

Brewing Wild and Sour Ales with Karen Palcho: Berks County Homebrew Club 9/13/16

I came to brewing with a background in ceramics and botanical product manufacturing. I am used to understanding raw materials, blending them in the presence of fire and oxygen, then reproducing them consistently for customers and students. The only reason I began brewing is that Terry and I discovered Orval and Cantillon. Once I tasted those beers and their American cousins, I did not want to drink anything else. And those beers were \$\$\$\$. So, I started to make them in 2009.

BJCP 2015 categories:

- European classics: Berliner Weiss, Flanders Red, Oud Bruin, Lambic, Gueuze, Fruit Lambic
- American Wild Ale: Brett Beer, Mixed Fermentation Sour Beer, Wild Specialty

GABF 2016 categories:

- European classics: Berliner Weiss, Flanders Red, Oud Bruin, Lambic, Gueuze, Fruit Lambic
- American Style Sour (no brett character)
- Brett Beer
- Mixed Culture Brett Beer

So, essentially, we have the old European classics, then the new American Brett and Sour beers. Where the classics are generally fermented by exposure to a vast variety of naturally occurring yeasts, bacteria and other microbes through spontaneous fermentation or exposure to brewery surfaces and air, American beers can be made with very specific lab bred and isolated cultures, or commercial blends, such as Roeselare, designed to mimic the complexities of spontaneous fermentation.

Brett Beer. Pour Orval and my #26.

WY+B (wild yeast and bacteria) were present in all fermentation through time, across culture until Pasteur 1800s and the development of sanitation. WY+B never disappeared in unindustrialized places. The word *brettanomyces* simply means "British Brewing Fungus" discovered by N. Claussen in English Stock Ales. Known as "wild" it is just another genus of yeast that was always present in fermentation. But due to its unpredictable nature and weird flavor contributions, it was eliminated from beverage fermentation as soon as practice allowed. *Saccaromyces*, the red delicious apple of the yeast world, became the domesticated horse and *Brettanomyces* remains the untamable zebra. Knowledge of brett strains is developing constantly. Some of the most widely recognized right now include: *B. anomolus*, *B. bruxellensis* (also know as *B. lambicus*), *B. claussenii*, *B. custersianus*, *B. naardensis*, *B. nanus*. See notes about the use classification of the Trois strain (pronounced 'twah'). Flavor profiles contributed to beer by Brett range from phenolic/spicy, estery/fruity and floral to horse blanket, barnyard musty and undesirable jockey, band aid and even the dreaded fecal. Brett can contribute a slight tanginess or tartness but is not responsible for sourness. With excess O2 post-pitch, it creates acetic acid (vinegar.)

Orval: Orval was always unique. It was not a lambic. It was just a monastic beer with a "secret" ingredient which was the Brett. This beer alone spawned American and international brewing with lab bred, commercial isolates of *brettanomyces*. Single infusion @145 with pale, caramel, candi syrup. Sacc 4-5 days @60. 2-3 weeks secondary in fining tanks with Brett. Dry hop, centrifuge, prime with fresh primary yeast. Condition for 3-5 weeks in bottle.

By the way, I use WL 510 Bastogne yeast in some percentage for most of my brewing. It is the Orval yeast. It used to be only special release but now available year round.

Brewing Brett Beer.

1. Traditional method: normal saccaromyces ferment followed by a small pitch of Brett in Secondary. Examples- Orval, De Proef Flemish Primitive, Blvd. Saison Brett. Classic barnyard flavors. If you are brewing only with brett, and not adding bacteria, there is no need to make a special dextrinous wort. Easy breezy: brew any favorite Belgian, IPA, even a Pils. Saisons are a great choice. Add a vial of brett to secondary. If you want it ready fast (3-6 months), go with low ABV, choose a high attenuation primary yeast and use the Trois or Claussenni strain of Brett. Most other strains of brett will take 6-18 months to develop. In all brett beer, funkiness increases with age in both fermenter and bottle. To balance thinness caused by low FG, introduce glycerol (3711 French saison yeast which produces glycerol, and/or oats, rye)

2. 100% Brett: examples- Avery 15+22, Prairie C, Cap'n Lawrence Super Friends IPA, RR Sanctification, Bruery many more all the time. **Pour Avery 22.**

A very different process because Brett gets to eat it all without that pesky sacc going first. Can be MUCH faster than traditional method- can be ready to package in a month. Tends to be cleaner and much less funky, at least while young especially when using the Trois strain. But read later in this doc about confusion over Trois strain, the most widely used brett strain for 100% beers. Sometimes, there can be almost no brett character- remember Fear of a Brett Planet? Or Mo Betta Bretta? Problem is that brett doesn't produce phenols, only sacc does, and phenols lead to the distinctive flavor characteristics of Brett beers. But some people really like this low level Brett character. To balance thinness caused by low FG, introduce glycerol (3711 French saison yeast which produces glycerol, and/or oats, rye)

3. Mixed Fermentation Brett: Pitch sacc and brett into primary for best of both worlds. This is absolutely my favorite way. Jason Yester, my friend at Trinity, got me started on this. For example, pitch 60% Dupont, 20% French Saison, 20% Brett into primary. You'll hit a very low FG in a week and you will get a fantastic blend of flavors in 6-12 months. **Pour #59 Saison Brett**

Sour Beer: Pour Cantillon or Cuvée Rene and my Wildberry and Peaches Sours

Sour Beer is beer made with LAB (lactic acid bacteria.) The LAB can be introduced at many points during the brew process. LAB cover our bodies, cover fresh vegetables, fruit and grains, cover most surfaces in our homes. Historically LAB got into beer from the first moment of the brew day (surface of the grain) to the last (surface of the barrels.) Today, we can choose many ways of getting these critters into our beer: open and/or spontaneous fermentation, fresh fruit and vegetables, acid malt, sour mash, kettle souring, dregs, and lab bred commercial cultures. There are two common genera- (though same with brett, new strains are being developed all of the time) Lactobacillus and Pediococcus- which both produce lactic acid and it's characteristic sourness in beer, yogurt, pickles, kimchi, sauerkraut and hundreds of other fermented foods and beverages worldwide. Like Brett, it was mostly eliminated from food and beverage production in industrialized places. Originally, all beer was sour and the chief preservative effect of hops was to control the growth of lactobacillus and therefore sourness in beer. Most strains are hop intolerant but some such as L. brevis are hop tolerant. Homofermentive strains generate only lactic acid.

Heterofermentive strains generate lactic acid, CO2 and alcohol. Pedio is slower to work but lowers pH more than lacto. Pedio can generate diacetyl but this can be cleaned up with time and brett. Some strains (not the Wyeast) cause "ropiness" due to exopolysaccharides. Brett also breaks this down. I think that pedio flavors are richer, deeper, smoother and more complex than lacto. Lacto seems brighter, sharper, one note.

Other microbes involved in historical sour beer production are acetobacter, enteric bacteria, sherry flor, and malolactic bacteria. If you watch spontaneously fermented wort under the microscope, you can observe waves of birth, growth, and death, as families of microbes rise and fall in the

increasingly alcoholic and acidic environment, each contributing essential characteristics along the way.

Brewing Sour Beer

Brewing sours is different than brewing Brett beer.

- Sanitation is even more crucial than with Brett beer.
- Highly dextrinous wort required through both higher temp mashing and 10-40% unmalted grains. Lambics are 40% unmalted wheat. But great sours can be made with only 20% unmalted or flaked grains, which avoids turbid mashing and stuck sparges.
- Hops will inhibit the growth of most lactobacillus strains (but not pedio) so keep IBU low- under 10. The Yeast Bay even specifies maximum IBUs for many of their yeast products. You can use this to advantage in certain brew processes- you can control acidity in an overly sour beer by adding hops.
- While brett may produce a 'tang' it does not produce lactic acid. Only the addition of LAB (lactobacillus, pediococcus) makes a sour beer. Not capable of fully attenuating wort alone, though accounts vary. Pedio takes a very long time to metabolize diacetyl but I think produces richer flavors.
- Takes 1-2 years to fully develop, unless brewing a kettle sour or pre souring the mash.
- Most commercial cultures have wimpy strains and you hear complaints that "the beer never soured." Try to use dregs of great sours for flavor complexity and pitch them along with commercial cultures.
- Sour Mash: I have never brewed sour mash or kettle sour. No offense to some of the great beers out there brewed with those methods but I just don't like them. They lack depth and complexity even when expertly brewed. Dr. Lambic at Sourbeerblog is the best. Matt Vardjan also. Many variations on this popular process.
- Mixed Fermentation: Pitching all microbes at once at primary. Probably the best way. Historically, this was the only way due to the nature of spontaneous fermentation. Most homebrew cultures for sour beer are blends of sacc, brett, and bacteria designed to be pitched at primary. But the growth in new products is so exciting. For example, Omega Yeast Labs now have a Lacto Blend that promises super rich and sour depth. Commercial American sours today mostly come out of barrels inoculated with bacteria.
- My fav way is to introduce lacto by adding fresh fruit. My sours are usually 100% Brett or mixed fermentation for 8-12 months followed by a heavy dose of fresh fruit- rinsed with water, then frozen to burst cell walls, then added. Freezing does not kill the microbes.
- I got started by cloning Jolly Pumpkin Bam Biere. It's a great place to begin with brewing sours. This recipe makes a fantastic beer and lots of homebrewers have used it. There is a great interview with Ron Jeffries too. I use the grist recipe for many of my sour and rustic saisons.
<https://embracethefunk.com/2011/08/28/jolly-pumpkin-artisan-ales-bam-biere/>

General Info for all WY&B beer

Sanitation: Standard sanitation practice in brewing is designed to kill all yeast and bacteria. The main differences between sacc. and WY&B is that it takes only a few cells of the latter to radically alter the flavor of a beer while a few cells of saison yeast will not be noticeable in an IPA. Also, the cells of WY&B are much smaller than sacc and can get stuck in much smaller crevices. The cells of bacteria are extremely small.

The best practice is to keep a separate set of equipment for anything plastic that touches these microbes: thief, tubing, siphon, bottling buckets, carboys etc...Separate areas or rooms should not be necessary to prevent contamination unless you are splashing beer around or doing open fermentation of clean beers. Spontaneous fermentation requires an extra layer of sanitation and

monitoring of pH due to pathogens (enterobacters such as e. coli and salmonella) not present in other processes. Many commercial breweries keep separate sets of equipment (Cap't Lawrence, Bruery) but some (Russian River) go further and require separate sets of clothes. Ithaca uses the same hoses and equipment for all of their beer, except the bottling lines.

Base Style: Any beer can be soured. Victory has a Pilsen now and Evil Twin a Helles!

Water: Any water will do except chlorinated. My favorite brewers take a minimal approach to treating water for brett and sour beer. If you have very hard water, dilute with distilled, spring or RO. Note very high bicarbonates in Trappiste beers historically. Note Yvan DeBaets (from De La Senne) debate with Orval over lowering pH and negative taste effects of "smoother bitterness."

Grain:

- Be careful with dark roasted, smoked or heavy spices= astringency
- To balance thinness caused by extremely low FG, insure dextrans by including unmalted grains and specialty malts, or mash hotter. Increase mouthfeel by increasing glycerol (use french saison yeast, oats, rye) or by using herbs and spices or squash in mash. I put oats and rye into almost all beers. Brett does not produce glycerol by itself.
- 10-20 % Acid malt in mash is a great way to lower pH and have a light tartness from the bacteria. Especially nice in Brett Beer- provides a light sourness that brings out brett flavors

Mash:

- Single infusion traditional and sufficient for most beers except lambics.
- Design wort for precursors: I don't want smoky, vinyl, clove, 4-vinylguaiacol. So, I reduce ferulic acid and polyphenol extraction by avoiding a protein rest; avoid hot sparge, over-sparging, or sparging with high pH water.
- Mash Thickness: Water to grist ratio of 1.3 or 1.4 quarts of water per lb. of grain. Beechum 1.2, Chad 1.3, Jeffries 1.4.
- Mash Temp: Tons says that mash temp is the most effective way to influence the composition of sugars and dextrans in the wort. Low temps (145-148)= more fermentables= faster ferment= less sourness. 150-156 is normal range for classic sours. 156 is what I use for sours. 147 for Saison bretts. 145 for Orval.

Hops: For Brett beer, anything goes! But the beer is going to be bone dry, and dryness accentuates bitterness. For sour beer, IBUs must be kept at 0-15 since most LAB strains are hop intolerant. L. brevis is not. In fact, one way to control sourness is to raise IBUs. The Yeast Bay even specifies how 0-5 ibu vs. 5-10 ibu changes the sourness produced by some of their blends. For beers aged over a year, most hop flavor or bitterness will dissipate. If you want a HOP kapow, dry hop. Dry hopped sours are the best!!!! For spontaneous, large quantities of aged hops are used for their anti-microbial properties without contributing bitterness or inhibiting growth of LAB.

Fermentation:

- Consider open fermentation. Main purposes of doing this are ester formation; off gassing of sulfur compounds; and yeast harvesting. FYI, Beechum et al say that Saison strains are pressure sensitive- open ferment or use foil instead of airlock during primary. Jolly Pumpkin, La Rulles, and Anchor Steam all use exclusively open fermentation.
- Pitch rate same as ales, 1 million cells/ML/degree plato. Please note that cell counts in White Labs brett vials/packs are extremely low since they were designed for use in secondary only. They are also highly variable!!! Note my experience counting of Brett C and then talking to White Labs. Brett grows very slowly so growing enough for primary takes 7-8 days on a stir plate. If you are doing 100%, make sure you have enough cells. FYI, there is ongoing discussion of under pitching to stress the yeast in order to get more esters and flavors- lots of good info out there on this topic. I do not under pitch. Yacobson is up to pitch rate of 1.25. White Labs now has cell counts of every package available online!

- Oxygenate to 10-12 ppm. Ongoing discussion of effects of O₂ on brett and sour beer. Some think less O₂= stress=more flavor but most O₂ at normal rates. I do. Micro-oxygenation essential during fermentation. If you have glass or Better Bottles which are non-permeable, just take the airlock off for a minute once every couple of months

- Temps: Chad 168-172. Tons up to 80! WLabs lists several strains at 85+. I pitch at 68 and free rise to 75.

-Packaging: See separate presentation on bottle conditioning on my website. Main thing is to get FG below 1.005 and stable. Please crash then re-yeast using neutral high floc sacc (T58 good choice) for Brett beer and DV-10 or other wine yeast for low pH sours. Aim for at least 2.5 vols of carb. Condition at 70-75 for **12 weeks**. Bottling with Brett my favorite way to go but that's a separate presentation (on my site) Brewer' Friend is the best calculator.

Strains of Brett. Yeast Bay, Bootleg Biology

All strains work and each has a unique profile. See experiments on strains by Chad Jacobson "Roy G. Biv," Jason Yester, and "Funk in the House" by Andrew Kazanovic. New strains being developed regularly. See Yeast Bay, Omega, and Bootleg Biology and White Labs Yeast Vault-crazy!!!

The most common strains:

Brettanomyces bruxellensis: Classic horse blanket, leather.

Brett lambicus: classic cherry pie. Most often used with brux. Fairly tart

Brett claussenii: low intensity brett character. Very fruity. Great for bottle conditioning

Trois: Up until April 9, 2015, "WLP644 *Brettanomyces bruxellensis* Trois" was thought to be a *Brettanomyces* species. Following the analysis of the genetics of *Trois* by Lance Shaner at MTF that showed this strain to be *S. cerevisiae*, White Labs said that their DNA analysis also showed that Trois was a *Saccharomyces* species. No wonder it fermented so fast:) Now you can get the 644 or 648 *Brettanomyces bruxellensis* Trois Vrai, what the 644 was supposed to be. Both tart and very fruity. Very fast to ferment. Great for primary. Trois means 3 in French. It sounds like Twaahhh.

There are many places to obtain wild yeast and bacteria:

- Commercial cultures. See later notes on significant difs in cell density of popular brands. Availability of new strains and producers is sky rocketing. Yeast Vault at WL incredible.

- Dregs of unpasteurized, unfiltered beer

- Spontaneous fermentation from the air

- from the skin of local fruit, vegetables, grains

- from bodies including skin, fur, hair, or surfaces of almost everything

References

- Michael Tonsmeire, The Mad Fermentationist Blog and [American Sour Beers](#)

- Chad Jacobson at Crooked Stave

- Milk the Funk Wiki

- Dr. Lambic at the Sour Beer Blog

- Stan Hieronymous- [Brew Like a Monk](#)

- Jeff Sparrow- [Wild Brews](#)

- Phil Markowski- [Farmhouse Ales](#)

