LIGHT GREEN EGGS
EIT FOOD PROJECT

Co-funded by the European Union

PROJECT PARTNERS

THE PROJECT AIMS TO DEMONSTRATE THE USABILITY OF ALFALFA IN THE AGRI-FOOD SECTOR AS AN ALTERNATIVE SOURCE OF HIGH-QUALITY PROTEIN.
THE PROJECT IS THE RESULT OF A COLLABORATION BETWEEN:

- AN ITALIAN PLANT ENGINEERING SME (**EBU SAS**)
- AN AUSTRIAN SME SPECIALIZING IN PROTEIN FORMULATIONS (**INNOV8**)
- A CONSORTIUM OF ALFALFA DRIERS (**FILIERA**)
- THE UNIVERSITY OF PARMA (**UNIPR**)
- THE UNIVERSITY OF BARCELONA (**UB**)

THE PROJECT STARTED IN JUNE 2024 AND WILL COMPLETE IN DECEMBER 2025
THE PROJECT WAS SELECTED AND FINANCED BY EIT FOOD WITH €700,000

PROJECT OBJECTIVES

M1 OPERATIONAL AND OPTIMIZED PILOT PLANT:
The goal will be achieved when the integrated pilot plant has operated continuously at full capacity (300 kg/day) for at least 2
consecutive days, with monitoring of:
- raw material and energy consumption;
- products generated;
- necessary maintenance (e.g., CIP);
- any waste or process emissions.

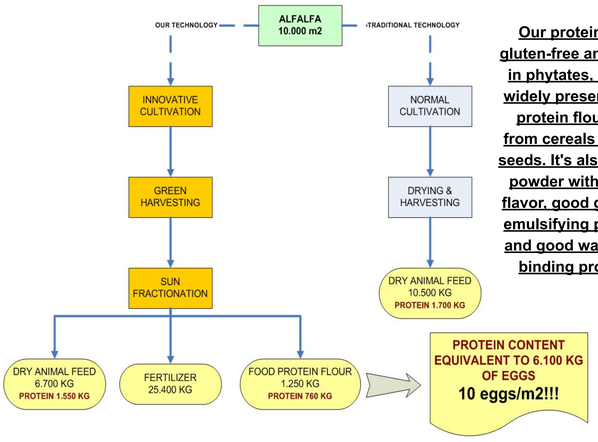
M2 PRE-INDUSTRIAL PRODUCTION TESTS COMPLETED
Tests conducted on products supplied by at least 10 potential users
Total production of at least 50 kg of protein meal;
Average agronomic yield (feed protein/hectare) greater than 600 kg/hectare;
Total energy consumption less than 0.2 kWh/kg of green alfalfa harvested;
Positive assessment by 70% of users of the quality of the co-produced feed and fertilizers.

M3 QUALIFIED AND CERTIFIED FOOD USE AREAS
At least two positively tested food applications for each type of protein flour produced (pure white, mixed, organic);
Sense and functional properties at least equivalent to those of plant-based protein products currently available on the market (soy, pea protein, etc.)
Content of critical substances (coumestrol, L-canavanine, beta-carotene) below the limits established by EFSA

M4 PRELIMINARY MARKET ASSESSMENT COMPLETED
Identification of a potential market for at least 10,000 tons/year of product
Selling price compatible with production costs, approximately €3/kg

M5 REFINED EXPLOITATION PLAN
Definition of the procedure for protecting the know-how.
Updating of the industrial development plan for the technology and new products generated..

PROTEIN FLOUR FROM ALFALFA

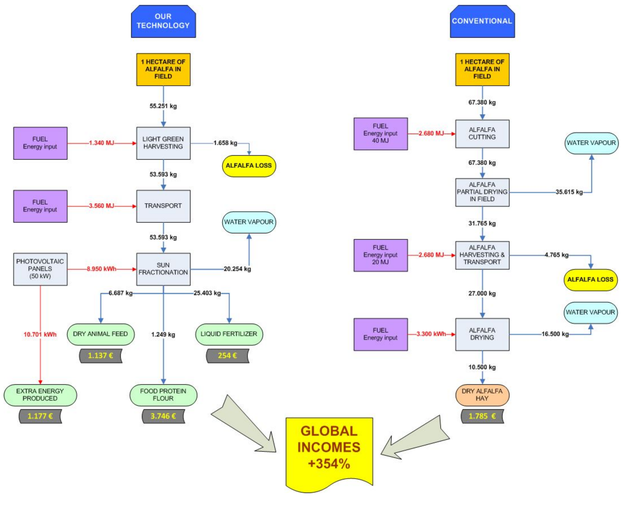


Our protein flour is gluten-free and very low in phytates, which are widely present in many protein flours made from cereals or legume seeds. It's also a soluble powder with a neutral flavor, good gelling and emulsifying properties, and good water and oil binding properties.

TARGET MARKET

Given the characteristics of our edible protein flour, the first application segment for the edible protein flour we produce will be the egg replacer market. Based on the experiments conducted so far with the protein flour, various applications will also be tested, such as the production of meat substitutes, protein drinks, and baked goods.

THE PROPOSED TECHNOLOGY



Our cultivation technology slightly reduces field yields but improves protein content and, thanks to the green and gentle harvesting technique, reduces raw material loss. Solar fractionation separates alfalfa into three standardized and programmable products, significantly expanding the target markets. The combination of these solutions generates a profit improvement of over 350% for farmers and a significant reduction in the overall environmental impact of the process.

ECONOMIC IMPACT

Calculations and assumptions for the smallest industrial plant for our technology:

Parameters	Amount	U.m.	Data source
Industrial plant treatment capacity (fresh alfalfa)	10.000,00	kg/day	Project design
Refence dry matter of fresh alfalfa	167,00	kg/ton	Lab test
Annual days of operation for pilot plant	150,00	days/year	Only ferial days on 6 months
Green alfalfa cultivation, harvesting and transport costs	8,10	euro/ton	Calculation on AIFE data
Industrial plant cost	380.000,00	euro/year	Project design
Industrial plant cost mortgage quote	38.000,00	euro/year	Project design
Industrial plant maintenance costs	7.500,00 €	euro/year	Project design

Unitary prices table					
Products in the table	Reference product	Source	Min	Max	Value used for calculations
EE energy (excess production)	IT kWh Price	GSE	0,10 €	0,12 €	0,11 €
Project animal feed (90%DM)	Alfalfa hay (90%DM)	agerborsamerci.it	0,16 €	0,18 €	0,17 €
Project protein flour	Egg protein	Partner INNOV8 estimation	3,00 €	3,50 €	3,00 €
Project fertilizer	No reference	Partner EBU estimation			0,01 €

Mass balance diagram	Production of finished products per tonne of fresh alfalfa	Finished products value per tonne of fresh alfalfa	Dayly production of finished products	Dayly finished products value	Yearly production of finished products	Yearly finished products value
	kg/ton	euro/year	kg/day	euro/year	kg/year	euro/year
Project animal feed (90%DM)	124,78	21,21 €	1.247,78	212,12 €	187.166,67	31.818,33 €
Project protein flour	23,30	69,90 €	233,00	699,00 €	34.950,00	104.850,00 €
Project fertilizer	432,00	4,32 €	4.320,00	43,20 €	648.000,00	6.480,00 €
TOTAL	580,08	95,43 €	5.800,78	954,32 €	870.116,67	143.148,33 €

Energy balance diagram	Energy needs per tonne of fresh alfalfa	Energy cost per tonne of fresh alfalfa	Dayly energy need	Dayly energy cost	Yearly energy need	Yearly energy cost
	kWh/ton	Euro/ton	kWh/day	Euro/day	kWh/year	Euro/year
EE solar production (total)	- 366,67	- €	- 3.666,67	- €	- 550.000,00	- €
Extra energy sold to GSE	- 199,67	- 21,96 €	- 1.996,67	- 219,63 €	- 299.500,00	- 32.945,00 €
Pressing	- 56,00	- €	- 560,00	- €	- 84.000,00	- €
Separation	- 31,00	- €	- 310,00	- €	- 46.500,00	- €
Drying/Concentration	- 80,00	- €	- 800,00	- €	- 120.000,00	- €
TOTAL	- 0,00	- 21,96 €	- 0,00	- 219,63 €	- -	- 32.945,00 €

Production costs	Input needs per tonne of fresh alfalfa	Input cost per tonne of fresh alfalfa	Dayly input need	Dayly input cost	Yearly input needs	Yearly input cost
	u.m./ton	Euro/ton	u.m./day	Euro/day	u.m./year	Euro/year
Production of green alfalfa (kg)	- 1.013,00	- 8,21 €	- 10.130,00	- 83,15 €	- 1.519.500,00	- 12.473,08 €
Energy (kWh)	- 0,00	- 21,96 €	- 0,00	- 219,63 €	- -	- 32.945,00 €
Industrial plant quote (Euro)		25,33 €		253,33 €		38.000,00 €
Maintenance (Euro)		5,00 €		50,00 €		7.500,00 €
TOTAL		16,58 €		166,85 €		25.028,08 €

Economic balance 10 ton/day	
Economic parameter	Euro
TOTAL INVESTMENTS	380.000,00 €
TOTAL INCOME	143.148,33 €
TOTAL COST	- 25.028,08 €
MARGIN	118.120,25 €
ROI (Years)	3,22