

## AlgaeLinkages – Report Seed Money Project

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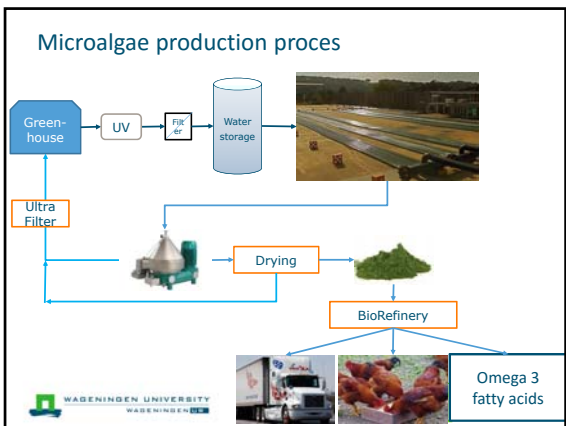
## Bussiness concept

### Cultivate microalgae in greenhouse drain water for the production of biodiesel and feed in Mexico

- Microalgae are very efficient in using nitrates and phosphates
- Products:
  - Clean and recycable water
  - Microalgae biomass
    - Animal feed
    - Biodiesel

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## Why use greenhouse drainwater

- Mexico has a large deficiency in water
- Reuse of waste water is necessary to deal with this deficiency
- Greenhouse drainwater is mostly discharged with a large content of nutrients
- The water and the containing nutrients are still valuable for agricultural processing
- Groundwater in Mexico has a high saltcontent which makes it impossible to completely reuse the water for plant production
- Algae can grow on higher salinities and filter nutrients very efficiently
- Microalgae in combination with desalinity will make water available for reuse

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## Why microalgae

- Microalgae contain various valuable products that we can use as different commodities
- Microalgal lipids are a source for biodiesel
- High nutritional value
  - Omega 3 fatty acids, all essential amino acids, pigments, B-glucans, antioxidants, vitamins
- No need to add expensive purified aminoacids into feed diets when using microalgae
- Higher quality eggs, milk, meat
- Possible less usage of antibiotics in animal production

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## Techniques and knowledge


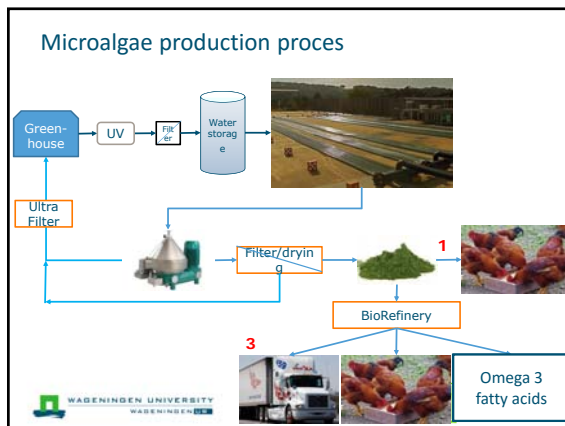
- Wastewater disinfection and treatment
- Photobioreactors
- Microalgal strain selection
  - Growth rate on waste water
  - Nutritional value
- Biorefinery / Separation technology
- Product development

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### Market


- Current market for microalgae biomass
  - High value products – cosmetics and nutraceuticals
- Two approaches – 1 or 3 products
- Aimed market:
  - Animal compound feed – protein fraction or total biomass
  - Biodiesel – lipid fraction
  - Omega 3 fatty acids
  - Wastewater treatment
- Potential markets:
  - Food
  - Chemicals
  - Bioplastics

### Business case – different scenarios

- SCENARIOS
  - Cost calculation based on current developments
  - Cost calculation based on future prospects
  - Both scenarios calculated for the production of 1 or 3 products
- USED DATA
  - 3500 Ha usable greenhouse area
- ASSUMPTIONS
  - No nutrient deficiency
  - Photosynthetic Efficiency 2 - 4%
  - 330 days running per year

Products	Price (€/kg)
Biodiesel	0.75
Protein	8
Omega 3 FA	185
Biomass	3




### Business case – different scenarios


Current costs				Future costs			
1 product							
Balance	Total	Per kilo algae	Balance	Total	Per kilo algae	Balance	Total
Algae production	21,840	Ton/y	Algae production	45,080	Ton/y	Algae production	45,080
Cost algae	€ 80,385,524.3	€ 3.68	Cost algae	€ 83,987,724	€ 1.86	Cost algae	€ 22,540,000
Cost down stream processing	€ 21,840,000.0	€ 1.00	Cost down stream processing	€ 22,540,000	€ 0.50	Cost down stream processing	€ 135,240,000
Income	€ 65,520,000.0	€ 3.00	Income	€ 135,240,000	€ 3.00	Income	€ 389,491,200
Gain/y	€ 54,755,124.3	€ 2.50	Gain/y	€ 28,712,276	€ 0.64	Gain/y	€ 170,263,476

3 products							
Balance	Total	Per kilo algae	Balance	Total	Per kilo algae	Balance	Total
Algae production	21,840	Ton/y	Algae production	45,080	Ton/y	Algae production	45,080
Cost algae	€ 80,385,524.3	€ 3.68	Cost algae	€ 83,987,724	€ 1.86	Cost algae	€ 22,540,000
Cost down stream processing	€ 21,840,000.0	€ 1.00	Cost down stream processing	€ 22,540,000	€ 0.50	Cost down stream processing	€ 135,240,000
Income	€ 188,697,000	€ 8.64	Income	€ 389,491,200	€ 8.64	Income	€ 1,201,263,476
Gain/y	€ 110,979,243.3	€ 5.04	Gain/y	€ 170,263,476	€ 3.78	Gain/y	€ 1,078,763,476




	Market	Our production
Palm oil	52.300.000 T	18.000 T Biodiesel
Fish oil (Source of EPA (20-30% EPA/DHA))	1.000.000 T	
Omega-3 oils	50.000 T	900 T
Soybean meal as commodity protein for adult animal (50-55% protein / DW)	180.000.000 T	
Fish meal as commodity protein for adult animal (65-70% protein / DW)	5.000.000 T	45.000 T / 26.000 T Protein
Soy concentrate as semi-commodity feed for young animals (60-80% protein /DW)	120.000 T	



### Advantages and risks


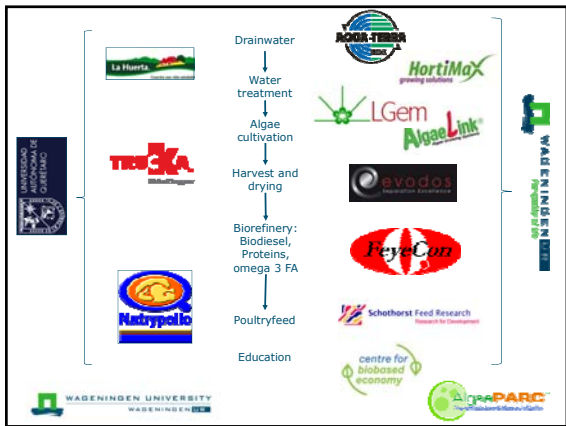
- Higher production rates per area compared to other crops
- Various products produced by one production process
- High nutritional value
  - Omega 3 fatty acids, all essential proteins, pigments, antioxidants, vitamins
- Production at large scale does not yet exist in Mexico
- Downstream processing using microalgae is still in preliminary research stage

➤ An innovation platform and network between Dutch and Mexican companies is necessary to accomplish this.



### Projectplan

- Proof of principle / technical feasibility in Mexico
- On small scale (~100m<sup>2</sup>) realize algae production on greenhouse drainwater in Mexico
- Compare different microalgae production plants next to each other
- Consortium of Mexican and Dutch companies to realize the projectplan

### Consortium meeting – 28th November

- All partners except for Nutripollo – Mexico, were present
- Fruitful and enthusiastic meeting
- Discussion about business case and future approach
- Project plan is discussed
- After the meeting two more partners added to consortium (HortiMax and Evodos)
- Need to know: How to proceed - which possible calls are coming that are interesting for this kind of project



### Questions?

