

Industrial production of food-grade soybean flour by solvent-free extrusion and pressing, and baked-goods formulations with soybean and quinoa flours

ARGENTINA, COLOMBIA, HONDURAS, URUGUAY



Webstory



Technological solution

The constraint is scale, not proof of concept. The process is patented and validated at pilot scale, yet output stays below five tonnes a year, too little to supply a public feeding program or a commercial channel; the distance between the validation reached (TRL 5-6) and operational adoption remains open. On top of that, conventional industrial extraction of soy protein depends on hexane, with the hazardous waste and occupational exposure that entails. Industrial scaling answers the first constraint: progressive runs tuning temperature, moisture, residence time, pressure, throughput, and yield until the line reaches some 30 tonnes a week, with standard procedures and batch-to-batch reproducibility control. The absence of solvents answers the second by process design. The quinoa formulations close the loop, turning the flour into a food people actually eat, with a verifiable protein gain and measured acceptability.



Technological description

The technology comprises two linked elements. The first is a patented extrusion and pressing process that produces food-grade soybean flour without organic solvents: grain reception and conditioning, thermal extrusion that inactivates antinutritional factors, mechanical pressing that separates the oil, then cooling and milling. The resulting flour runs 40% to 48% protein and 4.5% to 10% fat. The second element is a family of formulations combining that flour with quinoa and wheat flours in baked goods and other widely consumed foods. The reference sectors are food-grade oilseed milling and industrial baking, with public school feeding programs as the initial market.



Impacts and results

The expected outcome is an industrial plant operating and validated, with capacity on the order of 1,500 tonnes a year against a baseline of five, backed by standard procedures and records of capacity, grain-to-flour yield, stability, and continuity. Flour characterization will cover proximate composition, dietary fiber, urease activity, antinutritional factors, microbiological parameters, and batch-to-batch variability, and process assessment will cover energy use per tonne, waste generation, safety and hygiene, and a preliminary comparative life cycle assessment. On the product side, four formulations are to be characterized in the laboratory and then validated at semi-industrial scale, with at least a 30% gain in protein content over the conventional loaf and acceptability at or above 85%. Technology readiness will rise from the 5 to 6 range toward the scaling and adoption range, and the business model projects breaking even in under two years.



+ 1500 t/y

Expected soybean flour productivity increase



+ 2

Expected TRL increase



170000

Expected beneficiaries



50

Expected scientific-technical personnel trained



1

Scaling mechanism and business model designed



- 100 %

Expected elimination of organic solvents from the industrial process

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