

BACKYARD BREWING

How to craft your own brew

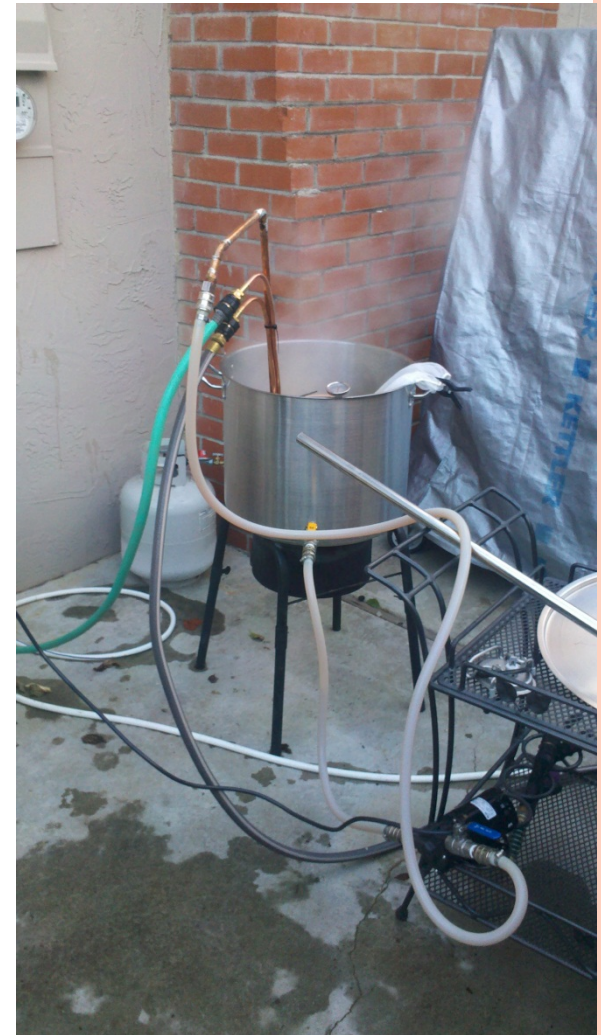
Mike Conant, Andrew Carroll, &
Derek Wolfgram



MIKE CONANT

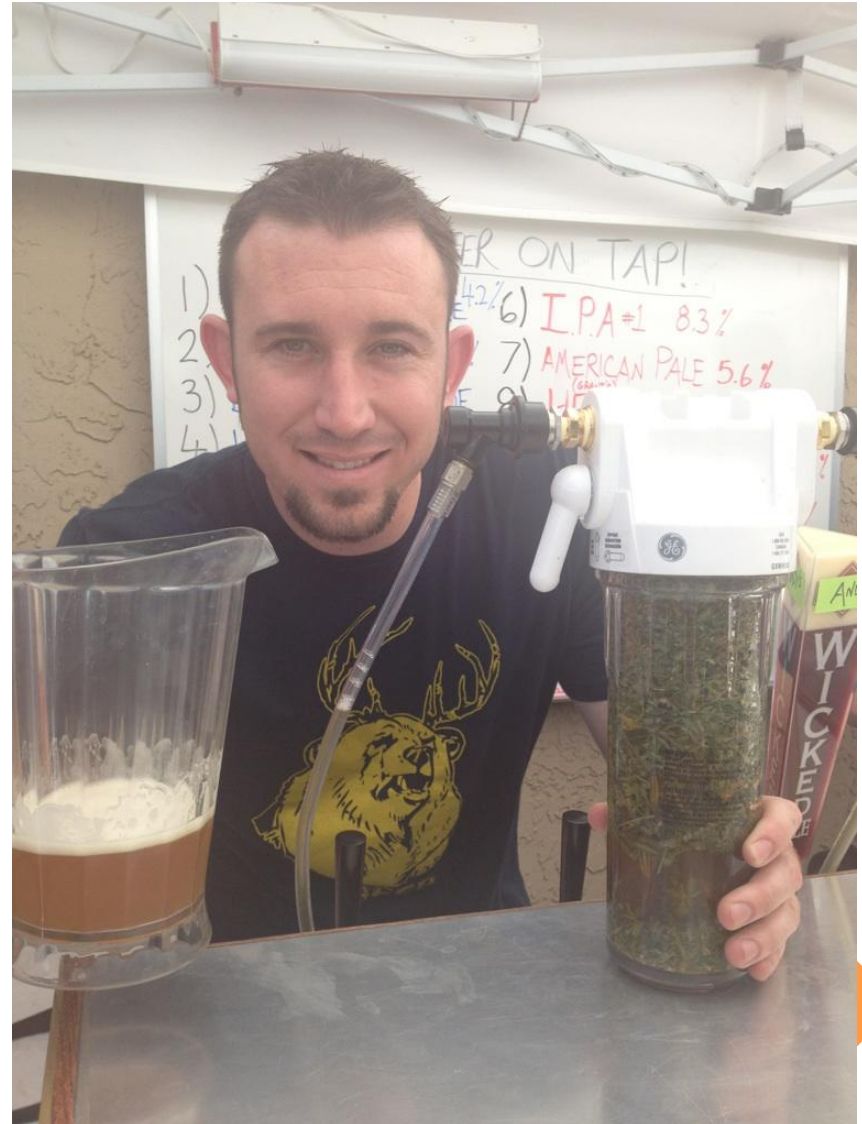


- Is a homebrewer since 1994, with a penchant for big, hop-forward IPAs, well before they became a west coast phenomenon. During the day he is a Director at Agilent, a company focused on chemical and biological test and measurement systems. He is now living in Aptos, but also a member of the Silicon Valley Sudzers, who meet monthly in Los Altos Hills.



ANDREW CARROLL

- has been homebrewing for close to five years now, and in that time has managed to brew almost 100 batches. Mild-mannered construction worker by day and beer enthusiast by night, Andy is continually trying to spread the good word of brewing and drinking better beer. He is currently President of The Headquarters homebrew club in Campbell, CA established January, 2012.



DEREK WOLFGRAM



- Derek Wolfgram has been a librarian since 1996, and a homebrewer since 2001. This program is his opportunity to bring those two passions together. Library-wise, Derek is Deputy County Librarian of the Santa Clara County Library District. Homebrew-wise, he is Past President and Secretary of the Silicon Valley Sudzers homebrew club and was the 2010 club Brewer of the Year, primarily for making plenty of coconut porter.





HOMEBREW ROUNDS

Round 1 – Where Beer Comes From

A BRIEF HISTORY OF BEER

~10,000 – 4,000 BC Egyptians are credited with discovering beer, but the agricultural revolution was most certainly tied to beer in most civilizations of the fertile crescent, where grains were produced, stored, and consumed – and where people hung out together!

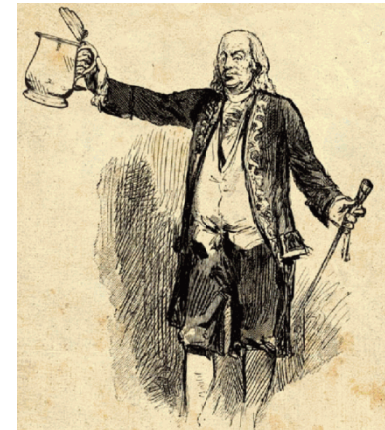


768 AD Weihenstephan Abbey was a Benedictine monastery in Bavaria, is credited as being the world's oldest brewery.

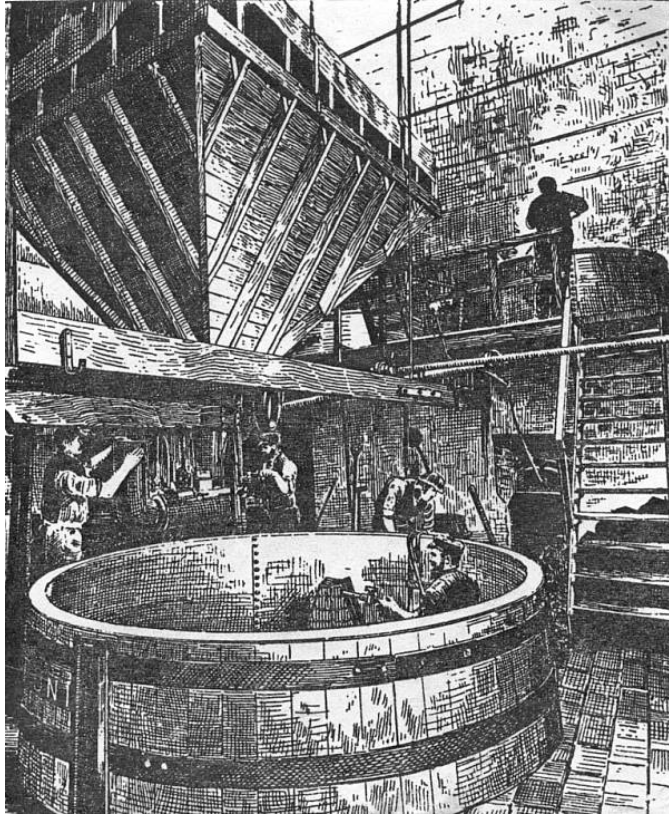
1587 AD In colonial Virginia, Europeans produced the first homebrew made from Corn.

Homebrewing was a standard practice by colonists, with beer becoming the staple beverage in the 17 and 18th centuries.

The Brits tried to export their Porter, but it didn't catch-on here in the states



BEER AND THE INDUSTRIAL REVOLUTION



- The **Industrial Revolution** helped define beer as we know it today
 - Mass production
 - Controlled malting and toasting of barley (pales)
 - Creation of economic glass (clarity)
- **Scale** and **trade** allowed brewers to export to markets and helped them create and refine their specialties, for example:

Region	Character	Style
Dublin	Highly alkaline water	Dry Stout (Guinness)
Burton on Trent	High sulfates	Pale Ale, IPA
Pilsen	Soft water	Pilsner

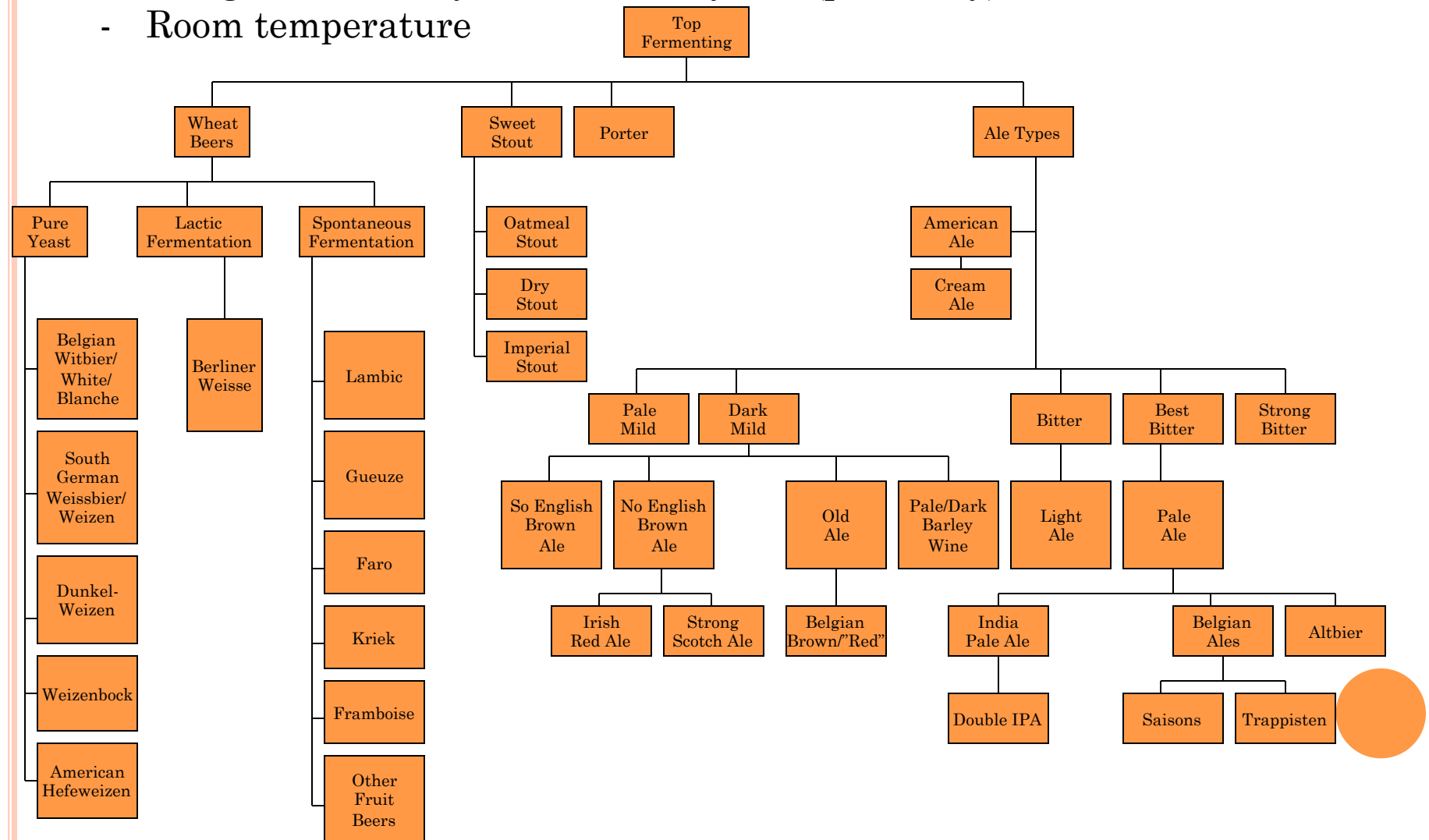
The varieties of beer styles are a result of regional differences in water, ingredient availability, and technical evolution...but we can emulate the differences while home brewing!



ALE STYLES

Ales are the traditional form of beer making

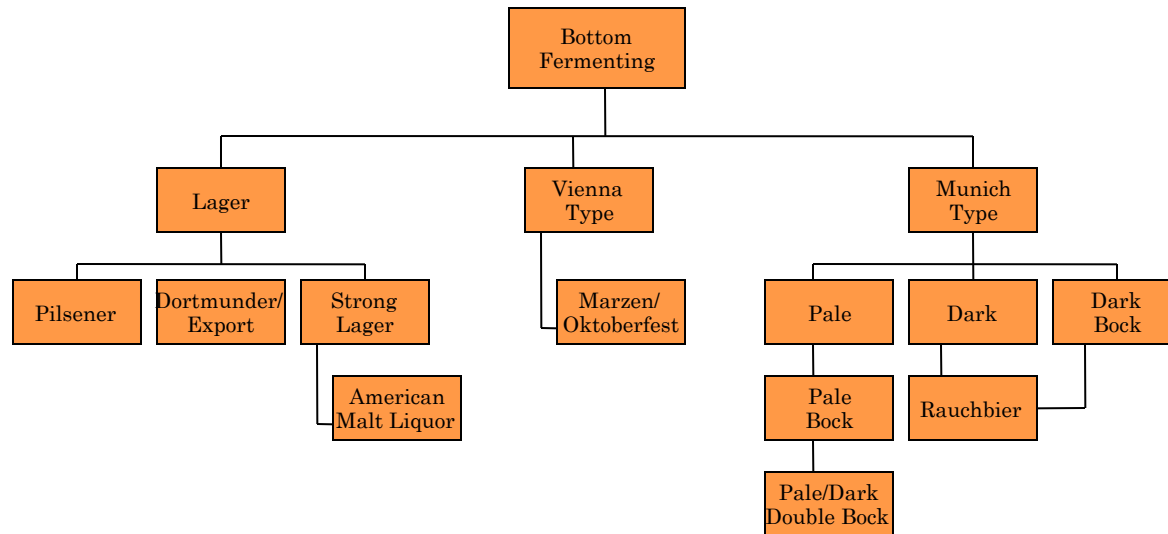
- Top fermenting
- using *Saccharomyces cerevisiae* yeast (primarily)
- Room temperature



LAGER STYLES

Lagers resulted from the central European practice of storing (lagering) beer at low temps

- “Bottom fermenting”
- Cool temperatures (~40° F)
- Because of the temperature control and time, lagering takes a bit more work for the home brewer



PRIMARY INGREDIENTS OF BEER

Malted Barley – base ingredient of beer, supplying sugars, starches, and starch-to-sugar enzymes needed for mashing. Barley grain is sprouted and toasted in a process called “malting”. Other grains may be added for giving a beer its character.



Hops – *Humulus lupulus*, provides the bittering component (*lupulin*) to beer and other hop flavors and aromas, which balances the malt sweetness and helps preserve the beer

Water – essential to the chemistry of extracting sugars from the malted barley, yeast fermentation, and makes up ~90% of your beer!



Yeast – Actually, they make your beer, you just make their food, the *wort*)



GRAIN GUIDE

Malt supplies most of the flavor and sugars for the beer. The base malts are combined with the other forms of grain or malt to create the beer character. The color of malt (darkness) is described in degrees Lovibond (°L).

Malt Extracts

Use for extract brewing, creating yeast starters, or to adjust target gravity of beer.

- DME – Dry malt extract, very stable
- LME – has 80% of water removed, there are more varieties available.

Base Malts

- 2 row pale malt – primary base malt for brewing (6 row is typically used for whisky) 2L
- Pilsner – smoother, lighter, sweeter than pale 1L
- Wheat – for wheat beers

Specialty Malts

Add color, flavor, and/or body to the brew. Some can be steeped when extract brewing

- Carapils – for head retention and stability w/o affecting color, flavor
- Munich – increases body, aroma, malt sweetness
- Rye – Must be mashed, adds a spicy, fruity flavor
- Rauch – smoked malt used in Rauchbiers, with peat flavor 25L
- Special Roast – Imparts a toasty or biscuity flavor 50L

Crystal Malts

Sugars are caramelized and non-fermentable, used to add color, flavor, and head retention

- Crystal 15L to 120L – L denotes darkness of roast
- Caramunich – 70L
- Caraviennne – 25L from Belgium
- Carastan – British version, 30L

Roasted Malts

For porters and stouts

- Chocolate Malt – has a chocolaty bitter flavor
- Black Patent Malt – very dark and bitter

Adjuncts

- Corn – lightens body, and adds corn taste
- Flaked Barley – added to stouts for head retention
- Black Roasted barley – Very dark grain (500L) used in stouts, very strong bitter flavor
- Flaked Maize – add to lighter American pilsners for lightening color and body
- Honey – adds fermentable sugars, some flavor and aroma
- Oats – adds a silky texture
- Rice – used in light colored beers for a dry or crisp flavor, very little taste

HOP GUIDE

Hops are selected and added to boiling wort to impart specific qualities to a beer. Some hops are considered best for bittering or

- **Bittering** : added early in the boil, 90 to 30 mins boil time
- **Flavor**: 30 to 0 mins boil time
- **Aroma**: 0 mins, or after fermentation, called “dry hopping”

VARIETY	ACID RANGE (ALPHA %)	FLAVOR PERCEPTION	COMMERCIAL EXAMPLE
Amarillo®	8-10%	A flowery, citrus-like aroma with medium bittering value that is gaining acceptance as a substitute for Cascade due to its hardy nature.	Ales, IPAs
<u>Cascade</u>	4-7%	Flowers, citrus & spice with grapefruit the noticeable fragrance quite often. This medium aroma balances the low bittering value. Very popular hop among craft brewers.	Pale Ales, IPAs, Porters
<u>Centennial</u>	8-11%	Flowers & citrus most evident. A medium aroma with mid to high bittering value makes it a dual purpose choice.	Ales, IPAs
<u>Chinook</u>	11-13%	A pine forest washed with exotic spice and infused with grapefruit. This alluring aroma and a high bittering value has gained this hop full respect from craft & major brewers.	Most beer styles from Pale Ales to Lagers
<u>Columbus</u>	14-17%	High on the bittering scale yet also valued for its oil content creates a hop that is an interesting dichotomy of sharp and herbal.	American IPAs & Pale Ales, Stout, Lager
<u>Crystal</u>	3-5%	Genteel, continental lady meets American belle with a delicate blend of spices and flowers. Low bittering value adds to the charm. Craft brewers love her style.	German-style Pilsner, Lager, Kölsch, ESB, Belgian Ales
<u>Fuggle</u>	4.0-5.5%	Classic English aroma hop with moderate bittering value. Pleasant wood and fruit tones will have you heading off to the hunt.	English-style beers (particularly Stout), American Ales
Hallertau	5-6%	Named for its origins in the Hallertauer region of Germany, this is a noble aroma hop with ever-so-subtle flower and spice fragrances defining its “über alles” superiority. Very low bittering value.	Pilsner, Bock, Lager, Wheat
Kent Golding	3-5%	The refined older English gentleman with his flowery tones that have produced some of England’s best bitters.	All English-style beers (Ales, ESB, Bitter), Belgian-style Ales
Liberty	2-6%	American cousin to Hallertau with very similar flower and spice characteristics. Best used as a finishing hop in German-style lagers.	Lager, Pilsner, Bock, Kölsch
Magnum	12-17%	A German thoroughbred with limited Pacific Northwest plantings. Prized for its high bittering value, the aromatic nature is one of spice and citrus.	Pale Ales, IPAs, German-style Lager
Mt. Hood	4-5%	Hybrid of Hallertau with similar mild flower/spice aroma characteristics with a hint more of the forest. “Clean” commonly describes it.	Lager, Pilsner, Bock, Wheat

HOP GUIDE (CONTINUED)

IBUs: stands for **I**nternational **B**ittering **U**nits, denotes the amount of bitterness in the beer. The Alpha Acid concentration of the hops (AAUs), quantity of the hops, and length of boil determines how many IBUs go into the beer.

VARIETY	ACID RANGE (ALPHA %)	FLAVOR PERCEPTION	COMMERCIAL EXAMPLE
Northern Brewer	7-11%	A plucky American filly found herself an affable English suitor and the happy union was this well-adapted hop with its neutral, clean aroma and slightly higher-than-average bittering value. Dual purpose.	English-style Ales, ESB, Bitter, Porter
Nugget	11-16%	Strong herbal/slight spice aroma and high bittering value (along with desirable growing traits) has brought this hop variety to the forefront of the industry.	All Ales, Stout
Perle	7-8%	A palate-pleaser with its moderate, clean bittering qualities and refreshing, spicy aroma.	A wide range from Pale Ale to Lager to Stout
Saaz	3-5%	The Old World steadfast standby made famous by Pilsner Urquell possesses the aromatic blend of earth and spice notable in European nobles. Low bittering value.	Pilsner, Lager, Wheat, Belgian-style Ales
Simcoe®	12-14%	A hop variety less than 10 years old that is quickly finding its way into the hearts of bitter-loving craft brewers. Intense pine aroma adds to the fresh, youthful vigor. Dual purpose but generally considered a bittering hop.	American Ales, IPAs, Double IPAs
Sorachi Ace	13-16%	A Japanese winner by all counts with its powerful lemon aroma, high bittering value and flavorful personality.	American Ales, Pale Ales, Wheat
Sterling	6-9%	Herbs and spices dominate, flowers and citrus around the fringes. Moderate bittering values with a mix of Saaz and Mt. Hood properties.	Ale, Pilsner, Lager
Summit (Dwarf)	17.5–19.5%	Quite new on the scene (2003) but the consensus is very positive with its “peak” bittering value coupled with robust citrus notes of orange, tangerine and grapefruit. Receiving accolades as an ideal hop for the ultimate Pale Ale.	<i>Drifter Pale Ale</i> , Widmer Brothers
Warrior	14.5- 17.0%	Its high bittering value and very mild aroma offers new dimensions to IPA & Double IPA brewers.	Three Floyd’s <i>Dogfish Head IPA</i>
Willamette	4-6%	The king of aroma hops in the U.S. with its modest bittering value and the joyous harmony of flowers, fruit, earth and spice.	American Pale and Brown Ales, English-style Ales

All-grain Brewing

Extract Brewing

FLOW CHART FOR MALTING AND BREWING

Harvest

Malting

Steeping

Germination

Kilning

Milling

Oxygenation

Trub removal

Hops

Boiling

Decoction

Infusion

Mashing

Pitching

Yeast strain

Fermentation

Lagering

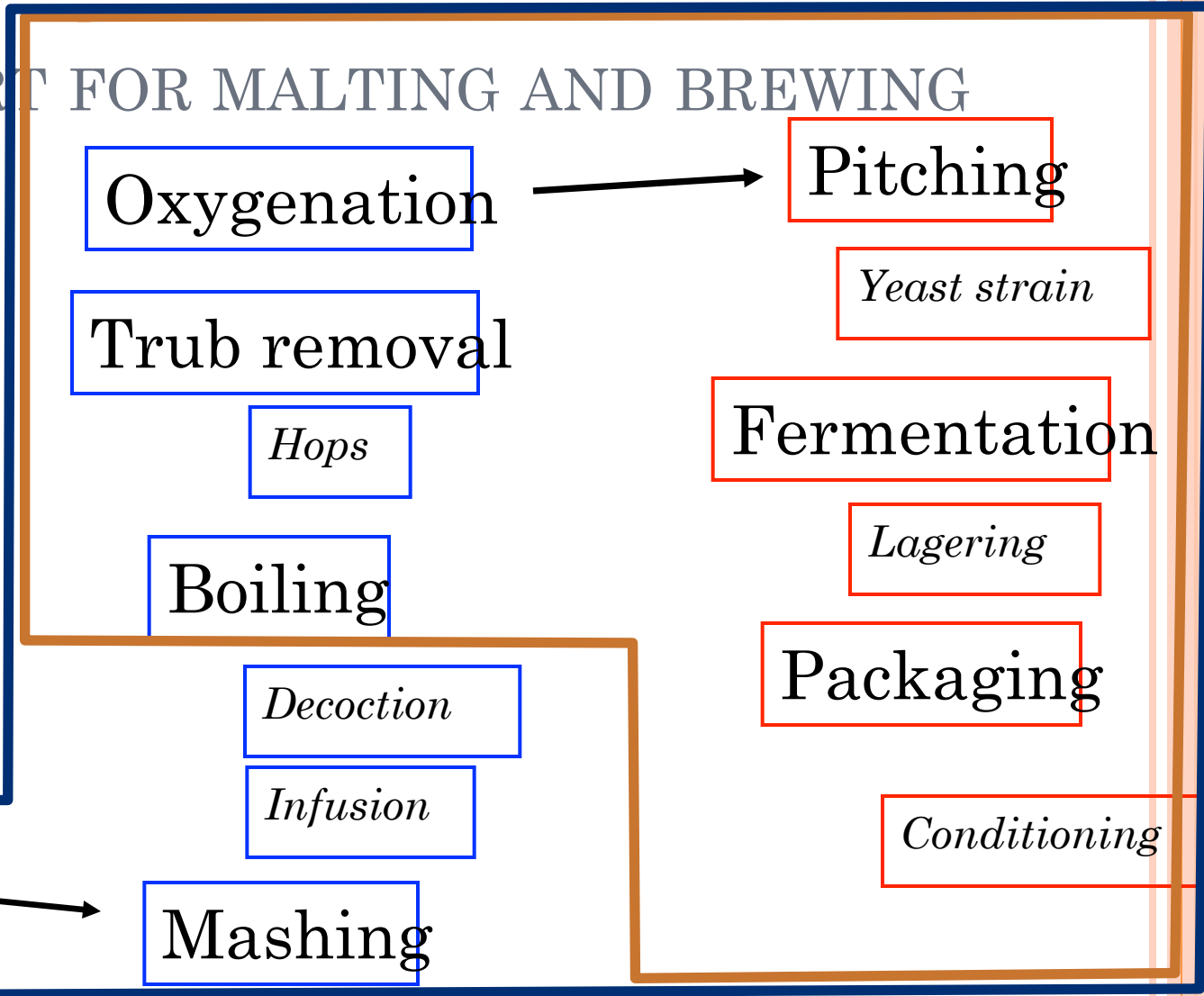
Packaging

Conditioning

*Barley and
Malt processes*

Wort production

*Conversion of
Wort into Beer*



METHOD OF HOMEBREWING #1

Beer Machine

- a. Pour water in
- b. Add prepackaged beer mix
- c. Wait 7-10 days



HOME BREWING METHOD #2

Extract Brewing

- Easy to get started
- Kits readily available
- Can be done on stovetop with 2 gallon boil
- Takes 2-4 hours to brew
- Can make quality beer
- Can always scale later



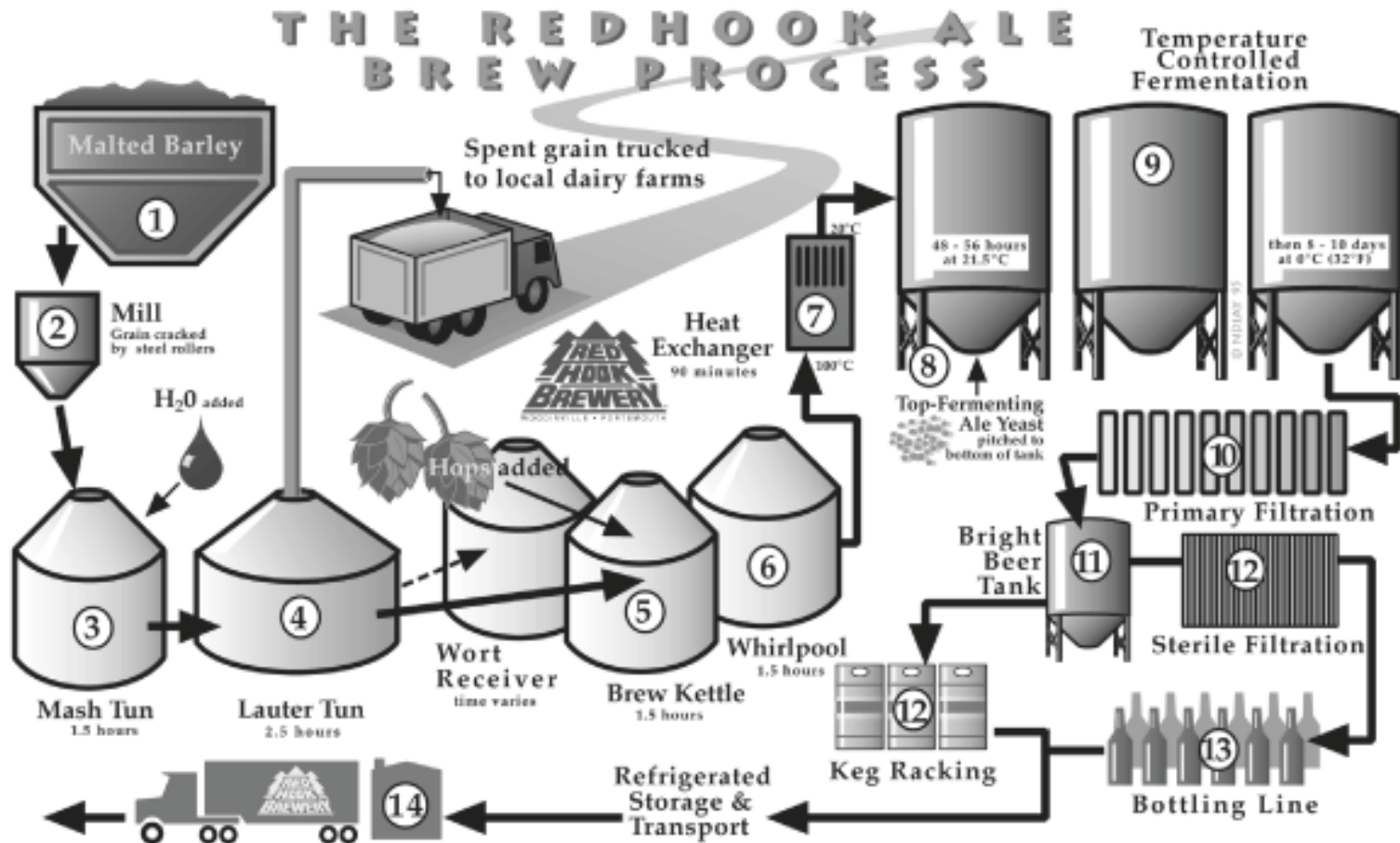
HOME BREWING METHOD #3

All-grain Brewing

- Requires additional mashing steps
- More control over process
- Better selection of malts
- Requires full boil (7 gallons for 5 gallon batch)
- Takes 4-6 hours



BREWING AT VOLUME – FOR LARGER BUDGETS





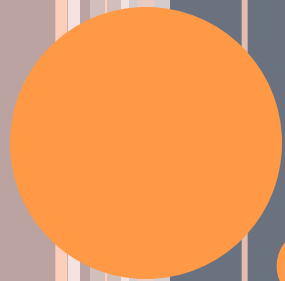
ROUND #2

Equipment and Process

THE HOMEBREWER'S TWELVE-STEP PROGRAM

- 1- Formulate your recipe, What do you want to brew?, What is your goal?
- 2- Water, If your water tastes good, the beer should!
- 3- Malt Extract vs. all grain brewing
- 4- The Mash
- 5- Sparging
- 6- The boil, hop additions and specialty ingredients
- 7- cooling the wort
- 8- Pitching Yeast and fermentation, Temp control!
- 9- Take your readings and write everything down(in case it turns out good!)
- 10- Cleanliness is next Godliness and Sanitation is King!
- 11- Bottling vs. kegging
- 12-Most importantly, Have fun!, its a *hobby* not a job.....yet!





ROUND #3

Recipes and Resources

DEREK'S COCONUT ROBUST PORTER

Ingredients

10.8 lbs American Two-Row
1.2 lbs American Crystal 60
.6 lbs British Chocolate
Malt
.6 lbs British Roasted
Barley

.5 oz. Magnum hops (13.1%
AA) for 60 minutes
1 oz. Willamette hops (4.6%
AA) for 30 minutes
1 oz. Cascade hops (6% AA)
for 5 minutes

Safale US 05 Dry American
Yeast

2 pounds packaged flaked
unsweetened coconut,
toasted

Directions

Mash grains at 154 degrees with 3.5 gallons of water for one hour. Mash out at 170° F and sparge with 5.5 gallons of water. Collect 7.5 gallons of runoff and bring to a boil. Add hops as indicated in the recipe. After a 60 minute boil (which should leave about 5.75 gallons of wort), chill wort to 70° F and transfer to fermenter. Pitch yeast and aerate well. Ferment at 68° F for one week, then rack to secondary fermentation bucket. Add toasted coconut in a sterile grain sack for one week. Remove coconut with sterile tool and rack beer into keg for force carbonation.

Original Gravity: 1.054

Final Gravity: 1.012

Alcohol by Volume: 5.5%

IBU: 40

SRM: 40



PLINY THE ELDER DOUBLE IPA (PART 1)

Ingredients for 6.0 gallons (22.7 L) [Net: 5 gallons (18.9 L) after hop loss]

13.25 lb (6.01 kg) Two-Row pale malt

0.6 lb (272 g) Crystal 45 malt

0.6 lb (272 g) Carapils (Dextrin) Malt

0.75 lb (340 g) Dextrose (corn) sugar

3.50 oz (99 g) Columbus* 13.90% A.A. 90 min.

0.75 oz (21 g) Columbus* 13.90% A.A. 45 min.

1.00 oz (28 g) Simcoe 12.30% A.A. 30 min.

1.00 oz (28 g) Centennial 8.00% A.A. 0 min.

2.50 oz (71 g) Simcoe 12.30% A.A. 0 min.

1.00 oz (28 g) Columbus* 13.90% A.A. Dry Hop (12 to 14 days total)

1.00 oz (28 g) Centennial 9.10% A.A. Dry Hop (12 to 14 days total)

1.00 oz (28 g) Simcoe 12.30% A.A. Dry Hop (12 to 14 days total)

0.25 oz (7 g) Columbus* 13.90% A.A. Dry Hop (5 days to go in dry hop)

0.25 oz (7 g) Centennial 9.10% A.A. Dry Hop (5 days to go in dry hop)

0.25 oz (7 g) Simcoe 12.30% A.A. Dry Hop (5 days to go in dry hop)

White Labs WLP001 California Ale Yeast or Wyeast 1056 American Ale Yeast

Original Gravity: 1.072

Extract Efficiency: 75 percent

ABV: 8.2%

Final Gravity: 1.011

IBUs: 90-95 (actual/not calculated)

SRM: 7



PLINY THE ELDER DOUBLE IPA (PART 2)

Directions

Mash grains at 151-152° F (66-67° C) for an hour or until starch conversion is complete. Mash out at 170° F (77° C) and sparge. Collect 8 gallons (30 L) of runoff, stir in dextrose, and bring to a boil. Add hops as indicated in the recipe. After a 90 minute boil, chill wort to 67° F (19° C) and transfer to fermenter. Pitch two packages of yeast or a yeast starter and aerate well. Ferment at 67° F (19° C) until fermentation activity subsides, then rack to secondary. Add first set of dry hops on top of the racked beer and age 7-9 days, then add the second set. Age five more days then bottle or keg the beer.

Extract Substitution

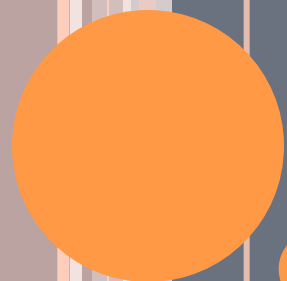
Substitute 6.5 lb (3.0 kg) of light dry malt extract for two-row malt. Due to the large hop bill for this recipe, a full wort boil is recommended. Steep grains in 1 gallon (3.8 L) of water at 165° F (74° C) for 30 minutes, then remove and rinse grains with hot water. Stir in dextrose and top up kettle to 8 gallons (30 L), and bring to a boil. Add hops as indicated in the recipe. After a 90 minute boil, chill wort to 67° F (19° C) and transfer to fermenter. Pitch two packages of yeast or a yeast starter and aerate well. Ferment at 67° F (19° C) until fermentation activity subsides, then rack to secondary. Add first set of dry hops on top of the racked beer and age 7-9 days then add the second set. Age five more days then bottle or keg the beer.



RECIPE FORMULATORS

- BeerSmith (Mac or PC) – www.beersmith.com
- ProMash (PC) – www.promash.com
- Beer Alchemy (Mac) –
<http://www.kentplacesoftware.com/products/BeerAlchemy.shtml>
- Web-based recipe formulators
 - www.brewtoad.com
 - www.hopville.com
 - Many more!





STYLE GUIDELINES

BEER JUDGE CERTIFICATION PROGRAM (BJCP)

- Online at
http://www.bjcp.org/docs/2008_Guidelines.pdf
- Descriptions of 80 distinct “styles” of beer in 23 categories
- Used in describing beer, judging beer competitions



IMPERIAL IPA STYLE GUIDELINES

14C. Imperial IPA

- **Aroma:** A prominent to intense hop aroma that can be derived from American, English and/or noble varieties (although a citrusy hop character is almost always present). Most versions are dry hopped and can have an additional resinous or grassy aroma, although this is not absolutely required. Some clean malty sweetness may be found in the background. Fruitiness, either from esters or hops, may also be detected in some versions, although a neutral fermentation character is typical. Some alcohol can usually be noted, but it should not have a “hot” character.
- **Appearance:** Color ranges from golden amber to medium reddish copper; some versions can have an orange-ish tint. Should be clear, although unfiltered dry-hopped versions may be a bit hazy. Good head stand with off-white color should persist.
- **Flavor:** Hop flavor is strong and complex, and can reflect the use of American, English and/or noble hop varieties. High to absurdly high hop bitterness, although the malt backbone will generally support the strong hop character and provide the best balance. Malt flavor should be low to medium, and is generally clean and malty although some caramel or toasty flavors are acceptable at low levels. No diacetyl. Low fruitiness is acceptable but not required. A long, lingering bitterness is usually present in the aftertaste but should not be harsh. Medium-dry to dry finish. A clean, smooth alcohol flavor is usually present. Oak is inappropriate in this style. May be slightly sulfury, but most examples do not exhibit this character.
- **Mouthfeel:** Smooth, medium-light to medium body. No harsh hop-derived astringency, although moderate to medium-high carbonation can combine to render an overall dry sensation in the presence of malt sweetness. Smooth alcohol warming.
- **Overall Impression:** An intensely hoppy, very strong pale ale without the big maltiness and/or deeper malt flavors of an American barleywine. Strongly hopped, but clean, lacking harshness, and a tribute to historical IPAs. Drinkability is an important characteristic; this should not be a heavy, sipping beer. It should also not have much residual sweetness or a heavy character grain profile.
- **Comments:** Bigger than either an English or American IPA in both alcohol strength and overall hop level (bittering and finish). Less malty, lower body, less rich and a greater overall hop intensity than an American Barleywine. Typically not as high in gravity/alcohol as a barleywine, since high alcohol and malt tend to limit drinkability. A showcase for hops.
- **History:** A recent American innovation reflecting the trend of American craft brewers “pushing the envelope” to satisfy the need of hop aficionados for increasingly intense products. The adjective “Imperial” is arbitrary and simply implies a stronger version of an IPA; “double,” “extra,” “extreme,” or any other variety of adjectives would be equally valid.
- **Ingredients:** Pale ale malt (well-modified and suitable for single-temperature infusion mashing); can use a complex variety of hops (English, American, noble). American yeast that can give a clean or slightly fruity profile. Generally all-malt, but mashed at lower temperatures for high attenuation. Water character varies from soft to moderately sulfate.
- **Vital Statistics:**

OG: 1.070 – 1.090	FG: 1.010 – 1.020	IBUs: 60 – 120	SRM: 8 – 15	ABV: 7.5 – 10%
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- **Commercial Examples:** Russian River Pliny the Elder, Three Floyd’s Dreadnaught, Avery Maharaja, Bell’s Hop Slam, Stone Ruination IPA, Great Divide Hercules Double IPA, Surly Furious, Rogue I2PA, Moylan’s Hopsickle Imperial India Pale Ale, Stoudt’s Double IPA, Dogfish Head 90-minute IPA, Victory Hop Wallop



The left side of the slide features a series of vertical stripes in shades of brown, tan, and grey. Overlaid on these stripes are several orange circles of varying sizes, arranged in a cluster that tapers towards the bottom.

SOURCES FOR MORE INFORMATION

LOCAL HOMEBREW CLUBS

- The HeadQuarters (groups.yahoo.com/group/the_headquarters/)
- Hetch Hetchy Hop Heads
- Silicon Valley Sudzers (www.sudzers.org)
- Worts of Wisdom (www.wortsofwisdom.org)



LOCAL HOMEBREW SUPPLY STORES

- Beer and Wine Makers of America (San Jose – www.beerandwinemakers.com)
- Fermentation Solutions (Campbell - www.fermentationsettlement.com)
- MoreBeer (Los Altos - www.morebeer.com)



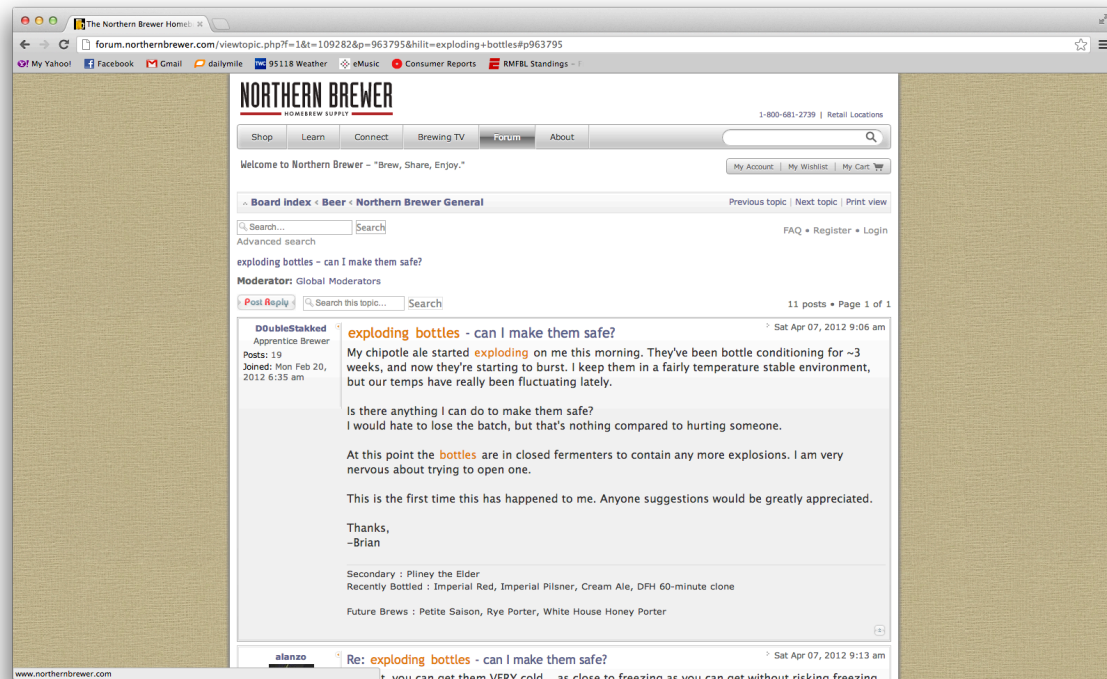
BOOKS AND DVDs FROM YOUR LIBRARY

- is.gd/homebrewlist



ONLINE FORUMS

- www.homebrewtalk.com
- forum.northernbrewer.com
- www.homebrewersassociation.org/forum/index.php



OTHER ONLINE RESOURCES

- American Homebrewers Association
(www.homebrewersassociation.com)
- Brew Your Own magazine (www.byo.com)
- Homebrew Talk Wiki
(www.homebrewtalk.com/wiki/index.php/Beer)



EVENTS

- Homebrew Competition Calendar:
www.bossbeer.org/calendar/beercomp.php
- Northern California Homebrewers Festival:
www.nchfinfo.org
- San Francisco Beer Week:
www.sfbeerweek.com
- Silicon Valley Beer Week:
www.svbeerweek.com
- AHA Events
 - AHA Big Brew (first Saturday in May)
 - National Homebrewers Conference (last weekend in June)
 - Mead Day (first Saturday in August)
 - Learn to Homebrew Day (first Saturday in November)
 - Learn more at:
www.homebrewersassociation.org/pages/grow-your-business/homebrew-events





THANK YOU! CHEERS!

**We hope to see you shortly at Steins Beer Garden,
895 Villa Street in Mountain View, for more
discussion of beer and brewing**



VISIT WWW.SUDZERS.ORG/?P=1050

To download or print a copy of this presentation