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INDUSTRIAL SYMBIOSIS TO VALORISE WASTEWATER DERIVED FROM RENDERING PLANTS FOR DIFFERENT INDUSTRIAL APPLICATIONS

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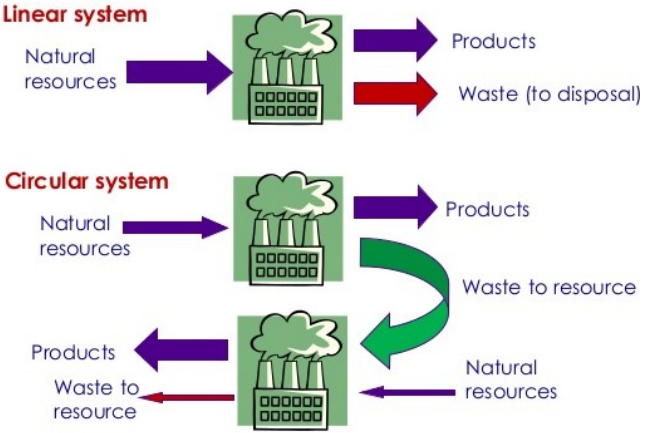
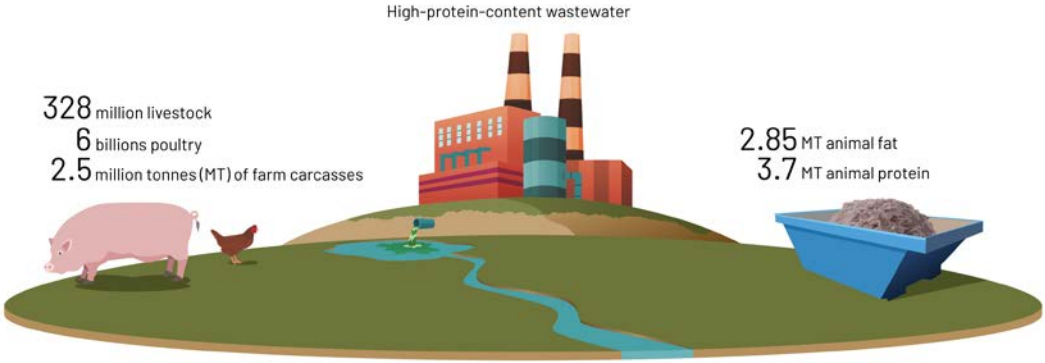
ECONOMY STRATEGIES IN THE INDUSTRY

Industrial Symbiosis Advances Sustainability



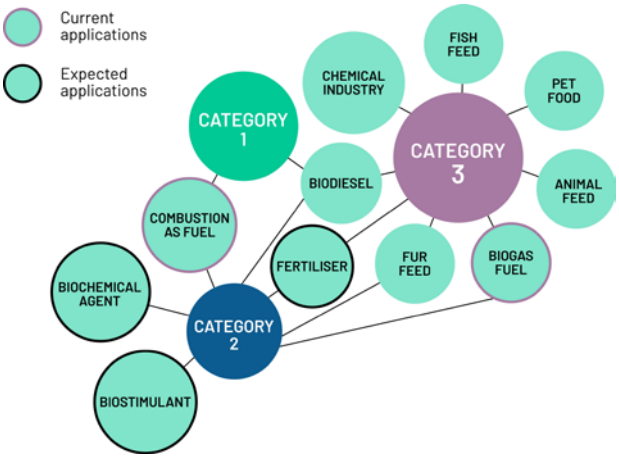
PROBLEM AND IMPACT OF THE RENDERING INDUSTRY



ABOUT **60%** of each meat producing animal becomes food **for human consumption.**

THE REMAINING **40% becomes animal by-products (ABPs)** transformed by the rendering industry into high added value products.

ANIMAL BY-PRODUCT PROPOSED SOLUTIONS



Source: EFPRA. The Facts About Rendering

BYPROTVAL

Obtaining bioproducts from the valorisation of animal by-products cat 2 and 3

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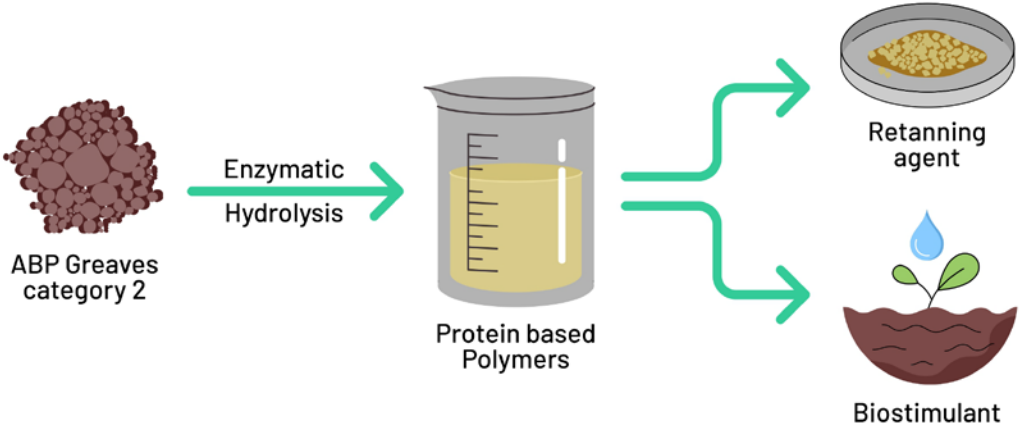
CENTRO TECNOLÓGICO DEL CALZADO

Energygreen Gas Almazan S.L.

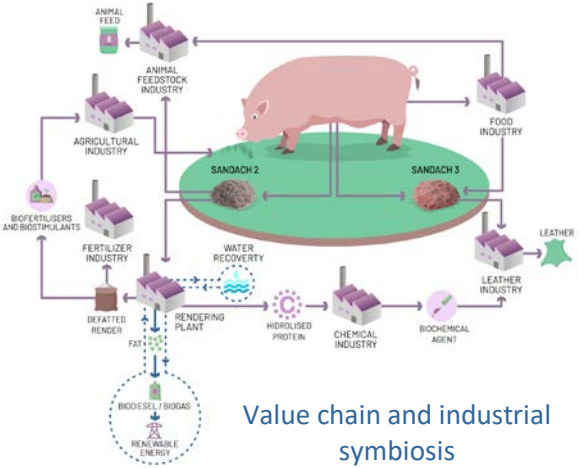
Trumpler
Creamos buena química

Otivar


ABP Greaves category 2
Enzymatic
Hydrolysis
Protein based Polymers
Retanning agent
Biostimulant

BIOECONOMY

Substitution of inorganic fertilisers (NPK)



Value chain and industrial symbiosis

Substitution of synthetic retanning agents

RAW MATERIALS

Wastewater cat 3

OTIVAR

ABP cat 2 (PAP-1)

Regulation (EC) No 1069/2009, transformation method 1

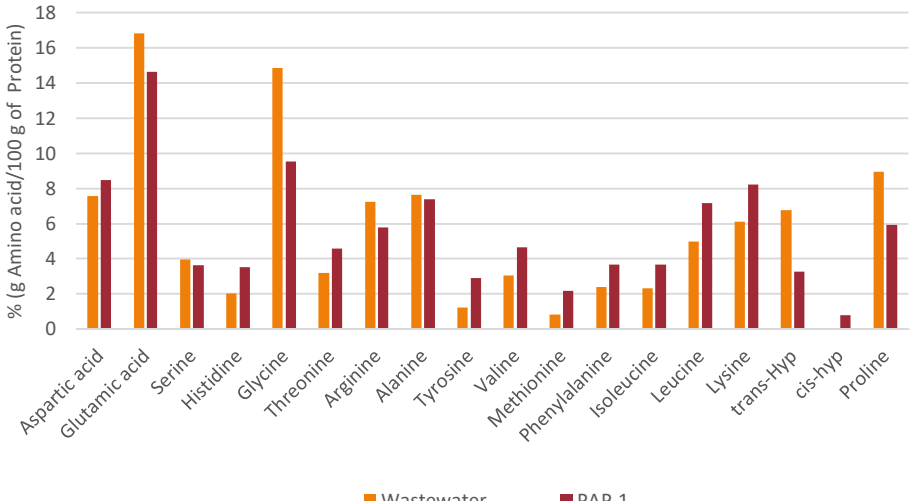
EGA

WHERE SOME SEE WASTE, byProtVAL SEE RESOURCES

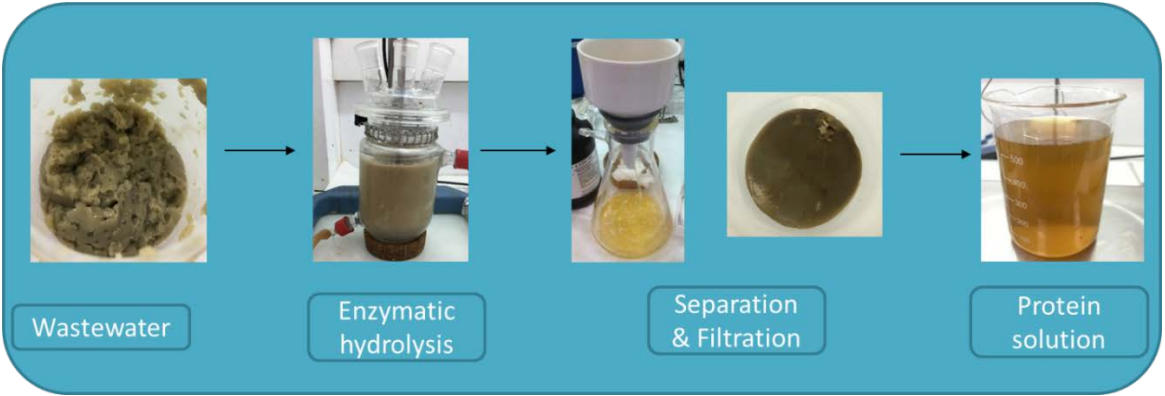
RAW MATERIALS CHARACTERISATION

Parameters	Wastewater cat 3	PAP-1 Cat 2
pH	6.29	6.48
Solids content (%)	19.49	91.49
Moisture (%)	80.51	1.5
Fat content (%in dry matter)	35.44	39.95
Ash content (%in dry matter)	6.84	7.7
Total aminoacids content (% in dry matter)	40.31	43.84

RAW MATERIALS CHARACTERISATION

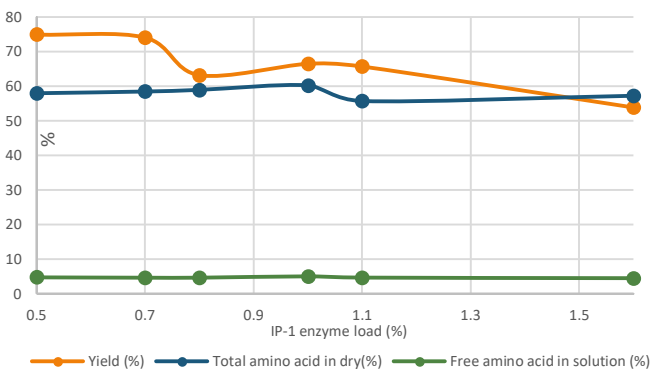


PROPOSED STRATEGY FOR PROTEIN RECOVERY FROM WASTEWATER CAT 3

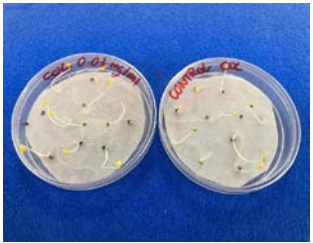


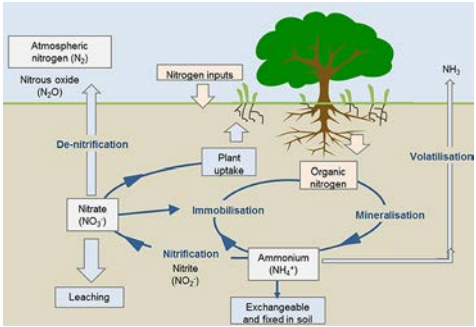
OPTIMISATION OF ENZYME LOADING TO OBTAIN BIOSTIMULANT FROM WASTEWATER

IP-2 (%)	t (h)	Yield (%)	Total amino acid (%)	Protein recovery (%)	Free amino acid solution (%)
0.5	6	74.91	57.98	94.85	4.79
0.7	6	74.04	58.47	94.55	4.70
0.8	6	63.20	58.96	97.22	4.70
1	6	66.49	60.72	87.50	5.09
1.1	6	65.69	55.73	96.26	4.72
1.6	6	53.86	57.25	67.34	4.56
0.8	4	73.27	51.85	97.45	4.26
1	4	75.92	53.73	99.63	4.45

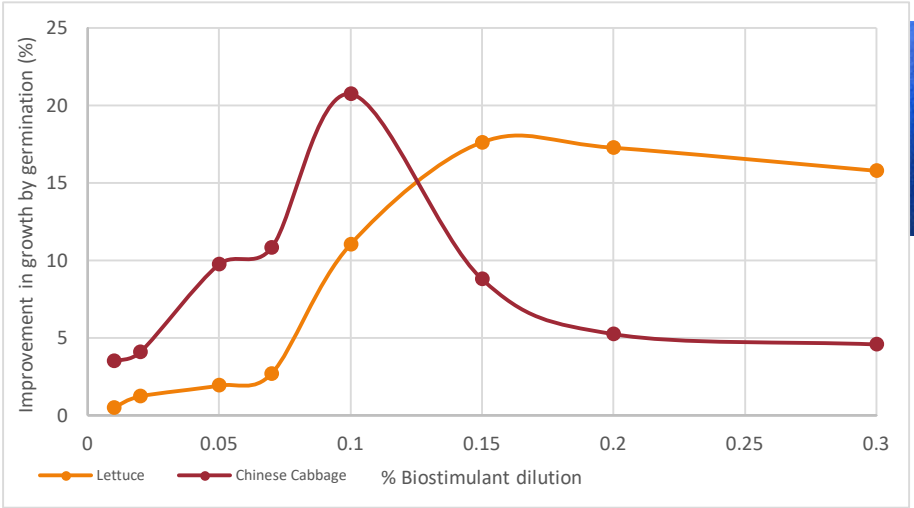


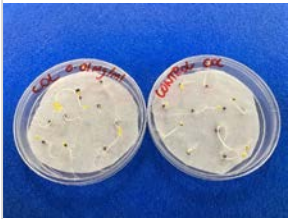
BIOSTIMULANTS



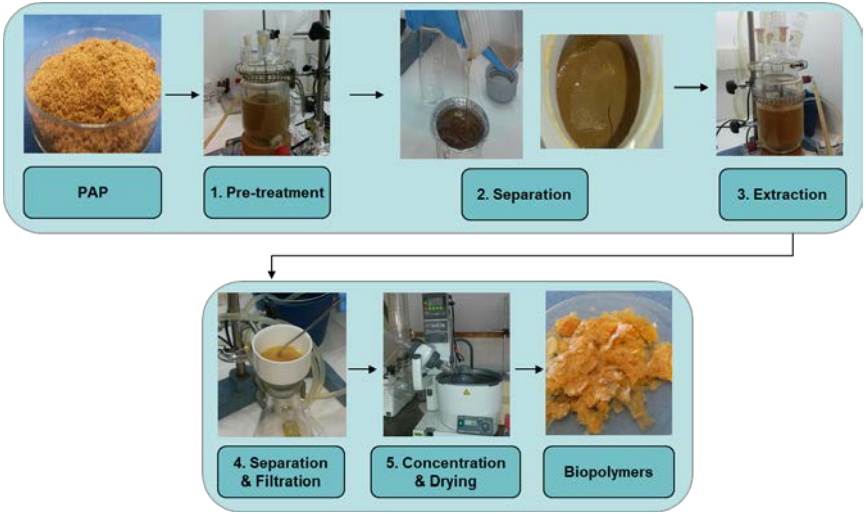


VALIDATION OF HYDROLYSED PRODUCT FROM WASTEWATER AS A BIOSTIMULANT





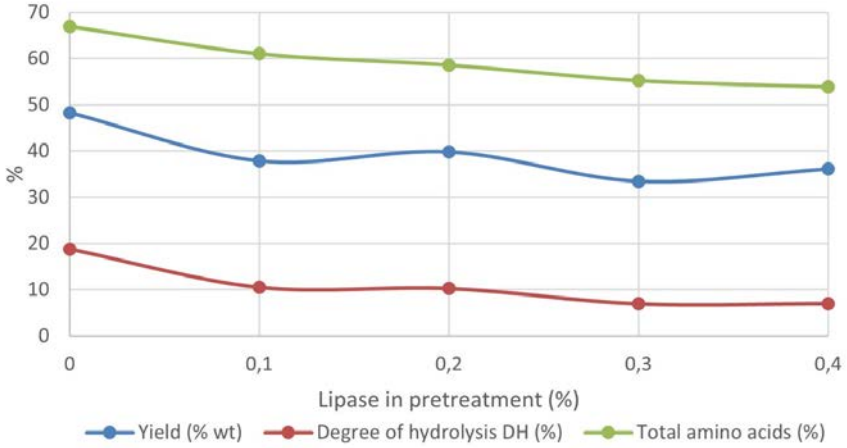
PROPOSED STRATEGY FOR PROTEIN RECOVERY FROM PAP CAT 2



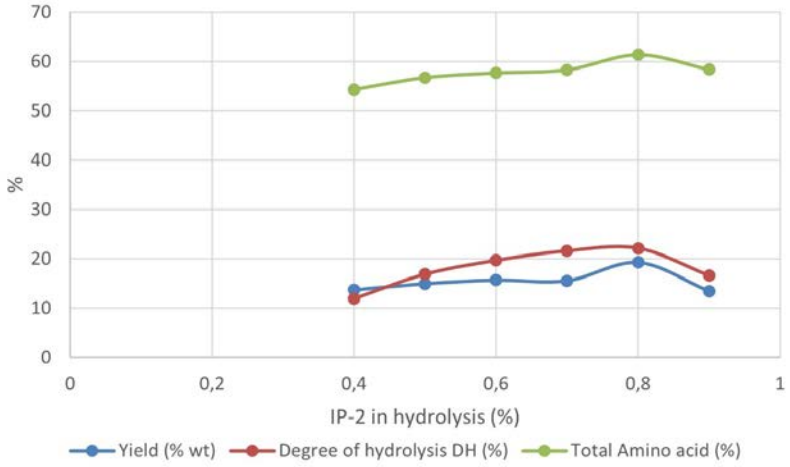
HYDROLYSIS PRETREATMENT

MECHANICAL

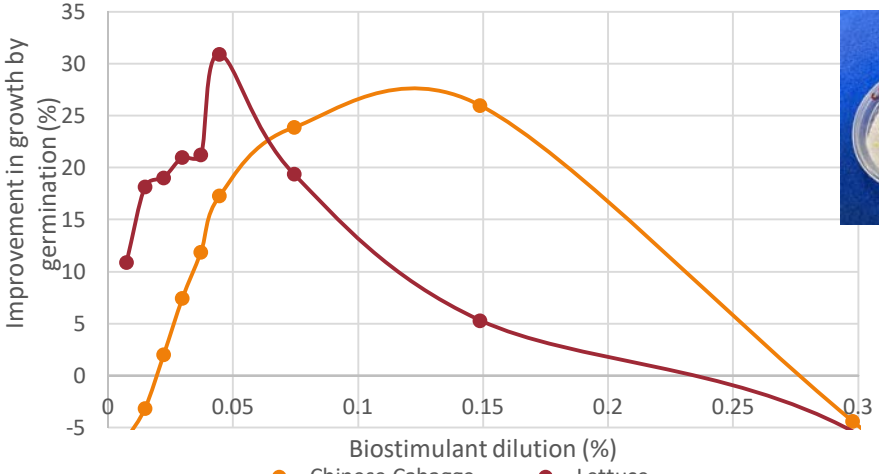
ENZYMATIC

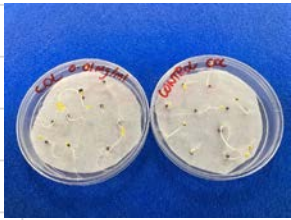


OPTIMISATION OF ENZYME LOADING TO OBTAIN COLLAGEN HYDROLYSATES FROM PAP



VALIDATION OF BIOPOLYMER BASED FREE AMINO ACIDS AS A BIOSTIMULANT





VALIDATION OF COLLAGEN HYDROLYSATE BASED BIOPOLYMER AS A RETANNING AGENT

STANDARD RETANNING AGENT

50% PROTEIN RETANNING AGENT

100% PROTEIN RETANNING AGENT

- **Sustainable approach** for the chemical industry (e.g. bio-content).
- Added-value through **functionalization of biowaste recoveries** and resource efficient procedures.
- **Reducing dependence** on imported chemicals.
- **Enabling product circularity.**
- Relatively **low carbon footprint** contributing to reduce PEF.

VALIDATION OF COLLAGEN HYDROLYSATE BASED BIOPOLYMER AS A RETANNING AGENT

lifesuperbiodiesel.eu

Production of advanced biodiesel from animal wastes using supercritical technologies

aiju Instituto Tecnológico de producto infantil y ocio

ORGANOVAC NATURE AMINO-ACIDS

INESCOP CENTRO TECNOLÓGICO DEL CALZADO

CEPSA

UNIVERSIDAD DE MURCIA

instituto imdea energía

ITQ INSTITUTO DE TECNOLOGÍA QUÍMICA

EXCELENCIA SEVERO OCHOA

RAW MATERIALS

Flesh liming and Green flesh
(Render cat 3)

Protein

Mechanical separation

Fat

lifesuperbiodiesel.eu

PREPARATION

Fleshings have an average content of 15% fat, 20% protein and 65% water.

FRACTION SEPARATION

The fat fraction is separated from the protein and liquid protein fraction in order to process them independently.

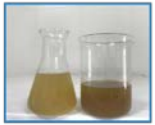
Separating process of the fleshing into protein fractions.

ENZYMATIC HYDROLYSIS

An enzymatic process is recommended for the extraction of the meat protein because it is a more environmentally friendly and less aggressive process.

CONCENTRATION

BIOESTIMULANTS



The bioprocess developed consist into transform the protein and liquid fraction into a biostimulant based on free amino acids.

Separating process of the fleshing into fat.

SUPERCRITICAL TRANSESTERIFICATION

The bioprocess transform fat fraction into an advanced biofuel and consists in catalytic transesterification of fat with heterogeneous catalysts made with methanol under supercritical conditions.

SUPERCRITICAL FLUID SYSTEM

SUPERBIODIESEL

This bioprocess allows transforming fats with high percentages of free fatty acids, without producing soaps, into an advanced biofuel that incorporates the modified glycerine, and reduce energy consumption of the process.

Thanks for your attention

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