ALGAFEED: on-farm production of protein-rich microalgae for animal feed

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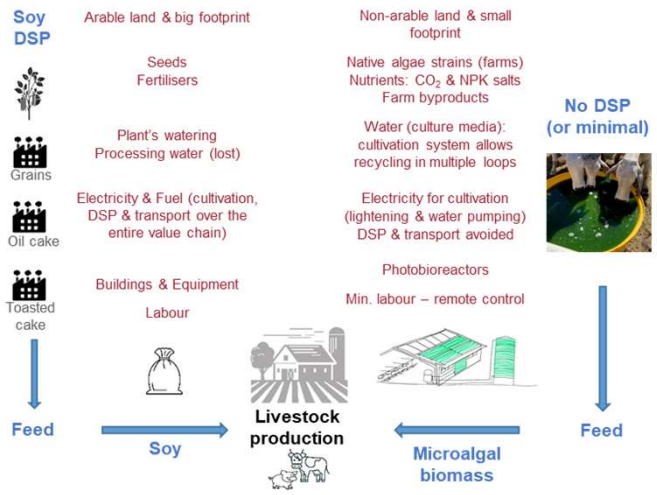
Algafeed aims to replace imported soy protein with protein from microalgae produced on-farm. The production of microalgal proteins are an advantageous alternative in four main aspects:

- At least 30 times more protein per ha per year than soybean in a non-arable land (1 ha required for 1 ton soy protein).
- Water is never lost. It can be recycled in infinite loops and used later for animal nutrition. For information, the water consumption to produce 1 kg soy protein is estimated to attain a volume of ca. 5 m^3 [1].
- Fertilizers are used at 100% efficiency thanks to the closed system (half of the nutrients are used by plants on traditional crops [2]).
- Emissions are prevented. As the production system is closed and regulated for pH and temperature, no N emissions can occur and the CO_2 absorption is highly efficient.

Microalgae *vs.* Soy – Sustainable aspects from production to downstream processing (DSP)



The new microalgae lab at Agroscope: scale-up from agar plates to the 170 L pilot photobioreactor

A successful production of microalgae-based proteins highly depends on stable and robust microalgae strains maintained at the optimal cultivation conditions. Agroscope aims to develop an own native microalgae strain collection in order to extend the production over all seasons. With strains well adapted to every climatic condition, an algal crop rotation method could be applied.

The mission of the new algae lab is to guarantee the success of applying validated strains at the pilot-scale algae cultivation system on farms. Agroscope therefore foresees to use a fully automated tubular photobioreactor system with enhanced performance to produce quality microalgal biomass on-farm.

Future developments – Innovations

- Development of a collection of native microalgae strains
- Development of crop rotation cultures for near year-round production
- Microalgal protein production on controlled agro-industrial streams (e.g potato processing effluents) otherwise lost or at a cost
- Technical innovations of tubular photobioreactor to enhance the productivity
- Integration in existing infrastructure and off-ground systems
- Integration of prospective life cycle analysis coupled with a techno-economical assessment to inform design decisions (e.g. size, location, reactor type)
- Simplification of downstream processes including development of strategies to enhance biodigestibility

References
1) Karlsson Potter et al., 2020; 2) Bijay & Craswell, 2021

Agroscope gutes Essen, gesunde Umwelt

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