Hangtown Brew Noose

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President's Message

First of all, a big Congratulation goes out to Steve Seeley for winning the Gold in the World Cup comp for his "not as good as last year's" English Brown Ale. Good work Steve! Hope to try some of that at the next meeting. Bring some of last year's, too.

The topic for April's meeting (coming up this Thursday) will be about that which comprises about 95% of every beer you brew... Water! We'll be keeping it straightforward and practical. Discussion will include the major ion components that affect beer quality and how those components vary regionally (think Pilsen vs. Burton on Trent vs. Placerville). We'll finish up with a demo of how to tweak your water chemistry to closely match that of other regions by the addition of compounds like calcium carbonate, baking soda, and for you lovers of Russian Imperial, Polonium 210.

Upcoming club events include the pub crawl, slated for Sunday April 29th, and National Homebrew Day Bigbrew on May 5th. For the pub crawl, the general plan is to utilize light rail from Folsom into the downtown Sacramento area and sample brews from various breweries and pubs. More details like a start time and a general list of places to hit will be posted soon. The Bigbrew (details at www.beertown.org) will be held at Morning Glory Fermentation. The idea is to bring your brew apparatus and make a batch of beer according to a recipe to be used by thousands of homebrewers across the country. You're welcome, of course, to brew your own recipe instead if you don't like the posted recipe.

Hope to see you all at the meeting this week!

Dave

HAZERs in the News!

We are so glad to have Bill Kenneyback with us after a nasty bout with cancer. Way to kick a** Bill!

Congratulations to Vice President Stan Backlund who scored a National Rank on his BJCP exam!

Also congrats to Treasurer Glen Franke for reaching the Beer Judge rank of Recognized!

Beer-A-Palooza '07

Another excellent time was had by all at Beer-A-Palooza in San Franciso back in February with much consumption of beer at Anchor Brewing, Pyramid in Berkley, 21st Amendment, Magnolias, Fritze, and of course the Celebrator Party at Trumer Brewery.

The Celebrator Party was a little subdued for me compared to last year, not that the weekend didn't have plenty of drama (separate story – don't mention the word "keys"!), we just didn't have quite the HAZE showing as we did last year. Henry made up for a lot of it, but considering that next year is the 25th Anniversary of the Celebrator Party, might not be bad idea to plan now to go to what surely will be a great time. In the meantime, a few pics….

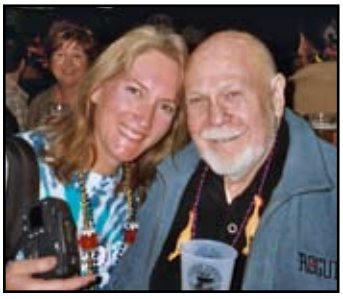
Henry and the BUV (Beer Utility Vehicle) awaiting festivities outside Trumer

Lars (center) , Uber Herr of Trumer Braurei, fields questions during the tour of the brewery

Tom Dalldorf, editor of the Celebrator and Lars

You never know who will show up – hey, it's Pete of Pete's Wicked Ale, Pete's Coffee, Pete's Chocolate!

Henry and Miguel having a little "Hair of the Dog" Sunday morning, warming up for the "party"!



The very lovely HAZE-ette, Lori Marshall (Glen, check her dues status!), with the maestro Fred Eckhardt

Water, Does It Really Matter?

Well, if we based our answer on the preponderance of information available relative to other information that is available, especially in trade magazines, the answer is probably “No”. I haven’t conducted a scientific study or anything, but if we compare any one category of brewing technique (mashing, hop selection, malt selection, care and feeding yeast, etc), I would be surprised if a serious water article appeared more than once for every fifty of any of these other topics. That being said, why talk about water at all? Well, because frankly it does matter, particularly when brewing all grain.

Mashing, which is the enzymatic conversion of starches in malted grain to soluble sugars which can be digested by yeast, has an ideal range of pH in which this enzymatic process occurs, and outside of which, efficiency of conversion drops off significantly. Ok, with that you’ve probably deduced that water chemistry is more important for all-grain brewing than extract brewing. True, but not entirely so, as we’ll discuss later.

So, back to water chemistry. The grains used in the mash, or grist, have a significant effect on the pH, or relative acidity, of water the water. The term pH refers to the “power Hydrogen’ or H+, the ion which makes an acid, an acid. The more an acid dissociates, or loses hydrogen to produce H+, the stronger the acid is, and vice versa. When grains are mashed, the enzyme phytase catalyzes the organic compound phytin in the grain to produce phytic acid, and calcium and/or magnesium phosphates. The phytic acid in turn combines with free Ca++ in the mash to form additional calcium phosphate and releasing H+ in the process. This acidifies the mash, lowering the pH. As long as the mash pH remains in the range of 5.1 to 5.5 (at mash temp, or 5.4-5.8 at room temp), all is well. If not, bad things can happen like loss of efficiency of mash enzymes and the extraction of tannins.

Consider the following grains, and a mash at room temperature. Note the profound impact each type of grain has on the pH of distilled water (pH = 7):

Grain	pH
Base Malt	5.7 – 5.8
Caramel malt	4.5 – 4.8
Chocolate malt	4.3 – 4.5
Black malt	4.0 – 4.2

Considering that pH measurement is logarithmic, and not linear, these are huge changes in pH based simply on the grain.

The four principle ions in water which a brewer should understand are Calcium (Ca++), Magnesium (Mg++), Bicarbonate (HCO3-) and Sulfate (SO4--). Calcium, because of it’s reaction with phytic acid, is the most important ion with regards to acidification of the mash, whereas bicarbonate is the most important for it’s buffering, or acid absorbing capability. Sodium and Chloride are also important ions but not for the pH.

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Water, Does It Really Matter? .... continued

Ultimately, the pH of the mash is determined by the hardness, alkalinity and buffering salts derived from the grist. Hardness is the amount of calcium (and magnesium) and hence the potential ability of the mash to acidify. Alkalinity is the ability of the mash to resist acidification (buffering) and is determined by bicarbonate. Buffering salts are provided by the grains.

As stated earlier, calcium reacts with malt phytin to release hydrogen ions which combine with bicarbonate, neutralizing the alkalinity. After all of the calcium has been utilized, the resulting alkalinity is called Residual Alkalinity, RA and can be expressed by different equations:

$$RA = \frac{(< HCO3- > - < Ca++ >)}{35} - \frac{(< Mg++ >)}{7}$$

Or

$$mEq/L\ RA = mEq/L\ Alkalinity - [mEq/L\ Ca/3.5 + (mEq\ Mg/L)7]$$

In either case, what's important to know is the RA of your water, and what your grist will likely do to the pH so you know if you need to modify your water.

Consider two very different beers made with two very different water profiles, Pilsner and Stout. Pilsen has a HCO3- value of 3 parts per million, perfect for a low acid producing pilsner grist, whereas the water of Dublin has a HCO3- value of 319 ppm. Dublin's water has the necessary residual alkalinity to absorb, or buffer, the H+ ions produced by all of the dark roasted malts.

So what about Placerville? Take visit to EID's website and search for the Water Quality Report.

El Dorado Main Water System

Element	Units MCL	Range	Average (Pilsen)	
Alkalinity mg/L	N/A	10-16	13	10
Bicarbonate mg/L	N/A	12.3-24.4	18.8	3
Calcium mg/L	N/A	2.6-3.9	3.3	
Carbonate mg/L	N/A	0.013-0.032	0.022	
Chloride mg/L	500-600	ND-1.3	0.8	
Hardness mg/L	N/A	9.05-15.9	13.02	
Magnesium mg/L	N/A	0.62-1.5	1.14	3
Sulfate mg/L	500-600	ND-1.1	0.37	4
pH Units	6.5-8.5	6.9-7.4	7.2	

Placerville thus has water softer than Pilsen!
Using this information the brewer has a choice:

a). You can plan to brew a beer which has a grist most suitable to your water profile, or
b). You can estimate the amounts of calcium, magnesium and/or bicarbonate to add to the brewing water to achieve the appropriate pH.

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Water, Does It Really Matter? .... continued

Common brewing salts are available as follows:

Brewing Salt	Conc. @ 1 Gram/gal.	Gram/Level Teaspoon	Brewing Range
Calcium Carbonate (chalk)	105 ppm Calcium ion 158 ppm Carbonate ion	1.8	50-150 ppm
Sodium Bicarbonate (baking Soda)	75 ppm Sodium 191 ppm bicarbonate	4.4	0 -50 ppm* 50-150 ppm* 150-250 ppm***
Calcium Sulfate (gypsum)	62 ppm Calcium 147 ppm Sulfate	4.0	
Calcium Chloride	72 ppm Calcium 127 ppm Chloride	3.4	
Magnesium Sulfate (Epsom Salts)	26 ppm Magnesium 103 ppm Sulfate	4.5	10-30 ppm

* Pale, base-malt beers
** Amber, toasted malt beers
*** Dark, roasted malt beers

As for checking the pH, you can use either the Fast-Strips, available at homebrew supply stores, or the hand held pH meters. I bought the latter for wine making, but it works good. Two things though, the mash must be measured near room temperature and not at the mash temperature. Second, the probes can go bad, even with calibration and should probably be replaced annually.

Finally, and especially if you're an extract brewer, gypsum may be appropriate in small amounts to enhance the crispness of hops. English ales and India Pale Ales are two styles which can benefit from both the calcium and sulfate that gypsum provides. But go easy, its often better to leave the water alone and focus more on your brewing technique. Sulfates also play an important role here and it's time well spent for brewers to become familiar with how the various ions interplay with flavors.

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Water, Does It Really Matter? .... continued

Can this be simplified? Perhaps like this:

1. The Parieto Principle, aka the 80:20 Rule Applies: Water Chemistry is 80% about the mash, 20% for flavor (hop accentuation, crispness, etc).
2. Mash pH is paramount: 5.1 – 5.5 at mash temp, regardless of the beer style
3. Mash pH is determined by RA and grist
4. The RA can be modified with brewing salts; allows you to brew any style
5. Grist can be adapted to RA; limits you styles suitable to your water
6. One should know their RA, and as well as the likely impact of their grist on it.

References and Additional Reading

- How To Brew; John Palmer, 2nd Edition, 2002
- Quickie Water Chemistry, Ken Schwartz, 1996
- Ingredients And The Brewing Process, BJCP Exam Site
- Brewing Lager Beer, Greg Noonan, 1996
- An Analysis Of Brewing, George Fix, 1997

Culinary Enjoyment Department

(Editor's disclaimer: I haven't made this yet, but it looks gooood!)

PIONEER STEW

6 slices bacon
1 onion, sliced
1 clove garlic, minced
1 lb beef shank crosscuts
1/2 lb ham hock
2 bottles beer
1 C water
1 tsp salt
2 15-oz cans garbanzo beans
4 potatoes, cubed
1 4-oz link cooked Polish sausage, thinly sliced

Cook bacon until crisp. Drain, reserve 2 TBS drippings. Crumble bacon and set aside. Add onion and garlic to reserved drippings in pan. Cook until tender.
Add beef shank, ham hock, beer, water and salt. Heat to a boil, reduce heat, cover, and simmer 1 1/2 hours. Remove meat from beef shank and ham hock, dice, and discard bones. Return to stew with undrained beans and potatoes.
Cover and simmer 20 minutes more. Add sausage and crumbled bacon.
Heat through. Skin off fat. Makes 8 servings.