The Revival of the Classic

Scene: Noon in a tavern in any city or town in America in 1900. A long mahogany bar, behind which a mustached bartender with striped shirt and sleeve garters is drawing five cent mugs of foaming golden beer as fast as he can for the crowd of working and businessmen crowding the bar. The end of the bar groans under a huge spread of thick sliced rye bread, cold meats, cheese, pickled eggs, pickles, mustard, radishes—all fixings for a free lunch to wash down with that nickel beer. And what was that beer? It was a new world version of the famous Bohemian Pilsner, a pale, sparkling, rich, flavorful lager, brewed by the millions of barrels for the thirsty masses with American ingredients and methods.

Cool fermented, cold aged lager beers, no doubt dark as were most beers historically, began to spread from their Bavarian origins to the rest of Europe during the first half of the nineteenth century. John Wagner of Philadelphia is generally credited with brewing the first lager in America in 1840. However, these weren't the golden lagers that were to become most famous. The first clear, pale lager was brewed in Plzen (Pilsen), Bohemia (now in the Czech Republic) in 1842, and its fame quickly spread.

In the next thirty years the lager revolution swept most of the beer world, and America was no exception. According to brewing historian Stanley Baron, "By the 1870s the American drinking public had made a clear choice for lager beer over ale, porter and the other English beers. What was more, the Americans preferred a lager closer to the Pilsen than the Munich type: i.e., a pale, light bodied, clear and effervescent beer, relatively low in alcoholic content." By the late nineteenth century, artificial refrigeration allowed brewers anywhere in the country to brew throughout the year.

Before you lament that something like Miller Lite had displaced Sierra Nevada Pale Ale or Anchor Porter, let me assure you that this pilsner was light bodied and low in alcohol only compared to the earlier pre-lager beers, which Baron quotes a "scientific writer" as describing as "half sour, muddy and intoxicating."

A classic American pilsner of one hundred years ago, which we can document from Wahl and Henius' 1902 classic *American Handy Book of the Brewing, Malting and Allied Trades,* would have had a gravity of 1.048-1.052 for draft "city beer," and 1.052 to 1.060 for the bottled version, suitable for shipping. Hopping was at the rate of a pound per barrel for the city beer of 1.052 OG, more for stronger or bottled beer, or 2.6 ounces per five gallons (3.8 g per liter). Using their reported addition schedule and their analysis of 4.7% alpha "resins," this would yield an IBU bitterness in the upper 30s IBU.

This beer was brewed in the style of European Pilsners of the time, but with some important differences made necessary by the differences in domestic malt and hops. While Europeans brewed an all malt beer using low protein

two-row barley malt, U.S. grown six-row malt was higher in protein. This could result in turbid or cloudy beer. However, corn and rice are largely starch with very low soluble protein levels, and six-row malt has more enzymes than are needed to convert its own starch. They seem made for each other.

Brewers had been experimenting with corn as an ingredient as early as the 1850s, but without success. Then in the 1870s, Anton Schwartz and others, using newly acquired scientific insight into the problem, developed the American "double mash" method of incorporating these raw cereals into the mash. This method is used to this day in American breweries.

The use of corn or rice eliminated the problems associated with six-row malt and had several side benefits. A beer with a portion of adjuncts (Wahl and Henius recommend no more than one-third) is less satiating and lighter in body

American Pilsner

By Jeff Renner

TRADITIONAL AMERICAN "DOUBLE MASH"

American brewers more than a hundred years ago realized that domestic barley had an excess of protein and that corn and rice, with their low protein levels, could be used to advantage. However, corn and rice starches don't gelatinize at mash temperatures, and so aren't available for conversion. Boiling the cereal gelatinizes the starch, but then they are hard to handle. The secret turned out to be malt. By adding a small amount of malt to the cereal and mashing a short time before cooking, the cereals become quite thin and stay that way.

I mash about five ounces of malt for every pound of adjunct. Use about a quart and a half of treated mash water per pound of corn, two quarts for rice. Rest at about 153°F for 20 minutes, then bring to a boil.

Rice and corn meal should be cooked covered about 30 minutes; grits or polenta 45 minutes to an hour. Stir as you bring them up to a boil and occasionally during the boil, adding more water if necessary. It's best not to overcook rice, but corn can be cooked longer for more flavor and color reactions to take place in the cooker if you want these.

Meanwhile, you have started the main, or malt mash, and timed it so that just as the cereal mash is done, it is time to boost the temperature of the main mash. It's best to plan this ahead on paper.

and color than an all malt beer. This may have been especially attractive to beer drinkers in the hot American summers. Still, this beer was not "lite;" it was richly flavored, but had "süffigkeit," an untranslatable German word beer chemist Robert Wahl said meant "you can drink it all afternoon and still not have enough." An added benefit is that unmalted cereals are cheaper than barley malt, at least for large commercial brewers, so it has been a temptation for brewers to save costs by increasing their use. Modern examples of this school may employ as much as 50% adjunct. While brewers of these beers may argue that the resulting light beers are what the consumer wants, most homebrewers and craft beer fans would disagree.

American prohibition, from 1919-1933, permanently closed most American breweries and severely weakened the financial position of the rest, which stayed in business by producing near beer, ice cream, soda pop, or malt extract. Some brewed bootleg beer, most famously in Chicago under the control of Al Capone's gang and others. Bootleg beer was often of questionable quality. When brewing was again legal in March, 1933, beer could at first have a maximum alcohol content of only 3.2% by weight (4.0% by volume). Even when strong beer again became legal at the end of 1933 with repeal of the Twenty-first Amendment, beer was being brewed lighter and sweeter, with less hops and more adjuncts, perhaps to appeal to drinkers accustomed to sweeter drinks of prohibition, and especially women.

Chicago beer historian Bob Skilnik writes, "Beer had become a light, bubbly drink, quite different in taste from the richer, pre-prohibition brew." This didn't happen all at once, but rather over several decades. In his 1948 *Brewers Manual*, A.L. Nugey recommended hopping rates of half to two-thirds by weight of those of Wahl & Henius, but hops had by now increased in alpha content to 5.5%-7.5%. This would still have been perhaps two to three times the bitterness of modern lagers.

But smaller breweries, perhaps as a result of advertising on the new medium of television, saw invading premium, less bitter regional and national beers eat into their market. During the 1950s and 1960s, the market share of at least one major regional brewery rose dramatically every time it lowered its beer's bitterness. Beer was on its way from enticing süffigkeit to unsatisfying tastelessness—a beer that when swallowed left no aftertaste, so you drank more, perhaps to try to capture a fleeting beery something, or perhaps because it just really didn't taste like much.

The Modern Classic American Pilsner

Several things mark a classic American pilsner, but most fundamental is the use of raw corn (maize) and/or rice adjunct.

The last thing the average homebrewer probably wants to put in his beer is corn or rice. That's the mark of the pale, fizzy, bland beers that drove him to start brewing in the first place. The first beer a homebrewer makes is probably dark, strong, bitter, and definitely all malt. We swear by Reinheitsgebot, yet we happily brew a Belgian witbier with 50% raw wheat and oats. So get that prejudice out of your mind and repeat after me, "Corn is good."

Corn or rice use should be kept between 20% and 30% so the malt character isn't lost but so it doesn't predominate too much, either. I generally use about 22–25%, but go to 30% for light, crisp beers.

Corn adds more than simple fermentables. It contributes a grainy sweetness and a subtle but distinctive flavor (not to be confused with the sometimes corny flavor dimethyl sulfide, or DMS, which comes from malt). Rice, on the other hand, is neutral in flavor and adds no sweetness, producing a crisper, drier beer. Both are good, but my strong personal preference is for corn, especially when reproducing the rich pre-prohibition style. Corn has always been more widely used than rice, and especially after the 1890s, when corn grits' quality had greatly improved. There are still several breweries that use rice, most notably Anheuser-Busch. It contributes to Budweiser's clean, crisp character. I have made very nice, drier CAPs with rice and relatively low mash temperatures, as well as ones using both corn and rice, as is used in Rolling Rock.

Strangely, in at least one case, the use of corn or rice was apparently interchangeable. Ed Westmeier has reported an old Cincinnati post-prohibition set of instructions for brewery workers that told how to handle rice or corn, depending on which was available.

The brewer has several choices of forms of corn to use. The easiest to use is flaked corn, because flakes have been pregelatinized so they can be used directly in the mash. Flakes are made from large chunks (flaking grits) of the starchy corn endosperm, about 3 mm in size, that are steamed and passed through heated rollers to gelatinize the starch and flatten into flakes. These must be fresh and treated gently. Old, dry, brittle flakes may lead to mash and lautering problems.

Other forms of raw corn must be mashed separately with a little malt, boiled, then added to the main mash. Commercial breweries most often use yellow brewer's grits, coarse pieces of the corn endosperm averaging 1 mm in size. These are hard for the amateur brewer to obtain, but degermed corn meal works very well

ILLUSTRATION BY STEPHEN COSTANZA

and is what I use. Coarser meal is better than the very fine grocery store kind that comes in cardboard cartons. Polenta is very similar to grits and works well. While home brewers have reported success with whole corn meal, its use can be problematic. The oils in the germ can cause problems with head retention, as well as fermentation and flavor problems.

Rice is available in flaked form, again for use directly in the mash tun, or as raw rice. Short grain or medium grain is preferred over long grain, which can cause gelatinization and viscosity problems in the cereal cooker. This may be of little concern to the home brewer, however. Rice should be ground to small pieces averaging about 1 mm before cooking. Corona-type mills work best for this; roller mills must be adjusted tight to work, and non-adjustable roller mills will not work at all.

Other characteristics of a CAP are more flexible, depending on whether you want to make an historically accurate beer or a modified one to your tastes.

Malt

Six-row malt seems an historic necessity, and I prefer it for the results as well. George Fix writes that he is "constantly struck by how well six-row pale malt does in a formulation like this." Nevertheless, he prefers the somewhat more refined result he gets from using two-row, especially a Moravian type that is no longer cultivated. I find that CAPs brewed with six-row seem to have more character, and that some two-row brews seem somewhat soft. However, two-row domestic lager-type malts work well, and even continental pils malts have been used by some brewers without problems.

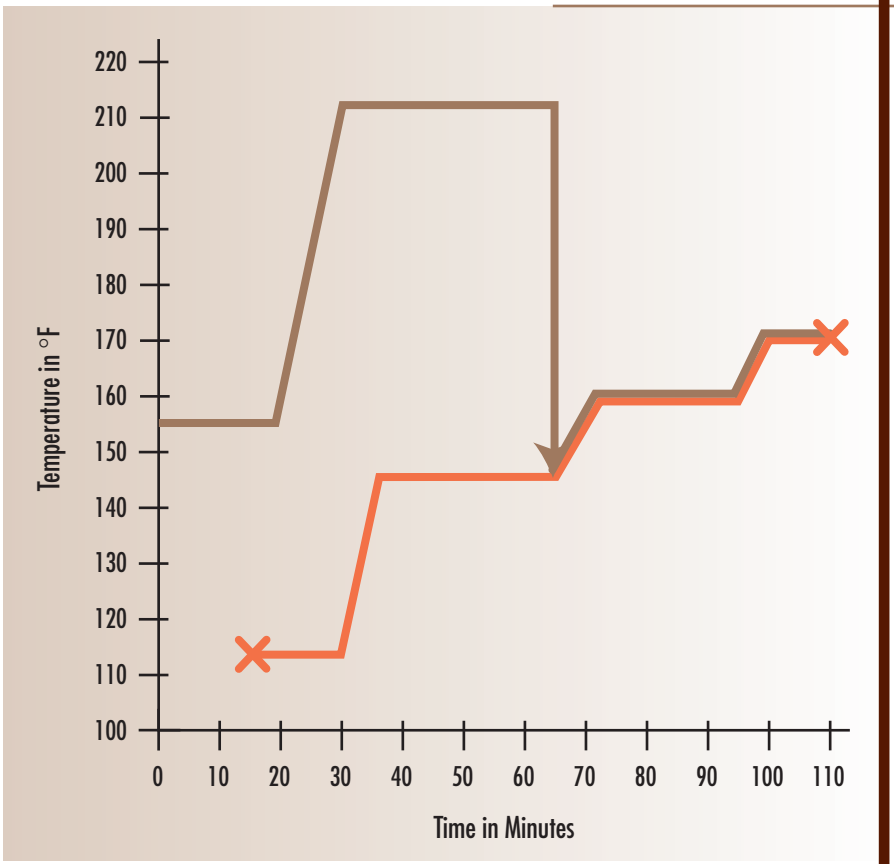
Hops

Hopping presents the brewer with more choices. Pre-prohibition domestic hops were virtually entirely of the Cluster type, as were most in the post-prohibition period through perhaps the 1950s. Cluster is even today the classic American bittering hop, and an important component of the "old-fashioned beer taste" that old timers remember. They are sometimes described as having a coarse flavor, with black-currant character. However, after a full boil their flavor is subtle. I can't always identify their use, but I miss the flavor when I don't use them in my beers. Fix has said that he dislikes Cluster hops, especially at the high hopping levels of a century ago. However, he very graciously told this year's MCAB conference audience, as we all were tasting a recent "Your Father's Mustache," that I was making a liar of him. This is likely due to the fact that my bittering is somewhat short of that very high rate.

Wahl and Henius in 1902 advised using "best quality" hops for late addition, and this may well have implied imported ones. They do not discuss hop origins, but 100 Years of Brewing a year later does mention both domestic and imported hops, the best of the latter being Bohemian "Saazer," then Bavarian "Spalter," and then "Holleetan" (Hallertauer?). Other hops that were imported include English Fuggles and Styrian Goldings, which are Fuggles grown in Yugoslavia. Clearly, imported hops were used, especially for late additions in premium beers. Fix notes that Budweiser labels of one hundred years ago proudly noted the use of Saaz. Nugey in 1948 is explicit about using imported hops for late additions in his recipes.

For flavor and aroma hops, I prefer top quality imported Saaz, Hallertauer, Tettnanger or sometimes Styrian Golding, and I have been very pleased recently with domestic *(continued on page 68)*

FIGURE 1: TRADITIONAL AMERICAN DOUBLE MASH



The American double mash is similar to a decoction except that the boiled portion (brown line) contains all of the adjunct (rice or corn product) along with a small portion of malt. This is mashed in at saccharification temperature and held for 20 minutes before the heat is increased to bring it to a boil. Meanwhile, the main mash (orange line) containing the remainder of the malt for the recipe is mashed in at protein rest temperatures then heated up to a low-level saccharification temperature. At the end of the adjunct boil, the adjunct portion is added to the main mash, raising its temperature to the upper end of the saccharification range.

American Pilsner *(from page 29)*

Ultra. Some use of "noble" hops adds greatly to the quality of this style. Some brewers, eschewing possible historic accuracy for their personal taste, use all noble hops in the style of continental pilsners. This will make a fine pilsner, although perhaps not typical of most historic beers.

Yeast

Any lager yeast should work, but avoid ones prone to diacetyl. It seems nice to try American yeasts. I used New Ulm from Yeast Culture Kit Co. in my original (also Wyeast American, 2035) and despite Wyeast's note that it is not a pilsner yeast, I liked it fine. Wyeast 2272 is reputedly from the old Christian Schmidt brewery in Philadelphia. Some brewers have reported diacetyl with Wyeast 2007 (reputedly Anheuser-Busch) and Wyeast 2112 (California Common, reputedly Anchor Steam). I really like Weihenstephan 34/70 (Wyeast 2124) as a good general purpose lager. I used Danish (Wyeast 2042) years ago for all malt Northern European lagers and very much liked the crisp, hop emphasized profile it gave. I think it would do well for a drier CAP style.

My regular lager yeast for several years has been Ayinger from Yeast Culture Kit Co. This is a fine all purpose lager yeast that was the clear favorite of six yeasts of a taste panel that I sat on along with a local brewpub's brewing staff and other judges. It produces clean, rich beers.

Water

Brewing water is of some importance in a pilsner. Indeed, Jankowski writes that brewing with well water in Bushwick gave "dubious results" until soft lake water was piped in around 1859, after which brewing began to thrive as German settlers moved in. It seems likely that it was this water and the resulting smooth hop bitterness that allowed higher hopping levels in Bushwick than was acceptable in other areas of the country, where "Just a kiss of the hops" became popular.

While water in Pilsen is dead soft, it is not necessary or even desirable to brew with water that is totally devoid of mineral content. The most important consideration is that brewing water for this style be low in total alkalinity (bicarbonate/carbonate) lest harshness result. Miller recommends pilsner brewing water be ideally under 50 ppm total alkalinity, and not over 75 ppm and this can be achieved by a variety of means which are well documented in brewing texts.

If you have or acquire soft water for brewing this beer, some treatement will be required to achieve the proper mash pH, in the range of 5.2 to 5.5. Generally this can be done by bringing the total calcium ion (Ca+2) content up to at least 50 ppm. In this style, calcium sulfate (gypsum) is an acceptable salt for calcium supplementation, but you can only add about 40 ppm of calcium this way before the added sulfate concentration exceeds 100 ppm and you run the risk of producing a dry harshness to the hop bitterness. Calcium chloride is a better choice as the chloride helps emphasize sweetness, but this salt can be rather hard for homebrewers to find. When using calcium chloride you should try to keep the added chloride level under 150 ppm, but this still would allow you to add about 75 ppm of calcium without any problems.

Brewing

Brewing a classic American pilsner can be as easy as is brewing an English ale or as complicated as you want to make it. While traditional brewing requires multiple temperature rests, modern malts make this unnecessary, and possibly undesirable in some cases. Likewise, the traditional American "double mash" method can be avoided by using flaked adjuncts. (See recipe for details)

The simplest method is to use about 25% flaked maize with the balance six-row malt, perhaps with 5% Munich and/or Carapils. The Munich gives a bit of maltiness and color and Carapils adds some body and head retention. These might be especially appropriate for a lower gravity beer. Mash in with appropriate brewing water to get from 148° F (64° C) to 156°F (69° C), depending on the degree of attenuation you want.

You can use a simple infusion mash to produce this style of beer, with the rest temperature anywhere in this same temperature range.

A more complex mash uses multiple steps with a separate cereal mash using corn or rice. In this procedure, the corn or rice is first mashed with a bit of malt, then boiled, and added to the main all-malt mash. The cereal addition steps up the temperature of the malt mash.

We have a choice of rests in a step mash. A mash-in at around 100° F (38° C) allows hydrolysis of enzymes and can help to bring the mash pH into range if calcium is low. A protein rest in the range of 122° F (50° C) to 135° F (57° C) was important with malts in the past, but rests in this range should be kept short with modern malts. In nearly all cases, the maltster has already modified the proteins appropriately, and long protein rests can break them down too much, resulting in poor body and head retention. I will sometimes mash in at temperatures below those suitable for a protein rest and simply ramp through this range.

Mash temperatures can be chosen for degree of fermentability. Budweiser is mashed in at 119° F (48° C) and held there while the cereal mash is boiled, then the two are combined for an extended rest at 148° F (64° C), resulting in a very fermentable mash and a well attenuated, dry beer. I have used this schedule with success. If the main rest were at higher temperatures, up to 156° F (69° C), the resulting beer would be less attenu-

NO BREW FRIDGE? BREW A CACA!

That's HBDer Paul Shick's "unfortunate acronym" for what he calls Classic American Cream Ale. Nineteenth century ale brewers, seeing their sales drop as the public's taste changed to pale, clear, effervescent lagers, but lacking refrigeration and aging facilities, developed a beer brewed like a pilsner, but fermented as an ale. These were called "present use" or cream ales, and they have evolved into today's cream ales just as pilsners evolved, but the few remaining cream ales today bear only a fleeting resemblance to their ancestors.

A CACA is a fine, enjoyable beer, and you'll be partaking of history. Ferment the beer with ale yeast at cellar temperatures and age it as cool as you can manage. This is an ale that can be served at 45° F, where chill haze can be a problem, so if that bothers you, consider using Polyclar® at the end of fermentation.

ated and less dry.

My current favorite RIMS mash schedule is a mash-in at either 104° F (40° C) with a rest of 30 minutes followed by a ramp up to 144° F (62° C), or a mash-in at 144° F (62° C). In either case, I hold 144° F (62° C) for 30 minutes, then add the cereal mash and aim for 158° F (70° C) for the combined mash, which I hold for another 30 minutes, followed by a mashout at 170° F (77° C). I often miss these marks, but the beer always turns out wonderfully.

Since I brew for fun, not simplicity, I like this traditional mash. It puts me in touch with American brewers of a hundred years ago. Besides, I think that boiling the cereal mash, especially using corn, produces a depth of flavor that is missing with flakes (and why I suggest using a bit of Munich malt with flakes). A diagram of this mash is shown in Figure 1.

The Extract Approach

Extract brewing presents more of a challenge. I am aware of no extracts produced from a mash that includes corn grits, only ones that have corn syrup added, although one has been produced and packaged for the homebrew trade in the past, and I am hopeful it will be again. That leaves two choices. First, choose the lightest all-malt liquid extract you can find, such as Alexander's or William's, and add about 25-30% brewer's corn syrup or rice syrup, or 20-25% dextrose (don't use baking corn syrup as it may have flavorings you don't want, and its degree of fermentability is unknown). All are flavor neutral, but corn and rice syrup, like malt, are not 100% fermentable. Dextrose is, and will produce a drier beer, but if you hop with Cluster and noble hops and ferment properly, you will have a closer approximation than you would with all malt. Rice syrup is available in homebrew sizes, but I am unaware of small packages of corn syrup. Another route is to do a mini-mash with flaked corn and six-row malt where the malt represents at least 50% of the grist.

Fermentation

Wort should be chilled to fermentation temperatures before pitching yeast. Many brewers are tempted to pitch warm to get fermentation off to a quick start, but ale-like flavors can develop in this early, warm fermentation. Cleaner flavors are obtained by pitching ample yeast into chilled, well oxygenated wort. One fluid ounce of thick, sedimented yeast per gallon of wort is ideal. This means repitching from a previous brew or using the yeast from a big starter—at least two quarts, four is better, for a five gallon brew (2 to 3.7 liters per 19 liter batch). You can discard the starter liquid. Underpitching is not disastrous, but be sure to make at least a quart starter.

I like to ferment at 48° F (9° C), although some commercial American breweries ferment as high as 57° F (14° C). Fermentation should be evident in 12 to 24 hours. Oxygenation or aeration at 14 hours can be beneficial to the yeast, as this is just when it has depleted reserves that oxygen will restore.

When fermentation has nearly stopped,

"YOUR FATHER'S MUSTACHE"

By Jeff Renner

Recipe for 5 gallons (19 L)

- **O.G. 1.051**

7.25 lb (3.3 kg) six-row malt

2 lb (.9 kg) corn meal*

***Or grits, polenta or coarsely ground rice, or combination of rice and corn**

First Wort Hops: 3 HBU Saaz or other noble hops (3.2 HBU for pellets)

Bittering hops: (60 minutes) 5.3 HBU whole Cluster (4.8 HBU for pellets)

Flavor hops: (15 minutes) 1.5 HBU whole noble hops or Styrian Goldings (1.2 HBU for pellets)

Yeast: Any clean lager yeast

Water: low alkalinity, low sulfate water

See sidebar TRADITIONAL AMERICAN "DOUBLE MASH" for additional details.

Schedule for American Double Mash for cornmeal or rice
(grits and polenta must be boiled longer):

Time 00: In a kitchen pot, mash in corn or rice and 10 ounces (283 g) of malt with 1.5 to 2 quarts (1.4 to 1.9 L) of water to hit 153° F (67° C)

Time 15: Mash in main mash 104° F (40° C)

Time 20: Bring cereal mash to boil

Time 30: Cereal mash boiling

Time 35: Add boiling water and/or burner with recirculation to ramp main mash to 144-146° F (62-63° C)

Time 65: Add cereal mash to main mash yield, adjust temperature as needed to 158° F (70° C)

Time 95: Ramp to 170° F (76° C) mashout

Time 105: Begin sparge and lauter

As soon as kettle bottom is covered add first wort hops and maintain wort temperature at approximately 170° F (76° C) during lautering. Collect enough wort to yield 5.25 gallons (20 L) finished wort.

Boil uncovered at least 60 minutes, longer to reduce DMS.

Chill to 48° F (9° C), aerate or oxygenate well, pitch yeast from large starter.

Ferment at 48° F (9° C) until fermentation nearly stops, about 10 to 14 days, rack to secondary and reduce temperature 4° F per day to 32° F (0° C). Lager six to seven weeks.

To brew with a simple infusion mash, substitute flaked maize of rice for the raw cereal and mash between 148° F (65° C) (for a very well attenuated, dry beer) to 157° F (70° C) (for a richer, less well attenuated beer).

For all extract beer, use six pounds (2.7 kg) of Alexander's or William's light liquid malt extract and 1.5 lbs (.68 kg) rice syrup. Steep the first wort hops in wort at 170° F (76° C) for 60 minutes before bringing to a boil and adding remaining hops. Increase hopping rate if boiling less than full volume.

typically in 10 to 14 days, check for diacetyl. It can be detected by its buttery or butterscotch aroma, and a CAP shouldn't have very high levels. Yeast selection can avoid this, but if is present, allow the temperature to rise to 60° F (16° C) for a day near the end of fermentation. Rack to a carboy or keg, but leave the airlock in place. It's best to have a little residual fermentable extract remaining going into lagering. The yeast will remain very slowly active. Reduce the temperature 4° F (2° C) per day to 32° F (0° C) for lagering. Lager for one week for each four degrees original gravity, or six to seven weeks for a typical pilsner. During this time, protein haze will precipitate and settle out, along with yeast and other haze, and your beer should be clear, and the flavor will become wonderfully clean and mellow as well.

Packaging

Kegging with artificial carbonation from CO2 pressure is easiest. It makes adjustment of carbonation easy, and by racking to a clean keg, you will have sediment-free beer. After kegging, you can carbonate in a half hour or less by setting CO2 pressure to 30 psi and rocking the keg. Listen for the gas flowing in, and gradually reduce the pressure to target pressure (consult carbonation charts). If no more gas flows at this pressure, you have reached the proper carbonation. With practice, you can carbonate perfectly, and if it is over carbonated, just bleed pressure until it's right.

If you choose to bottle or keg with priming sugar, there will still be enough yeast, even after lagering for weeks, to carbonate the beer—especially if you make sure to pick up a little extra with the end of the racking cane. Also, there will be a higher level of dissolved CO2 at the cold lagering temperature, so you'll need to reduce priming sugar accordingly. Two-thirds of a cup of corn sugar (dextrose) is about right. Allow the beer to condition at cool temperatures, 60° F (16° C) to 68° F (20° C), for two weeks, then store cold if possible.

An alternate method is to prime before lagering and allow the bottles to condition for two weeks, then lager in the bottles. This results in more bottle sediment, however.

Serve no colder than 45° F (7° C), and not too highly carbonated, as this makes the beer seem thin and sharp. Lower carbonation is much mellower, and contributes to süffigkeit.

Conclusion

It is up to us homebrewers to recapture and keep this most important American beer, and this can be a labor of love. A well made classic American pilsner can become your favorite beer, and the favorite of your friends and guests, from beer geeks to Joe Sixpack. I know it's my favorite.

Have fun brewing it, and spread the word. Classic American Pilsner is back!

Jeff Renner, an AHA member since 1980, a founding member of the Ann Arbor Brewers Guild, and a long time regular contributor to *Homebrew Digest*, has been brewing since 1973 and first brewed an all grain beer in 1979. His favorite styles are Classic American Pilsner, German lagers and low gravity British real ales. Now the owner of a small wholesale bakery, he is a former chemical engineering student and history and science teacher, all of which have shaped his interest in brewing.

FIRST WORT HOPPING

A lost and recently rediscovered German hopping technique from a hundred years ago, first wort hopping (FWH), works very well in CAPs. While I have found no direct evidence of this technique being used in the United States, American brewers of this time were largely German born or educated, or at least strongly German influenced, and it seems likely that it was used here. George Fix first reported the German research, which was published in *Braüwelt* in 1995, to the homebrewing community on HBD in 1996.

In this procedure, normal late addition or aroma hops are instead added to the first wort as soon as the kettle bottom is covered, and kept at runoff temperature (about 176° F [80° C]) during the entire time of runoff. These hops are then left in the kettle for the entire boil along with normal bittering hops. Hop oil constituents are bound in a complex manner with other wort constituents resulting in "a fine, unobtrusive hop aroma; a more harmonic beer; a more uniform bitterness" than control pilsners with conventional aroma hop additions, according to the professional taste panels, which preferred the FWH beer overwhelmingly. I feel it gives enhanced hop flavor as well.