

## *Brewing Demo at the Dove Street Inn, Ipswich by Steve Plampton*



*Mike Rumsey demonstrating the brewing practices.*

Well, here we are again, more tales from the East Anglia branch who were very pleased to be invited by the landlord of 'The Dove Street Inn', Ipswich, to give a brewing demonstration. What follows is an account of the events of the day, mostly fact, but some tongue in cheek.

Right, first of all, let's get the thank you out of the way. Our thanks go to Adrian (Ady) Smith landlord of The Dove for inviting us along, finding the room for us to perform the demo and generally putting up with us all day. James Smith from Muntons, who provided a sack of grain and a few other freebies. Along with Brian Pearson from the Ipswich Film Society who filmed the whole day. Also a thanks to all the CBA members who turned up to give support and provide beers for sampling, and of course not forgetting Mike Rumsey, who not only provided the brewing equipment and gave the

demonstration, but organised the whole thing.

Turning up around 10am at the pub, the gates were opened to a warm welcome from Ady, who then showed us where it was planned for us to do the brewing demo, which turned out to be a large marquee. Ady also provided us with 2 stainless steel tables, on which Mike set up his brewing kit. With the brewery in place, the task of filling the HLT was given to Steve Bach, the youngest CBA member present. Mike had set the HLT on top of a stool, which was on top of the table (all clamped down, I might add, so the 'elf N safety' minded among you can stop worrying!). Steve duly climbed a ladder, hose in hand, he then called out for the water to be turned on whoosh the water came out so fast it hit the bottom of the tank and bounced back up, covering Steve, and everything and everyone nearby. Poor Steve looked like a drowned rat.

With the HLT duly filled to the top and starting to heat up, we left Mike to finish the setting up. A few of us decided to explore the pub and formulate a plan on which beers, out of the excellent range, we were going to try throughout the day. After a short while we were joined by Ady who outlined his future plans for the place, most notable being the 2½ barrel brewery he was setting up, along with a home brew shop next door. Once all is built and

established, could there possibly be a better place to visit or have future meetings (the Ipswich CBA section, maybe)? with everything a beer lover and/or brewer could want, all in one place.

12 o'clock arrived, the water in the HLT had reached 80°C, the marquee slowly started to fill, Mike was almost ready to start, and so off I went to the bar to get a beer for the troops. When I got back to the marquee, there were about twenty people in there all keenly listening to Mike providing a lecture on brewing, taking the patrons through the various stages of the brewing process. What a performance Mike gave, you could see he's a trained lecturer. The pitch was absolutely perfect (and he assured me it was all off the cuff!) providing the basic principles of all grain brewing, without going into too much depth - thus not confusing everyone with jargon. This provided the opportunity for the audience to participate by asking questions and to get some hands-on experience.

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The practical demo started with Mike selecting an unsuspecting member of the audience to do the mashing (funnily enough, I did notice some people move to the back after that!). Mike then instructed the 'volunteer' to put some liquor (calling it by its technical term now) into the mash tun, handing over about 2lb of grain (Mike still works in old currency) and a whisk, and asked him to mix in the grain until a porridge like consistency was obtained. The audience was then invited to come up and have a look. After about 10 minutes Mike proceeded to draw off the wort and put it into the boiler. It was interesting to see that even after a 10 minute mash, some extraction had taken place.

The marquee contained about 50 people now with Mike repeating the mashing process and involving other members of the audience. Someone asked about 'sparging' as they'd heard about it but didn't know what it was, so a practical demonstration was given. After this, some more wort was transferred to the boiler, which had already been fired up, and then a handful of hops was added. Soon the tent (sorry marquee) started to fill with the lovely aroma of malt and hops.

After some more general questions from the audience, such as water treatment, evaporation from the boiler, uses of finings etc., the audience were again invited to come up and have a look and to try some sample brews which members had brought along. This time I think almost everyone came up, not sure if that was because of the offer of free beer, or they were genuinely interested in brewing, I'm sure it was the later. But anyway it now meant that we, the

other CBA members, had to earn our keep by answering questions and handing out samples.

So between us, for the next couple of hours, we met many people, ranging from experienced brewers of 15 years or more, those who had only done one or two brews to the kit brewers who wanted to know about all grain brewing (going to the dark side, as one of them called it!) but were put off by the expense of the set-up and a lack of knowledge. After seeing the demo and looking at Mike's brewing equipment, all made by his own fair hand, the mash tun made out of an old army dixie, and the boiler (a cut down firkin), both nicely engineered, some of the punters were encouraged to give it a go.

The brewing demo was supposed to finish at 3pm, but by 5pm people were still milling around. It was an exhausting but hugely rewarding day, thoroughly enjoyed by all.

Now some really good news: the day provided us with 6 new members, one of which being Ady. Whilst I was in the process of signing Ady up, he told me how pleased he was with how the day was going, and he would be looking at the logistics of inviting us to do another brewing demo at his winter beer festival. In the meantime, he's looking forward to East Anglia regional "Annual Get Together" in September,



*Some keen admirers*

which we will be holding at The Dove.

Finally, as mentioned above the whole day was filmed by Brian, which I hope can be used by the whole of the CBA. Brian did stay sober so hopefully we'll get some good results!



*Practical hands on experience.  
Photos taken from the video recording of  
the day, with thanks to Brian Pearce.*

### ***Hot Side Aeration (HSA)***

***by John Alexander***

This topic first raised its head for home brewers in an article by Dr. George Fix in the American home brewers magazine, *Zymurgy*, No 5, winter 1992. Since that time fierce debate has ensued over HSA and its consequences for home brewers. However, before home brewers go and get their brewing paddles in a terrible twist, let's look at the subject in more detail. The question whether the home brewer should worry about HSA we will leave to the end of the article.

### ***Redox Reactions***

The term 'Redox' comes from 'red' for reduction and 'ox' for oxygen. Oxidation and reduction reactions play an important role in energy flow through biological systems, so that a cell obtains most of its energy by oxidising food molecules. Redox reactions take place throughout the

brewing process, particularly during respiration and fermentation. Oxidation is defined as the loss of an electron from a molecule and reduction can only take place at the same time. As the uptake of oxygen and reduction also depend on temperature and pH, Clark coined the term rH in 1923. The rH scale indicates the level of dissolved oxygen in a beer and ranges from 0-20, with the typical oxygen levels found in beer ranging from 8-18.

Of course, all of this is hugely complex and oxygenation can also occur by the direct addition of molecular oxygen to a substance that becomes oxidised. This is the primary cause of staling in beer that is initially caused by careless aeration of the wort whilst it is still hot. This is referred to as hot-side aeration (HSA), which involves complex redox reactions between oxygen and malt constituents, including polyphenols and melanoidins.

The effects of aeration of hot wort were investigated as long ago as the 1870's and it was Pasteur who established that aeration of hot wort on the coolers modified the soluble resinous constituents so that they became insoluble and eventually precipitated. Other researchers discovered that fructose, glucose and maltose solutions, including proteins, get darker. Polyphenols (Tannins) and hop resins also take up oxygen and undergo condensation reactions during coppering that converts them into dark pigments traditionally called phlobanthenes. They also found that in such solutions, twice as much oxygen is absorbed at 82 °C than 45°C. Today we recognise that the absorption of oxygen during coppering and wort

clarification is fairly low at 3-15 mg/litre. The problem for home brewers is that the degree of oxidation is related to surface to volume ratios and so our small brews are more susceptible.

### *Melanoidins*

The composition of malt changes quite dramatically during kilning and the higher the temperature the more pronounced these changes are. Thus enzymes are progressively destroyed and the grain becomes more acidic, its extract potential falls and the aroma, colour and flavour increase. The colour and flavour changes that occur involve complex condensation reactions between amino acids and reducing sugars (glucose, fructose and maltose) that form highly viscous solutions.

Further polymerisation reactions produce coloured pigments that have rich caramel-like flavours called melanoidins. Melanoidins are hugely complex products that evolve in the presence of heat and their formation is more pronounced during kilning and coppering. The process is often referred to as Maillard reactions after the scientist who discovered them, Louis Maillard (1878-1936). Although coloured malts are used primarily to modify colour and flavour the melanoidins present also have the ability to absorb and fix oxygen and consequently they are valuable antioxidants. Such materials are referred to as reductones and crystal malt in particular is very rich in such products and is an important material in the keeping qualities of a beer.

This is evidenced by brewing trials in the early 1970's when two light beers were brewed, one brew used average quality pale

malt with no crystal malt and the other brew used low-grade lager malt plus some crystal malt. Tasting results showed that the latter brew had a better flavour profile and during storage trials the latter brew also increased its shelf life by 50% maintaining its freshness without the development of oxidised flavours. In this case the melanoidins present at bottling were in a reduced state and therefore able to absorb the damaging oxygen. Had the melanoidins absorbed oxygen during the early stages of brewing, particularly whilst the wort was still hot, they would have become oxidised and lost the ability to act as antioxidants later in the brewing process. Consequently, should the beer at bottling absorb too much oxygen any remaining melanoidins in a reduced state are simply swamped by the oxygen. In this case the melanoidins and other reductones actually become oxygen carriers and can produce off-flavours at a later date.

### *Changes in rH*

Beer will inevitably contain a quantity of air and the importance of minimising the amount of oxygen present is important for the stability of brilliance and flavour. Beer coming from the conditioning tanks will have a low level of oxygen present, typically with an rH of 8-10. This value is sufficient to deny the growth of micro-organisms and wild yeast. As the beer is bottled there is an inevitable uptake of air and the rH will creep up to 12 and at this level the growth of microflora is still inhibited. Should the rH rise to 15 the growth of wild yeast and bacteria is slow, but given time deterioration of the beer will kick in. Should the rH

rise to 16-18, which is fairly typical during bottling, this level is sufficient to allow wild yeast and bacteria to reproduce with the strong possibility of sour beer.

Fortunately, bottle-conditioned beers contain yeast, which is a reducing agent, as it will scavenge the last traces of oxygen from the beer, reducing the rH to a value that will inhibit the growth of wild yeast and bacteria. Also active at the same time, although at a much slower pace, are the reductones derived from the grist products, particularly melanoidins.

### *Poising*

The reserves of oxidising or reducing materials present act as buffers and afford the beer some protection in preventing or minimising changes in rH. Thus a beer that is protected in this way is known as being well 'poised', which is analogous to buffers in pH. The pH buffers in a solution are materials that resist or limit changes in pH so that when small amounts of acids or alkalis are added to the solution, they maintain the equilibrium. If either acid or alkali is added in large amounts the buffers are quickly overcome and the pH can go haywire. The main difference between a beer that is well-poised and acid solutions is that in the latter, additions of acid or alkali will have an immediate effect on the pH. In beer the change in rH due to aeration will initially increase fairly rapidly, but the poisoning effect of the beer materials will only operate slowly.

Thus a bottle of bottle-conditioned beer at bottling might have a pH of 4.2 and an rH of 16.0. Two weeks after bottling the brew might have a pH of 4.23

and an rH of 14.3. After six weeks the pH will drop to 4.00 and the rH falls to 13.4. After ten weeks the pH might fall slightly to 3.8 with the rH dropping to where it started at about 8-10. The increase in acidity and the removal of oxygen to an rH value that will deny wild yeast and bacteria the opportunity to grow, affords the beer microbial and flavour stability. Beer with a high rH also creates the conditions for haze and this is largely due to the oxygenation of proteins, but this problem is more common in bright filtered beers.

### *Conclusions*

Hot side aeration can certainly get some brewers hot under the collar and the question remains just what importance does it have in home brewing? There is no lack of scientific evidence that oxygenation of hot wort can have deleterious consequences for the stability of bottled beer. However, it is at this juncture that we must make a distinction between commercial bright beer and home brewed naturally conditioned beer. Both beers contain the naturally formed reductones that will give the beer some protection in the short term, but craft brewed bottle-conditioned beer also has the benefit of the reducing power of yeast and can show remarkable stability of clarity and flavour in the long term.

So, does all of this mean that we should become casual about our approach to craft brewing in regards of aeration during the brewing process? Not at all! My approach over the last forty years has always been to learn what the parameters of each brewing process was, and to work hard in keeping them as tight as possible.

As the deleterious consequences of aeration in brewing have been known for a long time we should at all times take the necessary steps to avoid it.

In practice this means that during mashing in of the goods it should not be excessively stirred, thereby avoiding the uptake of air. During sparging best results are obtained if the sparger is inside a closed mash tun and not hanging over it where the liquor will, apart from losing heat, absorb an unnecessary degree of oxygen. After boiling in the copper when the bitter wort is still hot, the flow from the copper into the fermentation vessel should be short to avoid oxygenating the reductones and causing a darkening of the polyphenols. In practice if the power is switched on immediately the heating element is covered any uptake of oxygen is immediately driven off by the action of the boil. None of the foregoing is difficult to avoid and a little thought before each brewing stage can eliminate the possibility of deleterious flavour and clarity problems at a later date.

Whilst the oxygenation of cold bitter wort is necessary for the initial growth of the yeast, the uptake of oxygen during this process is small in comparison and the damage done to the melanoidins is minimised. The inevitable rise in rH as the wort is aerated is quickly reduced within twenty-four hours as the yeast bursts into activity. The most dangerous time for a rise in rH is during bottling and as little as 1 mg/l of air in a 300 ml bottle is sufficient to neutralise all the reductones in brewery-conditioned light lager. Therefore, minimising the uptake of air during the bottling process

can reduce the risk of the beer eventually acquiring cardboard notes or cattiness. A degree of frothing during bottling is inevitable, but on the plus side carbon dioxide is liberated and reduces the amount of oxygen in the airspace. The airspace in 500 ml bottles should be about 10-15 mm and will only contain a fifth of CO<sub>2</sub>, which is rapidly absorbed by the beer and rapidly reduced by the yeast during the short conditioning period.

John is the author of 'A Guide to Craft Brewing' details can be found at [www.crowood.com](http://www.crowood.com) or from Amazon.

**References**

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Briggs et al, *Malting and Brewing Science*, Volume 2, Chapman and Hall, London, 1982.

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**Altbier,  
Horst D Dornbusch**

*A review by Michael Newman  
Classic Beer Style Series 12,  
Brewers Publications, 1998  
£8.99 from Amazon.co.uk*

The Classic Beer Style Series has been pretty variable over the years with a number of excellent books, some mediocre ones, and a few absolute stinkers. I am happy to say that "Altbier" is one of the good ones. This is not a new book but I was recently inspired to buy it after a trip to Düsseldorf (and its brew pubs).

Altbier is old beer in the sense that it is made with old fashioned top fermentation although quite a lot of the brewing process follows the typical modern German lager process including, decoction/temperature step mashing, cold storage, and filtering. It really is a mixture of the old and the new. For instance, rather anachronistically, the beer goes through a process of lagering and filtration in the cellar and then is racked into wooden casks for dispense in the brew pubs.

Altbier is generally a deep coppery brown colour with something of the look of a medium dark mild. Flavour wise it is rather like a hoppy dark mild although it is clearly cold conditioned which gives it that characteristic "clean" flavour.

Altbier is available throughout Germany but its heartland is in Düsseldorf and the Rhineland area. Horst Dornbusch hails from this area which you might expect to give him a particular insight into

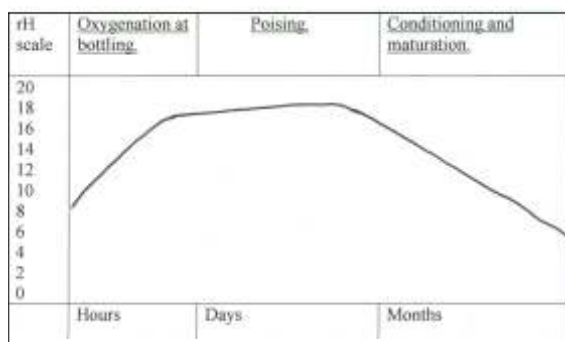
Altbier, and this does seem to be the case. (Which is more than can be said of some of the other authors in the series).

The book starts with the history of alt followed with a discussion of its flavour profile and the ingredients used to create it. This is all engagingly written and packed with lots of good information and well reasoned arguments of the advantages of multi-temperature step or decoction mashing. In fact I think he may have persuaded me to try step mashing although it will be odd to ask my maltster for "a pale malt with a relatively high protein level, please". Although I have read much about temperature stepping/decoction no previous book or article has so clearly brought out the advantages. This is one of many excellent aspects of this book.

Mind you I still don't quite understand how German beers are supposed to generally have more body than British ones. To me it seems the opposite way round. Or am I confusing fuller fermentation and the effects of cold conditioning with lightness of body?

The discussion of the peculiar characteristics of alt yeast is interesting. This is a beer that must be made with the right yeast (Wyeast 1007 for instance). It is an intermediate type of yeast in that, although a top fermenter, it performs best at the relatively low temperature of 13-19°C. Its flavour profile is best at the lower end of that range, a temperature at which most top fermenters will give up the struggle.

There is a bit of a hiatus after this good start with a description of the equipment that might be necessary to produce alt at home.



Poising Graph

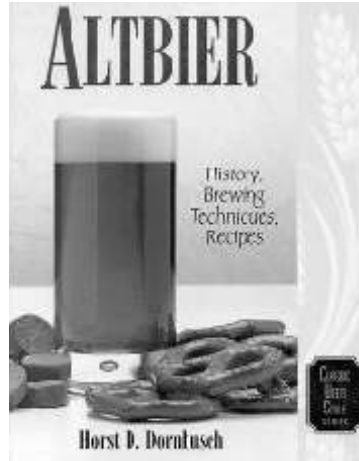
Some of the ideas seem a bit dodgy or Heath Robinsonish. I would have thought that any brewer buying a specialist book like this would already have a good idea of how to construct a lauter tun and false bottom or how to modify his existing brew kit as necessary.

We are back on the straight and narrow with the description of the characteristic of the Altbier brewing process, with particular emphasis on the processes used in commercial alt breweries. There certainly seem to be as many methods as there are brewers which offers vast scope for experiment. Following from this is the chapter on recipe formulation: hardly a riveting read but obviously useful when you get around to brewing your alt.

There are several appendices, some of which are rather good, including descriptions of various commercial examples of Altbier, an outline of the production of the malts often used, an introduction to mash pH and water hardness, an interesting essay on whether yeast is a plant or an animal (it's neither according to Dornbusch and he classes it as a protist which is oddly incorrect, our friend *saccharomyces cerevisiae* being a fungus), technical information on calculating colour and bitterness for your recipe, and finally a unit conversion chart. The book is completed with a glossary.

I really enjoyed this book. It gave me an insight into the brewing culture of the alt brewers and made me want to visit Düsseldorf again for further research (bless you FlyBe for cheap, but un-green flights). I finished the book enthused with the desire to try several of the procedures used in alt brewing in my own set-up. In

fact I have started work on a temperature controlled conditioning tank already. I might even brew an alt.




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## Members Websites.

Several of our members now have their own web sites; we would welcome you all to send in your web addresses so we can publish them for other craft brewers to appreciate, starting off with,  
[www.philrobins.org.uk](http://www.philrobins.org.uk)

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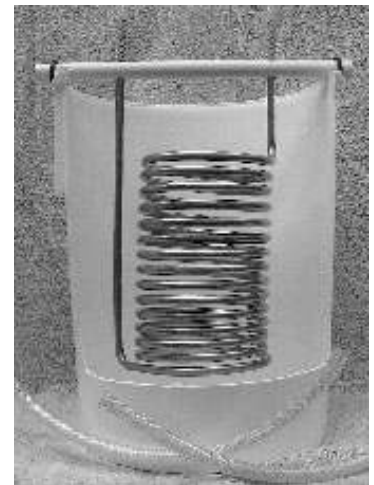
## Recession! What Recession?

Latest figures out for the last year in retail sales has pointed out a 30% increase in the public buying Hornby train sets and home brewing products! Some things just kick the trends, so any members who sip a pint of home brew whilst playing in the attic with their trains, can congratulate themselves for having done their bit to save England twice.

The rest of us must have found a safer way to invest our money.

## Wort Cooler

In response to my thoughts on obtaining a new stainless steel cooling coil, Guy Howard has kindly sent me the following details from the 'Hamstead brewing centre' priced at £39.99 + postage. [enquiry@hamstead-brewing-centre.co.uk](mailto:enquiry@hamstead-brewing-centre.co.uk)



*High quality Stainless steel coils.  
Adjustable depth to fit most size buckets.  
Hangs in the centre of your bucket to maximise effectiveness.  
Open coils to maximise cooling effect.*

## Tips for Pairing Food with Beer

by Graham Kingham

Wine is often paired with food and in principle the same rules apply when trying to match up beer with a particular meal; I have set out some suggestions below, try them and see if your palate agrees with mine.

Pale ales with a high hop content pair perfectly with full-fat cheeses or other rich, fatty foods.

Brown ale complements most fish or chicken dishes.

High alcohol content, sweet-

flavoured, malty beers go well with spicy hot foods or even sushi.

In general, sweet desserts cry out for an even sweeter beer.

Rich chocolate or coffee flavoured desserts can cope with an oatmeal stout's deep chocolaty flavour.

Robust British real ales bring out the best in most red meat dishes.

Irish stout is the traditional accompaniment for oysters and complements a surprisingly wide range of seafood recipes.

Oriental style lagers or traditional brown ales are fantastic with Thai cuisine.

Soups	Vegetable Meaty	Pale bitters, porter, brown ale, pale ale, pilsner lager, Vienna-style lager Malty ales
Shellfish		Stouts; porters; Belgian wheat beers
Fish		German lagers; light bitters; Belgian wheat beers. dry porter, oatmeal stout.
Pâté		Mild's, strong dark lagers
Quiches/soufflés		Light bitters
Beef		Full-bodied bitters, fruity ale, Indian pale ale, British brown ale, porter, bock
Pork		Pilsners; Bavarian wheat beers; strong dark lagers
Lamb		Spicy malty ales; dark lagers
Chicken		Lagers; wheat beers
Turkey		Malty ales
Duck		Kriek
Game		Malty ales; Trappist ales
Sausages		Full-bodied bitters; dark lagers, Bavarian wheat beers. German wise, Oktoberfest,
Meat Pies		Full-bodied bitters
Barbecue		Smoked beers; dark lagers
Oriental		Wheat beers; ginger / spiced beers
Curries, Mexican		Strong IPAs; lagers/ Vienna-style lager, hoppy pilsner, golden ale, wheat beer
Salads		Floral-hopped bitters; nutty, malty ales; pilsner, Belgian wit bier, amber ale
Pizzas and pasta		Malty lagers. Vienna-style lager, hoppy American pale ale, lambic beer
Ploughman's		Hoppy, fruity bitters
Egg dishes		German weissbier, Belgian wit bier, oatmeal stout, wheat beer
Cheeses	Mild Mature/ Blue	Light bitters Full-bodied ales Trappist ales; old ales; barley wines
Chocolate/Coffee		Porters; stouts; Belgian fruit beers
Red Berries		Porters
Apple/Banana		Bavarian wheat beers
Creamy desserts		Stouts
Spiced desserts		Bavarian wheat beers

I have sourced this information from various books, articles and web pages over the last few years, plus my own impressions from experimenting at home; there is no golden rule, it's all about your own preferences. I give this information out when I do beer appreciation courses locally.

This article leads onto a review of a new book out by Randy Mosher, see below for details.

### *Tasting Beer*

*by Randy Mosher*

*Amazon £8.49 plus postage*

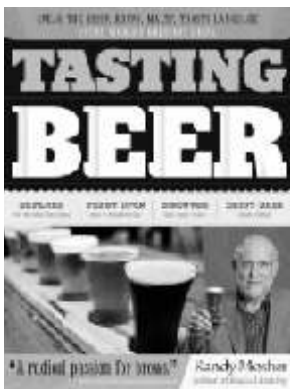
Beer may be the common beverage of the people, but it is far from simple. With 10,000 years of history, more than 900 identified flavours, dozens of styles, and thousands of breweries around the world, beer is as complex as its grape-based neighbours. It is an artistic creation, brewed from dozens of possible ingredients and processed in hundreds of different ways. Mosher guides readers to a better understanding of how every batch of beer is affected by each of the brew master's choices - recipe formulation, brewhouse procedures, yeasts, fermentations, carbonation, filtration, packaging, and much more. Beer can be light, dark, mild, strong, flat, or fizzy. Hundreds of tastes can be detected in beer, from resin to toast, and from apple to smoke. Readers will learn how to identify the scents, colours, flavours, and mouth-feel of all the major beer styles. There are also chapters on proper serving and storage conditions, and classic beer and food pairings. The second half of the book is a style-by-style compendium of the different

brews within major beer families, including American craft brews, British lagers, German ales, and Belgian Dubbels. For each style there are historical and regional facts, taste and aroma characteristics, seasonal availability and food pairings.

I found this book very interesting in general, giving a good introduction to tasting beer, some of the evidence will be familiar to the craft brewer, however some of the contents are a little American based, but still worth while at £8.49

For more in-depth reading, by several different authors is the American home brewer's publication, 'Evaluating Beer' which is readily available on line. Our own beer gurus also offer a wealth of advice, Michael Jackson being my personal favourite.

Randy has also published, 'Radical Brewing', which was reviewed in a previous edition of 'Brewers Contact', to great acclaim.



### **Beer Casks**

*by James McCrorie*

Traditionally, brewers have taken great pains to ensure that no trace of oak flavour contaminated their carefully, or otherwise, crafted beers. The favoured oak was, and still is, Memel oak, named after

the port of Memel on the Baltic, originally and again, in Lithuania, but re-named Klaipeda when it became part of the Lithuanian Soviet Socialist Republic in 1945.

Memel oak first came in use after 1742 when the Burton brewers started exporting their strong dark beers to the Baltic after the opening of the Trent Navigation from Burton to Gainsborough allowed them to transport their beers to Hull for shipment.

They developed a lucrative trade but cash was short in the Baltic States and they accepted barrel staves as part-payment. Not only was this useful, as most English oak was reserved for naval shipbuilding but it was found that this tightly grained Memel oak was far superior for use as beer casks. Thus a new standard was created.

The quality of 'Memel' oak is still recognised today. Some years ago when Traquair wanted to expand their historic brewery from 2 to 3 fermenters they sourced Memel oak from a vat being demolished in Canada. On a different scale, when Marston's decided to expand their Burton Unions in 1992 they wanted Memel oak. However the forests around Memel had been devastated during the fighting between the Russians and Germans in WW2. However, they found that oak growing in Germany, between Frankfurt and Heidelberg, had the same characteristics so they used that.

Subsequently, during a British Guild of Beer Writers visit to Marston's, their cooper said that this quality of oak was so important that Marston's had bought a forest in the area to ensure a supply of the oak for the maintenance and refurbishment of the Unions.

The point about Memel Oak is to emphasise the fundamental point that oak flavour has never been a desirable characteristic of British beers.

Some American micro and home brewers, using lateral thinking rather than historic fact, have introduced oak chips into their brews. They may like the result but historically accurate it aint!

### **Measurement of Copper in Beer**

*by Ray Carson, Midlands CB*

There has been some interesting discussion in the pages of Brewers' Contact recently about copper levels in beer (Vol. 8 Dec 2008, p. 9-10, Vol. 9 March 2009, p. 1-2). If Chris Holliland is right about copper being dissolved by the wort then we might expect to see cases of copper poisoning in the population, which clearly is not the case, indeed moderate beer drinking has been associated with some health benefits. Some enzymes in the body contain copper, so we all need trace amounts in our diet. One definitely beneficial component in beer is selenium, which comes from the barley (particularly if grown in East Anglia) and is a useful antioxidant in the body. Perhaps the health giving properties of moderate beer consumption are not promoted enough!

One thing which has been lacking in the argument so far is any measurements of copper in the finished beer. At the March meeting of the Midlands CBA in Banbury it was decided to measure copper levels in some samples of our own beers. Three

samples of beer were selected: one from a brewer with low amounts of copper in their brewing equipment, one from a medium copper brewery and one from a high copper brewery. It was also decided to measure the level of copper in a sample of commercially available hops (Fuggles, gold foil packed) which were not grown organically and which may have been sprayed with copper fungicide. Luckily, as I work at the University of Leicester, it was possible to get the samples analysed in the Geology Department there for a reasonable cost. For the technically minded, the analyser used was an Inductively Coupled Plasma Optical Emission Spectrometer. In this machine the liquid sample is vaporised, heated to a high temperature and some elements in the mixture then emit light of a certain wavelength. It is therefore specific and not very prone to interference. All of the assays were performed in triplicate and the possible error in the measurements was 5%. The limit of detection of the copper assay is 0.006 ppm. The beer samples were analysed directly and the hop sample was digested in aqua regia (conc. nitric acid/conc. hydrochloric acid) before analysis.

The measurements of copper are shown in Table 1.

**Table 1.** Measured concentrations of copper in dried hops and beer samples.

<i>Sample</i>	<i>Mean Copper Concentration (ppm)</i>
Dried hops	57.07
Beer from low copper brewery	0.02
Beer from Medium copper brewery	0.14
Beer from High copper brewery	0.04

*Note: For liquids 1 ppm = 1 mg/l = 1 µg/ml. For solids 1 ppm = 1 mg/Kg = 1 µg/g*

The levels of copper in beer were very low and well below the WHO limit of 2 mg/l. As a rough guide you would need to drink about 14 litres of the beer highest in copper in one session to get up to the WHO limit! Interestingly, the measured levels of copper did not match the amount of copper in the brewing equipment, which might be due to different cleaning regimes used or perhaps explained by the fact that the 'high copper' sample had been brewed with mostly home grown, untreated hops. The level of copper in the commercial hop sample was quite high, which could be due to the fact that plants accumulate minerals or perhaps due to residue from spraying with a copper containing fungicide, also the drying process would tend to concentrate any components in the hops. As relatively small amounts of hops are used in large volumes of wort the copper would be diluted to safe levels. A rough calculation based on using 100 g of these hops in a 25 litre batch suggests that the hops would contribute a maximum of 0.228 ppm to the finished beer. The hops sampled here were not used in brewing the beers, so there is no relationship between the copper levels in these hops and the beer samples analysed.

The question is still open though whether copper is dissolved by the weakly acidic wort and then precipitated out at some stage of the brewing process. Do yeast

cells take up copper? Is copper retained in the spent hops, as Chris Holliland suggested? The only way to find out is by experiment, so there is a need for a fuller scale study to measure copper levels at each stage of the brewing process and in some components, such as spent hops.

Based on an admittedly small sample of beers here it does appear that copper brewing equipment should not cause any problems. So keep taking the selenium!

Acknowledgements: the author would like to thank Greg Pittaway and Alan Quirk for supplying beer samples, Lin Marvin of the Geology Department, University of Leicester, for carrying out the analysis, the Midlands Branch of the CBA for providing the funding and Peter Fawcett for helpful comments.

***Oxford Brewers Group  
upcoming events and  
activities***

***Taste and Swap Day***

This now annual event takes place on Saturday 27th June at Marston Scout Hut in central Oxford. The Taste and Swap Day gives local craft brewers the opportunity to bring along their choice brews and allows those present to have a taste, and perhaps take a bottle home with them. This year's event includes a talk from beer writer Tim Hampson and a comparison brew where members have been given a bag of ingredients and have to devise their own recipe using only those ingredients. It could all make for an interesting tasting. If you wish to join us please contact the group via the website. A £5

contribution towards the hire of the hall is appreciated.

### ***Cotswold Brewery Tour***

The group are touring the Cotswold Brewing Company on the 1st August. This local small brewery near Chipping Norton is unique in the area in specialising in lager and traditional German style beers. I am sure a good number of questions will be asked on how we can brew good lager and wheat beers at home. The tour costs £15 per head and includes the opportunity to try their beers. Please use the 'contact us' form on the Oxford Brewers website if you wish to join the group on their tour.

### ***Quarterly Saturday Meeting***

The group has started to hold quarterly Saturday meetings. This is to help those brewers who find it difficult to join the regulars on midweek evening meetings. The next Saturday meeting coincides with the Cotswold Brewery Tour and the forthcoming Saturday meetings are scheduled to be held on 3rd October 2009 and 9th January 2010. Please check the Oxford Brewers website for details regarding venues and times.

### ***Monthly Meeting***

The group holds its monthly meeting on the third Wednesday of the month at a pub in central Oxford. We are currently getting around 8-14 members regularly coming to these informal meetings, which aim to be an opportunity for brewers to get together and discuss their recent brewing activity, failures and successes. New members are always welcome to join us.

As the venue changes regularly please contact Will Hanrott on

*will@oxfordbrewers.com* or check the Oxford Brewers website for meeting details.

*www.oxfordbrewers.com*

### ***Relocation, relocation, relocation*** ***by Guy Howard***

In the current political and financial environment, who in their right mind would want to move house? Who indeed! But that is exactly what my wife and I decided to embark upon in early 2008.

Having just re-designed and refurbished the Herts & Essex Brewery (which is in Northamptonshire just to confuse you!) I found myself disassembling the plant and packing it all up and transferring it to the mother-in-law's garage to make the house move a little less complicated. Or so I thought...!!

Getting on for six months in, the brewery was still non-productive, we hadn't moved and I had no beer in the house! This was a drought the like of which I hadn't seen for 36 years. I was reduced to BUYING beer!

Absolutely gutted, we waited while our buyer found a new buyer for her studio flat in West London and our shiny new house stood finished and awaiting the installation of the Herts & Essex Brewery.

I can hear you all asking why the 'Herts & Essex Brewery' when I live in Northamptonshire? Well the answer is easy really: I come from Essex and my wife comes from Hertfordshire. Having lived away from our roots for 25 years, we express the need to assert our ethnic origin in the title of our

brewery.

Finally in August 2008 completion day arrived and we moved into our nice new house in the east Northamptonshire countryside and I was determined to be 'on stream' by Christmas!

I was constructing a beautiful tower brewery in the garage of our old house when we decided to move and as you learnt above, it was gathering dust in my mother-in-law's garage. So off I went to bring it home much to the MIL's relief, I might add. Neither of us had any idea how much room a disassembled brewery can take up!

I commenced reconstruction in the integral garage of our new house and decided to follow the same principle that I was working on in the old place. So I installed the Hot Liquor Tank up by the ceiling and to the side and slightly lower down, went the shelving for my Mash Tun.

As this was, in effect a new brewery, I decided to go for a gas fired boiler. I had been using a plastic Hop & Grape set up, but this was the only part of the brewery gear not in stainless steel. It was my ambition to have an all steel set up and so the stage was set for a change.

I researched the availability of steel boilers of about 50 litres capacity. There is a lot of good stuff on the market particularly in the USA. In the end, I decided against importing from America because at the time I was ready to do so, the exchange rate went pear-shaped and the delivery cost was a bit silly.

John Braithwaite of Hop & Grape offered to construct a boiler to my specification and I have to say that the finished product is excellent. It was also a lot cheaper

than anything else that I fancied. I bought an 8.5Kw propane burner to go with it, opting for the indoor version which is dearer but worth it.

I now have the bones of a 50litre brewery that has been fully operational since Christmas last and I also salvaged our Fridge Freezer from the old house, to act as my Hop, Yeast and Beer store. Our new house has a fully fitted kitchen and so the Fridge Freezer was redundant. Waste not, want not!

I've included a picture of the new setup showing how reasonably compact it is. As with all our breweries, it is constantly under development. The most recent addition is a stainless steel wort cooling coil that I dunk in the boiler. This replaces the old copper coil and works just as well, if not a little better and is easier to clean. I bought mine from Hamstead Brewing Centre.

Future plans include a permanent water supply to the Hot Liquor Tank and I am developing a device to incorporate a plate counter flow wort cooler and pump to save my poor old back in the years ahead.

Although, the first few batches of beer went down well, particularly with the new neighbours, strangely, it has taken me until my last brew (May 09) to become fully accustomed to the new setup, even though some of the equipment was in use prior to the move! Perhaps it was psychological who knows? But suddenly, my mash yields are up and everything is going like clockwork.

The only problem now is finding time to brew, with a new garden to develop, all that decorating... the list goes on!



### ***High Gravity Dilution Brewing by the 'Brewing Team'***

*In response to Nick Mayes request for some information from members who have experienced with regard to the dual methods of high gravity brewing, diluting a high gravity brew either pre or post fermentation and their merits. I have put together some thoughts for consideration, most members contacted do not use this method, and only dilute with small amounts to adjust for wort loss or to reduce gravity slightly at the pre fermentation stage, which will result in a beer which will taste similar to a normal one brewed in the usual manner. (Technically the definition of high gravity brewing in the commercial industry means to dilute down after fermentation, for reasons set out below.)*

High-gravity brewing (or blending) is a technique used by the major breweries. After fermentation, the strong beer is diluted with liquor. (Water that has been treated with the same chemicals as the brewing water, pH adjusted and then boiled to remove oxygen and also as a means to sterilise it, then rapidly cooled and used as soon as possible.) The commercial

breweries brew this way because they can produce more beer, saving on energy costs and capital outlay. For home brewers, a 23 litre (L) batch of strong beer can easily be diluted to yield 2832 L of finished beer. (Normally beer brewed above 1065 OG would be considered suitable for this method, although some brewers will start at 1048 OG.)

### ***Easy recipe calculations***

The easiest way to formulate a high-gravity brewing recipe is to take a recipe for one volume and expand it to the larger target volume. To calculate how much to expand the recipe; divide the larger volume of target beer by the smaller volume of strong beer.

For example, let's say you have a 23 L pale ale recipe with 4.5 kg pale malt, 0.45 kg crystal malt and 55 g of bittering hops. If you want to end up with 29 L of beer, multiply all the ingredients by a factor of 1.26. ( $29/23 = \text{factor } 1.26$ ) You'd end up with 5.67 kg pale malt, 0.56 kg and 69 g of hops. Brew 23 L of this beer and then dilute it to 29 L. (This gives a 26% dilution rate. See; 'Taste test below'.)

A drawback to this simple calculation method is that hop utilization slightly decreases at higher wort gravities. Thus, using proportionally more hops in your high-gravity base beer may lead to an under hopped diluted beer.

### ***Complete recipe calculations***

For calculating gravity, use the decimal portion of specific gravity as an integer. For example, a specific gravity of 1.065 equals 65 "gravity points." If you had 23 L of wort at a specific gravity of 1.064, what would the gravity become if you diluted it to 29 L? Substituting the

values into the equation, we get  $64 \times 23 = Y \times 29$ . Solving for Y, we get  $64 \times 23 / 29 = 50$ , or a specific gravity of almost 1.051.

You can use IBU's values in these equations for calculating bitterness values. For example, if your 23 L batch of beer had 50 IBUs, the equation  $50 \times 23 = Y / 29$  solving Y, we get  $50 \times 23 / 29$  would give you the resulting 39.6 IBUs in your 29 L final beer.

This way, the influence of wort gravity on bitterness will be taken into consideration.

### ***Diluting Stage***

If you are barrelling your beer, rack the dilution water into the barrel via a siphon, treated as described above, followed by the strong beer. Replace the lid; add a squirt of CO<sub>2</sub> from a pressure bottle to force carbonate. I would vent the barrel a couple times with the CO<sub>2</sub> in order to blow off any oxygen in the headspace.

The biggest drawback of this method is unacceptably high ester levels in your finished beer and less head stabilisation.

The second problem to watch out for in high-gravity brewed beers is early staling. With increasing amounts of dilution water, you are introducing more oxygen into your beer. (Boiling this water will only drive off some of the oxygen.)

I wouldn't recommend large dilutions if you are planning to store your beer for periods over four months.

Adding a yeast nutrient will also help if diluting at the fermentation stage.

It would be prudent to choose a yeast with good attenuation capacity and a high alcohol tolerance.

Try the following taste test first before taking the decision to dilute; pour three glasses of the same beer and label them A, B, and C on the base of the glass. Glass A leave neat, glass B dilute down with 10% water, glass C dilute down with 15% water. Mix the glasses up then taste them and note your findings. Most people cannot taste a 10% dilution but can a 15%. For me at 10% I notice the lack of body first. (Measure out 90 ml of beer add 10 ml of water = 10%; 85ml of beer add 15 ml water = 15%) Try the 26% dilution as stated above; I would be interested in your opinions.

So what about diluting your wort after the boil? As mentioned in the introduction, most brewers will add some water at this stage to adjust for the boil losses and allow for the gravity differences as well, using a hydrometer to gauge the effects.

I regularly started out with 23L before the boil and ending up with 19L after, then adjusted the wort with cold untreated tap water making this a 20% dilution, all styles and gravity ranges where treated the same to no noticeable effect, all be it that in the early days I had a regular tasting panel and had to brew every three to four weeks to replenish stocks!

Today, I fit a lid and use ducting to exhaust the steam, which helps reduce the evaporation rate and seldom dilute down.

If the beer is left undiluted it can be out of balance due to the rather malty taste depending on the hopping rate and gravity. I would top up a small amount using the boiled water from the kettle.

There are merits in both methods if time, the scale of equipment is limit or even on the grounds of safety moving a heavy bulk of liquid about is a problem. It's all

about taste, the big brewers get away with it and we are all probably oblivious to their practices when we raise that glass of beer to our lips.

Try splitting the wort into two, diluting one down by 20% and leaving the other undiluted then ferment them out and invite some members to taste. (Of course we would expect to see your results in 'Brewers Contact' which ever methods you decide to choose.) Remember that brewing is about a bit of science, magic and art.

### ***CBA needs your help!***

We are looking for some volunteers to help us increase our publicity levels to make people aware of us as a group of craft brewers, and to attract new members. Several questions arise. How do folks know about us? Is it from Brewer's Contact, the only national craft brewing journal in Britain, or is it from our web site, or from the numerous brewing circles around the UK?

Repetition and reminders are the marketing person's way of making folks aware; we need some expert help to guide us!

Our membership has held steady over the last ten years between 300 and 350 people, but we feel that we need to promote ourselves in order to keep the craft alive.

### ***A couple of responses related to the recent edition of 'Brewer's Contact' by the George Mills***

Ron Allison asks if the brewing process is rather more robust than is often written about, and I would answer strongly in the affirmative. I only rinse (never

wash, let alone sterilise) anything used pre-boil and as I look out of the window I can see my siphon tube draped over the pergola waiting to transfer the current batch from the secondary to the barrel. I usually rinse that with tap water prior to use and it gets sterilised when I remember, probably every three or four months. Having said that I do maintain approximately 28l of Chempro solution which gets transferred to whatever post-boil container is not in use and hasn't been sterilised recently, mostly barrels and primary fermenting bin. The solution is renewed when it looks too dirty to continue. Barrel taps are hardly ever removed, just flushed through. I usually mash for 6 gallons at an OG of 1050, once every four weeks or so.

Since I started basic recording of my brewing activities, some 50 brews ago, I've lost only one, in the secondary, in June 2006 when the weather was quite hot.

In my view a lot of the sterilisation nonsense comes from the US: fitting air-locks on the primary (I don't even bother with the secondary, there's still enough CO<sub>2</sub> coming off to keep it safe) and telling you not to suck on your siphon tube but use a gravity-baster type gadget. All a waste of time in my view and experience.

More specifically, given *Error 1* of which I have had similar experience in the past (more a case of forgetting to replace the filter rather than it coming adrift though) I would rely on the remaining heat in the wort (still close to 100deg) to sterilise the jug, and bail out then pour the entire contents of the copper into the fermenting bin. Then remedy the hop-filtering arrangement in

the empty copper, before bailing then pouring the wort and all from the fermenting bin back into the copper. Allow to settle for 30 minutes (according to Wheeler – although I doubt I ever waited that long) rinse the fermenting bin with ordinary tap water, and then re-commence the running-off process.

*Error 2* gives a lowered OG but minimal source of infection in my view, given that many brewers top up with cold tap water prior to pitching the yeast.

Having got thus far I would always pitch the yeast. Running a considerably bodged up brewing set-up myself I've been through far worse in the past and always had favourable outcome, bar the one exception mentioned above.

Nick Mayes asks about boiling the full brew length in the copper. My view would be that the energy costs are but a small proportion of the total cost (less than 5% at 15p per unit) so the extra is not worth worrying about in the overall scheme of things. However the greater volume will take longer to reach boiling point, and then longer to cool to pitching temperature, an extra hour all told perhaps? Alpha utilisation may be a problem, but the best way to test that would be a trial brew with the existing boiler for two fermenters, I doubt it would turn out undrinkable.

### ***Tegestologists in decline!***

In a quiet corner of the Black Forest in South West Germany is the home of the world's biggest producer of the humble beer mat. These small pieces of cardboard - usually covered in the logo of a brewery or beer brand - are familiar to anyone who has spent

a bit of time in pubs and bars, especially in the UK and mainland Europe.

Drinkers have a habit of flipping them, spinning them, tearing them and scrawling telephone numbers on them.

The first wood pulp beer mat was made in 1892 by Robert Sputh of Dresden; they came to the UK in 1920, produced by the Watneys brewery, advertising its pale ale.

Sadly due to the economic downturn the company has gone into receivership. It had a 75% share of the estimated 5.5 billion beer mats produced annually. Starting with the logs which are reduced to pulp, the company produces lightweight, highly absorbent board which it prints, cuts and packages - producing more than 12 million of what they call in Germany, *Bierdeckel*, everyday. The tegestologists amongst you will know that this is the name given to the hobby of collecting beer mats, derived from the Greek word "*tegestos*" referring to a small reed mat. *Source: The BBC world news.*

### ***Square Casks by Chris Holliland***

***Following on from Tom Potts article in the last edition of 'Brewers Contact,' Chris Holliland from 'Brewlabs' has penned some interesting thought on the potential pit falls.***

Casks are traditionally made from long seasoned, quarter sawn oak. Each stave is coopered (the sides are planed at an angle) so that, when wet, each stave swells and clamps up close to its neighbours and makes a water tight seal.

Is it possible to make a water tight square cask?

The immediate answer is no.

Casks are made from oak, seasoned for 25 years or more. (During the Elizabethan period, raids were conducted on the Spanish mainland, just to burn wood yards where oak was seasoning. The rationale was that no oak = no casks, and no casks = no ships raiding Britain). The staves are cut from quarter sawn oak, where the grain goes across the short side of the end of the plank. This limits curving as the annual rings try to straighten out as the wood dries. Even so, oak is a very mobile wood, with oak floor boards moving more than 5% in width winter to summer. This means that oak planks made into a square cask will swell as they absorb water and break the joints (in a round cask swelling tightens the joints). If they are flat sawn (the annual rings go across the long side of the end of the plank) they will curve and break the joints as well as swelling and breaking the joints.

Beech is a good wood if kept dry but it has very poor performance once it gets wet. I doubt that beech would be a good choice to build a cask.

If you wanted to make your own cask, I would advise you to find some 25 year old air dried, quarter sawn oak. Kilned oak is as hard as iron. Air dried oak of that age is beautifully mild to plane and cut I made my kitchen table from 30 year old air dried oak. Alternatively, French oak is much milder than English oak.

***Drink with thine Eyes***  
***by Graham Kingham***

There has always been a strong preference in brewing for visual units to be used for the evaluation

and determination of beer colour. There are many reasons for this, not the least of which is the fact that the classic beer styles are defined in part by definite visual images concerning what is appropriate. Beer and wort colour traditionally have been measured visually, and early on the Lovibond (deg L) scale was adopted as a standard. This scale consists of a well-defined set of colour samples that are used for comparison. You view the film against your beer in front of a clear bright background, until you find the colour match. These films used to be obtainable some years ago for the home brewer, but I have not been able to find replacements recently. (My wife reminds me I tend to use the definitions, 'few, some and recently' to mean some time in distant memory and as I claim to still be 21 it must seem like yesterday to me, but a considerably longer time to others.)

In the 1950's it was discovered that for pale beers absorbance so measured was essentially proportional to visual units like the Lovibond scale. In 1958, the American Society of Brewing Chemists proposed that the absorbance of beer in a 12mm ID jar using a monochromatic light with a wavelength of 430 nm be used; the procedure was called the Standard Reference Method (SRM). They proposed a correction factor of 10 so the numbers reported would match up with the Lovibond scale. Commercial beer brewed at this time was almost always below 4 Lov, and hence SRM became viewed as an equivalent of Lov. All is well - Lov and SRM can be used interchangeably... unless beer colour moves into the amber regime at which time the

relationships between visual and spectrophotometric units start to diverge sharply. Large commercial breweries continue to use spectrophotometry for colour determination even for the amber and dark beers, adjusting the colour with either a small addition of chocolate malt or by using brewers caramel, a non sweetening dark syrup.

It should be noted that the visual units start becoming highly suspect once the full black regime is reached. It then becomes more of a flavour-oriented issue.

***The European Eye.***

The European Brewery Convention (EBC) Colour scale was designed specifically for the colour standardisation of Beer and Worts.

This scale was originally proposed by the Institute of Brewing in 1950 when it was finally decided that the original Lovibond, brown scale was irregular in spacing and lacking in red, at the high end of the scale.

When the EBC scale was first introduced the colours were mounted in Tintometer racks, which gave a good approximation of northern daylight.

The EBC colour scale was also supplied in disc form to be used in a Comparator and an especially prepared lighting cabinet with two 36-watt tungsten lamps reflecting light from a white surface. During the late 1950's and early 1960's a number of adjustments were made to the colour discs at the request of Dr Bishop of the Institute of Brewing, these changes were spread over about 8 years, now all discs are now made according to the 'Yellow spot' specification.

The EBC colour scale is now the recognised method for colour

grading of worts, malts, beers and caramels, by the European Brewing Convention and the Institute of Brewing (British). The relationship to the ASBC (American), i.e. EBC Colour = 2.65 ASBC 1.2.

Many samples required to be matched by the EBC scale do not match the disc colours. This is because they are sometimes off hue, too bright or too dull and sometimes because they are hazy or turbid. Because of this, alternative ways of measuring the colours are being used. Measurements are made at a single wavelength of 430nm.

Malts create problems because of turbidity but worts and beers are normally free from this problem.

Although in many cases this method is official, it still does not solve the problem of wrong readings as off hue colours are not compensated for and the results are just as uncertain as some visually obtained.

<i>Some typical beer style colour ranges</i>										
MALT	Lager	Extra Pale Malt	Pale Ale	Munich	Amber	Crystal	Brown	Dark Crystal	Chocolate	Black
EBC	2.5	3.5	4-5	15-25	50-90	80-140	140-160	230-250	800	1400

**Implication for Craft Brewers.**

A rule sometimes used by home brewers is that the colour contributed by malt is equal to its concentration in pounds per gallon times its colour rating in deg L. For pale beers this rule can give reasonable results. For example, 10 pounds of pale malt with colour 1.6 deg L in five gallons should produce a beer whose colour is near 1.6 x 10/5 = 3.2degL.

For darker coloured beers, this rule can give erratic results. Beers with an actual deg L of 23 will be predicted at 70+ using the simple deg L/lb/gal calculation.

**Other considerations that can affect colour.**

**Water:** As the alkalinity of the water increases, so does the extraction rate of the colouring pigments in malt. The mash pH has the same effect, and increasing pH leads to worts with deeper colour.

**Mash or Steep Time:** Colour increases with the amount of contact time with the grains. Thus, a prolonged mash (or steep) will produce a deeper-coloured beer than a short mash.

**Kettle Boil Time:** Wort colour increases with boil time (The Maillard reaction. See below.). A fact that is sometimes overlooked is that wort simmering has the same effect.

**Hops:** Some colour is obtained from hops both in the kettle and in storage containers when post-fermentation hopping is used.

**Fermentation:** The proteinous matter produced during the cold

break is full of colouring materials and, hence, removal of these materials will reduce colour. It has also been reported that colour changes during fermentation vary with yeast strain.

**Filtration:** This can dramatically reduce colour. It should be noted that a clear beer would appear to be lighter colour than turbid beer.

**Oxidation:** At all stages of brewing, air pickup will deepen beer colour. This is as true of hot wort production as it is of bottled beer with headspace air.

When discussing colour in a glass of beer it is better done under a

good light source with a white background, the terminology used to describe colour is 'hue and chroma' (When asked to identify the colour of an object, you'll most likely speak first of its hue. Quite simply, hue is how we perceive an object's colour red, orange, green, blue, etc.

Chroma describes the vividness or dullness of a colour in other words, how close the colour is to either gray or the pure hue. For example, think of the appearance of a tomato and a radish. The red of the tomato is vivid, while the radish appears duller.)

**The Maillard Reaction explained.**

The Maillard reaction was first discovered by Louis Camille Maillard as the reaction between carbohydrates (sugar) and proteins when heated together, and is responsible for changes in colour, flavour and nutrition in food.

This reaction gives bread its dark coloured crust, your roast its crispy brown outer and the malt its colour and flavour.

Nitrogen Compounds (Protein Parts)	+	Sugars
HEAT AND	↓	MOISTURE
Colour	+	Aroma

As indicated above there are currently two colour scales in common use: SRM in the US, and EBC in Europe. However, the following equations are reasonably good below SRM 4:

$$EBC = 2.65 \times SRM - 1.2$$

$$SRM = 0.377 \times EBC + 0.45$$

Dr. George Fix gives a method of colour judging in his book, 'Brewing Science.' He dilutes a dark beer down in stages to arrive at different hues. I found it a fag to keep having to use this method

every time I wanted to measure the colour.

Although I no longer bother too much about colour unless I end up with a darker beer than desired, I found it fun and interesting to experiment.

### **Kit Review**

by **G. Kingham**

**Milestone Brewery, 'Crusader'.  
Belgian style, Blond Beer.  
Retail price £18.90 or less**

First impressions are of citrus notes coming through on the nose, pale gold in colour with a thick creamy white coloured head when pouring, which remained during the lifetime of the glass.

On tasting, a slight hop nose followed by a lager style beer, malty, slightly sweetish, ending with a clean bitterness from the hops, a well balanced beer; medium bodied. With an alcoholic content of 4.4% ABV it is a good tasting beer, very drinkable, ideal with fish, chicken or vegetarian meals.

I said in the last edition that I would certainly be brewing some more of their beer kits, and my tasting panel all agreed again with the excellent results, so much so three of them have brought this kit

to brew for the summer. Highly recommended to all you kit brewers out there!

One of my tasting panel has put an old fridge in his garage in order to serve this drink cool in the summer. I brewed mine in the winter and my cold garage kept the beer cool and sparkling.

Further details can be found at [www.milestonebrewery.co.uk](http://www.milestonebrewery.co.uk)



### **Timstar, scientific suppliers**

Timstar have just released their 2009 catalogue, which offers a range of products for the brewer, ranging from microscopes and slides to pH papers and meters, plus all the laboratory kit needed for culturing yeast and cheap weighing scales. Check them out on their web page.

[www.timstar.co.uk](http://www.timstar.co.uk)

## **Craft Brewing workshop**

The ideal course for the keen amateur craft brewer aiming to take production to the next stage

7th – 10th September 2009

at a unique venue,

**The Craven Arms Cruck Barn,**  
Appletreewick, Skipton

(base for Yorkshire's Perfect Pint TV series)

This 4-day course consists of practical sessions and lectures and will include:

- The history of Craft Brewing
- Beers of the World
- Ingredients and purchasing
- The brewing process
- Hygiene in the brewery
- Recipe formulation
- Cost management
- Record keeping
- A tour of Copper Dragon Brewery, Skipton

For further details or to book contact Helen or Alison at

**Verner Wheelock Associates**  
Tel: 01756 700802

Email: [office@vwa.co.uk](mailto:office@vwa.co.uk)

[www.vwa.co.uk](http://www.vwa.co.uk)

The 'Craft Brewing Workshop' is a new venture set up for all small scale brewers, any members who are interested are advised to contact them direct for full course details and costs. We would also welcome any feed back or an article on the course. The Craft Brewing Association welcomes any events that help to educate and inform people in the fascination hobby of brewing.

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