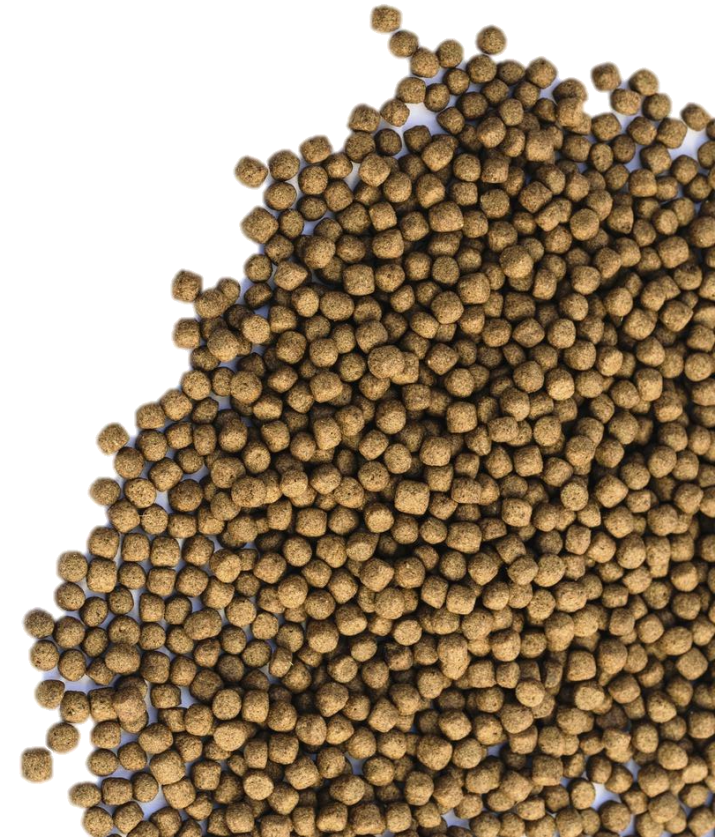


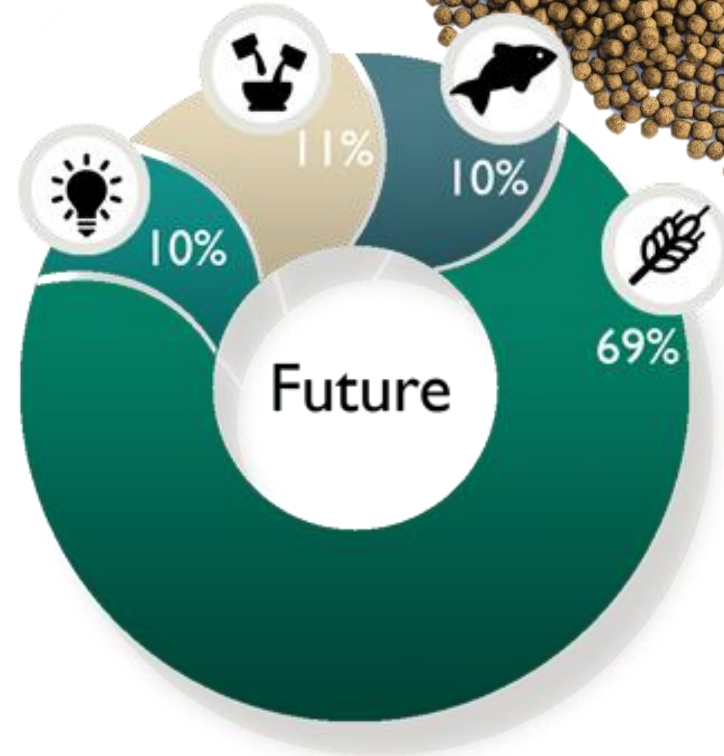
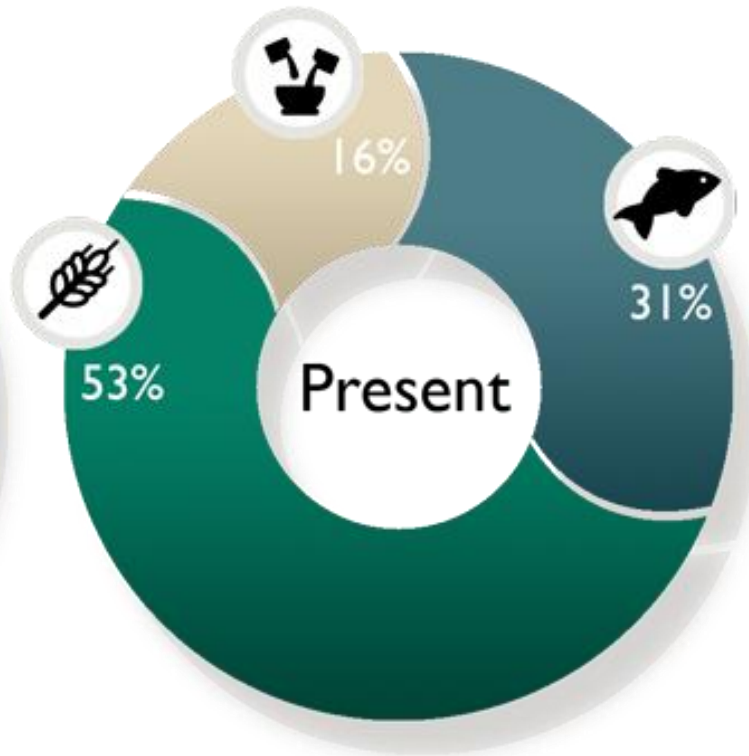
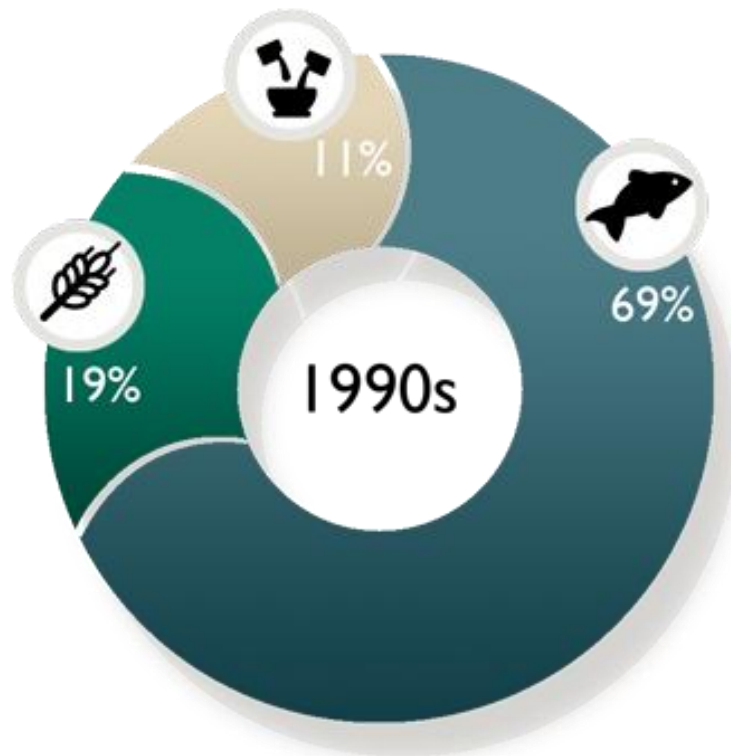
# NUTRITION and FISH HEALTH

**Enric Gisbert**










Fish Meal or Oil



Plant Protein



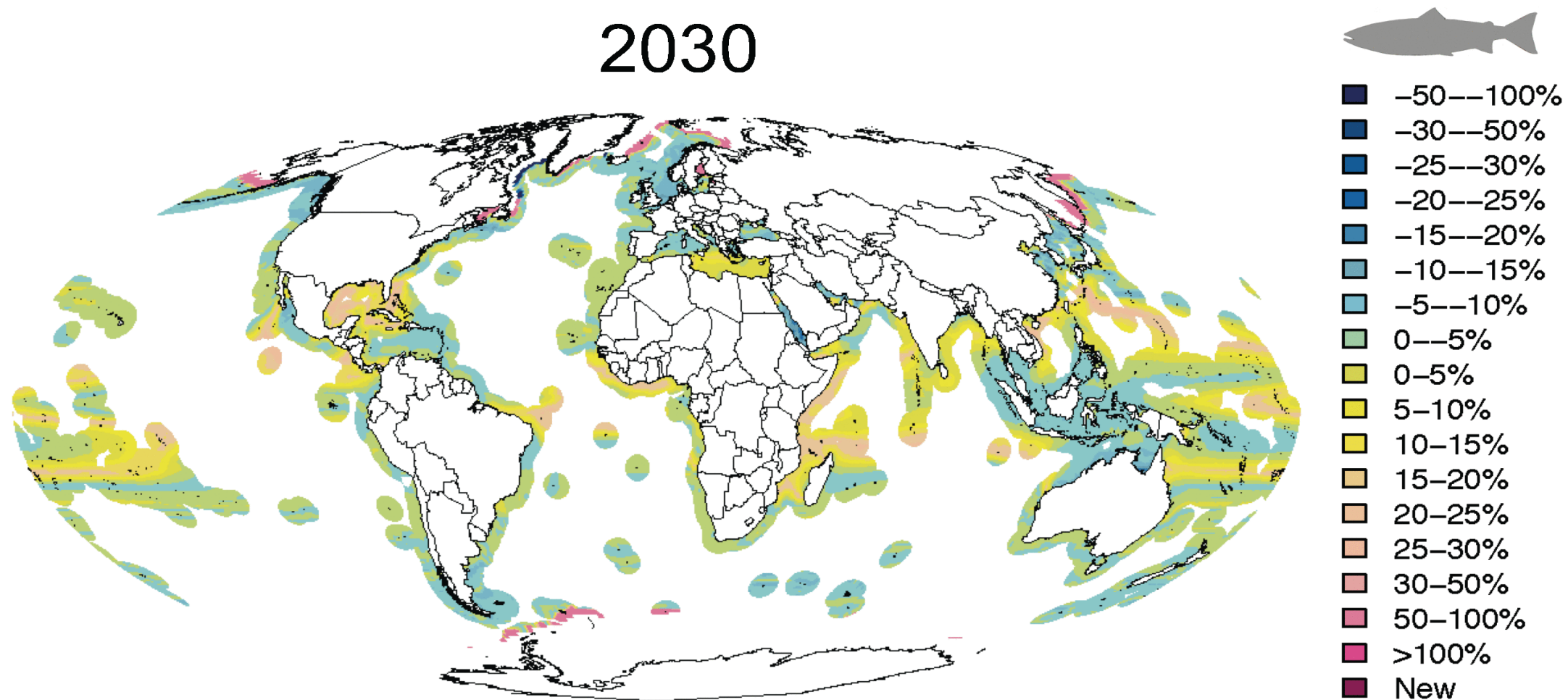
Binders/Minor Ingredients



Novel Feeding Alternatives



# 2030



H.E. Froehlich

DOI: 10.1038/s41559-018-0669-1



“Disease is the biggest risk to the industry. It undermines financing and market development and yet the industry is chronically under invested in disease management.”

# The Aquaculturists

A regular look inside the aquaculture industry

Perendale  
Publishers Ltd 

INTERNATIONAL  
**AQUA  
FEED**

[Home](#)

[International Aquafeed magazine](#)

[Interviews](#)

[AQ view](#)

[Events](#)

[Mobile](#)

[biomarine resources directory](#)

[About](#)

[Contact](#)

Sunday, October 13, 2013

## The Aquaculturists - 13/10/13: Day 1 - Disease the biggest risk to industry

Search The Aquaculturists

*International Aquafeed columnist Roy Palmer attended last week's GOAL, the Global Aquaculture Alliance's 2013 conference in Paris, France, from 7-10 October, and reports here on Day 1:*

# IRTA

RECERCA | TECNOLOGIA  
AGROALIMENTÀRIES





# IRTA

RECERCA | TECNOLOGIA  
AGROALIMENTÀRIES



# SOLUTIONS?



**Balanced diet**

**Protein levels and AA profile**  
**Arg, Trp, Met, Gln (IAA / DAA)**

**Digestible protein to energy (DP/DE)**

**Lipid levels and FA profile**  
**(PUFA n-3 & n-6)**



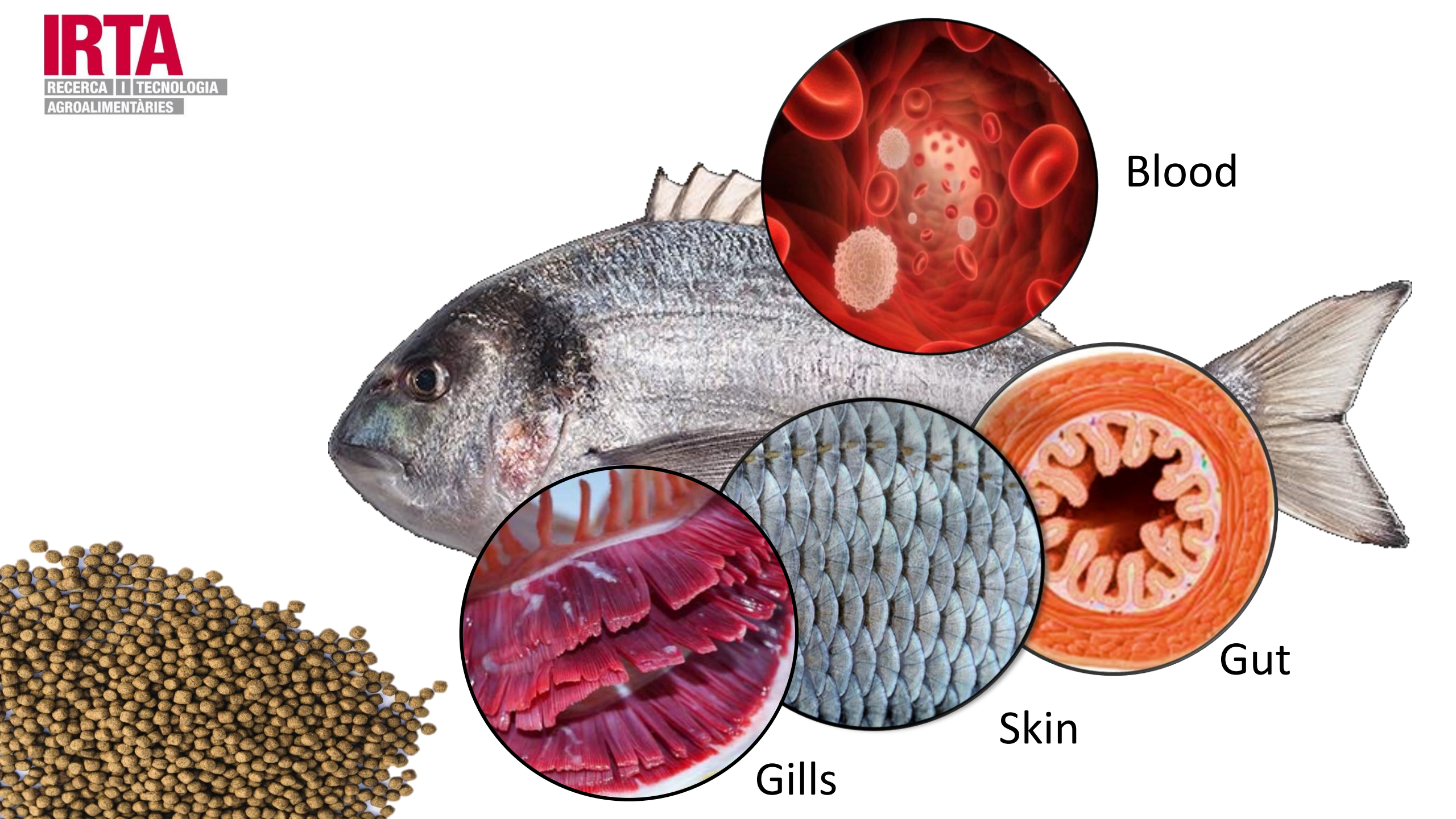
**Hidrosoluble & liposoluble vitamins**  
**(Vit. C, B family) (Vit. D, E, A, K)**

**Minerals (Ca, P)**  
**Trace Elements (I, Cu, Se, Zn, Mn)**

# SOLUTIONS?



**Functional Feeds**



Blood

Gut

Skin

Gills

# FUNCTIONAL ADDITIVES



**Amino acids: tryptophan (stress, immunity), arginine (disease resistance), glutamine, methionine (antioxidative capacity, immunity)**

**Protein hydrolysates (immunity & skeletal quality)**

# FUNCTIONAL ADDITIVES



**Probiotics (bacteria, yeast), prebiotics (inulin, FOS, MOS), symbiotics**

**Immunostimulants ( $\beta$ -glucans, nucleotides, lactoferrin)**

**Organic acids (formic, propionic, butyric, benzoic, fumaric acids)**

**Phytochemicals (essential oils, herbs and spices)**

# NUTRITIONAL AND SENSORY (ZOOTECHNICAL) ADDITIVES

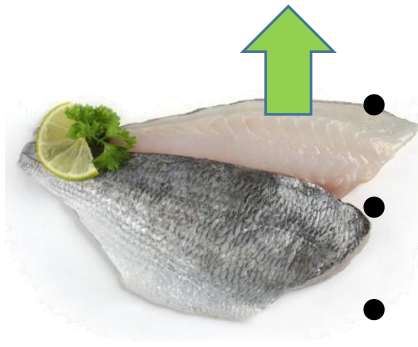


**Protein hydrolysates, amino acids, herbal extracts, essential oils...**





- Growth
- Welfare
- Robustness



- Fillet quality
- Nutritional value
- Shelf life



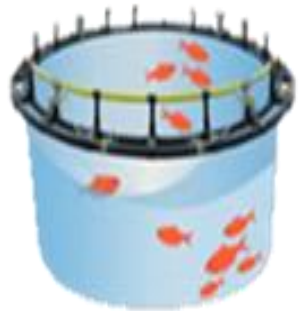
- Mortality
- Morbidity



- Stress tolerance / reduction



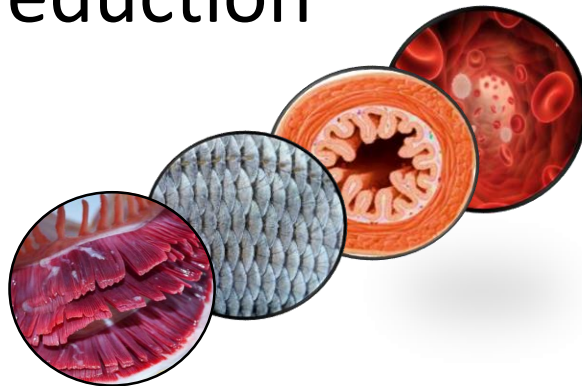
- Biomass



- Immunity



- Gut condition



- Size distribution
- FCR
- Use of facilities



Food and Agriculture  
Organization of the  
United Nations

## THE FAO ACTION PLAN ON ANTIMICROBIAL RESISTANCE 2016-2020

Supporting the food and agriculture sectors  
in implementing the Global Action Plan on  
Antimicrobial Resistance to minimize  
the impact of antimicrobial resistance



**1** NO POVERTY



**2** ZERO HUNGER



**3** GOOD HEALTH AND WELL-BEING



**4** QUALITY EDUCATION



**5** GENDER EQUALITY



**6** CLEAN WATER AND SANITATION



**7** AFFORDABLE AND CLEAN ENERGY



**8** DECENT WORK AND ECONOMIC GROWTH



**9** INDUSTRY, INNOVATION AND INFRASTRUCTURE



**10** REDUCED INEQUALITIES



**11** SUSTAINABLE CITIES AND COMMUNITIES



**12** RESPONSIBLE CONSUMPTION AND PRODUCTION



**13** CLIMATE ACTION



**14** LIFE BELOW WATER



**15** LIFE ON LAND



**16** PEACE, JUSTICE AND STRONG INSTITUTIONS



**17** PARTNERSHIPS FOR THE GOALS



**SUSTAINABLE DEVELOPMENT GOALS**

**Thanks for your attention**