



The brewing process generates mountains of spent grain – finding a use for this is key to making the brewing industry more sustainable | Photo source [Yanhong He](#)

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BREWING WASTE USED FOR BIOFUEL AND FOOD



Researchers have developed a way to extract the proteins in brewing waste products for use in food and biofuel

Spotted: As anyone who has ever brewed beer knows, the process produces huge mounds of leftover grain. This “spent” grain is what remains after the flavour has been extracted in the brewing process – but it still contains a lot of protein and fibre. Up to now, the main use of spent grain has been as animal feed, but researchers at the Virginia Polytechnic and State University (Virginia Tech) have recently found a way to turn the protein in spent grain into biofuels and more.

The researchers, who presented their results at the spring meeting of the American Chemical Society, developed a novel wet milling fractionation process to separate the protein in the grains from the fibre. Unlike other processes, this one did not involve drying the grains first – which saves a lot of energy. Instead, enzymes are used to aid in separating the fibre and proteins. The result is then sieved to produce two products: a protein concentrate and a fibre-rich product.

Initially, the research team, led by Haibo Huang, PhD, proposed using the protein concentrate as a more sustainable replacement for fishmeal to feed farmed shrimp. However, they also believe the protein could be used as an ingredient in human food products. For the fibre-rich product, they have found that a newly-discovered species of *Bacillus licheniformis* can be used to convert sugars to 2,3-butanediol, a compound that is used to make products such as synthetic rubber and the fuel 2-butanol.

This would mean that both the protein and the fibre could be sustainably converted into a protein source, biofuels, plastics and more. Yanhong He, a graduate student who is presenting the work at the meeting **explained:** “Spent grain has a very high percentage of protein compared to other

agricultural waste, so our goal was to find a novel way to extract and use it.” Huang added: “There is a critical need in the brewing industry to reduce waste.”

Spent grain joins a rapidly growing list of agricultural waste products that are being sustainably repurposed for new uses. Almost every week brings another development in this fast-growing space. At Springwise, we have recently covered the use of [unwanted oranges](#) for generating electricity and an organism that can turn [cardboard](#) into biofuel.

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Takeaway:

As a next step, the team plans to work on scaling up the process of separating the protein and fibre components to allow them to work with the huge volumes of spent grain that are generated at commercial breweries. They are also experimenting with cheaper enzymes, and hope to make the process more sustainable and affordable. If successful, the new process could allow breweries to extract a lot more usable protein and other materials from the mountains of grain they use. Given that, for every 1,000 tonnes of beer produced, around 173 tonnes of solid waste is produced – the new process could be a big help in helping the brewing industry to reach zero-waste status.