



## SME Solutions Centre Case Study

### Prioritisation of value-adding opportunities to upcycle brewing by-products

#### The challenge

Brewers Spent Grain (BSG) is the primary by-product of beer production. Over 45 million tonnes of wet brewers spent grain is produced globally each year, of which over 300,000 tonnes are produced in Australia. According to the food waste hierarchy it is considered underutilised, usually sent to landfill or as a low-value livestock feed. The beer brewing process removes the starchy sugars from the original virgin grain, leaving all the highly nutritious protein, fibre and other nutrients to go to waste. This creates a big food waste opportunity that Grainstone is working to systemically solve.

To explore the best valorisation opportunities the Fight Food Waste SME Solutions Centre, in partnership with Grainstone, first conducted a competitive research tender process among Australia's top research institutions. The winning proposal was from the Queensland University of Technology (QUT) supported by top research specialists from its Centre for Agriculture and the

Bioeconomy, Faculty of Science and School of Mechanical, Medical and Process Engineering, Faculty of Engineering.

These world renown specialists conducted a deep literature review, compositional analysis and exploration of cutting-edge processing technologies and high-value product development opportunities for grain by-products. After an opportunity review process, including preliminary techno-economic assessments, a prioritised ranking concluded with process development, innovation cycles and proof-of-concept prototyping.

Grainstone has now developed world leading novel and inventive platform processes to upcycle barley grain by products and related feedstocks. This technology maximises and optimises yield, purity, profitability, and sustainability.



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## Project impacts

There are rapidly growing markets for the ingredients that Grainstone's innovative processes can produce. Globally consumers are seeking healthier, more adventurous, and sustainable food products. For instance, protein powders can be used in plant-based meats, specialty flours can be used widely in baking and snack foods, whilst soluble fibres can be used to nutritionally fortify foods and beverages, all providing a range of health benefits.

Grainstone has been working to scale up and commercially deploy the innovative biotechnology created through this project with a range of brewers and food manufacturers in the value chain.

When fully deployed the potential annual global impacts include:

- *Large scale* - Providing a solution to enable upcycling of the 45million tonnes of wet spent grain produced annually from beer manufacturing. With additional feedstock opportunities in alcohol spirit production, grain milling as well as other grain feedstocks.
- *Climate positive* – A net emissions benefit of several tonnes for every tonne of dry feedstock that would otherwise be sent to landfill. Global benefit could be in the order of >150 million tonnes of net emissions reduction per annum.
- *Reduction in food waste* – Deploying the infrastructure to fix major inefficiencies in the global food system. Providing a meaningful contribution towards UN Sustainable Development Goal 12.3 target to 'halve food waste by 2030'.
- *Land and biodiversity saving* - Avoiding the resources

and land clearing needed for the annual production of tens of millions of tonnes of virgin grain;

- *Circular economy jobs* - Creating thousands of new circular economy jobs;
- *Investment & development opportunities* – Creating the opportunity for a new manufacturing hub in every major city globally where beer is brewed.
- *All new ingredients value chain* - Adding billions in profitability to the food and beverage industry.

## Conclusions & recommendations

The rigorous and structured approach to this project has generated exciting novel and inventive IP that is following a clear roadmap pathway from laboratory to widespread deployment. Grainstone's technologies will meaningfully contribute to solving a major food waste and climate problem in the most valuable, highest yielding and cleanest ways.

Grainstone has taken a wholistic green field approach to the problem to future proof and maximise the environmental sustainability of its solutions by using regenerative circular technologies. Opportunities for future improvements and future research have also been identified.

Grainstone is investing in scaling up the IP developed with Queensland University of Technology and the Fight Food Waste CRC, in partnership with Australia's scientific agency, CSIRO, and other partners. As a nimble fast-moving start-up Grainstone, continues to raise private and public investment to support its efforts.

## Participants



[www.fightfoodwastecrc.com.au](http://www.fightfoodwastecrc.com.au)

## Authors and acknowledgements

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