

EverPro as the Missing Piece in the Plant Protein Portfolio to Aid the Transformation to Sustainable Food Systems

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Abstract : Our current food systems cause an increase in malnutrition resulting in more people being overweight or obese in the Western World. Additionally, our natural resources are under enormous pressure and the greenhouse gas emission increases yearly with a significant contribution to climate change. Hence, transforming our food systems is of highest priority. Plant-based food products have a lower environmental impact compared to their animal-based counterpart, representing a more sustainable protein source. However, most plant-based protein ingredients, such as soy and pea, are lacking indispensable amino acids and extremely limited in their functionality and, thus, in their food application potential. They are known to have a low solubility in water and change their properties during processing. The low solubility displays the biggest challenge in the development of milk alternatives leading to inferior protein content and protein quality in dairy alternatives on the market. Moreover, plant-based protein ingredients often possess an off-flavour, which makes them less attractive to consumers. EverPro, a plant-protein isolate originated from Brewer's Spent Grain, the most abundant by-product in the brewing industry, represents the missing piece in the plant protein portfolio. With a protein content of >85%, it is of high nutritional value, including all indispensable amino acids which allows closing the protein quality gap of plant proteins. Moreover, it possesses high techno-functional properties. It is fully soluble in water ($101.7 \pm 2.9\%$), has a high fat absorption capacity ($182.4 \pm 1.9\%$), and a foaming capacity which is superior to soy protein or pea protein. This makes EverPro suitable for a vast range of food applications. Furthermore, it does not cause changes in viscosity during heating and cooling of dispersions, such as beverages. Besides its outstanding nutritional and functional characteristics, the production of EverPro has a much lower environmental impact compared to dairy or other plant protein ingredients. Life cycle assessment analysis showed that EverPro has the lowest impact on global warming compared to soy protein isolate, pea protein isolate, whey protein isolate, and egg white powder. It also contributes significantly less to freshwater eutrophication, marine eutrophication and land use compared the protein sources mentioned above. EverPro is the prime example of sustainable ingredients, and the type of plant protein the food industry was waiting for: nutritious, multi-functional, and environmentally friendly.

Keywords : plant-based protein, upcycled, brewers' spent grain, low environmental impact, highly functional ingredient

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