

Spent Grains

DESCRIPTION

Cereal grains – typically malted barley, but others depending on the flavor desired – are milled and mashed, and when the liquid extract that will become beer is filtered, the remaining solids are referred to as spent grains. Spent grains, which can be combined with other process wastes like [spent hops](#), are typically sold to farmers as a livestock feed called brewers grains. Brewers grains can be sold wet or dry and provide both crude protein and fiber.

CLASSIFICATION

Plant-based proteins, lignocellulosic biomass

SOURCE INDUSTRY

[Breweries](#)

ANNUAL VOLUME GENERATED IN WISCONSIN

188,000 wet tons (based on 8.57 million barrels¹ at 44 lbs/barrel^{2,3,4})

CURRENT APPLICATIONS

Animal consumption

PRICE

~\$47/ton when sold as brewers grains⁵

APPLICABLE BIOREFINING PROCESSES

[Anaerobic digestion](#), [biomass gasification](#), [combustion](#), [fast pyrolysis](#), [fermentation of lignocellulosic biomass](#), [thermochemical liquefaction](#)

REFERENCES

¹ Ivey, Mike. 2004. "State says Cheers! Wisconsin brewers buck trend." The Capital Times, March 25. Madison, WI. www.madison.com/captimes/business/stories/70895.php (15 April 2004).

² Olson, Gary. Plant manager, Huber Brewing Company. Interviewed by Sean Weitner. Telephone, 16 April 2004.

³ Galitsky, Christina, et al. 2003. Energy Efficiency Improvement and Cost Saving Opportunities for Breweries. Ernest Orlando Lawrence Berkeley National Laboratory. Berkeley, CA. eetd.lbl.gov/ea/ies/iespubs/50934.pdf (15 April 2004).

⁴ Becker, Rich, Brewmaster, JT Whitney's. Interviewed by Sean Weitner. Telephone, 16 April 2004.

⁵ Anderson, Nolan. Dane County Dairy and Livestock Agent, University of Wisconsin Extension. Interviewed by Sean Weitner. Telephone, 19 April 2004.

Ingredients 101. Brewers grains, dried. www.ingredients101.com/brsgrnd.htm (15 April 2004).