

The Essentialist

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Making Beer at Home, with Keith Blaylock

Keith challenged us from the very beginning, with a written test, while he played the "Final Jeopardy" tune.

Home-Brew Knowledge Test

1. What are virgin hops?
2. What is malt:
3. What is beer?
4. What causes beer?
5. What is Zymurgy?
6. What is Brix?
7. What type of alcohol is in beer?
8. Can lupulin hurt you?
9. What is the specific gravity of water?
10. How much beer can you (legally) brew at home?

He pretty much stumped us with most of these, but some people had humorous answers to #'s 1 and 3....

The answers are:

1. Virgin hops are unfertilized female hop flowers (*Humulus lupulus*), and are the best hops for beer. But all hop cones can be used.
2. Malt is sprouted and kiln-dried cereal grains. This process releases stored starch so it can be mashed and converted into sugar for making beer. The malt can be simply dried, or roasted to varying levels, to affect the flavor of a beer. Barley is probably the most common grain, but others are also used for different flavors. There is a new malting plant in Eastern Montana.
3. Beer is one of the oldest beverages in the world, and the third most popular today (after water and tea). Beer is also the oldest written recipe, in cuneiform from ancient Egypt. Wort is the liquid from crushed malt. It is rich in sugar, which is converted by the yeast into alcohol and carbon dioxide, and many different flavor compounds.
4. Yeast acting on the sugar from the malt causes beer. Yeast (*Saccharomyces*) is everywhere, but each locality has its own strain or variety, which gives different flavors to beers from different locations. (see the [beer advocate](#) for more on different yeasts). Wild (native) yeast can be used, but you never know what you'll get, so Keith selects the yeast

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based on the flavor and type of beer he wants to make. Brewing yeast is the same species that makes sourdough, and beer can be made from sourdough bread.

5. Zymurgy is the art and science of making fermented beverages.
6. Brix is a measure of sugar content in brews, and hence the alcohol content of the brew. It is directly related to the specific gravity of the liquid. 1 brix = specific gravity of 1.004 (pure water has specific gravity of 1.000).
7. The alcohol in beer is ethanol.
8. Lupulin is the resinous material between the leaves of the hop cone, and makes beer bitter. It cannot hurt you; in fact, bitter compounds, in general, are good for health.
9. Specific gravity of water is 1.000.
10. Federal law allows 100 gallons of beer for a 1-person household, or 200 gallons of beer for a larger household, per year. However, some states override this rule, and may even prohibit home brewing. Further, it is illegal to sell home brew, but you can barter or donate it (be discreet).

Myths of Home Brew

1. *It will make your sick or go blind.* Yes and no. In general, bacteria and other harmful bugs will not survive the acidic and alcoholic beer. From a disease standpoint, beer is more healthful than water. In a few extreme cases, heavily contaminated beer may cause diarrhea or stomachache, but the beer will be so foul tasting that you won't drink it.
2. *It will give you a beer belly.* Keith affirms this is not true, and cites himself as example; lifestyle and genetics are the reason for big bellies. However, excessive consumption of alcohol over extended periods can lead to elevated levels of blood insulin. This can lead to a condition known as "fatty liver" that, left unchecked, can lead to cirrhosis. The accumulation of fat in the liver is also known as "beer belly." Beer also contributes calories.
3. *Dark beer is heavier/maltier than light beer.* Not true. Dark malt (made by roasting the malted grain until it is almost charcoal) has less sugar, and hence a lower alcohol content.
4. *It will explode in the bottle.* This can happen if you are not careful; over-carbonation can be explosive.
 - Be sure to sanitize anything that contacts the wort or brew. If not properly sanitized, bacteria can infect the brew and cause over-carbonation, which can be explosive.
 - don't use too much sugar when you bottle-condition the brew (sugar is added to the finished brew to produce carbonation when bottled).
5. *It's not as good as commercial or micro-brews.* Not true. Keith says, "Deciding which tastes better is in the eyes of the beerholder."
6. *It is full of B vitamins.* This is partially true - yeast produces B vitamins, but not enough to be a good B-vitamin supplement.

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7. *It has more alcohol than commercial or micro-brews.* Mostly, home brew and commercial brews have the same alcohol content (4.5 - 6% range); some microbrews have up to 12% alcohol by volume. But home brewers have complete control over the alcohol level (by controlling the specific gravity of the brew).
8. *Using aluminum pots can cause Alzheimers.* Keith says this is not true, but he uses stainless steel pots. Ceramic can also be used. Do not use an aluminum pot that shows signs of inter-granular corrosion due to electrolysis. There is evidence that aluminum accumulates in the brains of Alzheimers patients, and the acidity of the brew is favorable to leaching of aluminum from the pot into the brew.
9. *Smoking hops will get you high.* Hops are in the same family as marijuana. They are sedative (calming).
10. *Home brew gives you a bad hangover.* Not true. Dehydration is the cause of hangovers, but B vitamins (present in the yeast sediment) help to combat this problem. Commercial beer is filtered and so does not have this added benefit. Keith adds, "If you find yourself in a situation where you have had too much alcohol make sure you drink plenty of water before heading to bed."
11. *Making home brew is against the law.* This could be true in some states, but Montana follows the federal law (see quiz question 10, above). Keith attests, "I personally never have more than 200 gallons of beer on hand at any given time."

Designing Beer

By regulating the specific gravity and the IBUs (International bittering Unit), you can affect the flavor and body of the brew. Keith uses a brew-sheet calculator to do this, available at www.beersmith.com. You can download a trial version for free; it costs \$29 if you decide to purchase it; Keith says it is well worth the cost if you want to experiment with your beer flavors. [See sample brew-sheets \(from Keith\).](#)

How much hops for desired balance: high hop is bitter; high malt is sweet. See chart at end of this document.

Temperature, alcohol content, and water source also affect the bitter/sweet balance in flavor. Hard water favors dark beers; soft water favors pilsners.

Determine Alcohol Content (% Volume)

To determine the alcohol content (in %): measure the specific gravity of:

- starting wort (before the yeast is added) = SG (in formula below), and
- finishing brew (when ready to bottle) = FG (in formula below).

Note that alcohol is lighter than water, so the higher the gravity, the lower the alcohol content, because unconverted sugars are heavier than alcohol. Then calculate (see [How stuff works](#) for more):

$$\% \text{ alcohol content} = (\text{SG} - \text{fFG}) \times 100\% / 7.4$$

First Time Brew Process

The three most important factors in a successful brew are;

- ✓ Preparation
- ✓ Sanitation: Keith recommends “Starsan” sanitzier available at Witheys. Mix with water; it’s reusable and sanitizes in 35 seconds.
- ✓ Good Record Keeping (such as a beer chart)

Cost

Using prices from Withey’s (before the discount), for 10 gallons of brew:

Item	Amount	Cost
Liquid malt extract	7 pounds	\$18.95
Hops	2 oz	\$ 9.99
Yeast (dry)	1 package	\$ 1.19
Sugar (plus extra for bottling)	2.5 pounds	\$ 3.00
TOTAL	10 gallons	\$33.13

10 gallons fills 107 12-oz bottles; 31 cents average, per bottle

What you need:

- Prep list
- Large stainless pot, to hold at least 4 gallons (you can boil in batches). Best have a false-bottom and a valve at the bottom for draining out the liquid, while the hops are held back by the false bottom.
- Stir spoon; slotted or perforated spoons are good for aeration.
- Hop socks (If your pot doesn’t have a false bottom): put hops in the sock, tie closed, and toss into pot, so you don’t have to strain out the hops later.
- Thermometer: floating kind, or electronic/digital
- Hydrometer in test tube (to measure specific gravity of starting and finishing brew). This is not required, but is a good idea if you want to keep records for repeat batches.
- Airlock
- Auto-siphon (used for racking: transfer of liquid from one vessel to another). Siphons make the transfer easy, and are more sanitary.
- Bottling bucket (food grade plastic; has valve at bottom for attaching siphon, and lid with a hole for attaching airlock)

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- Fermenting bucket (food grade plastic; has lid with a hole for attaching airlock) or glass carboy
- Bottles and caps (caps not required for re-sealable bottles)
- Bottle capper (if using caps)
- Ingredients for 5 gallons beer (see "Cost" section above; divide amounts in half for 5 gallons).

Process:

Proof Yeast (to ensure it is active)

1. Sanitize yeast packet, scissors, measuring cup and spoon (35 seconds with Starsan).
2. Heat 1 cup water to boiling, adding 1 Tbsp sugar.
3. Pour into sanitized cup, cover (with plastic wrap), then cool to 80 -90° F (covered)
4. If it starts to bubble after about 30 minutes, it is good. If not, get fresh yeast and proof again.

Prepare Wort:

At the end you want 5 gallons brew (fills about 55 bottles), but you start with 6.5 gallons water; some will boil off, some is absorbed by the hops, etc..

5. Pour 3 ½ gallons water into large pot; boil for 15 minutes (uncovered). Transfer water into sanitized food grade plastic bucket. Cool to 60-70° F (covered).
6. Pour 3 gallons water into emptied pot. Add hops (use hop sock if pot doesn't have false bottom). Boil 45 minutes. Remove from burner.
7. Add liquid malt extract (LME) or dry malt (DME), [Keith prefers liquid malt because dry malt is messy], and sugar. Get all LME out of container by dipping into hot water and rinsing into boil pot. Stir until completely dissolved.
8. Add Irish Moss (if using). This is a type of seaweed that makes the proteins separate out for a clearer beer. To use: hydrate about 1 Tbsp in 1 cup water, then pour into pot.
9. Put pot back on burner and bring to boil. Watch carefully, as the boil happens quickly (and explosively). Turn heat to low, and keep at a simmering boil for 15 minutes.
10. Cool to 60-70° F (covered). Cool as rapidly as you can to minimize contamination: set covered pot in snow or ice bath (cools in 30 minutes or more). Or use a plate chiller (heat transfer mechanism that uses flowing water), which cools in 7 - 8 minutes.
11. Pour or siphon wort into sanitized fermenting bucket or carboy; this transfer of wort is called "racking." Pouring aerates the wort with oxygen, which is good, but you need to use a siphon if you use a carboy. You can also stir with a perforated spoon to aerate the wort in the pot before racking.
12. Pour/siphon enough of first batch of water into bucket or carboy to fill 5 ¼ gallons. Check temperature; want to be 60-70° F, never over 80° F. Fermenting generates 8° on its own, so take this into account.
13. Add proofed yeast when at desired temperature, stirring with perforated spoon to aerate. Add sanitized lid and airlock, and put in fermenting place which will maintain the

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65-70° F temperature. Keith uses a large chest freezer (unplugged), equipped with a heat source.

14. Allow to ferment 1 week in fermenting bucket/carboy. Then rack to sanitized secondary bucket/carboy (use siphon), cover with sanitized lid and airlock, and ferment for another 2 weeks in fermenting place.

Bottling Time

15. Check beer with hydrometer. If specific gravity is around 1.010-14 and stable for three days it is ready to bottle.
16. Prepare sugar (for bottling): boil 2 cups water and $\frac{3}{4}$ cup sugar for 5 gallons of beer. Then cool to 60-70° F. Most brewers prefer corn sugar (not corn syrup), but cane sugar can also be used. Honey takes longer to carbonate, and you need more of it).
17. Sanitize bottling bucket, bottling tool, racking cane and hoses, and spoon. Sanitize bottles and keep covered until ready to fill.
18. Rack wort to sanitized bottling bucket. Add sugar/water and stir. Secure lid. Attach bottling hose to bucket (one end attaches to bucket; other end is the wand for delivering the brew to the bottle). Keep bucket covered while bottling.
19. Insert wand into sanitized bottle and press against the bottom to start flow. Fill bottle, then pull out wand. It leaves the proper amount of head space in the bottle. Fill several bottles at the same time.
20. Cap filled bottles with capper (or close seal on re-sealable bottles).
21. Repeat until all bottles are filled and capped.
22. Rinse off each bottle and put in box or 6-pack. Keep out of sunlight, but at 65-70° F (never above 80°) for 3 weeks to carbonate.
23. Chill and taste!

General Timing Rule:

1 week in primary, 2 weeks in secondary, 3 weeks in the bottle.

Conclusion

All attendees got a Homebrewing Award certificate, for having completed his seminar, and a discount coupon from Witheys for first purchase of brewing supplies.

Information sources:

- Keith Blaylock
- <http://beeradvocate.com/beer/101/yeast.php>
- <http://recipes.howstuffworks.com/question532.htm>

Attachments

Sample Brew Sheet

BeerSmith Recipe Printout - <http://www.beersmith.com>

Recipe: First home brew

Brewer: Keith the brewer

Asst Brewer:

Style: American Light/Standard/Premium Lager

TYPE: Extract

Taste: (45.0) Tastes very good!!!

Recipe Specifications

Batch Size: 5.25 gal

Boil Size: 6.01 gal

Estimated OG: 1.041 SG

Estimated Color: 4.9 SRM

Estimated IBU: 18.4 IBU

Brewhouse Efficiency: - %

Boil Time: 60 Minutes

Ingredients:

Amount	Item	Type	% or IBU
3.50 lb	Pale Liquid Extract (8.0 SRM)	Extract	63.64 %
1.00 oz	Domestic Saaz [5.50 %] (60 min)	Hops	18.4 IBU
1.00 oz	Cascade [7.60 %] (0 min)	Hops	-
0.26 oz	Irish Moss (Boil 15.0 min)	Misc	
2.00 lb	Sugar, Table (Sucrose) (1.0 SRM)	Sugar	36.36 %
7.00 gal	Keith's well water	Water	
1 Pkgs	Dry yeast (Any brand #-)	Yeast-Lager	

Mash Schedule: None

Total Grain Weight: 10.00 lb

Notes:

Prepare 3.5 gallons of water by boiling for five minutes and cooling to 60 degrees (keep covered after boiling). Re-hydrate yeast. Re-hydrate Irish moss. Place three more gallons of water in boil pot and bring to a boil. Add first hops (in hop sock) and boil for 45 minutes (be careful when adding hops as they can cause the liquid to flare up and boil over). REMOVE FROM HEAT and slowly stir in LME and sugar (rinse LME inside of container with hot water from the boil pot). After extract and sugar are well dissolved place back onto burner. Add Irish moss. Bring to a slow rolling boil for 15 more minutes (be sure to watch carefully to prevent boil over). Add aroma/flavor hops (in hop sock) cover pot and remove from heat (flame out). Cool to 70 degrees. Put wort into sanitized fermentor and top off with prepared cooled water until you have 5.25 gallons in fermentor. Shake or stir with a large perforated spoon to aerate. Note: temperature should be around 64-70 degrees. Pour yeast into fermentor. Place lid and air lock onto fermentor and store in a cool (65-70 degree) area. Fermentation should begin within 24 hours (airlock will be bubbling).

Hop-Malt Balance Chart:

