

1. Aim

The aim of both the ReMAPP (Ressource Efficient Microalgae Protein Production) and the ProLocAL (Protein from locally grown legumes and algae for organic chickens) projects, is to evaluate a locally isolated strain of *Scenedesmus sp.* as a protein source for feed applications, to supplement and replace some of the imported soybean protein.

Industrial side-streams will be tested for the cultivation, in terms of degassed manure and CO₂ from biogas plants (ReMAPP) and organic N-enriched brown juice (ProLocAL). Work in both projects includes measures to increase algae protein bioavailability.

2. The Challenge

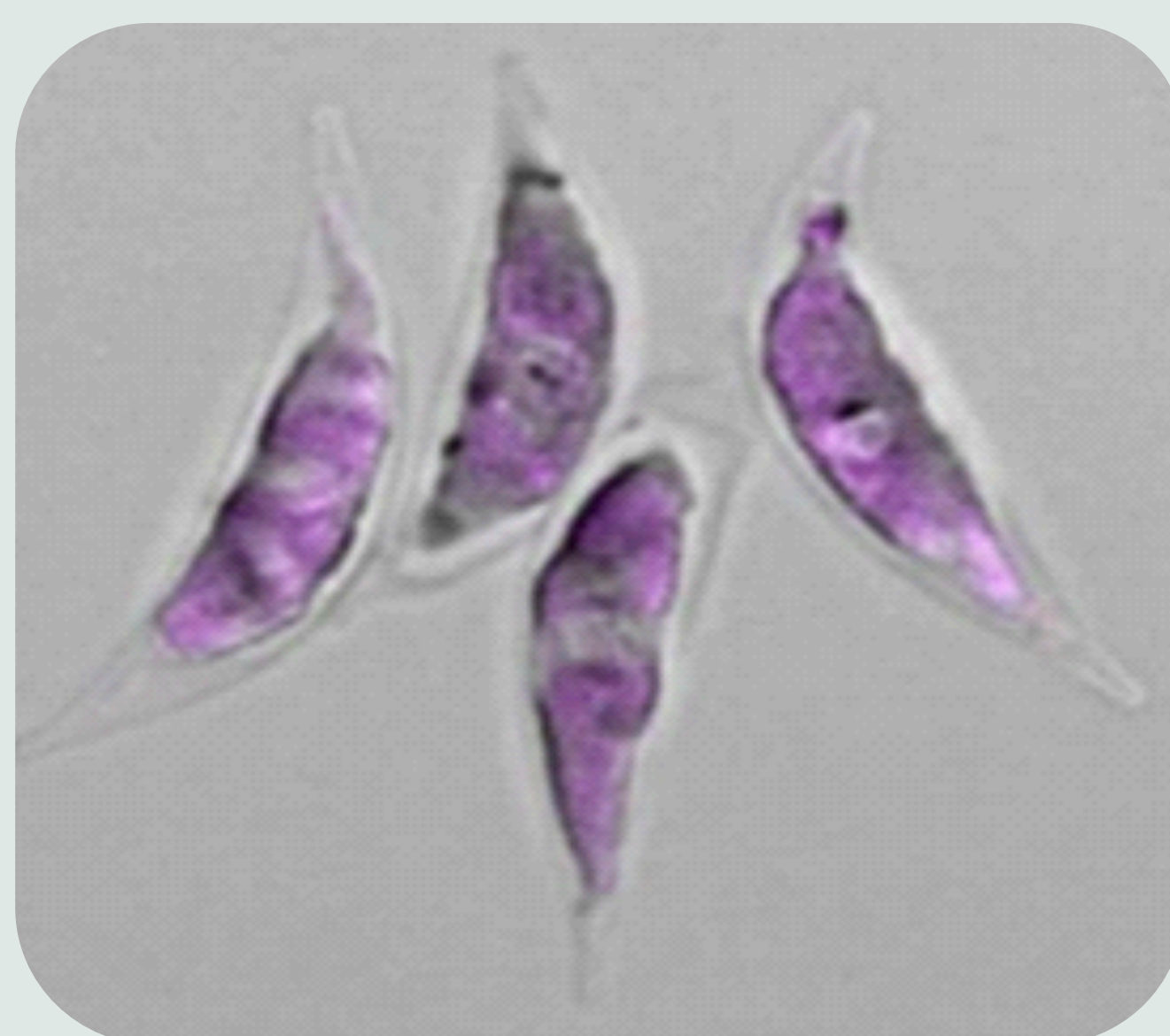
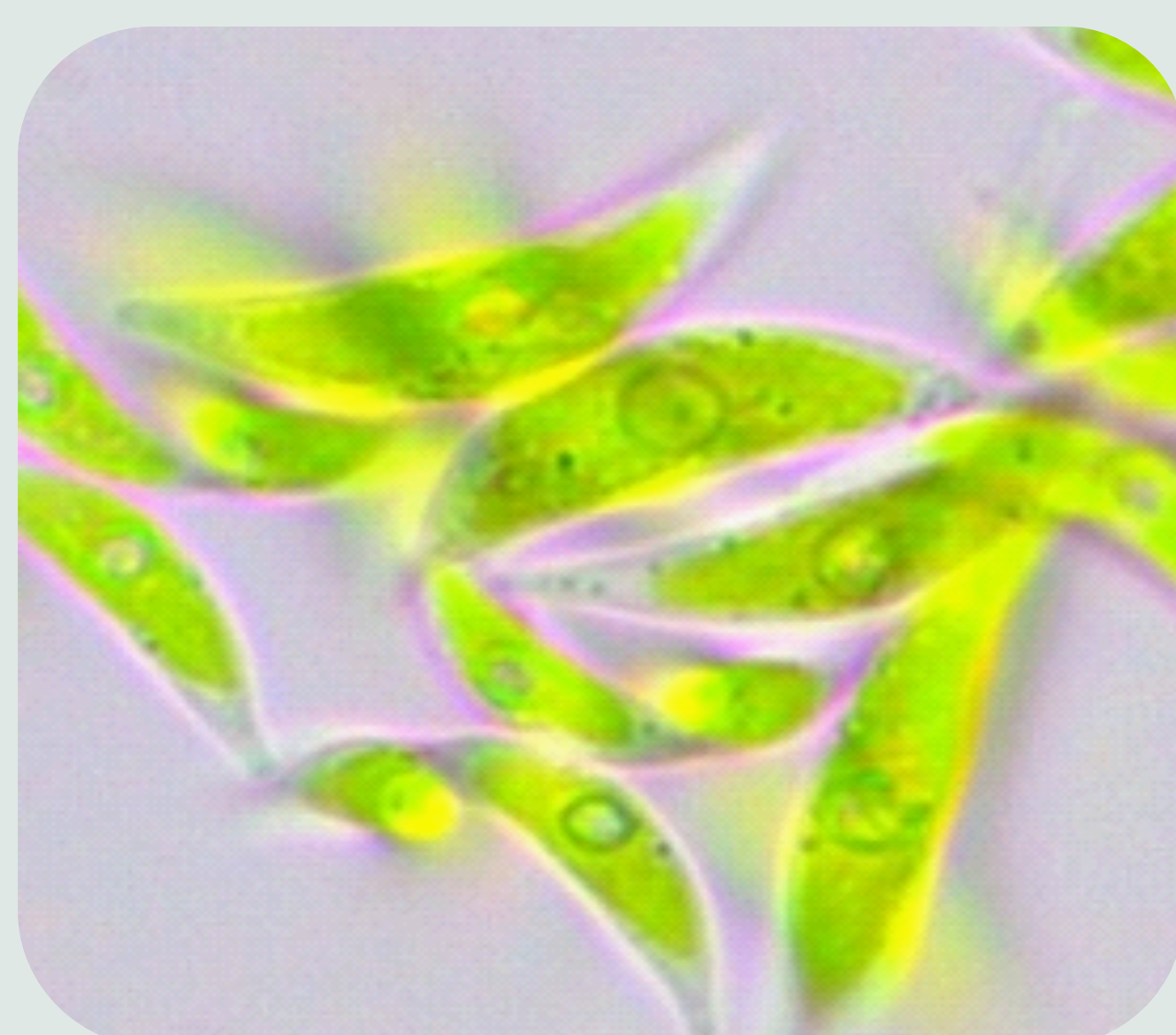
Soybean is an important and relatively inexpensive source of livestock and poultry feed, but the production comes with a cost to the environment.

The ProLocAL project will include formulation of chicken feed where soy has been replaced by *Scenedesmus* microalgae and locally produced organic legumes. The *Scenedesmus* strain is very robust for outdoor cultivation in the media used, and the amino acid composition makes it an interesting feed protein source, but without proper pretreatment, the digestibility is low². The projects test extrusion, fermentation, enzymatic hydrolysis and homogenization to improve the bioavailability.

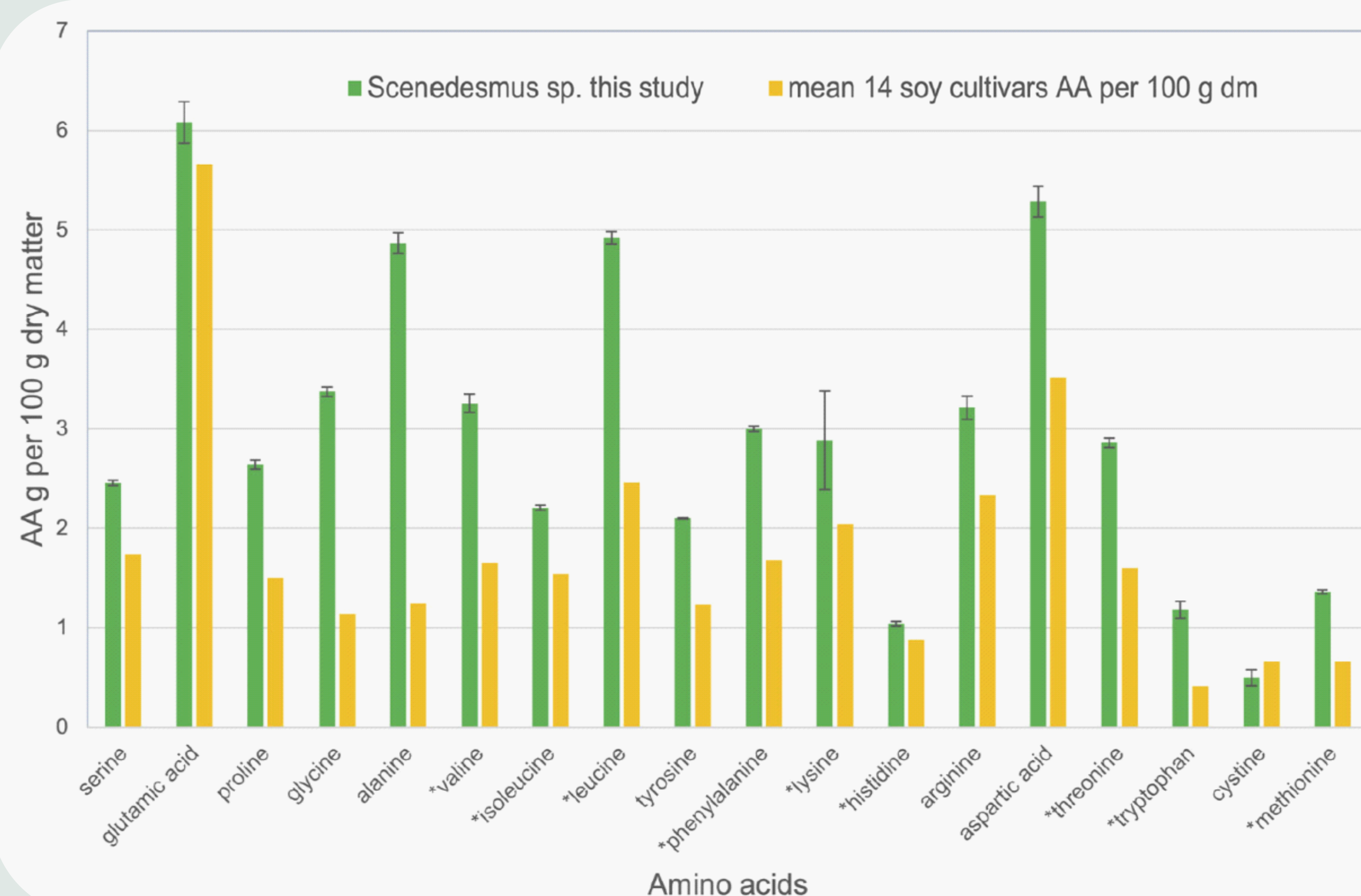
3. Results

We apply a Danish isolate of the microalgae *Scenedesmus sp.* containing 50-55% protein (dm) and with a productivity of 10-15 tons of protein/ha/year when cultivated in Denmark - a land use efficiency 15-20 times higher than soy protein produced in South America¹.

The sum of essential amino acids is 42% which is high compared to other microalgae.



Left: The Danish *Scenedesmus sp.* isolate, light microscope at 1000 magnification. Right: Confocal microscopy of the algae cells isolate stained with Acid Fuchsin (protein dye).



4. Summary

ReMAPP and ProLocAL-project novelty and research include:

- Local cultivation of protein-rich *Scenedesmus* microalgae based on industrial side-streams.
- Pretreatment to increase digestibility of the algae.
- Balancing the nutritional value of the feed by mixing organic microalgae and legumes.
- Evaluating impact on climate, animal welfare and meat quality.

