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Microalgae protein production using industrial side streams for poultry feed

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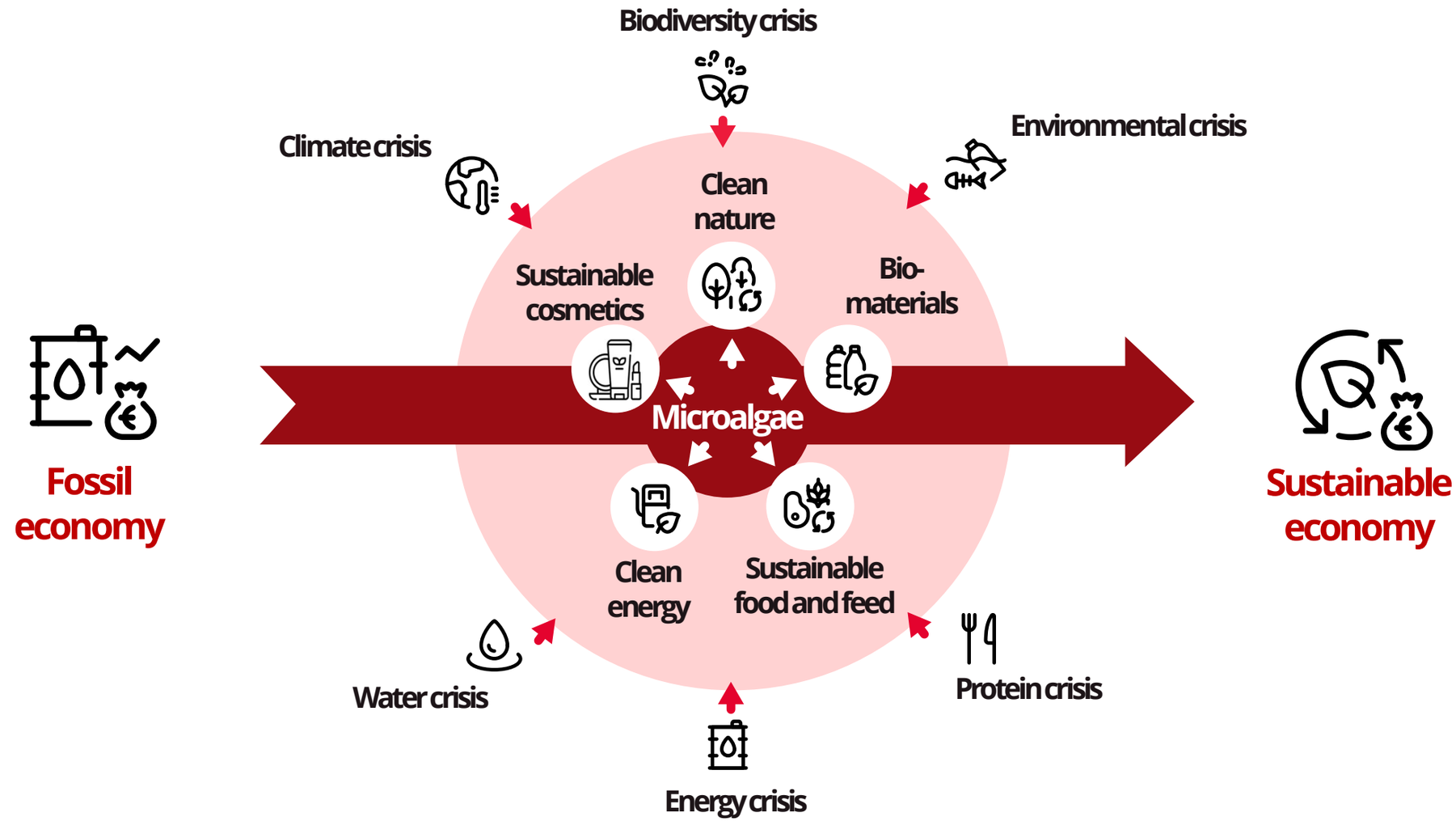
Center for Bioresources
Food and Production
DTI, Denmark

Danish Bioeconomy Conference 2025

Microalgae section at DTI

	Cultivation	Harvesting	Drying	Biomass processing	Product development
Customer services	Pilot GMO cultivation Validation of lighting systems for cultivation Validation of cultivation systems Flow cytometer analysis	Continuous centrifugation Membrane filtration Flocculation Magnetophoretic separation	Freeze drying Spray drying Microwave drying Oven drying	Biomass extrussion $ScCO_2$ extraction (lipids and pigments) Short-path distillation Protein and EPS extraction Removal of off-flavours	Food, feed, nutraceuticals and biomaterials development
Value chain					
Focus	• PBR design and fabrication • Sidestream valorization • Contamination control	• Harvesting efficiency • Energy efficiency • Biomass quality	• Biomass/bioproduct quality • Energy efficiency • Time	• Improve bioavailability • Biomolecules fractionation • Refining	• Food ingredients • Feed (poultry, aquaculture) • Nutraceuticals
R&D projects	ReMAPP (IFD, DK) ProLocAL (GUDP, DK) GeneBEcon (Horizon Europe, EU) ALGAESOL (Horizon Europe, EU) SOPHONSTER (ESA, EU) MICROFOAM (BSZ, DK) SEAlgaePower (SBEP, EU)	ReMAPP (IFD, DK) ProLocAL (GUDP, DK)	ReMAPP (IFD, DK) ProLocAL (GUDP, DK)	MAGIC (BSZ, DK) MICROFOAM (BSZ, DK) PIGMENT (BSZ, DK) ReMAPP (IFD, DK) ProLocAL (GUDP, DK) SEAlgaePower (SBEP, EU)	MAGIC (BSZ, DK) ReMAPP (IFD, DK) ProLocAL (GUDP, DK) PIGMENT (BSZ, DK) SEAlgaePower (SBEP, EU)

Microalgae for Sustainable Bioeconomy

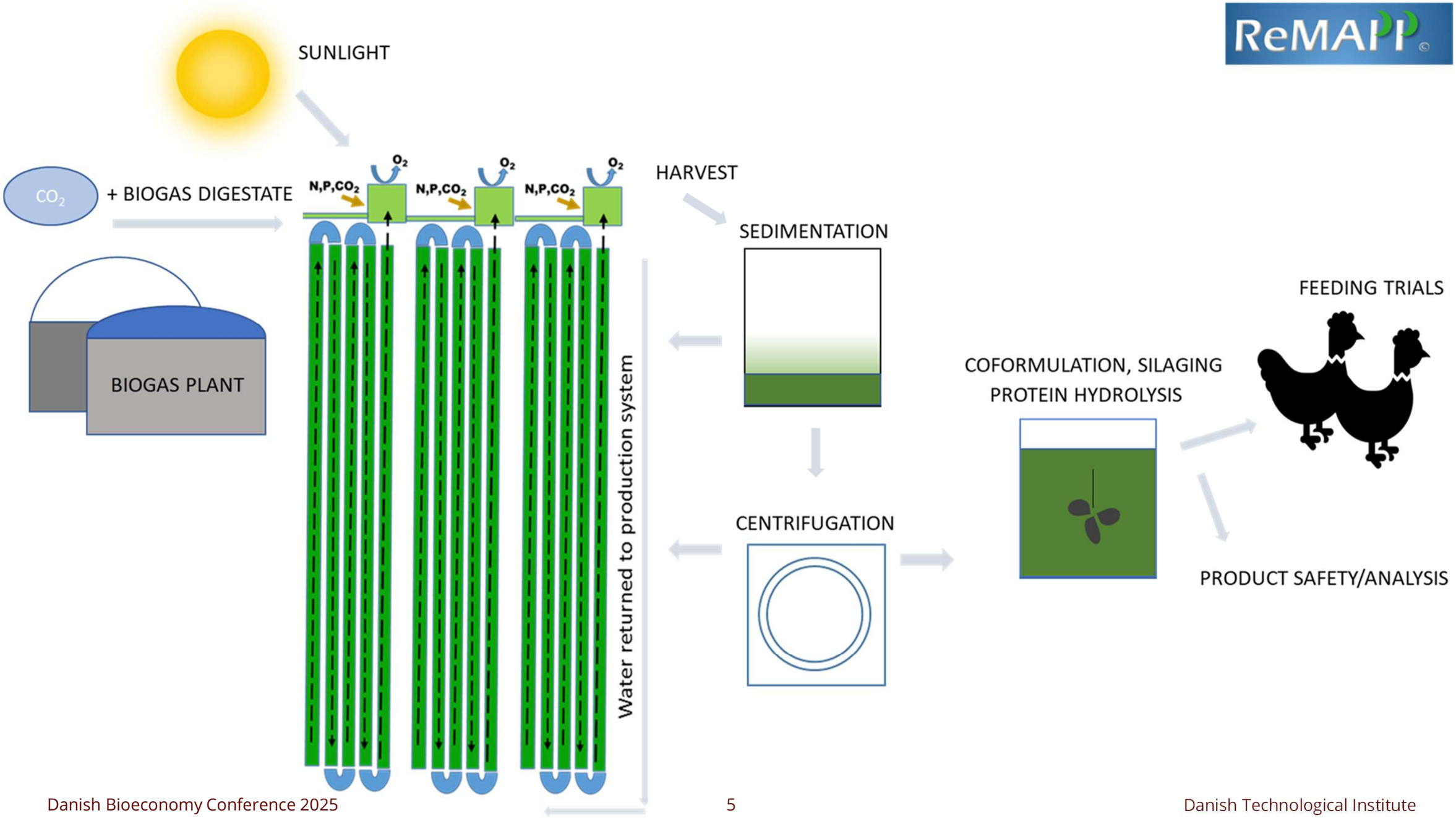


ReMAPP

Resource Efficient Microalgae Protein Production

Innovationsfonden

Funded by the Innovation Fund Denmark (IFD)
October 2018 – June 2024


SUNLIGHT
CO_2
+ BIOGAS DIGESTATE
BIOGAS PLANT
O_2
N,P,CO_2
HARVEST
SEDIMENTATION
CENTRIFUGATION
Water returned to production system
COFORMULATION, SILAGING
PROTEIN HYDROLYSIS
FEEDING TRIALS
PRODUCT SAFETY/ANALYSIS

Photobioreactors coupled with biogas CO_2 uptake

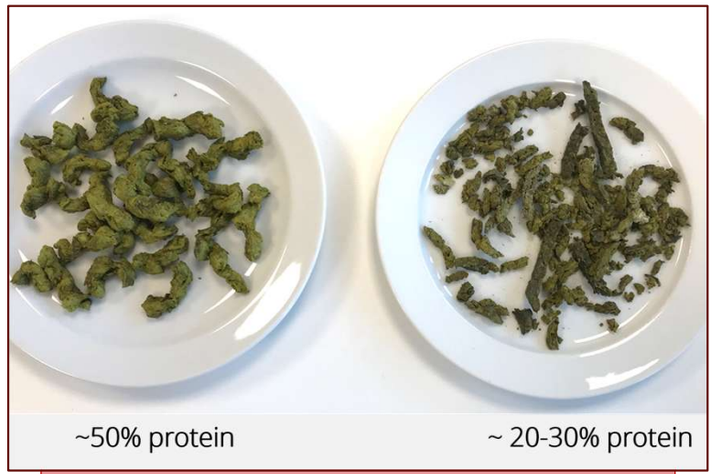
Processing for poultry feed

Twin screw extruder

Alters protein configurations

Biomass - 7-60 kg/h

Improves texture and bioavailability



Co-extrusion with pea / soy for food or feed applications

Numbers from ReMAPP

Area (Hectare)	1	
Culture volume (L)	440,000	
Biomass productivity (t/y)	26.7	(Soy = 2.5 t/y)
Chicken feed (t/d)	1,5	(5% microalgae inclusion)
No. of chickens that can be fed per day	13,000	(0.115 kg/d per chicken)

With 5% microalgae inclusion in feed, laying hens could get 20% of their daily demand of methionine (Methionine is the sulphur-containing essential amino acid that is lacking in soy-based chicken feed)

Vestjyllands Andel

AARHUS UNIVERSITET

TEKNOLOGISK INSTITUT

SEGES

KØBENHAVNS UNIVERSITET

ICROFS
Internationalt Center for Forskning i Økologisk Jordbrug og Fødevaresystemer

ProLocAL

Protein from locally grown legumes and algae for organic chickens

ROKKEDAHL LANDBRUG

Ministeriet for Fødevarer, Landbrug og Fiskeri

gudp

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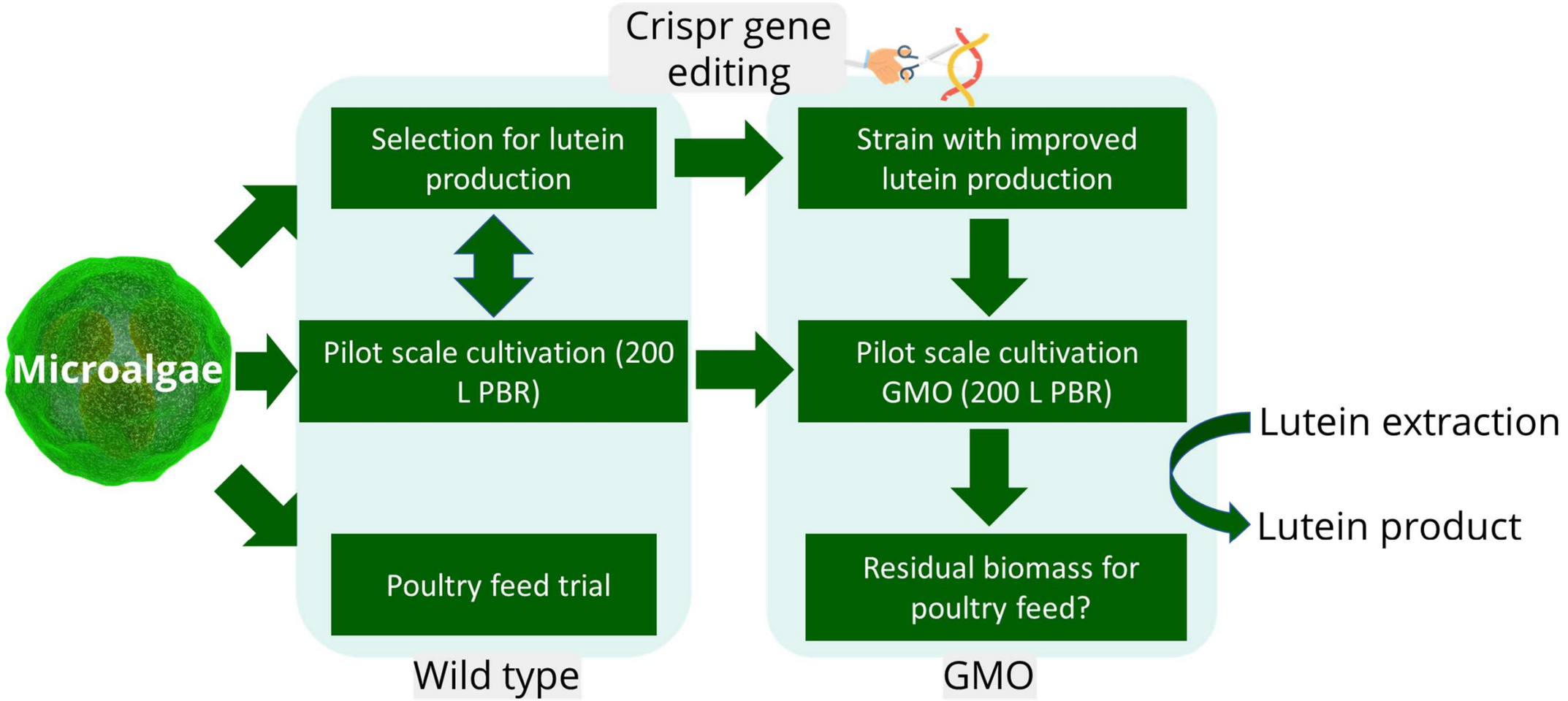
GeneBEcon

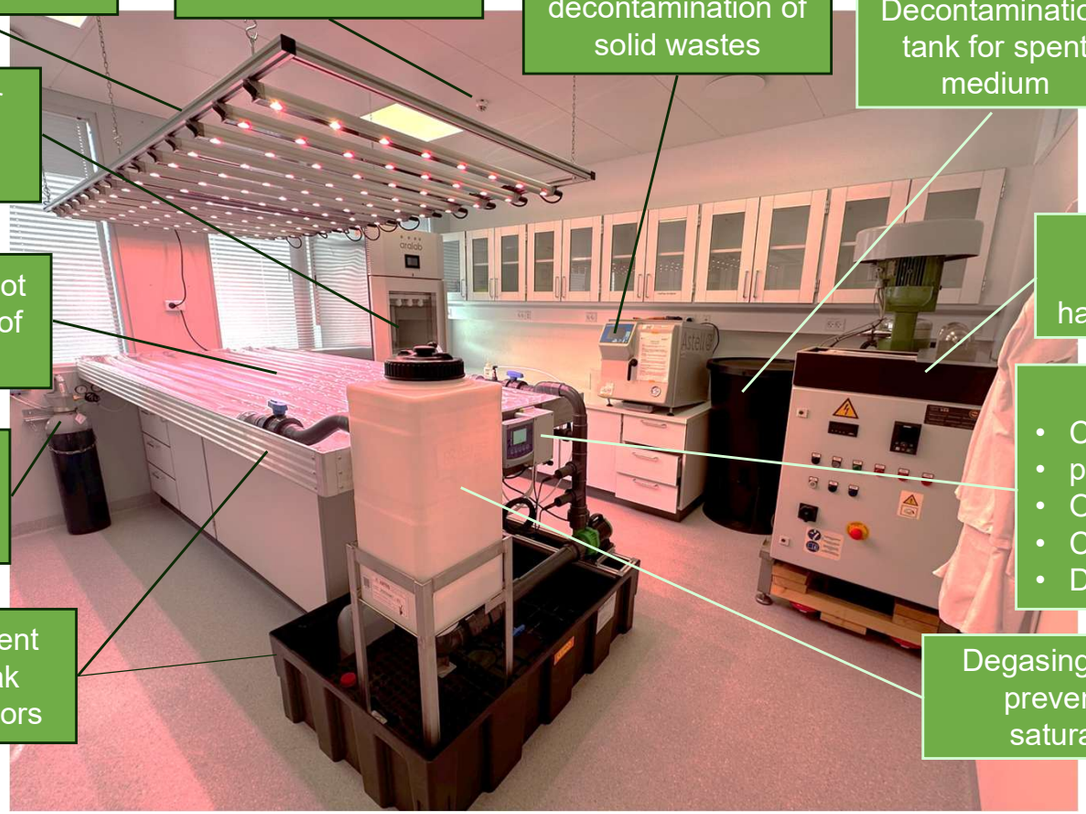
Funded by the European Union

Capturing the potential of **Gene** editing for a sustainable **B**io**Econ**omy

Research approach



Pilot facility for GMO microalgae



In this facility, we are capable of handling cultures from 50 mL to 200 L GMO microalgae cultivation

Pilot Plant Biorefining and Biofermentation (food grade)

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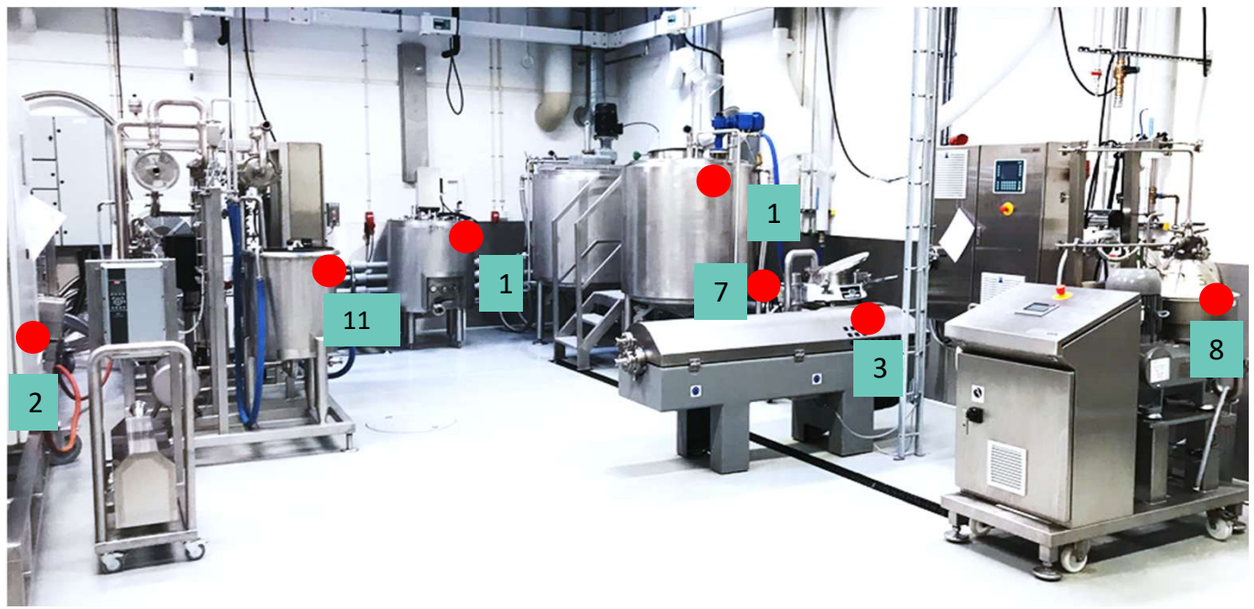
Multiple process units available at one spot

All units are adaptable to fit customized process

Certified for food production

Process developed and adapted to every biomass

Minimal waste



Stirred tanks (100 – 1000 L)	1
Heat exchanger	2
Decanter centrifuge	3
Wet mill	4
Spray dryer	5
Decanter centrifuge	6
Vibrating sieve	7
Clarifier centrifuge	8
Column chromatography	9
Dry fractionation unit	11
Membrane filtration	10
SANI membrane	12
Fermenter (1 – 2000 L)	13

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Biosolution Technology Center (food grade)

Microalgae team

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Team Manager

Jakob S Pedersen, M.Sc.
Senior Consultant

Malene L Olsen, Ph.D.
Senior Specialist

Nikola Medic, Ph.D.
Specialist

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Danish Technological Institute > Services > Biobased Business > Microalgae Expertise

Microalgae Expertise

Microalgae are an attractive and alternative feedstock for high quality nutrients such as proteins, omega 3 fatty acids, antioxidative pigments such as carotene and astaxanthin, vitamins etc. Moreover, their ability to fix CO_2 at high rates has been attracting much attention as an environmentally benign solution to reduce CO_2 emissions. At DTI, we offer services for companies and partners to test, evaluate and develop processes for microalgal production and products.

Microalgae Team >

Microalgae Services >

Microalgae Facilities >

Case Model - Algae >

Feel free to contact us

Microalgae Expertise

Biosolutions Technology Center

Biofermentation & Biorefining

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Journal of Applied Poultry Research

journal homepage: www.elsevier.com/locate/japr

Research Report

Chlorella vulgaris supplementation in broiler feed: relation between dosage and effect on intestinal health under an *Eimeria* vaccine challenge☆

Sofie Van Nerom [a,b,*], Kobe Buyse [a,c], Filip Van Immerseel [b], Johan Robbens [a], Evelyne Delezie [a]

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[c] Department of Veterinary and Biosciences, Faculty of Veterinary Medicine, Ghent University, Merelbeke-Melle 9820, Belgium

Consumer perception and willingness to purchase chicken meat from algae-fed broilers: a survey in Flanders (Belgium)

Sofie Van Nerom[1,2], Filip Van Immerseel[2], Johan Robbens[1], Evelyne Delezie[1]

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Despite limited knowledge about microalgae, the findings suggest that Flemish consumers are generally receptive to chicken meat from algae-fed broilers, especially when the product is framed in terms of sustainability. Clear ingredient labeling and targeted consumer education may enhance market acceptance and support the transition to more sustainable animal production systems.

animals

MDPI

Article

Exploring Feed Digestibility and Broiler Performance in Response to Dietary Supplementation of *Chlorella vulgaris*

Sofie Van Nerom [1,2,*], Kobe Buyse [1,3], Filip Van Immerseel [2], Johan Robbens [1] and Evelyne Delezie [1,*]

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Microalgae as feed additives in poultry: A review on the health-promoting effects

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