

Exploitation of microalgae for cheese whey treatment and biomass production

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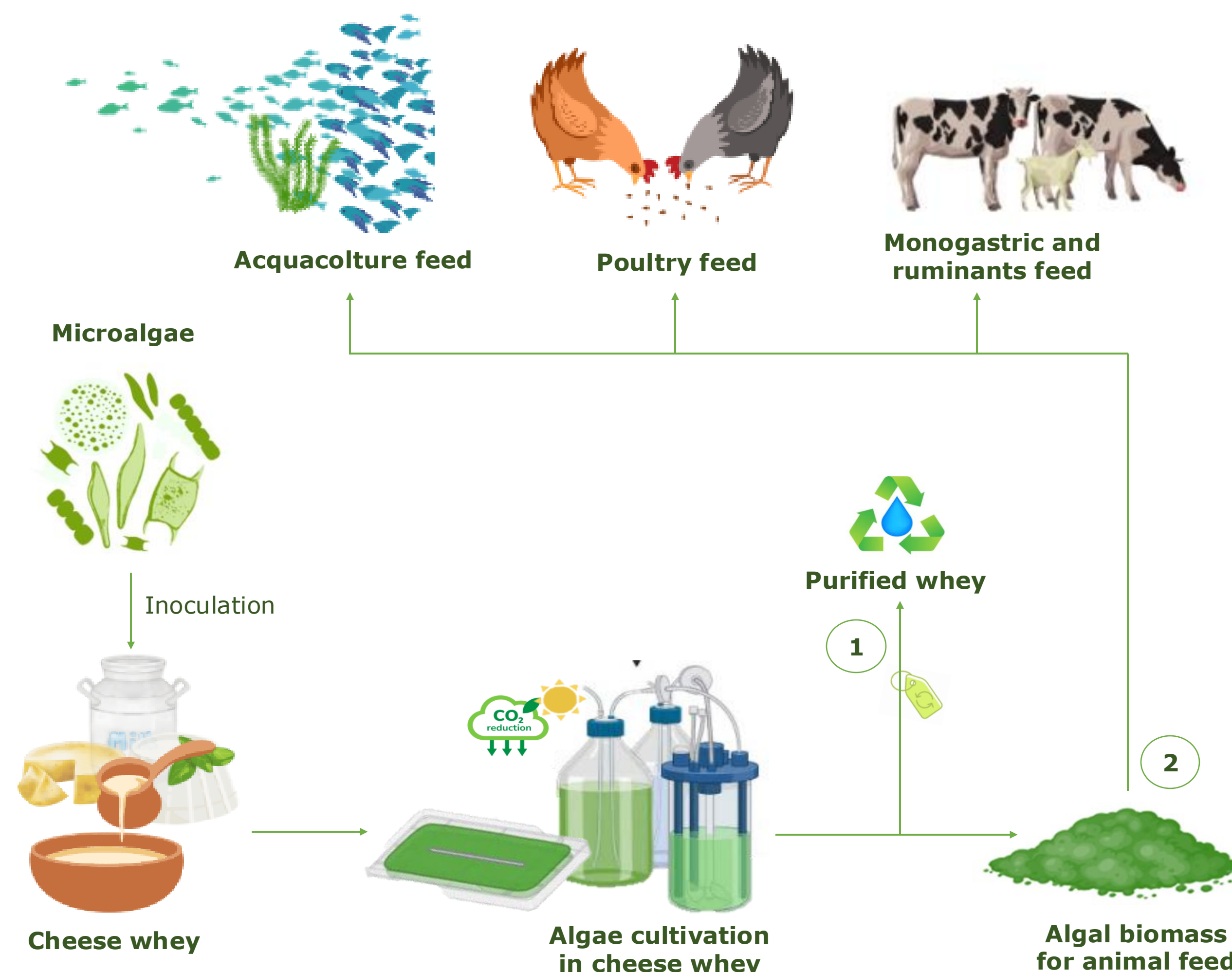
Tutor: Prof. Cinzia Caggia

This PhD project aims to set up a dairy wastewater recycling system using microalgal consortium. Starting from a lab scale and progressing to a pilot scale, a biological treatment of ricotta whey (also known as scotta) will be performed using a microalgae consortium. Furthermore, the obtained microalgae biomass will be tested as a high value-added product, with potential applications as animal feed.

State-of-the-art

In Europe, and mainly in Italy, the dairy industry produces annually over 1 million tons of scotta. Scotta being rich in lactose, nitrogen, vitamins, and minerals, is a relevant substrate for production of high-value compounds. However, its high salinity and significant biological (BOD 50 g/L) and chemical oxygen demand (COD 80 g/L) limit its use. Uncontrolled discharge is prohibited, and recent technologies have been focused on natural treatments. Microbiological bioconversion and microalgae-based treatments seem very promising, offering benefits like nutrient recovery, greenhouse gas reduction, and biomass repurposing. Microalgae biomass has high content of proteins, amino acids, lipids, pigments and by-active compounds. Using a microalgal consortium the project aims to enhance scotta treatment and microalgal biomass production for animal feed.

Graphical abstract

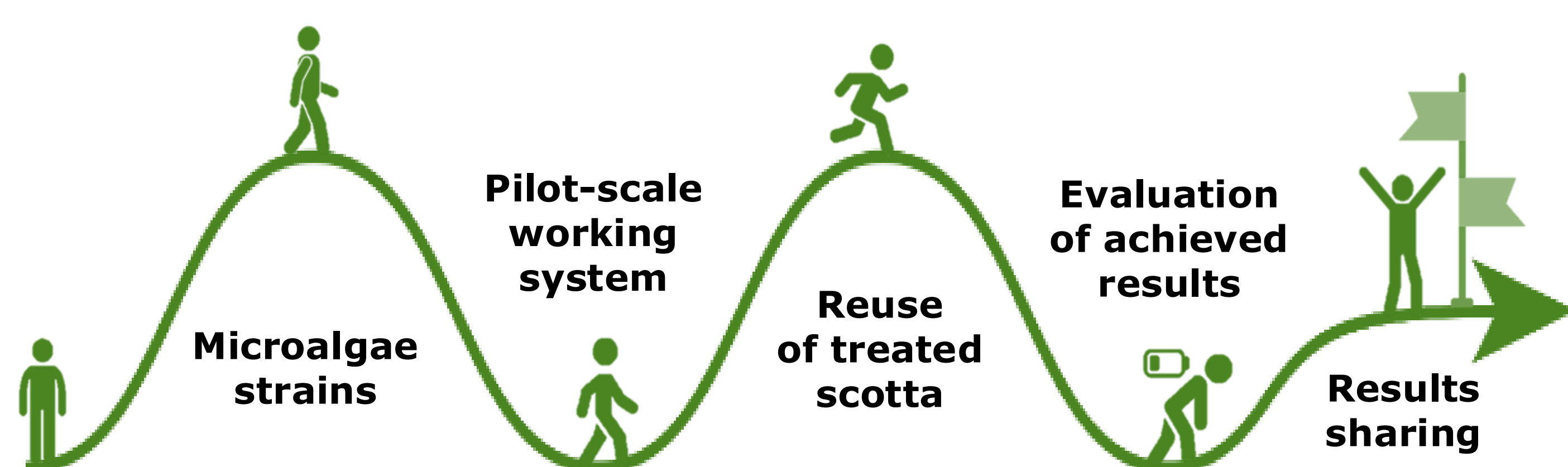


Activities program

The activities are organized following the Gantt diagram

Activities	Months of the second year												Months of the third year											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1. Selection of microalgae	█	█	█	█	█																			
2. Designing a pilot scale system						█	█	█	█	█	█	█												
3. Reuse of scotta																								
4. Evaluating the depuration effects and nutritional values of the microalgal biomass																								
5. Write the thesis and participating to scientific events																								

Milestones



Expected results

- ✓ Microalgal Biomass: by using scotta as substrate
- ✓ COD and BOD reduction: lower COD and BOD levels for compliant reuse or disposal.
- ✓ Protein feed: replace soy or traditional feed with microalgae biomass.
- ✓ Environmental impact: microalgae absorb CO₂ to grow and reduce gas emissions when included in animal diets.

Acknowledgments

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