



**10th International Conference on
Sustainable Solid Waste Management**

Optimization and scaling up bioactive peptides production from fish discards

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22th June 2023 – CHANIA (Greece)



MEMBER OF
BASQUE RESEARCH
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Optimal utilization of seafood side-streams through the design of new holistic process lines



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Bio-based Industries
Consortium

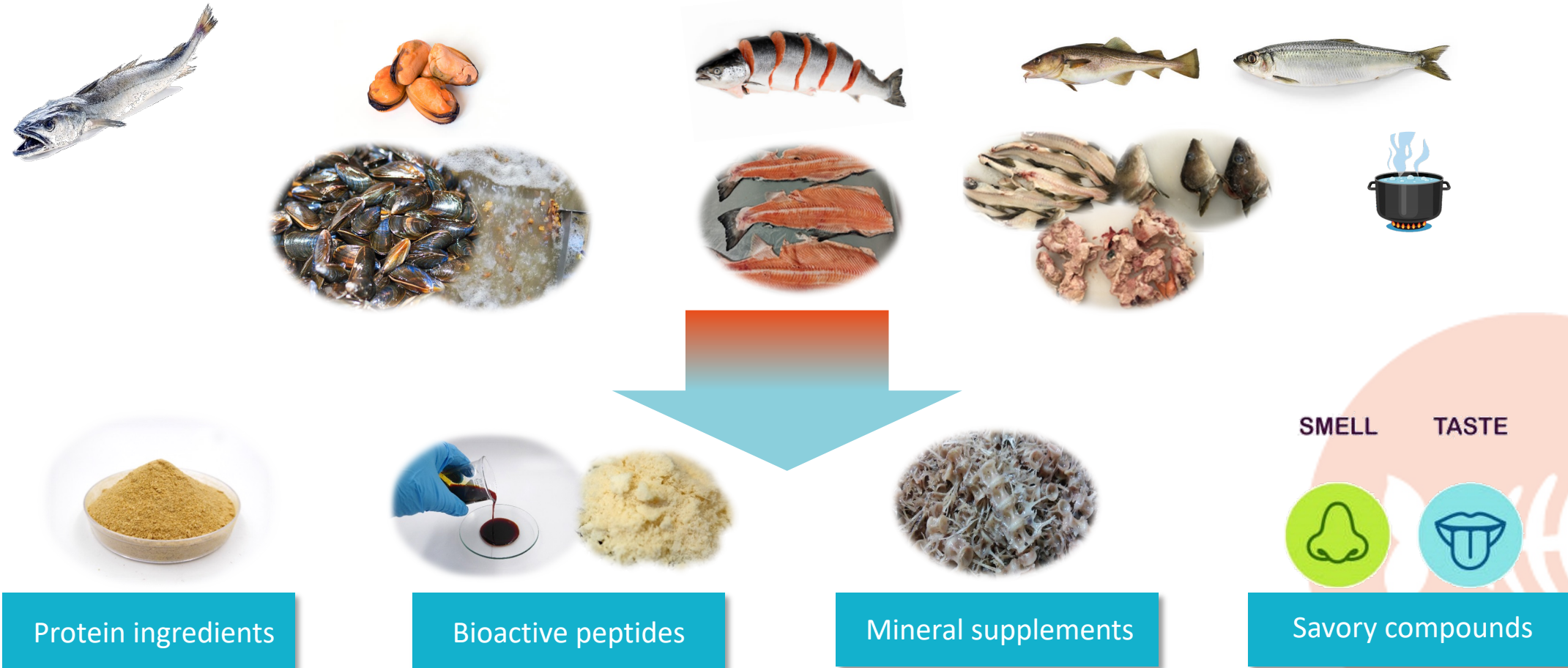


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FROM SIDE-STREAMS TO PRODUCTS



- Up to 70 % of seafood end up as low-value products or waste
- Efficient and sustainable valorisation system of **seafood side-streams** into **MARKETABLE PRODUCTS**



- **Hake bycatches**

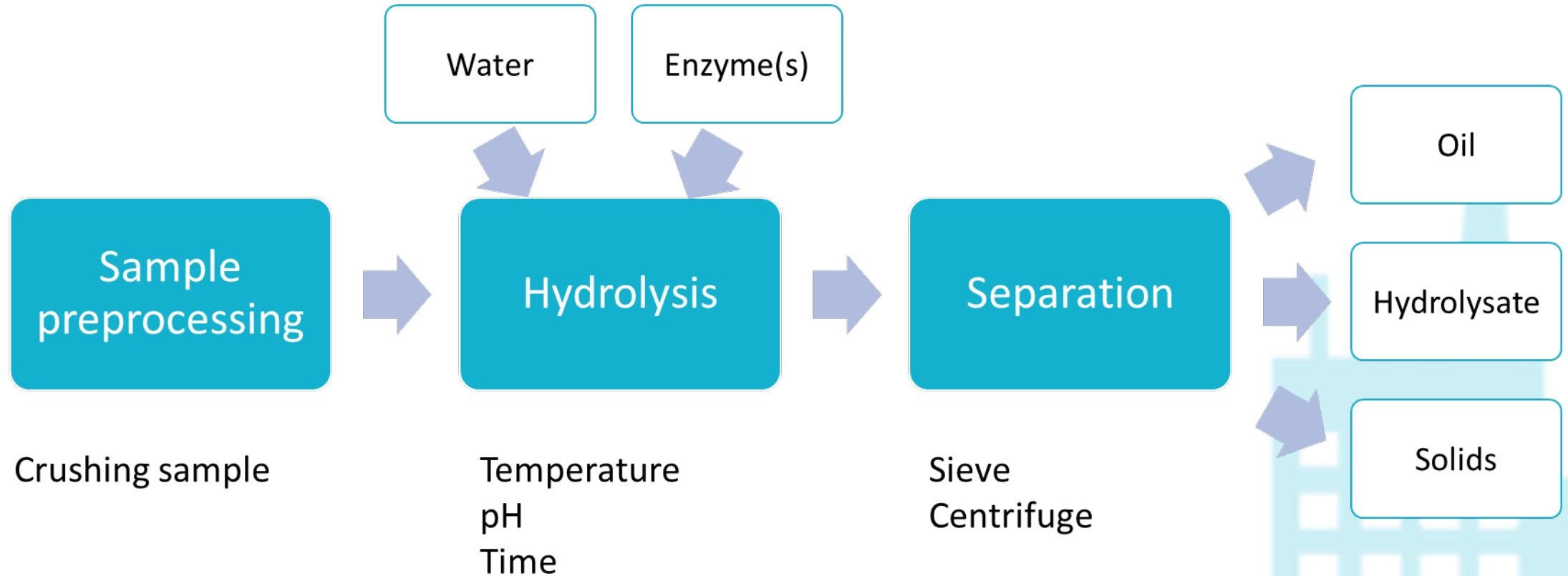
- Selected as model of fish discard in Bay of Biscay
- Account up to 30 % of hake catches (~ 1500 tn/year)
- Can not be used for direct human consumption
- Looking for valorisation options



 Bioactive peptides from hake bycatch

The process:

Enzymatic protein hydrolysis.



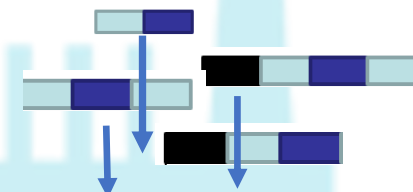
Bioactive peptides from hake bycatches

Fish protein hydrolyzates (FPH)

- Protein yield up to 70 %
- Powder or concentrated liquid product
- Protein content up to 90 % (dry matter)
- Easily digestible peptides
- Wide range of bioactivities



Enzyme(s)



Bioactivities

Antioxidant

Antihypertensive

Anticancer

Antimicrobial

Anti-inflammatory

Bone protector

Immunostimulant

Anticoagulant



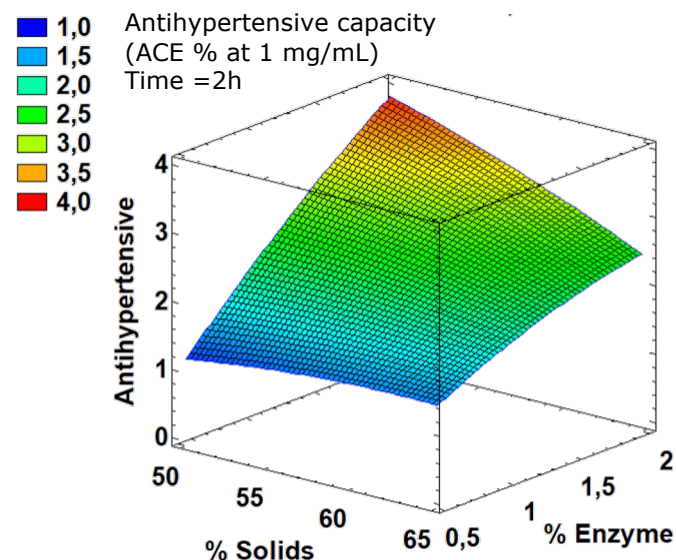
Bioactive peptides from hake bycatches



Lab scale

Optimization

Pilot scale

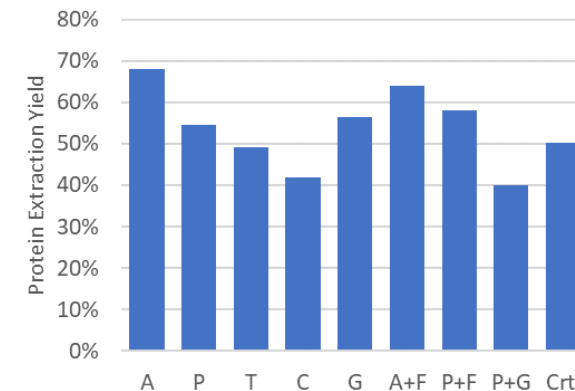
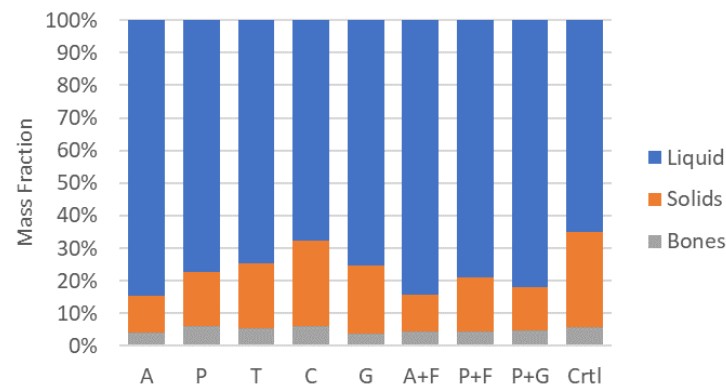


Bioactive peptides from hake bycatches

Lab scale:

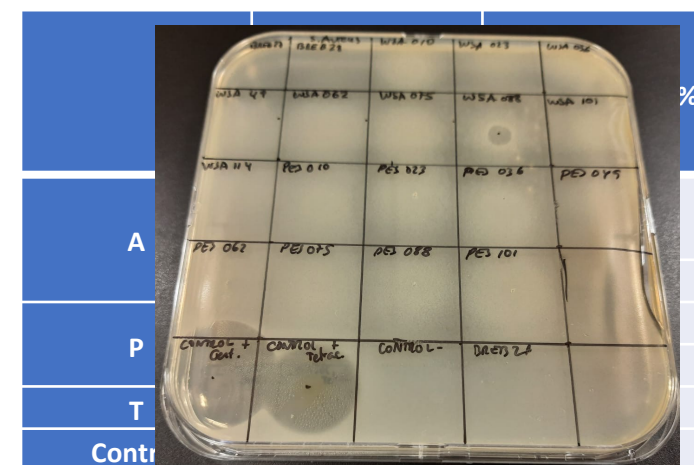
Enzyme tested

- Endo-protease of the serine type (A)
- Broad-spectrum endo-proteases (P)
- Trypsin specific protease (T)
- Chymotrypsin like protease (C)
- Glutamic acid specific protease (G)
- Blend of endo- and exo-peptidases (F)



Analysis

- Proximal analysis (Moisture, Protein, Fat, Ashes)
 - Bioactivities
 - Antioxidant
 - Antihypertensive
 - Antibacterial
- Staphylococcus aureus* (CECT 435)
Escherichia coli (CECT 516)
Salmonella enterica (CECT 415)
Aeromonas salmonicida (CECT 5173)
Bacillus subtilis (CECT 39)
Vibrio vulnificus (CECT 529)
Bacillus cereus (CECT 131)
Control : Tetracycline and Gentamicin

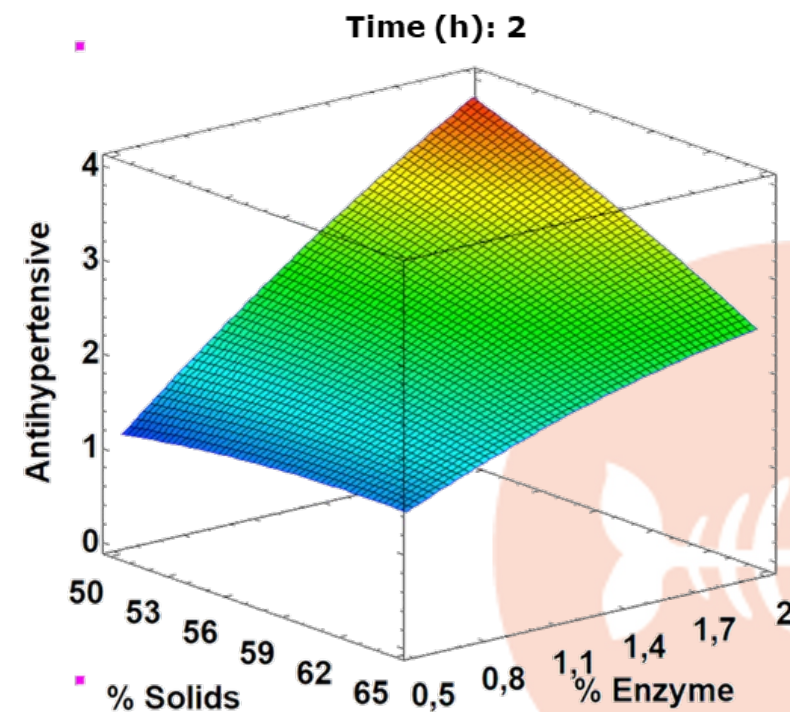
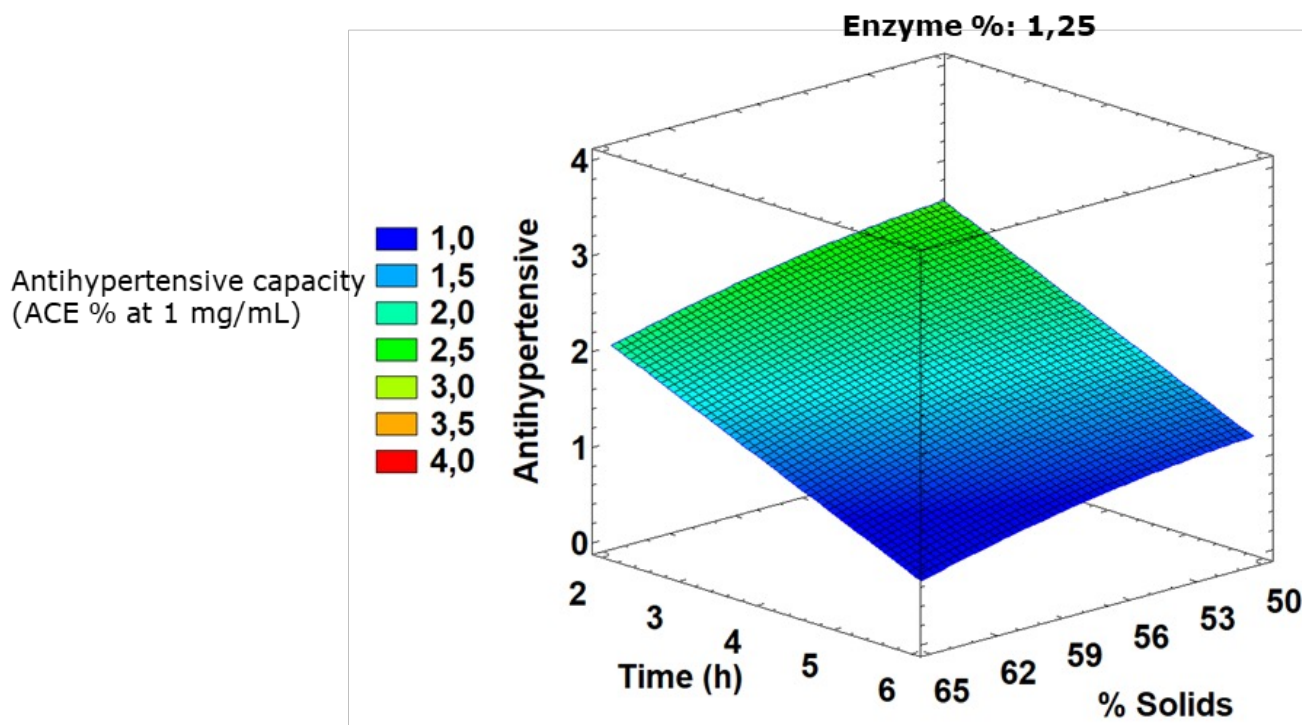


Bioactive peptides from hake bycatches



Optimization:

- Products obtained with most promising results in terms of yield and bioactivity optimized.
- Process condition optimized to maximise antihypertensive capacity.



Bioactive peptides from hake bycatches

Pilot test:



Bioactive peptides from hake bycatches

Pilot test:

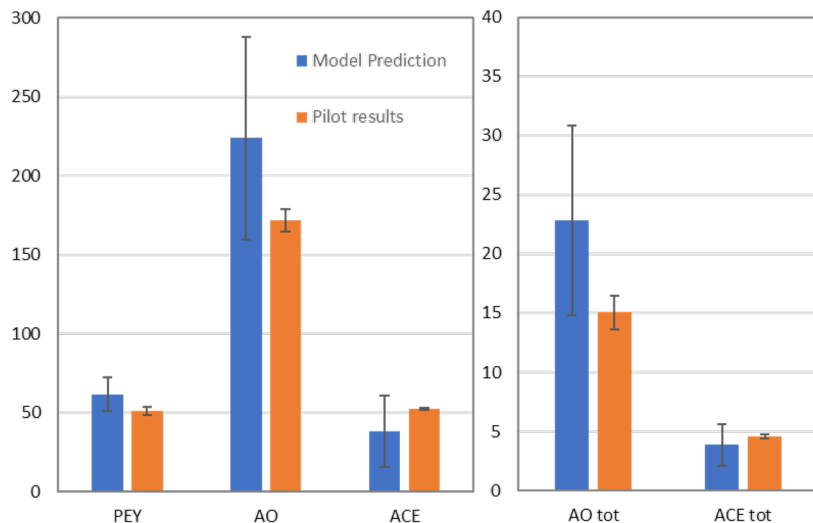
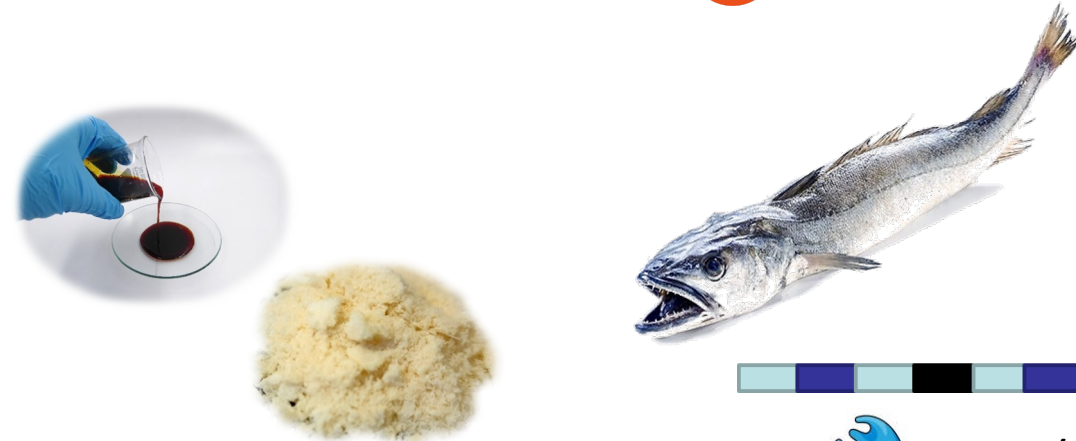


Bioactive peptides from hake bycatches

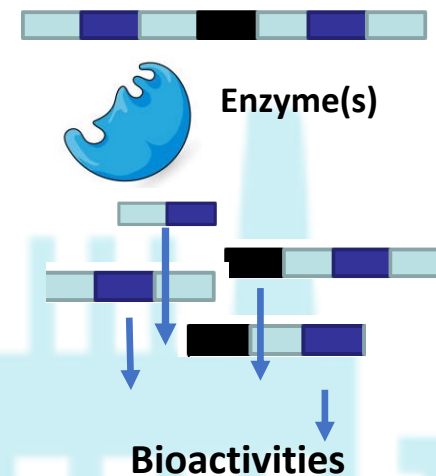


Fish protein hydrolysates

- Protein extraction yield > 50 %
- Liquid hydrolysate > 6 % protein (92 %H)
- Solid powder > 85 % protein (4 %H)
- Antioxidant and Antihypertensive capacity
 - Pilot results according to models
 - Antihypertensive capacity in the range of results reported in literature



Antioxidant
Antihypertensive



Fish protein hydrolysates

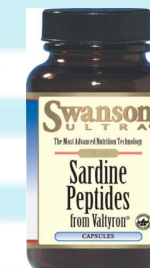
Market applications

- Supplement as health promoting properties (nutraceuticals or food supplements)
- Protein supplement in the food industry
- Most applications are in nutraceutical market
 - Antihypertensive capsules and pills

Antioxidant

Antihypertensive

Antimicrobial



Fish protein hydrolysates

Market applications

- Animal feeding (aquafeed, pet food, livestock)
 - high digestibility and bioactivity
- Suitable substitutes for antibiotics in livestock production
- Avoid resistance to conventional antibiotics

Antioxidant

Antihypertensive

Antimicrobial





Thank you! Any questions?



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