

# FROM SPENT BARLEY GRAINS TO BEVERAGES

Spent barley grains can be seen as a game-changer as they are highly sustainable. At the end of the beer fermentation processes, the spent barley grains can get a second life by using them for beverage formulations. Discover the authentic natural barley protein solution platform and learn how proprietary technologies and responsible sustainable sourcing can provide the best from nature. By Henk Hoogenkamp, author and protein application expert.

## THE BARLEY BREWING STORY

The beer brewing fermentation process removes most of the soluble carbohydrates, as well as some soluble protein fractions, in barley.

Craft beer brewers in particular like barley because the sugars in the starch are easily converted to alcohol in the fermentation process. The residual side-stream protein still has unique features as these components can be naturally captured and modified for upstream protein and fibre solutions for many foods and plant meat applications.

Beer-brewing companies around the world have vast amounts of spent barley grains that will be sold as high-protein feedstock. In recent years, however, spent barley grains have undergone a “trash-to-treasure”

transformation. Proprietary technology refinements are now available to capture valuable macro- and micro components for use in food and drink products.

EverGrain, a fully owned subsidiary of AB InBev, can be seen as a pioneer in redefining upcycling. They have mastered the technology to fully utilise the protein value extracted from the leftovers of the natural beer brewing process. The company is on a mission to redirect animal nutrition into valuable protein ingredients. They have a broad barley-based ingredient portfolio and are gaining recognition by using science-enabled solutions for tasty, healthy and sustainable food applications.

EverGrain has an extensive portfolio of innovative solutions to help with current plant protein ingredient





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shortages as well as pricing challenges. Some of these barley protein ingredients are still in the development phase – to modify gelation and to achieve improved fat and water binding properties.

### **PROTEIN RECOVERY METHODS**

- Chemical extraction
- Dry fragmentation separation
- Precision fermentation

The makeup of barley grains are as follows: 10 percent protein 10 percent fat, and the rest are carbohydrates, fibre and roughage cell walls. Both physical and chemical methods can be used to obtain the separation of the various compounds that are embedded in the plant substrate. Chemical processing entails the use of a sequence of treatments that involve temperature, pH, alkalis, acids, as well as enzymes to modify protein performance.

To maintain a natural status, dry fragmentation is gaining popularity. This process does not need chemicals and vast amounts of clean water for centrifuging. Neither does it require expensive energy for spray or drum-drying. Physical separation is a time-

tested process with dry/air fragmentation and follows steps such as de-husking, sieving, heat stabilising, and final grinding. Physical plant treatment systems are usually most cost efficient. Because of the high demand for “green & clean” food labels, air fragmentation has become a popular choice to maintain the all-natural characteristics of the individual plant protein or plant fibre ingredient.

### **BARLEY PROTEIN APPLICATIONS FOR BEVERAGES**

- Sports & wellness nutrition drinks
- Smoothies, beverages
- Bakery, chocolate, confectionary, nutria-bars
- Plant & hybrid meat products
- Extruded crisps and textured meat analog foods.

Native or targeted enzymatically-modified barley protein has excellent emulsifying and interfacial film-forming properties, reducing the tension between water and oil droplets. The high encapsulation efficiency of barley protein is stable at low pH values. It also reduces oxidative degradation, which may increase the shelf life of a processed food product.





EverPro, a product of EverGrain, is produced from label-friendly spent barley grains. It has the following qualities:

- Light honey-like flavour
- Outstanding solubility
- A range of desired performances
- High-quality nutritional amino acid pattern
- Upcycling valorizes waste and sustainability
- Clean & green label

The EverPro protein isolate (85%) brand has unique application properties such as low-viscosity and high solubility. It is therefore ideal for a plethora of alternative dairy beverages.

**BARLEY PROTEIN INFUSED CHOCOLATE MILK**

- |                                   |         |
|-----------------------------------|---------|
| - Skimmed milk                    | 42.00%  |
| - Cream                           | 6.00%   |
| - Water                           | 38.50%  |
| - EverPro barley protein isolate. | 2.50%   |
| - Carrageenan                     | 1.00%   |
| - Coconut oil                     | 1.50%   |
| - Native corn starch              | 0.50%   |
| - Cocoa powder                    | 8.00%   |
| - Total                           | 100.00% |
- Optional: Pectin / Xantham Gum





Ready to drink and with no sugar added, Everpro fulfils the clean label claim and is healthy and sustainable, which is what modern consumers today want.

At this point, however, in terms of taste and nutritional value, plant milk products pale in comparison to dairy products. More work needs to be done in this area.

### FINE TUNING

The use of enzymes such as protease, amylase and bromelain is called hydrolysis, which is the process of cutting or splitting the protein chain into pre-determined chain lengths. As a rule of thumb, the higher the enzyme dosage and the longer the incubation or holding time at preset temperatures, the higher the protein or amino acids content. Yet, a possible negative side effect of longer incubation is

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that amino acids and peptides are formed with a bitter note. Seemingly, small processing changes can have significant influence on protein performance, such as its dispersibility and solubility, as well as its foaming, gelling, and emulsification properties.

The arrival of designer enzymes now allows the targeting and modifying of specific functionalities of plant protein ingredients. Most of them are:

- Reduced bitterness
- Creation of umami flavour
- Creation of bioactive peptides
- pH acidity stability
- digestibility
- dispersibility
- solubility
- reduced allergenicity
- gelation
- emulsification
- salt tolerance
- temperature stability
- non-dusting
- non-lumping
- low-glycemic

Converting spent barley grains for use in food and beverages is sustainable and affordable. Food companies that can adapt by using upcycled food proteins will potentially benefit the most. This is because spent barley grains can be a stable and reliable source of affordable, nutritious products. **APPI**

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