



Volume 4 Issue 2

Price £2.50

June 2004

Inside BREWER'S CONTACT;

Gillian's Guide	2
Scottish Yeast Trial	3
Malt part Three	5
One Barrel Brewery	7
Bill Hoodless Thought's	9
Midland's Report	11

Northern Brewer's update, 12 pm for lunch, 1pm start, July 31st. The Howcroft, Pool St, Bolton. American Steam Beer competition. Roy Dutson NGB judge will talk on larger & mini brewing.

SET YOUR DIARIES FOR SUTTON

It may be early days but never too early to note that Saturday 20th November is the date set for the 2004 National Homebrew Festival. Organised by Richard Burns of 'Cheers Homebrew' with the essential assistance from Andrew Smith, Phil Wicox and Carl Grigg this has become a favourite event for many home brewers over the past 3 years. As before, it will be held in the 'Robin Hood' pub in Sutton.

Contact Richard on **020-8644-0934** for further details

Further north, David and Ralf Edge are busy organising a Homebrew Festival to be held in Derby at a venue close to the railway station. Planned for December or early 2005. Full details in our next edition.

BUGS BREWS AND BEVIES The Science of Beer

by Bill Cooper

This was the title of a lecture at Heriot Watt University International Centre of Brewing and Distilling, (ICBD) sponsored by the British Association as part of their National Science Week in March. It was intended for the general public and in fact it turned out to be 2 lectures, the first on beer and the second on whisky. Professor Graham Stuart, head of ICBD, gave a general account of the brewing process and went on to discuss recent trends in large scale commercial brewing, the *raison d'être* of ICBD. In Canada, where he started brewing, 90% of brewery production in 1960 was of beer and 10% lager. By the 1990s the proportions had been reversed. He did not indicate how far marketing had contributed to this change in public taste. He stressed the pressure of costs on the major brewers - breweries were very capital intensive- resulting in a constant striving for greater efficiency and economies. This had led to a trend towards high gravity brewing. He gave examples of eight breweries with typical brewing gravities ranging from 12 to 18 degrees Plato. (Multiply by 4 to get the kind of degrees most of us are used to - I had to ask). Apart from economies in the brewing process the system also facilitated the use of un-malted adjuncts such as maize and rice, although their use is nothing new, at least not in Edinburgh. After fermentation these beers are diluted prior to sale. It was not indicated whether these high gravity worts were used exclusively for single beers, or whether they formed the basis for producing several different beers. Some Camra members were present and a question was asked about "real ales" in this context, but the speaker claimed not to recognise the term. But it made me ponder on whether a cask ale produced by diluting a high gravity wort constituted a real ale within Camra's definition, particularly if it was just one of several beers produced from the same fermentation. But then how many people would be able to recognise such a beer for what it was, and does it matter anyway? Would it be different in principle if the dilution took place before the fermentation? Is such high gravity brewing an acceptable practice for the production of normal strength home brewed beers? Go on; tell me you are all doing it. I can't help feeling there must be important flavour implications in this process.

One last thought on this part of the proceedings; 4 beers were displayed as examples of the brewing craft - canned Guinness, McEwan's 80/- and Hoegarten Wheat Beer, (brown bottles), and Stella Artois, (green bottle). Michaela, a post graduate student (having already completed 3 years study of brewing in Munich) poured the beers and described them judiciously. In discussion with her afterwards she was quick to point out that the beer in the green bottle was light struck, but she had not said so publicly. We have drawn attention previously to the effect of light on beer in green and clear bottles but I mention it again because I discovered that an eminent Scottish craft brewer, (not a bottling fan) had assumed that green must be OK because so many famous brewers world wide used green glass.

The second half of the proceedings introduced by Alan Rutherford, Visiting Professor of Distilling, was concerned with whisky with an emphasis on malt whisky. (There were 3 malts, a single grain whisky and a de luxe blend available for tasting.) What has this to do with beer? Stay with me and something might emerge. The Professor outlined the different production methods for malt and grain whiskies and went on to discuss the many flavour characteristics of malt whiskies arising from such things as the use of peat, the different qualities of local water, sea air in some cases, and in particular the use of second hand casks in which to mature the whisky - casks previously used to

FREEZING YEAST

by Dr. Gillian Grafton

Yeast can be frozen simply at home. You can harvest the yeast from the top of the beer during fermentation or from the bottom of the secondary fermentation. If you harvest yeast from the top make sure you've skimmed the fermenting wort at least once beforehand to remove any trub that has been thrown up by the fermentation. If you harvest yeast from the bottom of the fermentation, make sure that it is from the bottom of your secondary fermentation i.e. the beer has been racked at least once. This prevents carry over of trub. Skim as much yeast as possible and put into a clean and sterilised container. Allow it to sit in a cool dark place for several hours so that the yeast settles. Pour off as much of the overlying liquid as possible. You should be left with a cake of yeast with the consistency of thick porridge. Mix boiled and cooled water with glycerol (glycerine - you can get it from Boots or other chemists) in the ratio water:glycerol = 4:1. This is an approximately 20% solution of glycerol. Make sure that you mix it well otherwise the glycerol will tend to settle out. Please don't try to boil glycerol to sterilise it, all that will happen is that you will caramelise it. Neat glycerol is highly unlikely to get infected, so don't worry about sterilisation. The diluted glycerol solution can become infected and therefore should be used straight away. Add the diluted glycerol solution to your yeast. You should aim to make a thin porridge consistency. When it is well mixed, put the yeast into suitable freezer containers and remember to allow about one third air space for the contents to expand during freezing. You should aim to have a lot of small containers rather than one large container, this avoids repeated freeze-thaw cycles of your yeast stock. Put the yeast into the freezer as soon as possible, or later it will adapt to its surroundings and after time will not be quite the same strain you started out with. Perhaps you might want this to happen, it is after all how many breweries have developed their own "house strains" of yeast which are reputed to give their beer it's own particular characteristics. However, if you are interested in consistency, then you will want the yeast to always be the same. Modern breweries advise that you never reuse yeast more than 8 times, after that you should go back to your original frozen stock and start again. If you want even more consistency than that, then you should grow your starter from a single colony each and every time. Commercial breweries bank their yeast with central facilities to ensure that if there is an accident, they always have the original yeast strain stored somewhere else for safety. This is probably a step too far for home brewers! *(However, many traditional breweries, producing high quality beers, re-use their yeast many more than 8 times-James)* And the final consideration is time. Plating and freezing yeast take time, as do thawing them out and stepping up starters before a brew session. You have to plan ahead. Thawing, plating out, and stepping up the starters can take as much as two weeks. With the advent of reliable yeast cultures available through homebrew shops, many home brewers won't want to go to the trouble. However if you have rare strains that you want to keep going, or if you are serious about control of consistency, then the trade off is probably worth it.

Dr Gillian Grafton is a biochemist working on leukaemia research at Birmingham University.

A keen home brewer for many years, she was CBA's first Membership Secretary, handing over to Bill Cooper in August 1997. Her professional training and experience, combined with her brewing skills and interest in yeast, qualify her as the best possible person to give a high quality but practical presentation on yeast at the Midlands CBA meeting on 8 November 2003. Thank you Gillian!

Editors Platform.

An apology to the Northern Craft Brewers, the drastic editing of your news letter was because I assumed you already had a copy, and Brewers Contact would report a summary.

Q & A

Tony Smart asks how brewers manage to get 'massive hop aroma in their brews? Send your answers and suggestions to the editor. I add my hops in stages, boil for 1 hour, CO₂ in the barrel will scrub the beer of hop oils, dry hopping adds essence, I find that time erases the aroma.

The black substance on the brewer tap is mould, accumulated over time, clean off with a cleaning spray and a cotton bud, rinse off with clean water.



Scottish Craft Brewers Yeast Trial
Reported by Les Howarth

On 18th January the members of Scottish Craft Brewers (and a good number of new faces) gathered at the Calton Centre in Edinburgh to, amongst other things, taste the results of their yeast trial. Five volunteers had been given the ingredients to brew a standard recipe. As far as possible, the aim was that the only thing that would be changed would be the variety of yeast.

The recipe, instructions and ingredients were supplied by Ian McAnally and involved mashing 4.4 kg of pale malt at 65°C for 70 minutes, sparging, boiling with 77g/AA of East Kent Goldings and 135g/AA of Fuggles copper hops for 60 minutes (adding Irish moss 45 minutes into boil) and then adding 54g/AA of East Kent Goldings and 88g/AA of Styrian Goldings aroma hops for 10 minutes of a gentle simmer. Ian represents the quantities of his bittering hops as weight x alpha acid content. To obtain weights in g the g/AA figures above have to be divided by the alpha acid %. The boil was then stopped and 38g each of East Kent Goldings and Styrian Goldings "End of boil 1 hops", leaving for 20 minutes, bringing the temperature of the wort down to 70°C and adding another 38 g each of East Kent Goldings and Styrian Goldings "End of boil 2 hops" and leaving for 30 minutes before cooling to fermentation temperature, straining out the hops and pitching the yeast. The rest of the process was to be "as usual" with the beers supplied to the January SCB meeting in Cornelius kegs for tasting and assessment. The target final brew length was 23 litres (although Ian McAnally brewed 60 litres). Ian's yeast was supplied by a local brewery which I shall call "Skudlers".

Inevitably not all of the brewing went quite to plan and some of the brews didn't exactly follow the above instructions. I was interrupted by a phone call so my EOB1 hops got 15 minutes longer (and EOB2 got 15 minutes less), Tom mashed for 90 minutes instead of 70, Neil had a problem with a detached water pipe and Ian McManus had all sorts of problems*. A summary of who brewed what and when is given in the table below, along with OG and SG at racking (FG).

Yeast	Brewer	OG	FG	Date
"SKUDLERS"	Ian McAnally	1042	1012	20 Dec 2003
Indveralmond	Ian McManus	1043	1007	17 Dec 2003
Safale SO4	Neil Williams	1043	1010	12 Dec 2003
White Labs English Ale Yeast	Les Howeth	1045	1011	12 Dec 2003

Wyeast 10 Tom Pettigrew's British Ale sheet (whose format was taken from one available from the Bacchus Wine and Beer forum, which I believe is a simplification of an American homebrew Association judging form) where tasters were asked to rank Appearance (on a score from 0-3), Flavour (0-20), Body (0-5), Aroma (0-12) and Drinkability (0-10). This gives a potential maximum score of 50 with 40-50 being considered "excellent", 30-39 "very good", 25-29 "good", 20-24 "drinkable" and less than 20 indicating a problem. Tasters were also invited to add comments on the beer.

I received 19 tasting sheets back and the table below gives the average scores for the beers.

Yeast	Appearance	Flavour	Body	Aroma	Drinkability	Total
Inveralmond	1.0	11.6	2.8	7.4	6.1	28.9
Wyeast #1098	2.4	13.1	3.2	7.2	7.2	33.1
Skudlers	2.8	14.8	3.4	8.2	8.1	37.3
White Labs #WLP002	2.3	11.9	2.8	8.1	6.7	31.8
Safale S-04	2.5	12.6	2.9	7.9	7.1	33.0

All of the brews were of a high standard and the Inveralmond brew would have been judged as "Good" and the others as "Very Good" under the scoring system.

The Inveralmond brew scored lowest overall but this was largely due to its cloudiness and consequent low appearance due to Ian's brewing problems and is not truly representative of the potential of Inveralmond yeast. Interestingly perhaps, in spite of Ian's problems, this brew did not score worst. The Skudlers brew scored best overall which might have something to do with it being one of Ian MaAnally's standard brews so he'd had some experience of this recipe, in particular the use of the large amount of hops that caught some of us by surprise, myself included. The other 3 brews were broadly similar and on a side by side tasting I found the White Labs and Safale brews to be indistinguishable but

not everyone agreed with this assessment so maybe my taste buds had become tired by that stage.

The other three brews scored broadly the same but it may be of interest to look at which yeast came second (after Skudlers) for each ranking. The Safale gets the "silver medal" for appearance which probably fits with its extremely flocculant nature. The Wyeast comes second on flavour, body and drinkability while the White Labs yeast does it on aroma. I am sure that others present might disagree with my conclusions (see below) but I'd say that the yeast had noticeable but relatively subtle effects on the beers. It was also noticeable to me how well the only dried yeast (Safale) had done and its scoring was very close to the most readily available liquid yeast in the UK (Wyeast).

The average scores in the table above give no indication of the spread of scores but, without going into the statistics, the analysis of the data indicates that the Skudlers was better than average for the group, the Inveralmond was worse than average and the other three were pretty much the same. However, beer appreciation is very much a matter of opinion and to give some idea of the range of opinion of the beers amongst tasters here is an edited (there was some illegibility due to bad handwriting and smudging due to beer spillage) list of notes made on the tasting sheets ranging from the least to most favourable:

Inveralmond: Infection?; Too sweet; Yeasty; nice and malty; Much more drinkable than cloudiness suggests. White Labs: Astringent/metallic finish; Harsh hops; Dry finish; Woody flavour; Would have 2nd pint. Safale S-04: Poor finish; Poor aroma; Something not right; Slightly harsh; Well rounded; Fruity. Wyeast: Solvent aroma which dominates flavour; Slightly harsh; Doughy; Toffee flavour; Peppery. Skudlers: Balance is poor-hops all the way through; Simple, spicy; So drinkable-p***ed again. There is clearly no accounting for taste! This gives some idea of the range of opinion with both positive and negative comments for each beer. I liked them all. I'm also wondering whether the comments on the beer I brewed could relate to tannins in the beer caused by over sparging, rather than anything to do with the yeast, so hopefully this exercise will also improve my own brewing practice because of this feedback. This exercise in yeast comparison clearly had its limitations, so the results should not be taken too seriously. The bottom line is that we enjoyed ourselves and it certainly provided food for thought and discussion. Now the SCB has to decide what it is going to do for its next research project...Thanks are due to Davie and Eileen Martin of Edina Homebrew for laying on an excellent spread of food for us again.

Les Howarth is Author of *The Home Brewer's Recipe Database* published www.i.universe.com

* - The story of Ian McManus' brew in his own words: "brewed the goods on 17/12/03 at 10:13. I made a mistake with the mash temperature and had it far too cool. I will bore you with the details. Patience is a virtue I must cultivate!

Ran in 9 litres liquor @ 92C. Mash tun seemed stable at 80.8C, so stirred in Grain.10:19, temp on top centre 69.2 (only a little higher than I was seeking) and immersed centre 74C. Stirred Stirred again 10:21 temp immersed in corner 73.6C Add 1pt tap water Temp 71.4. Add 2 pts water temp 70. Add 2 more pts tap water and gave bloody good stir. Temp 73.3!!!! Added 4 pints cold water, making 9 pints in all. Temp in corner now 49C. Guess the language in the kitchen. Strained off 1 gallon, raised to 80C and stirred in. 10:44, temp 56C.Heated more wort to 80 10:53 temp 61.6, That will have to do.12:15, final temp 55C. OG 1043-surprisingly enough, just on target. Boiled 60 mins etc, etc, pitched Inveralmond yeast. 21/12/03 Racked beer into secondary fermenter at SG 1007 still fermenting slowly. 2 weeks later, into Cornelius. disappointingly cloudy FG about 1005.



David Edge's labels

Our attempt at Durden Park Maclay's 63/- Stronger than expected by the ratio of 78:63. Our standard label with a lower-quadrant signal (indicates, one that dips when it clears).

The story is on the label. Fans of Thomas the Tank Engine will remember the schoolboy who offered Daisy a bullseye – he's there in the background.

78/- Oatmeal Stout

OG: 1055

Brewed on: 27/12/2003 Serve: Cellar temp

An astringent chocolately oatmeal stout with a black head. Purely medicinal, Vicar.

Signalbox Brewery
Belper Rd, Derby DE1 3EP
'A Millenium of brewing experience'

107 094
OAT088a

MALT ANALYSIS

The information used in this article comes from a variety of sources, mainly my 1991 edition of the Institute of Brewing 'Recommended Methods of Analysis' and Murphy & Son Ltd's web site (www.murphyandson.co.uk) James

Is a malt analysis of any use to the craft brewer? Well, I suppose the answer is yes, in part, but we don't always find them easy to get hold of. All maltsters should be able to provide the homebrew wholesaler with an analysis of each batch of the malt they supply. If they refuse, the wholesaler should start having a mild suspicion that he might not be getting the best or freshest malt, although one must bear in mind the relatively small purchasing power of the home brew trade compared to commercial breweries. However, there should be no problem in obtaining a 'typical' analysis for each type of malt supplied. These typical analyses should be available in each home brew retailer for examination by customers. Especially good retailers should provide photocopies but if you are only buying a pound (alright, a kilogram) or so you should expect to pay the cost of copying.

Lets look at some typical analysis:

1. Barley Variety	Maris Otter Pale	Golden Promise Pale	Unspecified Lager
2. Colour	5.0° EBC	4° EBC	3.8
3. Diastatic Power	40° IoB	87° IoB	83° IoB
4. Moisture	2.7%	3.4%	4%
5. Extract (Dry)	307 litre°/kg	304 l°/kg	312 l°/kg
6. F/C Diff	4 litre°/kg	1 l°/kg	
7. Cold Water Extract	18.5%		
8. T.N.	1.55 %	1.54%	1.63%
9. S .N.R.	39.0	39.8	39.1%
10. Friability	91%	90%	88%
11.Homogeneity	98%	100%	98%

With modern quality control systems I doubt if any poor quality malt is produced today, certainly within the UK, although the occasional error in packaging or delivery may occur. In any case, the homebrew trade has little purchasing power and influence over malting specifications, unlike in the 1800s, when some 16,000 tons of malt was used by home, or private, brewers each year.

However, some aspects of malt specification are of value to the craft brewer, particularly when formulating recipes.

Explanation:

1. As read, regretfully no barley variety is mentioned for the lager malt.
2. The normal colour for Pale Malt is 5° and Lager Malt 2.5-3°. The Golden Promise malt is 4° which is the colour of what used to be called 'East India' malt and used for the original IPAs. In recent years it has been brought back into use for lighter 'Summer' Ales. Summer Lightning was one of the first to specify this. Good news for 'proper' IPA brewers. However, colour is not quite as simple as it seems. UK maltsters usually quote their malt colours as achieved by the 'IoB' (Institute of Brewing) methods, although maltsters involved in the export trade sometimes quote both 'IoB' and 'EBC' (European Brewing Convention). Colour is measured from a mashed wort and expressed as ° EBC but British maltsters tend to use the 'IoB' method, which is based on the infusion mash system whilst the EBC trial mash replicates the decoction method. The problem arises because the Institute of Brewing specified 'trial mash' uses a lower malt/liquor ratio than the EBC specified 'trial mash'. This obviously produces a smaller colour number for the same malt than when the measurement is carried out by the 'EBC Method'. Confusion is caused by both methods expressing their results as 'EBC' meaning EBC colour units. Typically, Pale Malt is 5° EBC by the IoB method and 6°EBC using the EBC trial mash method.
- 3.This is one of the most important features for the brewer. Diastatic Power (DP) is a measurement of the 'mashability' of the malt and is a measurement of the starch/sugar converting enzymes. Generally, the

darker the malt the less DP, commercial malts above 50°EBC colour are unlikely to have any DP. Note that Brupaks have just introduced a Diastatic Belgian Amber Malt at 50° EBC. See the Home-roasting article; it is possible to produce 70+° EBC amber malt at home.

However, it is not generally known that you only need an average of 15° DP to achieve a satisfactory mash. Pale malt has considerable reserve DP available, and lager malt even more so. This allows some mega-swirl breweries to use up to 40% unmalted adjuncts although this is intended to improve profits, not flavour.

4. This also is obvious, but records only the moisture content at the maltings. Long, inappropriate storage will increase the moisture and encourage moulds, to the detriment of the malt. Whole grains, stored in sealed dry containers will actually stay good for some time, even as long as two years. However, ground malt is particularly susceptible to becoming 'slack' due to absorbing moisture. Many brewers mill their malt the day before they brew. Every maltster I have spoken to, except one national maltster, say that ground malt should be considered to have a maximum of 3 months shelf life. However, Muntons, at last checking, mark their sacks of ground malt as 'Best Before' 12 months from the milling date!

5. Extract is often quoted as 'dry' and this is a calculation based on a trial mash with an actual sample of the malt, adjusted to take account of the moisture content. For a 3% moisture pale malt the 'dry' extract would be about 309 litres /kilogram (l°/kg) and the actual sample would be 300 l°/kg. Ideally, one should get an analysis which has a 'sample' reading. This figure represents the 'theoretical' perfect extract achieved under laboratory conditions and is useful should you want to check the efficiency of your mashing system. Bear in mind that the laboratory IoB mash is at the rate of 50g (1.76 oz) grist to 360ml (12 fl oz) of distilled water. (I use 3oz to 1 ½ pints of liquor in my home trial mashes) It is mashed for 1 hour @ 65° C and then cooled to 20° C, filtered, made up to 515ml (17.4 fl oz) then measured with a hydrometer. The resultant gravity is then multiplied by 10.13 to produce the l°/kg figure. Reversing this calculation shows that this mash produces about OG 1030 – it is a quite thin mash. A value of 300 l°/kg represents the production of 7.5 litres of wort at OG 1040 from 1 kg of malt. Comparing your own results, including your discarded last running, will give you an indication of your mashing efficiency. 85% is normally acceptable in a microbrewery. I once got excited when I achieved 105% until I realised that by accident my mash had extended to 2 ½ hours! You only need to do this calculation a couple of times to establish your mashing efficiency. You may see 'Miag 7' against this entry, this refers to the type of mill used and it's setting.

6. This is the extract difference between a finely ground and a coarsely ground grist and is an indication of how well the malt has been modified. It should be no more than 5 and the smaller the better, be doubtful about any result above 1.5.

7 For our purposes the Cold Water Extract figure can be ignored, only pre-gelatinised starch gives cold water extract as enzymes are not active in cold water.

8. The Total Nitrogen figure multiplied by 6.26 gives the protein content. As the protein content increases the starch content, and extract, decreases. See James Craven-Smith's article (in a previous edition of BC) for more.

9 The Soluble Nitrogen Ratio is a clear indication of the modification of the malt. A value of 38-40 is satisfactory for British malts used for infusion mashing.

10. The Friability is the mill-ability, usually 80-90%.

11. This records the evenness in the germination process during malting.

MALT TESTING PROCEEDURE

James explains how he tests malt at home

Malt is ground in a Phillips Coffee Mill at the coarsest setting. This produces a fine grind. An insulated cafeteria is used as a Mash Tun and is filled with 1½ pints of boiled water with a pinch of Gypsum added. 3 oz of the ground malt is mashed in at a strike temp of 70-72°C. This equates to a 1 lb/gallon mash. The cafeteria is inverted (twice) 3 times during the mash at 15 min intervals. After 1 hour the temperature is noted, the cafeteria lid returned & the plunger lowered. Wort is run off, rapidly cooled to 20°C, and measured for S.G. This produces a quick result and checks against this and measuring filtered wort show this method measures 1° - 2° of gravity more than filtered wort. Should you wish, you can filter the wort through a coffee filter and re-measure the gravity. Bear in mind that this is a thin , 1 hour

mash. A 'Control' mash of MO Pale malt should produce an OG of 1030, as did my home-roasted Pale Amber. Home roasted Amber produced 1022. OG 1020 or above indicates a satisfactory mash



A ONE BARREL BREWERY by Keith Andrews

The Editor has chastised me (see letters in Vol.3 Issue No.1) for assuming that members would not be interested in the fact that I have now created a set-up at home capable of mashing a full 25kg. sack of malt. So, please accept this article which I hope may give you an idea or two if you are thinking of "up-sizing". Those of you who have been brewing since Adam was a lad will doubtless get bored so please blame Ed. The title of the article is a bit far fetched as I haven't yet tried to mash and boil one barrel (about 163 litres) of worts, although I have the mash capacity and *could* get close by running a third copper length. However, I would have thought that a 25kg. mash of grain is ambitious enough for most of us. The extract from this quantity should produce about one barrel of beer when liquored down to the gravity of a typical pub bitter. Most craft brewers, I suspect, may like to keep the gravity a little higher and accept less beer. So why do it? I enjoy the hobby and certainly enjoy the beer but acknowledge that brewing is very time consuming. Moreover, it does not take much extra effort to brew a lot rather than a little once a brewing day has been designated. Thus, you get more to show for your labour. That's the philosophy. However, *you must have the plant!* Otherwise, forget it. There are also a couple of beneficial side-effects. A full sack is the most

economical way to buy malt and, as you are using all of it, there is no remnant lying around going slack in storage. I buy it freshly-milled from a reputable supplier and use it within days. I do not own a malt mill. Also, bulk brewing gives you a better opportunity to divide the same beer into different strengths (a party-gyle as our commercial friends call it). Divide the gyle before fermentation if you need exact OGs for the two or more beers you wish to create, otherwise, brew all at high gravity and do your division and liquoring down when finished. This works fine *provided* you allow a few days for any liquored beer to marry and condition. Before we start to talk specifically about brewing in bulk, you have to read a health and safety warning. Large volumes of wet grain are *heavy*. Supports must be sturdy. The same goes for large volumes of liquid which at some stage will be *boiling*. The danger is obvious and I do not want a horrible accident on my conscience. Think also of your power supply regarding blown fuses and/or fire risk. If using 2 x twin-element electric boilers as suggested below, it's possible that they may be going full blast together for short periods. So make sure the amperage can cope e.g. use different ring mains or maybe a cooker point. Do not run everything off the same socket. Thus, the brew house is no place for (1) children; (2) pets; (3) drunks; and (4) wives (unless of course they are ale-wives). If you are lucky enough to live with a brewster, she will accept without challenge that her home's primary purpose is to act as an integral part of the brew house. My wife is not a brewster but has child-bearing hips to compensate. She has undergone extensive attitudinal training but with a limited degree of success. Now we must look at the kit. I like a 2:1 liquor to malt ratio for the mash, thus need 50 litres of liquor for 25kg. of malt. The grain will displace it's own weight for volume at the approximate rate of 1 kg./1 litre if that makes sense. In other words, we end up with 75 litres of porridge weighing 75kg. (about 12 stone). It follows that you must have a mash tun of at least 100 litres total content in order to fit it all in and mount a sparge arm above it. Mine is a converted heavy duty plastic barrel once used for the importation of fruit with a content of 170 litres. I sliced the top off and replaced it with a wooden lid with a hole drilled through it for the sparge arm. I drilled another hole in the side of the vessel for the tap and use a scavenger (copper tubing with slots cut into it) to pick up the worts from the bottom. It works very well indeed. This vessel

also doubles up as a fermenter. Next, we need to think about boiling capacity. The Hop & Grape twin element plastic boilers are good and reasonably priced but you will need two of them or something of equivalent size. According to my gauge, these vessels have a content of 66 litres each but the working level is no more than 50 litres. So, one is needed to heat up the initial 50 litres of mash liquor which I then follow with 75 litres of sparge liquor, temporarily using both boilers. Note that the malt will swallow up its equivalent weight in liquor which never comes back, so from a total of 125 litres of liquor put through the mash tun, barely 100 litres of worts will come out. This quantity will pretty much fill both boilers. But before it gets there, you have to catch it in something as there will be times when the boilers still have sparge liquor in them. So you also need a fair sized underback vessel which can be lifted. Consider next the extract and fermenting capacity. It's handy to remember (even though it mixes up metric with imperial units) that 1kg. of malt will produce 1 gallon (4.55 litres) of worts at the old excise standard gravity of 55 i.e. 25kg. gives 25 gallons or 113 litres at standard. This actually is a good extract and if you can achieve this, I reckon that you are doing very well. Do you have enough vessels to ferment the two boilerfuls, despite evaporation, mentioned above especially if you decide to liquor the gyle? What about kegging/bottling thereafter? You must work this one out. It's essential that you think about gravity feeding as you will not be able to lift most of these vessels when full. You must also work the details of this one out for yourselves as everybody's house/shed etc. will have a different layout. However, I reckon that you need 3 levels: one at head height or more for hot liquor, one at table height for mashing, boiling and fermenting and the final level is the floor. The most awkward of these is likely to be the high one. I am able to site my boilers in a first floor bedroom (it's a scruffy old-world cottage ... don't be alarmed) and run the liquor by hose into a room below. So I mash in the house but move the boilers to a garden table for the actual wort/hop boil. So here is a typical brewing day: (1) The night before, fill one boiler by garden hose with 50 litres of mash liquor. (2) Wake up the next morning and switch it on. The liquor will take at least 45 minutes to heat up so time for breakfast, shower, dress etc. (3) When the liquor is 5 degrees or so above strike heat, drop it into the mash tun below by gravity and adjust the temperature with cold liquor if necessary. (4) Tip in the malt and whiz it around (thoroughly!) with an electric power drill as described in "letters" in the last issue. (5) Give all

cash and credit cards to wife to get rid of her. (6) Partly refill both boilers with a total of 75 litres of sparge liquor and start to heat it up about 40 minutes or so before needed. (7) When the temperature is reached, turn on the taps and start sparging. (8) Collect the extract in an underback vessel at first until one of the boilers becomes free. It can then run directly into the copper up to the limit of what can be lifted. The gravity of the first running will probably be approaching 100. (9) Continue sparging and collecting (the temperature of the sparge liquor may need boosting but don't be too fussy). (10) Power up the first copper when 50 litres of worts have been collected. The gravity will still be very high, perhaps about 90 and nearer 100 after the boil. (11) Collect worts for the second copper in the underback until sparging has finished and the copper is free. The final running will be weak (15 or so). (12) Power up the second copper which should have a gravity of 40-ish and nearer 50 after the boil. (13) Spent grains from the mash tun will need to be dug out with a garden trowel or something similar. My method is then to hose out the vessel ready for fermentation. (14) I don't sparge hops from the first copper but tip them into the second one instead (at the end rest). The theory is that they "wash" in weaker worts so strong worts are not wasted. (15) I cool with an elaborate system of copper piping but it takes quite some time. During cooling, the decision may be taken to keep the two boils separate if barley wine is contemplated or mix worts in any proportion according to what is required. (16) Adjust gravity and pitch with plenty of yeast; I generally use 2 sachets of Munton's Gold preferably out of a starter bottle which should be well away by the following day. (17) By now it will be late afternoon and you will be knackered. Have a drink. Looking at my last 2 brews, I note that in both cases I decided to blend the coppers and ferment the gyle as one after liquoring down to 66 gravity. The quantities and gravities ex coppers were (1) 41 @ 99; 46 @ 48 and (2) 39 @ 101; 38 @ 52. After mixing and gravity adjustment, this gave (1) 95 @ 66 and (2) 90 @ 66. The extract in standard litres per kg. of grain was thus 4.56 and 4.32 respectively. Just for the record, taking brew (1) above as an example, 95 litres x 1.066 weighs 101 kg. i.e. about 16 stone. I trust you take the point about sturdy supports! Ed also asks what beer emerges from this plant; I assume he means styles. !

SOME THOUGHTS FROM AN "IMPROVER"**by Bill Hoodless**

Although I have made real ale for eight years, my experience remains limited due to a low frequency of brew and simplicity of equipment. Despite this, or perhaps because of it, I felt it might be of interest to set down some basic stuff, which has come to light, often the hard way! I hope and believe that what follows is fairly accurate, but any comment would be welcome.

Books. Mainly, I found these to be too technical or giving too little information to get started on a full mash home brew. If you just want to know how to produce a very drinkable beer at home, I think it is best to start with a good working knowledge of *Brew Your Own Real Ale at Home* (Graham Wheeler and Roger Protz) and the Practical sections in *Home Brewing – The CAMRA Guide* (Graham Wheeler). No less important is the brewer's own book, giving a detailed record of each brew done, because it allows building on experience. Or at least serves to prevent the sin of making the same mistake twice!

Equipment. All my stuff, except the insulating jacket but including 70 bottles, is in the garage on freestanding, self-assembled, painted steel shelving on three levels. Two shelf kits were bolted together to give a good depth and the whole covered with a sheet for protection. Total storage space used is about 6' high by 4' wide by 2' deep. The bigger items are a wide aluminum handled bucket, two fermentation bins, a mash tun cum hopback made from two bins (inner one without tap and the bottom drilled) barrel and boiler. Other essentials in my view include two thermometers (to improve accuracy) a wort chiller (well worth £30 odd from Brupak to provide cooling in only 15 minutes) a heating belt (to ensure correct fermentation temperature in the winter) Phil's Sparger (to give a simple and well-controlled sparge spray) hydrometer (as tested in water to find any adjustment needed to gravity readings). I would also be lost without two 10" copper pipes for the ends of a siphon tube and a stiff plastic one with a closed end except for two entry holes 1/2" above this end. The latter slips on to a copper pipe and allows siphoning above the debris level. The Home Brew shop at Farnborough has always been knowledgeable and helpful with a good web site and mail order facility.

Yeast. I confess to this being the main problem

for me in the past. It is heartbreaking to find no fermentation starting after all that hard work!

Wheeler says dried yeasts are very poor and should never be used just from the packet. I have yet to try self-propagation from a previous brew or a slope from Brewlab in Sunderland. Even brewery live yeast has failed me on occasion, as have starter cultures. Somehow or another, all my brews have worked in the end with remedial treatment, i.e. repitching, rousing and/or temperature adjustment. My conclusions are as follows. First, it is best to have one or preferably two spare yeasts to hand. Second, a live yeast from a brewery should only be used if the brewery has first been effectively quizzed about its properties, e.g. on pitching temperature, rousing needs etc. Third, the very popular Safale simply sprinkled from the packet at 25°C to 26°C is unlikely to go wrong. This seems to be both a top and bottom working yeast, which ends on the bottom, so preventing any late stage skimming. This means that it is not practical to stop the yeast falling into the beer towards the end of attenuation, because by then there are just a few bubbles left on top. Probably, the lid should be loosely fitted for the last 12 hours.

Process. Here are some random thoughts. Nearly everything works on three levels: kitchen worktop, stool and floor. The exception is sparging, where I find it best to place the boiler on thick newspaper on an upturned plastic box on the worktop, the mash tun on the stool and the collection bin on the floor. Although Chempro SDP packets have no "use by" date, I have found that old stocks will not dissolve properly and have binned them in favour of some new VWP powder. For a full mash brew day, I sterilise the day before and put the small items in a covered bin. That way, a start can be made on heating the mash liquor at 7.30 am and the yeast pitched by 5 pm. I find that the same hand-hot solution can be used for about 15 minutes to make each big vessel spotless in turn. On the brew day, I fill the aluminum bucket with a sterilised water solution, which will last from the start through to the end of attenuation. This is for storage of the small items, which are then rinsed before each use. I have never used water treatment, but seem to have had no resulting problems, despite having brewed in hard water areas in both Surrey and Dorset. The same applies to my practice of using tap water to reduce the gravity before pitching. I use the red strip sections from a hot water cylinder jacket for insulating the top and sides of the mash tun, which is placed on 1" thick newspaper in temperature

Then totally covered in a blanket. Since, the drop in temperature is only about 1°C to 2°C over 1½ hours, no boiled water needs adding during the mash. Sparging is surprisingly easy. It can therefore make sense to do a full mash using Wheeler's Method C for quality. Moreover, the cost can be much less because malt extract is much dearer than pale malt. By adjusting the tap on the boiler from time to time, a fine spray can keep the wort level just above or below the grain level, whilst at the same time the wort is slowly run off from the mash tun. This works well when the sparger is only 12" below the boiler tap.

The wort chiller is a great improvement on slow sink-cooling. It is simple to connect the short hose provided to a standard hosepipe with a Hoselock fitting and to run it through the kitchen window. But cooling can be so quick that subsequent dilution with cold water (to get to the right gravity) has to be limited or even omitted. Otherwise, the wort will finish up too cool to pitch the yeast.

I find it best to turn off water to the chiller at 45°C. After adding cold water, the tap to the chiller can be turned on again, but the temperature must be monitored very carefully and the chilling stopped somewhat above pitching temperature. This is because the next stage, aeration, will cause further cooling of around 5°C. It is both slow and annoying to have to reheat the wort, in order to pitch the yeast at the right temperature. Dropping the ale during fermentation does get rid of the unsightly dark matter and gives a pristine new head. I think it best to do this a bit before half way as it slows the fermentation. For the same reason, i.e. to keep the fermentation going as much as possible, it works better by running from one bin to another for aeration reasons, rather than by syphoning. I don't think I have ever had any problems here from airborne bacteria.

Planning. I have left this to the end to try and leave it in the reader's mind. Please don't make my mistake and run out of full bottles!

It use to take a lad 7 years as a journeyman / improver to learn the art of brewing, nothing like learning the hard way, although some would say that drinking the fruits of your labour is just reward. Ed

September's Contact

Temperature control

The Acid Test

Favourite House Brews

Weird Mob

James Set Up

Craft Brewers Regional Reports

News Round Up

Yeast, One Brewer's Comments

BUGS BREWS AND BEVIES continued

All this is well understood by malt whisky fans, but he went on to emphasise the importance of the copper stills to the character of malt whisky. Most distilleries will insist that the unique shape of their particular stills determines the character of the whisky. But the professor seemed to be implying that the copper itself contributed to the flavour. After the lecture, whilst tasting the whiskies, (I did not think the beers on offer, apart from the Hoegarten, would be worth tasting) I asked him if the copper acted as a catalyst in some way or did it actually get into the whisky. "Both", he replied. He mentioned one distillery he knew that lost a kilogram of copper a week from its vessels, most of which went into the effluent but some certainly went into the whisky. I explained that I brewed and had heard that it was beneficial to have some copper in the boiler. (All I have is a small copper hop strainer). He said he was a brewer before he became a distiller and when a brewery he worked for in Newcastle changed from copper boilers to stainless steel, they could not get the beer to taste the same as before. They eventually decided to put some 'sacrificial' copper into the boilers but discovered it was not enough just to put in a copper ingot. The important thing turned out to be the surface area of the copper exposed to the wort. At this point other people demanded his attention and I am left wondering exactly what does copper do to beer. I resolved for my next brew to experiment by putting my copper cooling coil in the boiler at the beginning of the boil instead of towards the end and see if I can perceive any difference. But if any of you chemists, or savants, out there already knows the answer, please don't leave me in the dark.

James asked Tim O'Rourke, lately Director of Education of the Institute & Guild of Brewing for his experienced view. He commented.

"Copper has a number of effects in brewing and beer and some people held the traditional view that you required sacrificial copper in the wort - others do not. Both systems are in operation. Trace amounts of copper are required for yeast enzyme co factors, but this could be expected to be more than satisfied by the copper ions from the malt and for normal beers with >70% malt should not represent a problem. In higher concentrations copper promotes oxidation reactions and molecular copper in the wort will encourage staling reactions and more rapid development of colloidal haze and hence is best avoided. Somewhere in between copper reduces sulphur compounds such as H₂S and SO₂ naturally produced in the beer particularly during fermentation which is strain and temperature dependent. Some breweries anxious to reduce sulphur notes use copper, this may explain Professor Rutherford's comments."

Midlands C B A News.**Malts**

Cara Aroma malt produces a pronounced caramel aroma, in a test batch using pale malt, wheat malt, flaked oats and Cara Aroma. If it's what you're after it's just the job, but if you don't like toffee flavoured beer, avoid. If you're still keen The Hop and Grape have some in stock along with other Weyermann specialities. For Durden Park enthusiasts, diastatic pale amber malt is available from Brupaks stockists at about £45 per sack, and as demand is slack you may struggle to persuade your supplier to split it. The colour is 50EBC against the 30EBC specified by Durden Park, so you may wish to reduce the quantity used. One brew of Kingston Amber using pale, amber and Carafa Special 1 malt along with Goldings and yeast from a south west London brewery supplied by James blew us away with aromas of chocolate and cherries. We can't attribute the result to the malt alone, but it's an encouraging start.

Beeston Beer Circle

Janette Edge has been invited to a meeting of the Beeston Beer Circle in Nottingham. Some readers may have spent the sixties tripping to The Pink Floyd or Jimi Hendrix, but the founders of the Circle were better employed liberating malt and yeast from Shipstone's brewery. The group meets once a month in the evening and each member brings along a beer to taste. Samples are small allowing members to get through over a dozen beers in an evening without over-indulging. The Circle includes some National beer judges and a commercial brewer. The beer quality was embarrassingly good, although members were not afraid to identify flaws of features where present. One brewer has a signature belt of diacetyl that others wish they could emulate occasionally.

Brewery Visit Report - Grainstore

The Midlands CBA meeting in February was arranged by James Farley and held at the Grainstore Brewery, Oakham and held on Valentine's Day. A remarkable number of understanding ladies participated. The day was marred but slightly when the ladies were barred from the butchers' in Oakham for being a little exuberant in their behaviour. Those who follow in our footsteps should acquire their pork pies before going to the Grainstore.

Grainstore Brewery is situated in the old railway grainstore at Oakham Station, well-served from the Eastern Counties and the West Midlands. (Those of a certain age and disposition will recall the "Airfix" signalbox which was based on Oakham.) The area is well-known for food products (Stilton, Melton Mowbray pies and Pedigree pet foods). We were very privileged to be shown round the brewery by Tony Davis, the head brewer, who founded the brewery nine years ago. Tony was very friendly, helpful and open and was able to talk with the authority of one who has spent a lifetime brewing. Tony was formerly the head brewer of the late lamented Ruddles Langham brewery where County was brewed and has also worked for Lupofresh, hop growers to the gentry and Charles Wells. For younger readers, County was one of the beers that helped make CAMRA's point in the early days by outshining the competition. A beer called County is now brewed by Greene King at Bury St Edmunds, but many feel that Grainstore Ten-Fifty has many of the characteristics that turned heads in the late seventies and early eighties during the dark night of keg. Other Grainstore beers range from the appropriately-named 3.6% "Cooking" to the terrifying 7.3% Winter Nip, all of which mirrored the brewer's intention by being well crafted and balanced traditional English ales. A dark mild, Rutland Panther, is brewed and was selling well. Raw materials used are traditional, in fact more traditional than many with enzymic as well as darker malts. Pearl and Halcyon are used to get a broader supply base and build up knowledge of the subtle effects of these barleys. Tony joked that many enthusiasts think that Otter is the original brewing barley, but as readers of the giant malt edition of Brewers' Contact will know, it only dates back to the 1960s. Sugars and caramels are used in moderation for colour adjustment, reminding us that while the amateur craft brewer often has the luxury of only one or two more-or-less discerning "customers", the professional brewer has an awful lot of them and their critical faculties are sharpened by having to pay for their beer. Hops are mostly English varieties and are used as whole flowers. Northdown provides much of the base while Fuggles, Goldings and Challenger provide aroma and Saaz in summer. One member of the party had to be dragged kicking and screaming from the hopstore after immersing his head in a pocket of fresh, juicy Bramling Cross. Grainstore beers are not screamingly hoppy in the style of many micro-breweries though, rather showing a good balance of malt and hop and with traditional colour. Yeast comes from Charles Wells and is used for twenty generations and renewed. The Wells yeast is a single

strain and Tony finds it easier to maintain than with older multi-strain types where injudicious skimming can change the balance of strains. The authors recall two consecutive wheat beers made with Wyeast Hefe yeast a year ago. The first of these was a roaring success, disappearing down throats within weeks while the balance of the second disappointed, finally coming to form after nine months in bottle. Another illustration of the luxuries that amateur craft brewers don't share with professional ones - they need the cash flow. The plant is relatively conventional with the interest in the detail. Tony's business partner is an engineer, but without a brewing background and has approached the challenges of brewing in an ancient building from unusual directions, of which more anon. Tony taught him to brew using a machine built from a pair of twin-tub washing machines. The first piece of equipment spotted was the trusty Burco boiler! Not the copper as such, as the brew length is 25hl (15 barrels in the old money), but used for priming. Water is accumulated the day before brewing in two liquor tanks, boiled in the copper to drive off chlorine before being returned ready for the brew. Grain is supplied crushed from Muntons and fed to the mash tun by an auger and a simple, but effective, pre-masher. The level of the mash is regulated by a "valentine", an inverted U shaped pipe between the mash tun and the underback. The really clever bit is that the mash tun is on gimbals so that the spent grain can be easily removed. Tony places much emphasis on the mash in determining beer quality. "If you can't get the mash right, you might as well give up". Some embarrassed shuffling. His balance of body and flavour is achieved with a 65-degree mash. Some of us amateurs have great difficulty in knowing what temperature our mash is at owing to in homogeneity, but the pre-masher solves that. The copper is an almost-conventional (you'll have to wait to find out why "almost") gas-fired job with a powerful extractor to remove steam and the less-desirable volatiles, giving the equivalent of an open copper without the damp problems. A one-hour boil drives off ten percent of the water. There was some discussion of the practice noted at a couple of similar-sized breweries of putting in a small initial charge of hops for the full boil followed by the main bittering hops after thirty minutes. Tony agrees that the bulk of the bittering is extracted in twenty to thirty minutes, but prefers to have the hops there for the full boil to maximise the effect of hop tannins in precipitating protein. Proceeding to the floor below we discover something rather unnerving about the copper - it is suspended from the floor above and floats above the floor. It turns out that the fire inspector would have required the bar ceiling to have been bomb proofed, losing its charm had it borne any loads. The hop-back is a large, three chamber arrangement allowing the late hopping to be fine-tuned. In contrast the Para flow cooler is a rather dinky affair that struggles in summer and a cold liquor tank is to be constructed to improve capacity. The fermenters, like the copper are suspended vessels, with precise automatic temperature control. Fermentation is complete in three to four days and the beer is then chilled to drop most of the yeast before being dropped straight to metric casks without the intervention of racking tanks.

Next meet. Saturday 18th September, Alexandra Arms, James Street, 5 minutes walk from station.

Caroline's Ale comparison. 27th November, Nottingham brewery tour, venue tba.

Sunderland Brewlab intensive 2-3 day course, hands on experience, cost £160 downwards depending on numbers booked. Contact David Edge 01332-347601 for more information.

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Copy date for Sept issue is **24th August 2004**

Brewer's Contact is the Journal of the Craft Brewing Association and is privately circulated to members & friends

It is published by the Craft Brewing Association, 82 Elmfield Road, London SW17 8AN

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