

Brewery Bi-Products

Focus on Brewer's Spent Grain

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A Brief History and a Bright Future



MOOSEHEAD

- BREWERIES -

The four main ingredients of beer

1 - Water



The four main ingredients of beer

2 - Hops



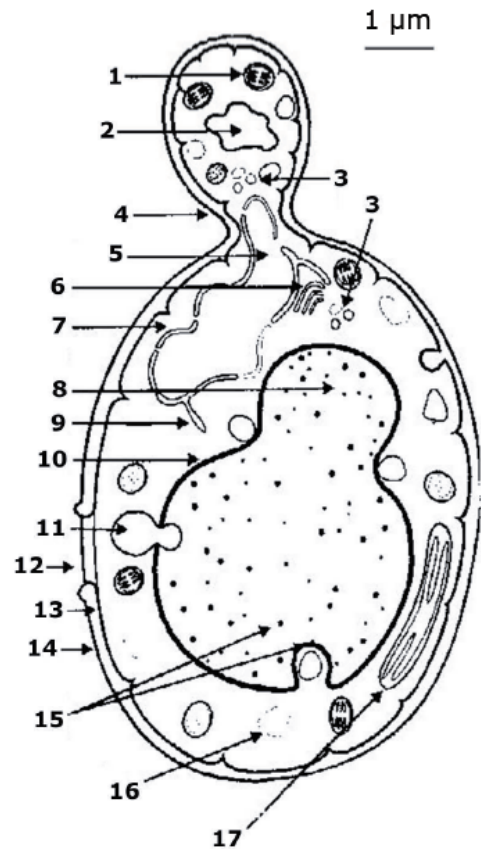
The four main ingredients of beer

3 - Malt



The four main ingredients of beer

4 - Yeast

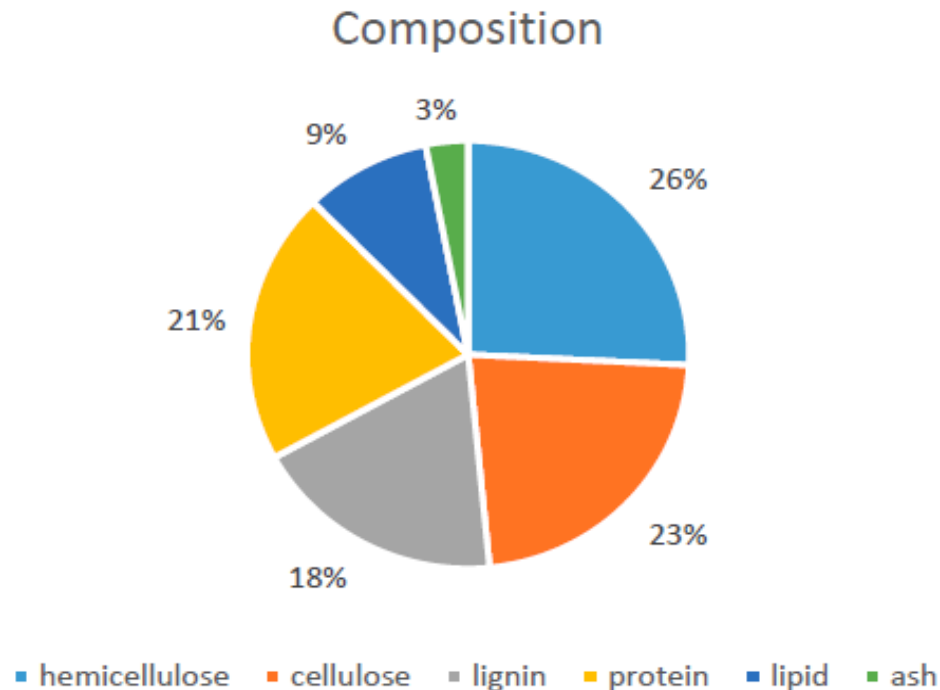


Main features of a typical yeast cell

- (1) Mitochondrion
- (2) Bud vacuole
- (3) Secretory vesicles
- (4) Bud
- (5) Nucleus
- (6) Golgi complex
- (7) Pore in nuclear membrane
- (8) Vacuole
- (9) Endoplasmic reticulum
- (10) Vacuolar membrane
- (11) Liquid granule
- (12) Bud scar
- (13) Cell membrane
- (14) Cell wall
- (15) Vacuolar granules
- (16) Storage granule
- (17) Thread-like mitochondrion

What are “spent grains”

BSG is the leftover grain from the brewing process. It is composed of cellulose, hemicellulose, proteins, and lignin, lipids, and ashes. The composition can vary significantly depending on its source as there are many factors affecting the final product such as cereal variety, time of harvest, grain bill, malting regime, mashing regime, extraction efficiency and other factors.



How is spent grain produced?

1. Grinding
2. Mashing
3. Lautering
4. Grains out

Uses for spent grain – Food & Feed

BSG contains a high concentration of fibers and proteins which can add to the dietary value of baked goods when a percentage of flour is replaced by BSG flour.

Use in animal feed is generally the standard method for breweries to deal with their spent grains. This alleviates much of the handling issues associated with other uses for the grain and is a good compliment to traditional feeding strategies.

Other uses for spent grain – Alternative agricultural uses

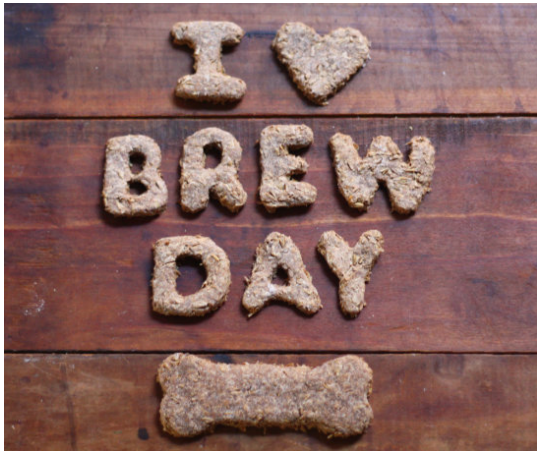
- Compost
- Mushroom farming
- Bedding

Other uses for spent grain

- Power generation
- Biogas production

Other uses for spent grain – Novel uses

- Dog biscuits
- Brewery tableware
- Packaging for canned beer



QUESTIONS

