FRIDAY MORNING: Kicking things off

Welcome

Andrew Davison

ANHC Chairman

Session Sponsor: Grain and Grape

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FRIDAY MORNING: Sponsored by Grain and Grape

Preventing Sour Beer Off-Flavors

Jay Goodwin

Session Chair: Andy Davidson
Tasting Sponsor: The Rare Barrel

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Preventing Sour Beer Off-Flavors

Jay Goodwin

The Rare Barrel

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For FUNK's sake!

- What do we think of when people say a sour beer is "funky"?
- Too often, we're actually perceiving off-flavors we simply don't know as well
- How do we combat this?
  - Learn the names and descriptions of these flavors
  - Learn how to prevent them

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Common Off-Flavors

Clean beers

- *Diacetyl*
- *Sulfur*
- *Oxidation*
- Acetaldehyde
- DMS
- Contamination
- Under-attenuation

Sour beers

- *Diacetyl*
- *Sulfur*
- *Oxidation*
- Acetic Acid
- Ethyl Acetate
- THP
- Under / Over Carb'n.

Key Differences

Common sour beer off-flavors are generally **not** common to clean beer.

However, a clean beer with off-flavors is **significantly** more likely to produce a sour beer with off-flavors.

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Sour Beer Off-Flavor Overview

Common Off-Flavors

Uncommon Off-Flavors

Name / Desc. / Prevention / Correction?

Common Off-Flavor: Acetic Acid

1. Description

Vinegar. Contrast with Lactic Acid. Flavor. Present in all sour beer. Threshold?

1. Prevention

Acetobacter. Intense vs. long exposure to oxygen.

1. Correction? NO

Possible to blend down if levels are low and stable, but not generally advised.

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Common Off-Flavor: Ethyl Acetat

1. Description

Nail polish remover. Acetone. Very noticeable aroma. Solvent-y.

1. Prevention

Acetobacter. Intense vs. long exposure to oxygen. Acetic warning signs.

1. Correction? NO

Possible to blend down if levels are low and stable, but not generally advised.

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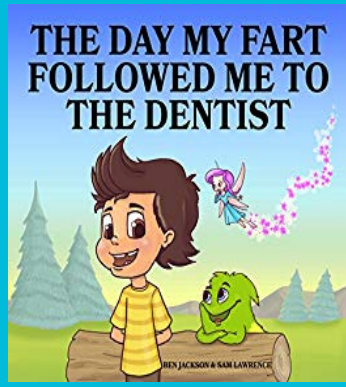
Common Off-Flavor: Sulfur



1. Description

Egg, sewage, burnt match. Much more aromatic than taste. Lowers as you drink.

1. Prevention

Yeast selection. Strong primary fermentation. Extended aging. Transfers.

1. Correction? YES! :)

Should go away with time, agitation. However, too much of either of those could ruin the beer.

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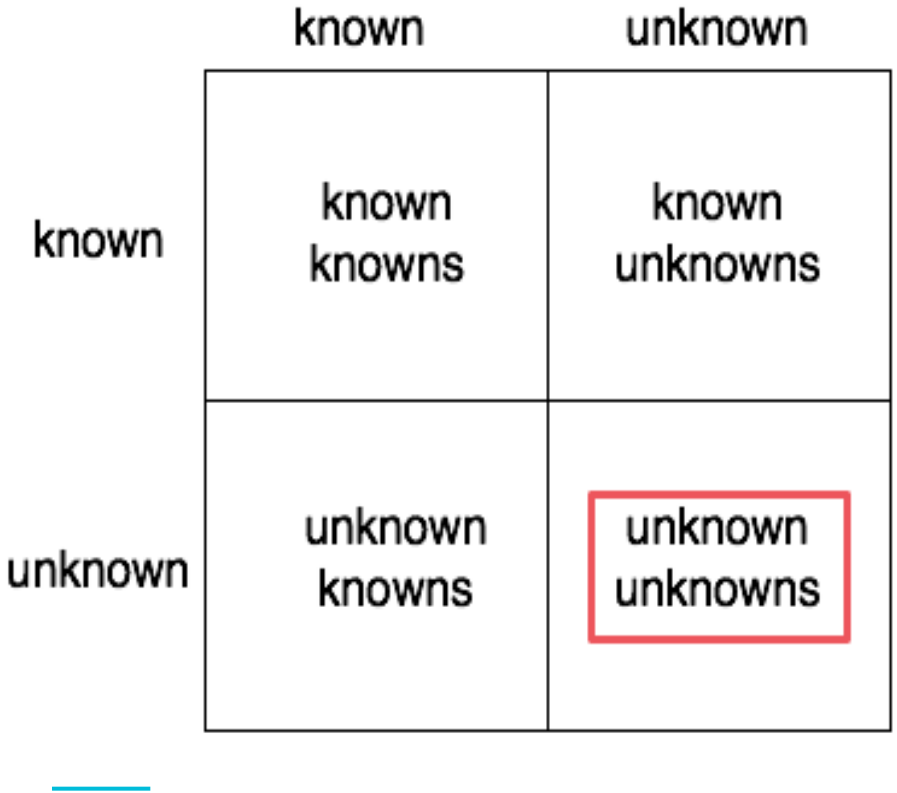
Apologies in advance...

...but this next one may ruin sour beer for you for months or years.
BUT IT'S MY JOB!
Use this knowledge responsibly and be nice.



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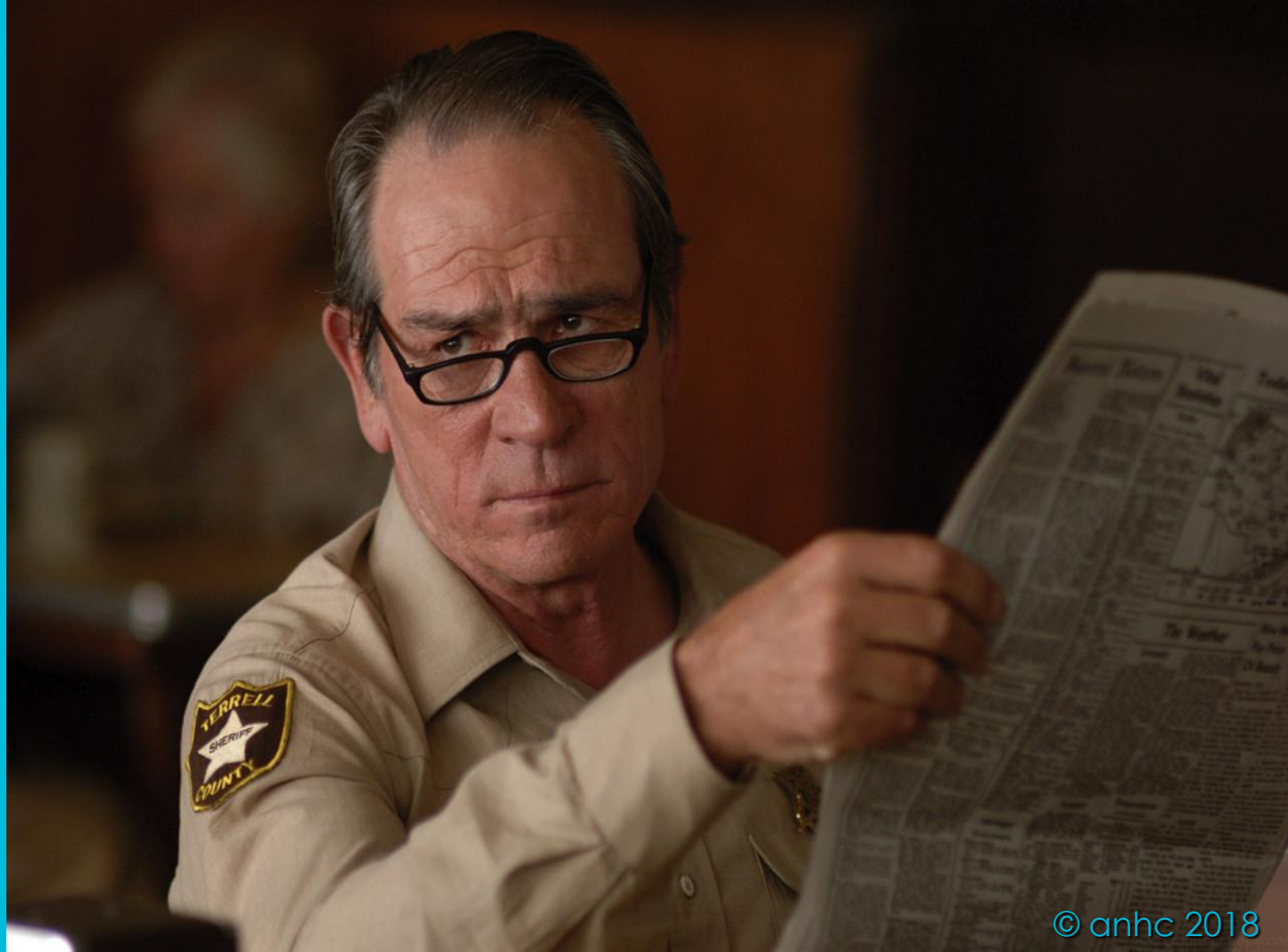
WTF, Jay?



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Common Off-Flavor: THP

1. Description

NOT a traditional off-flavor! More defined by the timing of *when* you experience it rather the the quality of *how* you perceive it (...mind...blown.)

But Jay, in all seriousness, what does it taste or smell like?

- Stale cereal, cheerios, cracker, biscuit
- My take: Hangover morning breath
- Commonly confused with brett phenolics, “grainy”, and diacetyl

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Common Off-Flavor: THP

2. **Prevention**

Oxygen exposure post-primary. Adding secondary ingredients (still o2 related).

2. **Correction? YES! :)**

Should go away with time (a few weeks to several months depending on severity). However, too much of time could ruin the beer. Add fresh yeast and bottle condition as soon as practical. However, this most commonly comes up post-packaging. I suggest you come to my talk on this tomorrow :)

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Common Off-Flavor: Over/ Under Carbonated

1. Description

Too many or too few bubbles. Over-carbonation can be quite dangerous.

1. Prevention

Pay attention to sugar levels. Know your cultures. Experient and experience.

1. Correction? NO...and YES? :|

Draft beer yes, but once it's in the bottle you can't do much about it.

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Uncommon Sour Beer Off-Flavor Overview

Uncommon Off-Flavor: Isovaleric Acid

1. Description

Parmesan cheese, sweaty foot odor.

1. Prevention

Oxygen exposure, early introduction of bacteria, aged hops.

1. Correction? YES! :)

Isovaleric acid will turn into ethyl isovalerate (sweet berry like aroma) with Brettanomyces interaction, although this can take many months. If after 6 months it remains strong, dump the beer.

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Uncommon Off-Flavor: Butyric Acid

1. Description

Vomit, bile.

1. Prevention

Seemingly culture and wort dependent in my experience. More common in kettle sours.

1. Correction? YES! :)

Butyric acid will turn into ethyl butyrate (tropical fruitlike aroma) with Brettanomyces interaction, although this can take many months. If after 6 months it remains strong, dump the beer.

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Uncommon Off-Flavor: Oxidation

1. Description

Wet cardboard, stale.

1. Prevention

...exposure to oxygen.

1. Correction? NO. :(

Oxidated beer gets worse over time. However, micro-oxidation in sour beer is a normal part of the process. In general, sour beer (when given proper time) is more oxygen resistant than clean beer in my experience.

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Uncommon Off-Flavor: Harsh Phenolics

1. Description

Spicy, intense bitterness, “extreme barnyard”. Orval on steroids.

1. Prevention

Proper sanitation procedures and not too much hops with Brett.

1. Correction? NO. :(

If this is in the beer, it doesn’t go away. If due to over-hopping, you could use it as a blending component.

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A few words on balance and blending...

- Arguably, I did not mention the *most* common off-flavor of all: out of balance.
- Sour beer is, in general, too sour. It's reminiscent of the IBU wars of a few years ago.
- Excessive lactic acid, while not technically an off-flavor, makes sour beer undrinkable and un-blendable.
- A brief history of (acidity over) time...

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Quick 5-step guide to not fucking up:

1. A normal, strong primary fermentation is a great start
2. Keep O2 away. CO2 is your friend. Use it liberally.
3. Culture maintenance: hit the gas, then slam the brakes!
4. Vessels are 10x more important. Keep them topped.
5. Monitor and mitigate temperature and humidity swings.

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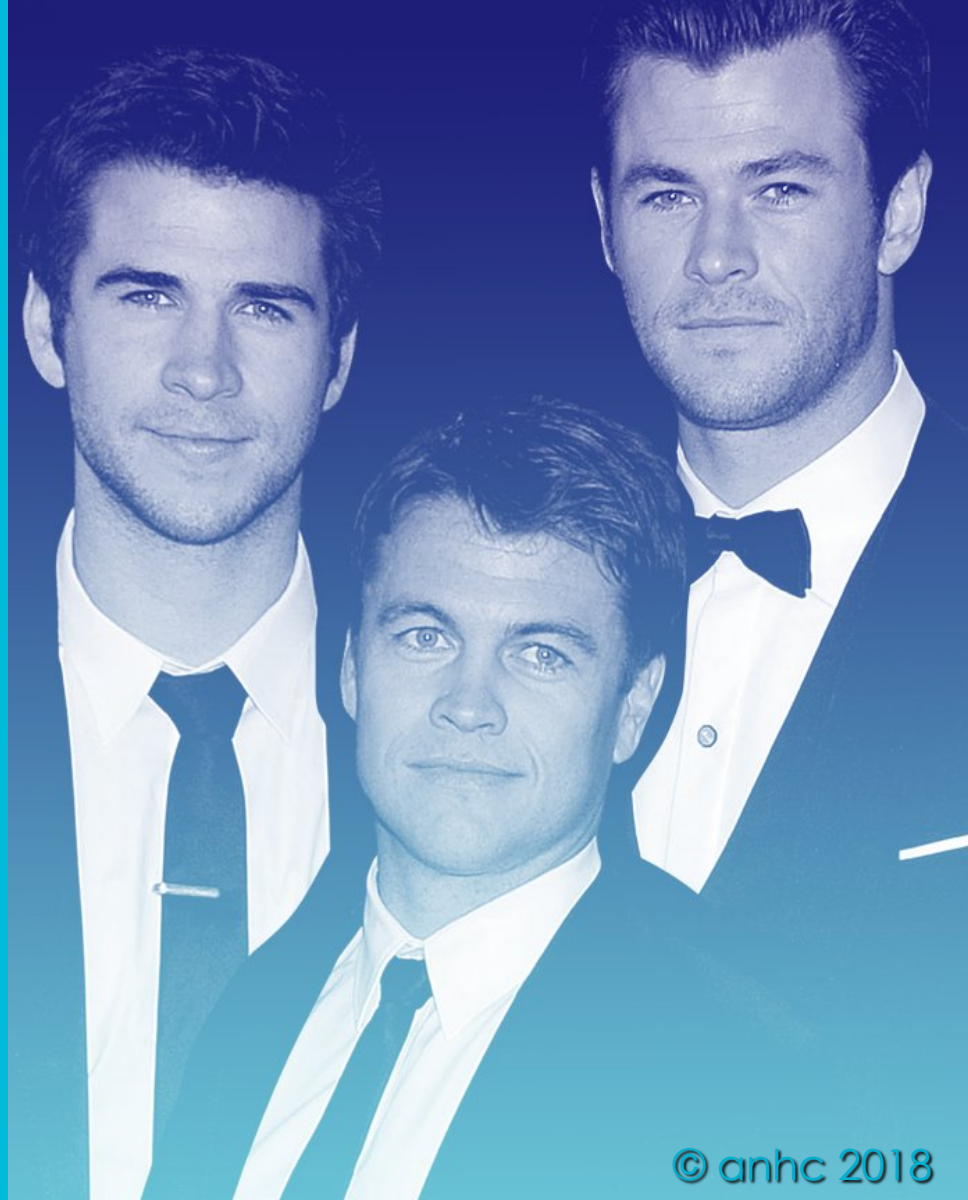
Questions?
Comments?
Concerns?

Jay Goodwin
jay@therarebarrel.com



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The Philosophy of Recipe Design and Evaluation

Denny Conn

Session Chair: Andy Davidson

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The Philosophy of Recipe Design and Evaluation

A Fancy Title for Some Easy Concepts

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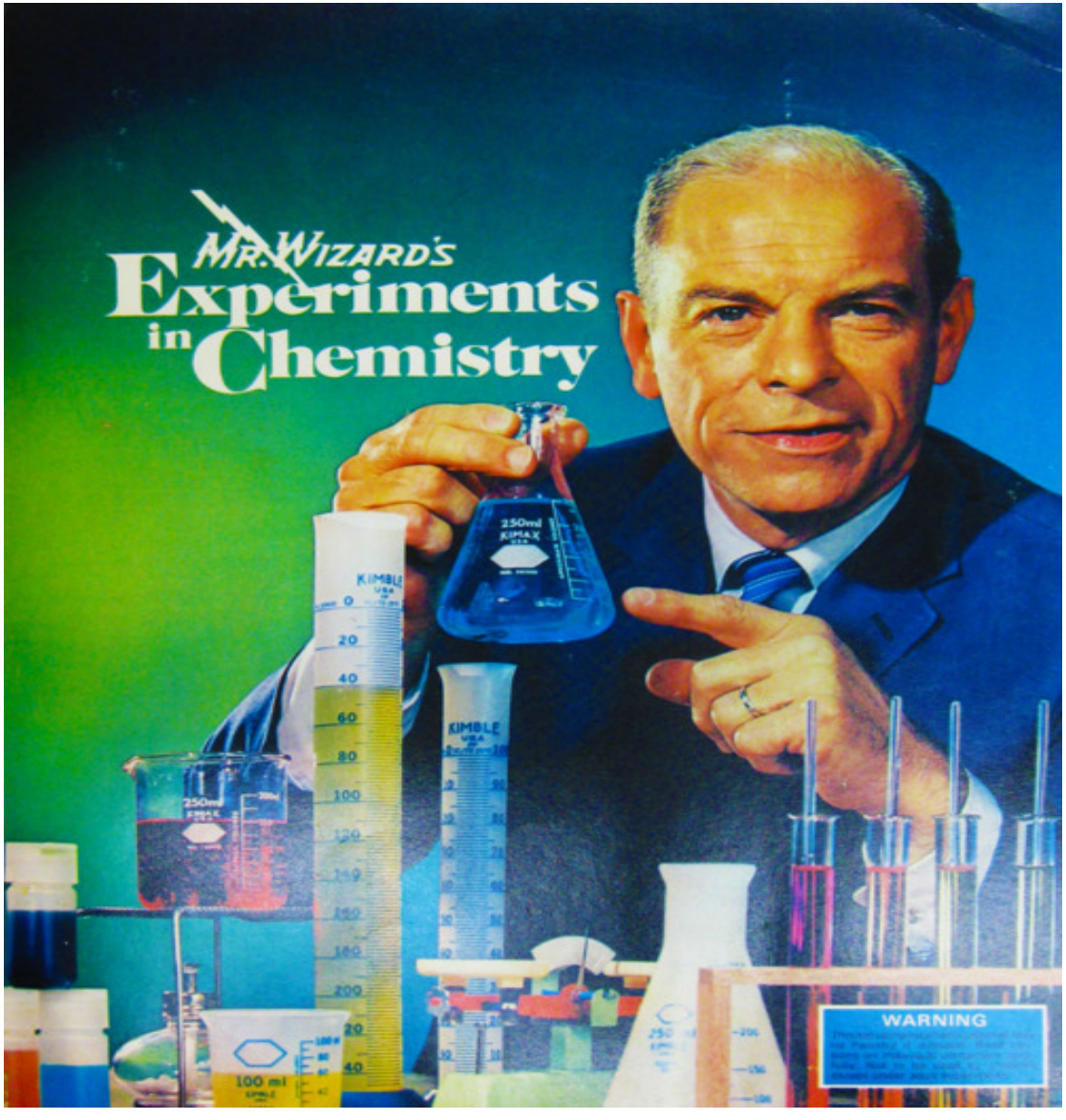
MR. WIZARD'S
Experiments
in Chemistry
KIMBLE
250ml
KIMAX
100 ml
WARNING

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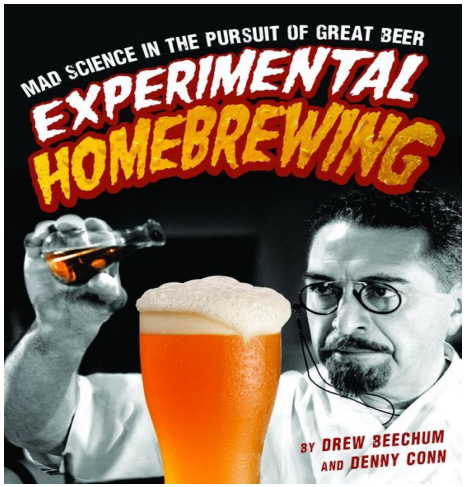

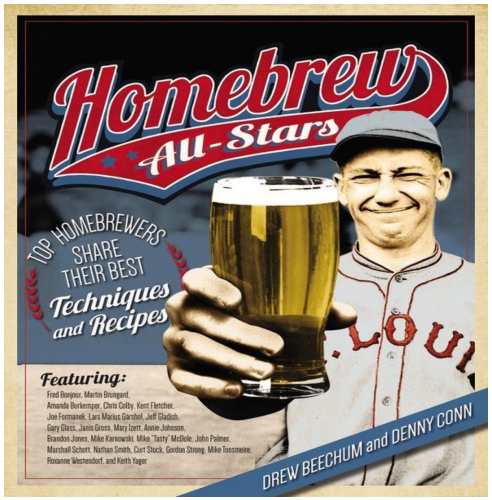

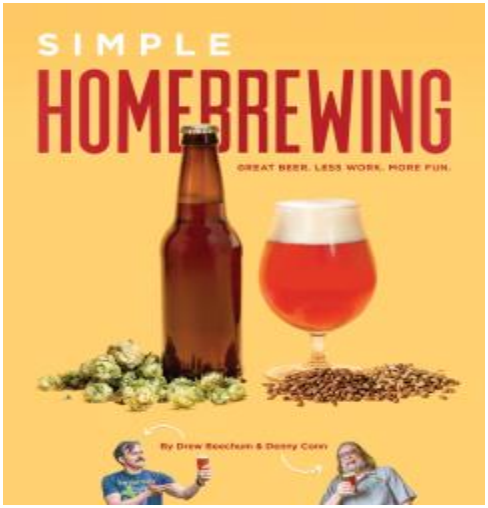

Two Most Recent Books – Experimental Homebrewing and Homebrew All-Stars
Simple Homebrewing coming in spring 2019

One Weekly Podcast – Experimental Brewing / The Brew Files

12 years on the AHA Governing Committee

Wyeast 1450 Denny's Favorite

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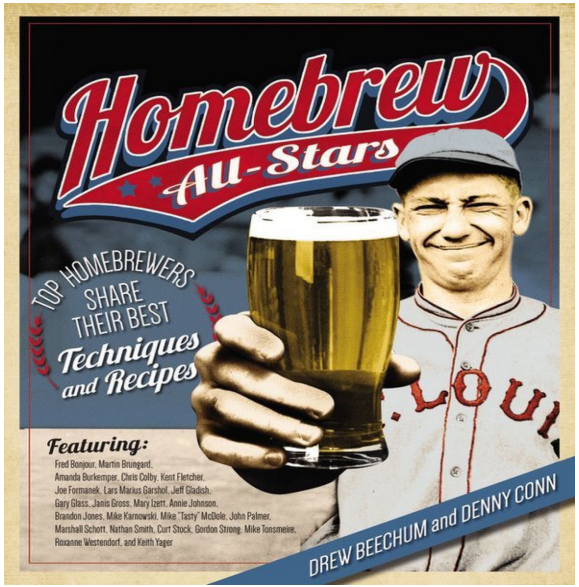

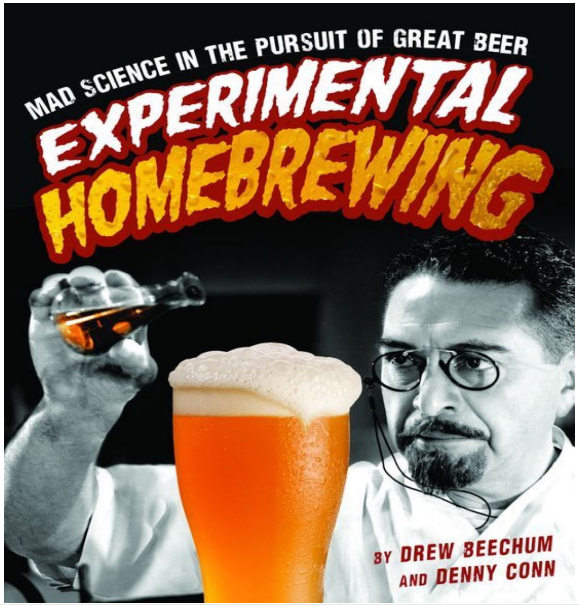

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Pragmatic

Make the best beer possible

While having the most fun possible

While doing the least work possible

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Corollary

Do whatever it takes to make better beer

BUT

Make sure the effort you take yields results that are worth the effort!

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Bottom Up

Start with ingredients and see where it leads

Top Down

Start with the finished beer and figure out how to get there

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The Usual Method of Recipe Design

- What do I want to make?
- What do I have on hand?
- I think a little of this, a little of that, plug it into my computer and
  - At least the numbers look right!
- Well that didn't work, change this and that and pray

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Common Recipe Pitfalls

- Too much stuff
- Not understanding your ingredients
  - Yes, that brown malt will make the SRM calculate correctly, but the beer will be terrible
- Not understanding your techniques
- Not understanding the style

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Approaches to Recipe Design

- More is Better
- What Have I Got?
- Tweaking Another Recipe
- Every Beer Tells a Story
- The Road Map

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More Is Better

- I'll start with some pale malt as a base
- Maybe some Vienna for depth
- How about some melanoidin for richness?
- I need wheat for head formation
- And of course carapils for body
- Every recipe I see has Crystal 60
- Maybe some brown malt for color
- I like Munich malt
- Seven different hops will add complexity
- And I'll age it in Hungarian goulash barrels just because I can

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More is not necessarily better, but neither is less

Use whatever it takes to make the beer you want, but be sure it will give you what you want

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What have I got?

- Clean out the grain bins!
- Let's see what happens
- May work, may not….are you feeling lucky?

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Tweaking Another Recipe

- Either yours or someone else's – consensus design
- Not a bad place to start, assuming the recipe is sound
- Change only one thing at a time to assess changes
- Think about how your tweak will affect the base recipe

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Every Beer Tells a Story

- Ingredients based on the idea behind the beer
  - Good chance to use local or homegrown stuff
  - Great for “personal beers”
  - Drew, the crazy saison guy
    - –Saison Guacamole
    - –Clam Chowdah Saison

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Narrative

- Humans are storytellers
- Deconstruction as a story
- Figure out the component parts

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Building the RECIPE

- Deconstruction Rules:
  - No fats – enhance the mouthfeel instead
  - No alliums (garlic, onion, leeks, shallots…)
- Remember - Recreate the experience, not the ingredients

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Saison Guacamole

- Farmhouse Ale
- What's in my farmhouse?
- I have:
  - 2 Avocado Trees
  - Tomatoes
  - Cilantro
  - Lime tree
- GUACAMOLE!

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Saison GuacaMOLE - The Recipe

For 5.5 gallons at 1.055, 20 SRM, 27 IBUs, 6.1% ABV, 90 minute boil

Amount	Malt Type
9.0 lbs	Pilsner Malt
1.5 lbs	Malted Oats
0.75 lbs	Pale Chocolate
0.25 lbs	Carafa II Special
0.5 lbs	Flaked Rye
1.0 lbs	Avocado Honey

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GUACAMOLE – The Recipe Part 2

Amount	Name	Type	AA%	Time
0.5 oz	Magnum	Pellet	12.9	60
1.0 oz	Hallertau Sapphir	Pellet	4.4	10

Amount	
1.5 tsp	Black Pepper Tincture
1.5 tsp	Cilantro Tincture
1.5 tsp	Coriander Tincture
1.5 tsp	Red Chile Tincture
1.5 tsp	Cumin Tincture
1.5 tsp	Lime Zest
1.5 tsp	Sundried Tomatoes

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The Roadmap

- Use your “taste imagination” to envision the finished beer
- Imagine what every ingredient will contribute to that beer
- If you don’t know why something is there, leave it out

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Learning Ingredients

- SMaSH brews – may not make a dynamic beer, but you'll learn what every ingredient contributes
- Hop and Grain teas – Hop teas may not have a lot of value in terms of absolute flavors, but can help in comparisons. Grain teas can let you taste the flavor of each grain

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HOPS

- Heat 4 oz. of water to about 170F

(about a minute in the microwave)

- Add 2-3 grams of either whole or pellet hops (1/3 cup whole or about a dozen pellets)
- Steep for 5 minutes
- Filter through coffee filter
- Drink, gag, spit
- Most useful for comparisons

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Grain

- Heat 4 oz. of water to about 170F
- Stir in 1.5 oz. crushed grain (about 4 heaping tablespoons)
- Let sit for 30 min. Reheating for 30 seconds at 10 min. intervals to hold temp
- Strain through coffee filter and taste
- Try a combo of grains to see how they work together

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Other resources

- AHA Recipe Wiki - http://wiki.homebrewersassociation.org/BeerRecipes
- Brewing Classic Styles – Zainasheff and Palmer
- 7 Barrels Brewery – Noonan
- Discussion forums
- AHA forum https://www.homebrewersassociation.org/forum/index.php
- Experimental Homebrewing – Beechum and Conn
- Other club members
- Brewery websites – Deschutes, Stone, others

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Decoction Experiment

Brewers were asked to brew 2 batches of beer (any style) using identical recipes. One batch was to be decocted, using any decoction schedule they preferred. The other batch was to be brewed using either a single infusion or step mash (either infusions or direct fired), again the brewer's preference. The reasons for doing this were to find what type of decoction or infusion schedule a typical homebrewer would use for their beer. Then each brewer was asked to assemble a tasting panel and have them answer a set of questions. Beers brewed were a basic pale ale (single infusion, double decoction with 60 and 30 min. boils), an alt (3 step infusion, single decoction with 30 min. boil), a Dortmunder Export (single infusion, single decoction with 45 min. boil), a German pils (single infusion, single decoction with 30 min. boil), and a Munich dunkel (single infusion, single decoction with 30 min. boil).

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Tasting Report Form

Decocting is reputed to have several effects on beer so we are asking you to judge some samples side-by-side to see if you can tell a difference. Both beers are made using the exact same ingredients, yeast, and fermentation times but only one is decocted.

You should now have two beer samples in front of you. Evaluate the beers by sight, smell, taste and texture. Describe each sensation in as much detail as you can on page 2.

Circle your choices on the questions below

1.) Which beer seemed to you to be "maltier"?
A B No preference

2.) Which beer seemed to you to have more body?
A B No preference

3.) Which beer seemed to you to be sweeter?
A B No preference

4.) Which beer seemed to you to have better head retention and formation?
A B No preference

5.) Which beer seemed to you to better fit the BJCP guidelines for the style?
A B No preference

6.) Which beer do you think was decocted?
A B No preference

7.) Which beer do you prefer, regardless of your other choices?
A B No preference

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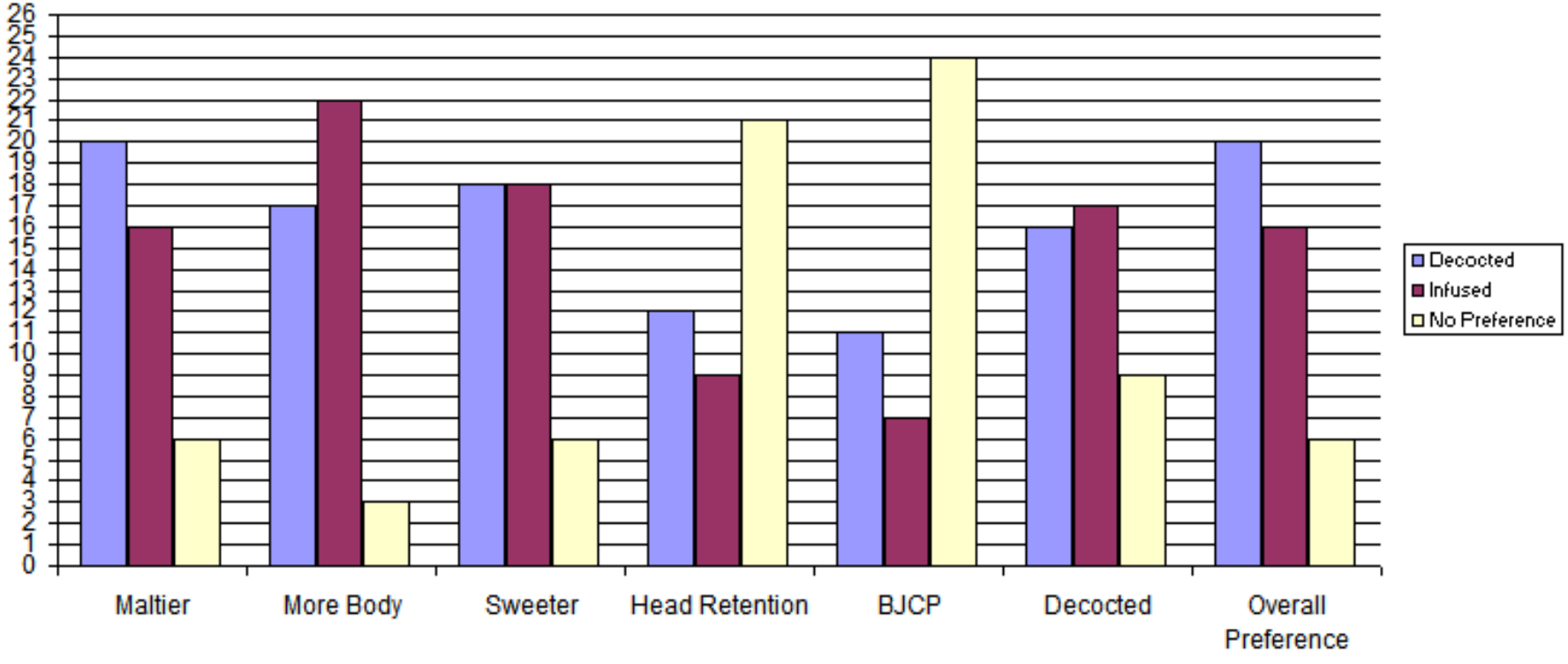
Overall Results



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Decoction Conclusions

The purpose of the experiment was to find if tasters preferred the flavor of decocted beers. Despite other purported benefits of decoction mashing, the overall goal is to make a beer that drinkers prefer. Looking at the results, decocted beers were slightly preferred over infused beers. But combining the results for infused beers with the "no preference" results gives the combination a slight preference. This says to me that a single decoction with a 30 min. boil does not make a clearly preferred beer, and that the difference in preference for this decoction method is so close to the preference for infused beers that the decoction may not be worth the effort for the results it provides. I urge homebrewers to do their own experiment to decide if decoction is worth it, but make sure to do it objectively and not let their own prejudices or expectations influence the experiment.

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FIRST WORT HOPPING EXPERIMENT

The purpose of this experiment was to determine the effects of First Wort Hopping (FWH) on a beer's flavor. Purported effects are increased hop flavor and a "smoother" quality of bitterness. A 10 gal batch of wort was produced and split into 2 5 gal. batches. One batch received and ounce of Cascade hops at 60 min. as the only addition, the other received an ounce of Cascade as FWH as the only addition. Boil times, yeast pitching rates, and fermentation characteristics were controlled as tightly as possible to produce 2 batches with the only difference being the hop schedule. The beers were tasted by 2 panels, one in California and the other in Eugene, OR, by experienced homebrewers, BJCP judges, and commercial brewers in a blind triangle tasting. In the first part of the tasting, panelists were told nothing about the 3 beers they were presented and asked to answer questions about them. In the second part, tasters were told that there were only 2 different beers and again asked to fill out questionnaires about the beers.

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PART 1

1) **These three samples are:**

- The same
- One is different from the other two
- All three are different from each other.

2) **If 2 or more beers are the same, list which they are.**

3) **If you detected a difference, describe what was detected for each sample:**

A: drier finish, softer/less bitter, more pronounced bitter, slightly more bitter than C, more hop aroma & flavor

B: more hop aroma, drier, sharper finish, less edgy than A,

C: more malt flavor, not as sharp, less bitter

4) Did you prefer one of the samples? A B C no preference

5) If you had a preference, what was it about the sample that you preferred?

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PART 2

At this point, identify the 2 different samples and re-label them as 1 and 2

1) Thinking of bitterness, did one sample seem more bitter?

1 2 no preference

2) Subjectively describe your impression of the bitterness of each sample

1:

2:

3) Thinking of hop flavor, did one sample seem to have more hop flavor?

1 2 no preference

4) Subjectively describe your impression of the hop flavor of each sample

1:

2:

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IBU Analysis Results

- Gas Chromatography by Scott Bruslind at Analysis Laboratory

Beer	IBU
A (FWH)	31
B (60)	28.7

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IBU Analysis Results

- Here are the HPLC (High Pressure Liquid Chromatogrpahy) results of the brews: The alpha-acids are not bitter though they contribute to bitterness units value. The humulinones are oxidized alpha-acids and are slightly bitter.

Beer	Iso-alpha-acids	Alpha-acids	Humulinones
A (FWH)	24.8	3.5	1.9
B (60)	21.8	4.7	1.8

- Thanks to Bob Smith at S.S. Steiner

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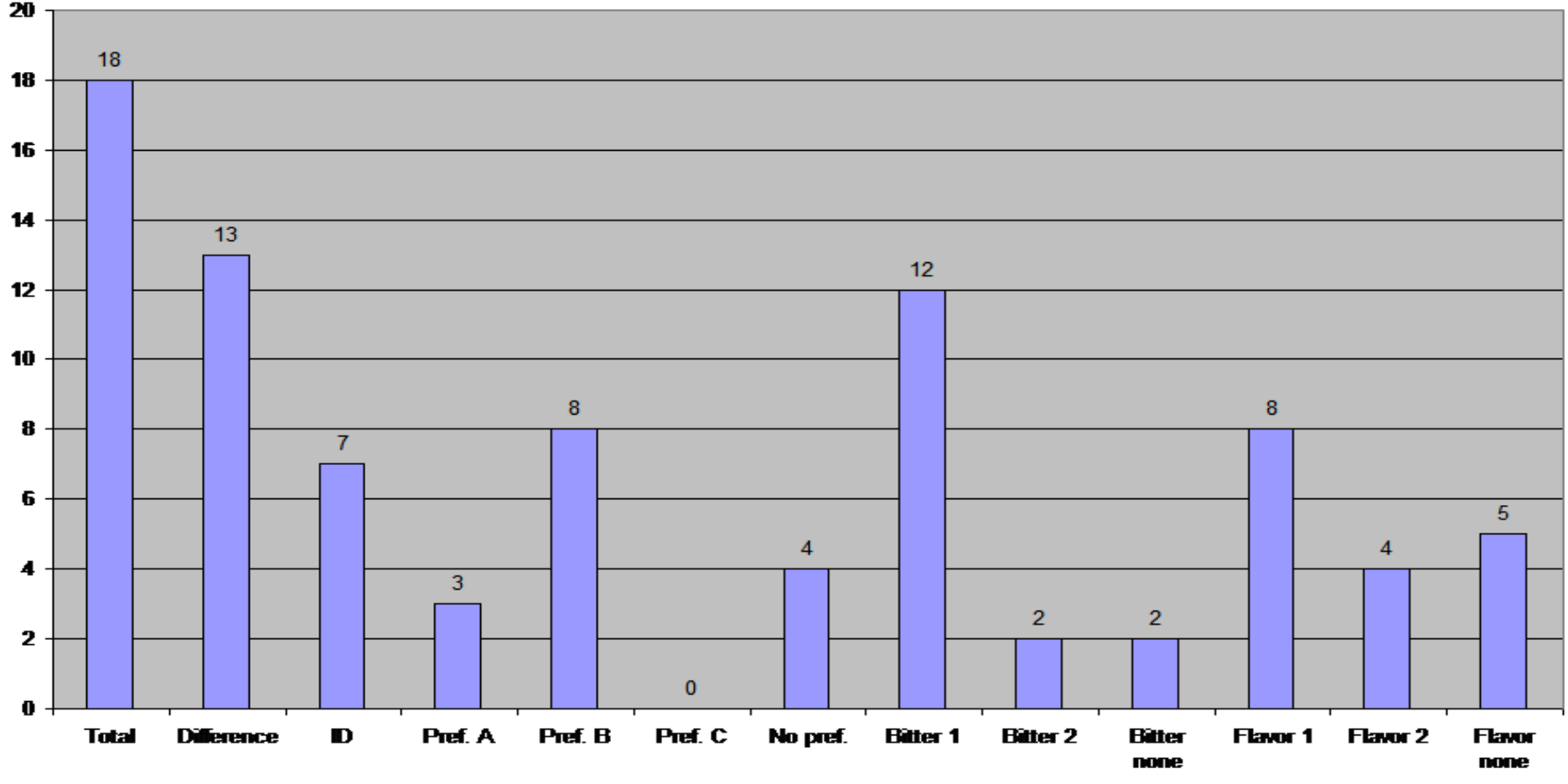
FWH Tasting Results



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FWH TASTING RESULTS

Difference A	Difference B	Difference C	Pref. reason	Bitter desc. 1	Bitter desc. 2	Flavor desc. 1	Flavor desc. 2
drier finish	more hop aroma	more malt flavor	better aroma	more early	more late	balance, cleaner	less flavor
softer,less bitter	drier, sharper finish			fresh,crisp,dry		almost none	none
	smoke aroma	lighter smoke	more sweetness&body	smoother			
more pronounced bitter	less edgy than A	not as sharp	pronounced bitter, not as soft	slightly bitter	mellow	hop lingers	fuller hop
bitter	less than A&C		A&C sour bitterness			most bitter, hoppier	smoother
slightly more bitter than C				more edge to bitterness	not as pronounced	shaper	more flavor
		less bitter		lingering aftertaste bitter	light finish	pleasant, nice balance	more malt
			less hoppy	balanced	lingering bitter	light,just right	
more hop aroma, flavor	malty, grainy			upfront, sharper	maltier, more hop aftertaste		

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FWH Conclusions

As you can see from the comments from tasters, there was no clear conclusion to be drawn. Although the FWH beer was measured to have approximately 10% more IBUs than the 60 min. beer, taster's comments often found the FWH beer to have less bitter character and a "smoother" bitterness. But these conclusions were by no means unanimous. Again, I encourage homebrewers to repeat this experiment for themselves, especially the blind triangle tasting. When I tasted the beers before the blind tasting, I could clearly discern the differences I'd expected to be there. When I did the blind tasting, it took me 3 tries to pick out the different beer and even then I misidentified which one it was. Only 7 out of 18 tasters correctly identified the different beer, which says to me there may be little difference made by FWH. On the other hand, I still use the technique because it's easy to do and I think it might make a difference.

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Changing and Assessing Your Beer

- Change only one thing at a time
- Split the wort to assess hops or yeasts
- Do back to back batches to assess recipe or technique differences
- Use blind triangle tasting to assess beers
- Don’t give away information to the tasters

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DON'T FOOL YOURSELF!

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A Study of the Effect of Perceived Beer History on Reported Preferences by Sensory Panels with Different Levels of Training

J.E. Smythe and C.W. Bamforth

Journal of the Institute of Brewing

Vol. 8, No.1, 2002

The study indicates that the suggestion of a beer's history may well play a psychological role in the perception of the beer.

Merely suggesting a difference between histories causes some judges to perceive beers as different.

..as panel members are more highly trained, they appear to be less likely to declare a preference, effectively superseding the information they have been given

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Beer Time Study

Degree of Training	Rigorously Trained	Trained	Untrained
Country	Belgium	Finland	Ireland
# traditional	7	5	5
# non traditional	1	4	5
no preference	6	3	2

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Adjunct Study

Degree of Training	Rigorously Trained	Trained	Untrained
Country	Belgium	Finland	Ireland
# traditional	6	7	6
# non traditional	4	3	5
no preference	4	2	1

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Larsblog

http://www.garshol.priv.no/blog/187.html

We were then given a batch of three unidentified black beers, and told to write notes on them, then attempt to guess the beer styles. After tasting the three we were asked one by one to read our notes on the first one, all of which went along the lines of "roasty, caramel, maybe a bit neutral". The shock was considerable when we were told that it was, again, Ringnes Pils, this time with some black colouring added to it. Every single one of the 10 participants claimed to taste roastiness in the beer, and not one of the 10 so much as came near the idea that this might be a pilsener. An interesting example of the sense of taste being affected by visual signals.

The third beer was again described as having a pretty lasting brown head, being roasty, kind of neutral, maybe a bit sweet, and, by one person, as slightly estery. There was again considerable shock on being told that this was Erdinger Hefe-Weissbier (the pale variety) with dark colouring. We'd again been fooled by the colour into picking up an entirely imaginary roastiness, although the ester character is certainly correct.

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I'm still surprised by this result. There was considerable beer tasting experience among the participants. There were three RateBeer users with approximately 8,000 ratings put together, one guy educated as a wine sommelier, two commercial microbrewers, and the rest were certainly not novices, either. And yet while the participants were able to recognize two beers simply by tasting them, they were also fooled into tasting something that was just not there. There is much research and anecdotal evidence indicating that people's sense of taste and aroma are strongly influenced by their expectations, so this shouldn't have come as a shock. But it did.

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Another very interesting example, albeit with wine rather than beer, came from Frédéric Brochet in a 2001 experiment at the University of Bordeaux. He assembled a panel of fifty-four experienced wine tasters for evaluation of what they thought were four different wines. In the first test, they were given two glasses of wine, one white and one red. However, the red wine was actually the same white wine as was in the other glass with red food coloring. Nearly every taster described the red wine in terms ordinarily used to describe red wine, including words like jammy and crushed red fruit—terms that are seldom, if ever, used to describe white wines.

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In another test he took two bottles of wine, one a *grand cru* and the other an ordinary *vin de table*, poured them out, and filled both bottles with a mid-level Bordeaux. Tasters then described exactly the same wine in almost completely opposite terms. The wine in the grand cru bottle was described as agreeable, woody, complex, balanced, and rounded, while the supposed vin de table was weak, short, light, flat, and faulty. Brochet's conclusion was that the perception of the wine was often more important than what was actually in the glass. Kind of makes you wonder about your own tasting skills and susceptibility to labels, doesn't it?

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Avenue Vine

Jan. 14, 2008

A study has found that people who pay more for a product do enjoy it more. The researchers discovered that people given two identical red wines to drink said they got much more pleasure from the one they were told had cost more. Brain scans confirmed that their pleasure centres were activated far more by the higher-priced wine. The findings could help to explain why rich diners are often willing to pay thousands of pounds for a bottle of fine wine. It seems much of the real pleasure is generated by the high price paid rather than by the quality of the vintage.

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The researchers observed changes in a part of the brain known as the medial orbito-frontal cortex, which plays a central role in many types of pleasure. They found that the cortex became more activated by the“expensive” wines than by the cheaper ones. This, said Rangel, showed that the increase in pleasure was real, even though the products were identical.

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