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Honey and Homebrewing

A Sweet History

Honey. For tens of thousands of years "the universal sweetener" was almost the only available source of sugar in the countries where it was used. Ancient civilizations looked on the making of honey as a miracle, and even today, after much scientific research, honey remains something of a mystery.

Honey is made by honey bees from the nectar that they collect from flowers. The nectar itself is a sweet liquid produced by flowering plants to attract insects helpful in pollination. Honey contains much less moisture than the original nectar. About 80 percent of honey is sugars, mostly fructose and glucose. Maltose, sucrose and other complex carbohydrates are present in varying amounts, as are proteins, amino acids, vitamins and minerals. Although relatively low in nutrients, honey contains more nutrients than refined sugars. As a rule, darker honeys contain higher amounts of minerals than lighter honeys.

Historical Use of Honey in Beer

The earliest alcoholic beverages were probably made from diluted fermented honey. The beer that the early Anglo-Saxons drank was a brew of water and honeycomb made in a clay pot, to which herbs may have been added for flavoring.

Around the world, present-day brewers continue to experiment with beer additives. In Germany, where beer drinking is serious business, the use of wheat as an adjunct has gradually grown in popularity, while in England, oatmeal or lactose is generally used to impart body. In Belgium, brewers have long been known for their use of sugars and spices in brewing ales.

Many modern brewers have come to value the use of all-natural ingredients in their beers. One such ingredient is honey, which is used in a variety of beers from herb and specialty beers to traditional and flavored mead. The use of honey in beers has become popular with the rise of micro- and homebrews. In addition, homebrewing has become increasingly popular with nearly one million Americans making their own beer according to the American Homebrewers Association.

A honey beer research project, conducted on behalf of the National Honey Board, determined the potential, usage level and benefits of using honey in beer produced by microbrewers.

For formulas, research monographs, technical article reprints and practical tips, please call the Honey Hotline at 1-800-356-5941.

Special Properties of Honey

PRACTICAL REASONS FOR USING HONEY IN BEER

The flavors of honey suggest a natural marriage with the sweet flavors of malted barley; the floral, spicy tones of late addition hops; and the perfume of yeast fermentation esters. The National Honey Board's study showed that honey is an excellent beer ingredient when used at recommended levels and, added at the appropriate stage, the flavor and aroma imparted by honey is exceptional.

Honey can be used in virtually any type of beer. It is generally used in herb beers, specialty beers, traditional mead and flavored meads. For mead production, since the honey is diluted, most experts recommend using a strong-tasting type of honey, such as buckwheat. Some mead producers claim that fresh, unprocessed honey is the best choice.

HONEY'S FLAVOR CONTRIBUTION TO BEERS

- ❑ **Herb Beers** (1.5 lbs. honey for 5 gallons) Ginger, cinnamon, cloves, orange peel and many other types of herbs and spices are used. These items are especially popular in Christmas and holiday beers. Lake Front Brewing (Milwaukee, Wisc.) produces holiday Spice Beer that uses a total of 180 pounds of honey in each batch!
- ❑ **Specialty Beers** (2.5 lbs. honey for 5 gallons) Special brewing adjuncts that add a characteristic note are popular in this category. Such fermentables include honey, as well as molasses, brewer's caramel, chocolate, etc. Honey, fruits and herbs are used in these products for flavoring only (not a major ingredient as in flavored meads).
- ❑ **Traditional Meads** (up to 20 lbs. honey for 5 gallons) Mead styles include sparkling, dry, medium and sweet. Mead requires the use of nutrients and additives to accelerate production. Mead takes from several weeks to one year to produce, and derives benefits from aging. Traditional meads are available on a limited basis in the United States and can be found in specialty stores. Mead is gaining popularity, as several meaderies are scheduled to open in the near future.
- ❑ **Flavored Meads** (10-12 lbs. honey for 5 gallons)
Melomel: a fruit flavored mead (other than apple).
Cyser: a Melomel made with honey and apple juice.
Clarre or Pyment or Pymeat: a Melomel made with grape juice.
Hippocras: a Pyment made with herbs.
Metheglin: a Melomel flavored with spices or herbs.

HONEY'S EFFECT ON BEER

In honey, wild yeasts and bacteria are ubiquitous, yet they are kept in stasis due to honey's low water content (average 17 percent). As soon as honey is diluted in water or wort (the liquid extraction of the malt), these microbes are free to grow and proliferate. Many homebrewers have reported a high incidence of bacterial and wild yeast contamination when introducing honey to their beers.

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The possible incorporation of honey's diastatic enzymes (alpha-amylase and beta-amylase) to beer could pose further complications for brewing with honey. These enzymes are present in malted barley and are activated and manipulated by the brewer with specific temperature regimes during the mashing process. Diastatic enzymes are responsible for the conversion of the complex carbohydrates of the malt starch into a balance of fermentable sugars and unfermentable dextrins. The dextrin complement (average 25-35 percent) consists of partially degraded complex carbohydrates that contribute importantly to the final extract, body and texture of a beer. It is essential that the brewer prevent further degradation of these dextrins into simple fermentable sugars by diastatic enzymes.

Boiling the wort effectively destroys these enzymes along with any yeasts or bacteria that may have survived to this stage. If honey were added to the boiling wort, there is little doubt that it would be rendered sterile and enzymatically deactivated. Unfortunately, it would also likely be rendered without much positive contribution of flavor to the beer.

How to Use Honey in the Homebrewing Process

Sterilization is needed to control honey's diastatic enzymes as well as its yeast and bacterial count. Honey should be added in such a way so that its diastatic enzymes (alpha-amylase and beta-amylase) do not degrade the dextrins (non-fermentable carbohydrates) in beer into simple sugars, thereby destroying the texture and body of the end product. The yeast and bacteria in honey, which are generally in stasis due to honey's low water activity, can grow and proliferate when diluted during beer making. This will adversely affect the microbiological profile of the end product.

COMPENSATING FOR HONEY IN THE BREWING TECHNIQUE

The carbohydrates in honey must be considered to comprise approximately 95 percent fermentable sugars (fructose, glucose, maltose and sucrose), whereas the carbohydrates in premium beers may comprise 65-75 percent fermentable sugars. The 25-35 percent of the carbohydrates remaining unfermented are dextrins (beta glucans) which provide body and richness to the finished beer. Honey added to fermenting beer wort not only decreases the dextrin content of the beer proportionately by dilution, but it also increases the potential alcohol content of the finished beer by increasing the proportion of fermentable sugars in the wort. The saccharization which occurs during mashing converts the starches in grain to fermentable sugars. The brewer should consider using higher saccharization temperatures to promote dextrin formation and retention. The brewer should also consider starting with a lower gravity in the wort to reduce overall potential alcohol when brewing with honey.

HONEY: HEAT TREATMENT

The following method is recommended for pasteurizing honey for homebrewing:

1. Preheat the oven to 176°F.
2. Place the honey in a sanitized oven-proof saucepan.
3. Heat the honey on the stovetop to 176°F. The honey should be stirred occasionally.
4. When the honey reaches 176°F, cover the pan and place it in the oven.
5. The trick for the homebrewer will be maintaining the pasteurization temperature for the required time. Use a thermometer that is reliable, and hold the honey in the oven at 176°F for 2 and 1/2 hours.

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6. At the end of the pasteurization process, bring the honey temperature down to the beer temperature by placing it in an ice bath.

HOW TO USE HONEY IN THE HOMEBREWING PROCESS

Honey should be added to the beer at high kraeusen (peak of fermentation activity), diluted (with hot pasteurized water) to the original specific gravity of beer and cooled to the temperature of the fermenting beer. There should be an increase in mash temperature if more honey is being used to compensate for the dilution factor. Brewers should aim for mash temperatures between 155-162°F to promote more dextrins.

Where and How to Get Variety Honeys

Homebrewers may want to purchase honey from a local beekeeper or honey packer, or from a warehouse store, as typical supermarkets sell honey in relatively small containers. To receive a list of honey suppliers please contact the National Honey Board at 303-776-2337 or download a suppliers guide at www.nhb.org.

CHOOSING THE HONEY

When choosing the type of honey to use, there are three factors to consider: aroma, flavor, color and body. Aroma and flavor are influenced by the flowers from which the nectar is gathered. Color can also be attributed to the flower, and varies from nearly clear to very dark. Body depends on 1) floral source and 2) how the honey is extracted from the comb and blended.

RECOMMENDED HONEYS AND THEIR LEVELS FOR BREWING

Apart from the considerations of dilution of dextrins, free-amino nitrogen and other nutrients, ideal honey usage levels can be quite variable. Honey's primary contribution to beer is its characteristic aroma and flavor. Most brewers will want to keep that flavor in the background as an aromatic nuance complementing the other flavors in their beers. The following percentages of honey (as percent weight of total grain bill) are suggested based on the National Honey Board's beer research:

- **3-10%** - A subtle honey flavor is contributed to the ale or lager. Most commercially available honeys such as clover, alfalfa, orange blossom, sage and mixed wildflower are very mild in aromatic flavor intensity.
- **11-30%** - A distinctly noticeable honey flavor note will develop. Stronger hops flavors, caramelized or roasted malts, spices or other ingredients should be carefully considered when formulating recipes to balance stronger honey flavors at this higher level.
- **More than 30%** - The flavor of the honey will likely dominate the other flavors in the beer. The beverage should probably be considered in a category of its own.

Flavor preference is a highly subjective consideration. The permutations of brewing technique, various yeast strains, diverse malts, adjuncts, hops, herbs and spices along with the many variations of honey types, seasons and sources will keep the innovative honey homebrewer creating new recipes for a very long time!

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