



Return of the home brewer

A brew-off of home-brew kits at HQ

A recent analyst report predicted the top five brewing trends for 2015. The first, that craft breweries would consolidate and continue to be bought out by the big guys, seems fairly obvious. Another, that was a bit more of a surprise. In the first of two reports, The BDI takes a look at home-brewing, which is expected to continue its recent growth and popularity over the coming year.

The resurgence of home brewing over the last ten years has brought along with it a wide variety of methods in making beer at home. In part one of a two-part series we look at some of the options and technology available for those wishing to dabble in the art and science of brewing beer at home. The second part will discuss the fruits of our labour and review each of the systems. Products and brewing systems range from very complex (all grain brewing) through to very simple (just add water) and offer a very wide range of choice of raw materials (full choice to no choice) to the brewer. For this review, we tried out a range of options in the IBD's Curlew Street kitchen.

Speidel Braumeister

The Braumeister is a compact (10L to 50L sizes), fully-automatic-control brewing system that allows the

brewing process to be pre-set for each individual recipe. After ensuring that all equipment was cleaned and sterilised we proceeded with the first step, which is to set the mashing and boiling profile of the beer using the touch display. We selected a four-step mash profile with a low mash-in (45°C) temperature and a high mash-out temperature (78°C). We then filled the Braumeister with water to the desired amount (23L) for a 20L brewlength. After the strike temperature was reached we added 5kg of pre-milled grain for a best bitter recipe.

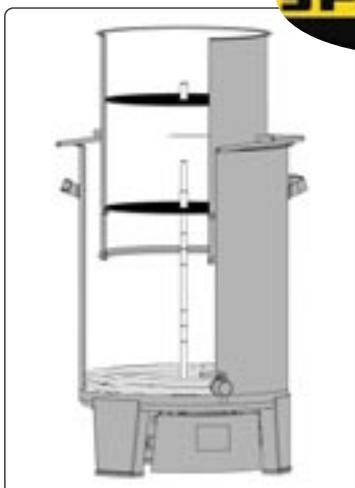
The mash wort is circulated through the system via a pump, thus ensuring efficient extraction of the available sugars. With the mashing period complete we removed the malt pipe housing the grain and sat it on top of the Braumeister to drain wort from spent grain. Using pre-heated water (78°C) from a separate kettle

we ran seven litres of sparge water through the grain to ensure efficiency and extraction. The Braumeister then went into the boiling phase whereby we added hops at the start of the 60-minute boiling period for bitterness and added a small amount towards the end (five minutes) for a delicate hop aroma. Once complete, we placed a wort immersion chiller into the Braumeister and chilled the wort to 20°C using cold water. The wort was then drained through the tap at the bottom of the Braumeister into a fermenter, pitched with dried yeast and left to ferment for seven days. Fermentation complete, we then transferred the beer to a pressure barrel (adding some priming sugar for carbonation). After fourteen days the beer was ready to drink.

The Braumeister system is currently used by both small and large breweries as well as home brewers. Many smaller breweries use several 50L systems as their brew house system, while larger breweries use the Braumeister to create and adjust new recipes before scaling up. A 2hL and 5hL system, based on the same principles, are available for larger-scale operations. The precise nature of the system and ease of repeatability mean that such a system is perfect for these developments (often smaller breweries once upgrading to larger equipment will keep these systems for this purpose). Speidel is a 4th generation German family company founded in 1912, its 95 employees produce brewing systems, fermentation vessels and other ancillary equipment for the brewing and winemaking industries.

Brewbarrel

What differentiates Brewbarrel (an all-in-one homebrew kit) from similar kits is the variability in the initial choice. The first step is going to the website and choosing from over 30,000 combinations. By selecting different liquid malt extracts, hop extracts, woodchips, and other essences, one can feel a sense of ownership over the recipe. Once we had decided on our beer recipe, the package duly arrived with a stepped process outlined and each component numbered. The first step is to add the liquid malt extract to the 5L mini-keg. Boiling water is then added to dissolve the extract with the contents then shaken and topped up with cold water. Once topped up the hop extracts, woodchips and essences are added (these additions will depend on your recipe). The supplied yeast sachet is then added, a pressure release valve placed on the top and



Top left: The Braumeister system. Top middle: Circulation of mash via the pump. Top right: Malt pipe on top ready for sparging. Far left: Cross section of the Braumeister system. Left: Braumeister size range – 10 to 50L.

the beer left to ferment for five days (inverted up and back after 24 hours). After five days the beer is finished fermenting and placed in a fridge for two days after which it is ready for drinking.

The creators of Brewbarrel have seen a gap in the market where the other all-in-one kits have limitations – variability and choice. The use of the combinations and options allows a sense of creativity and ownership over the recipe. The second innovative aspect is the use of the mini-keg as the all-in-one system. By using the mini-keg, carbonation levels are able to be higher than that of an all-in-one ‘bag’ method. This allows beers to be become something more akin to draught beer carbonation levels (as opposed to cask beer levels). The Brewbarrel was developed by former students who met during their studies at the Technical University of Munich (TUM) after nearly six months of product development. The TUM itself is well known as one of the most renowned and oldest faculties for brewery sciences.

Muntons Homebrewing
The use of liquid malt extract is by far the most established way of making

homebrew and has long been the alternative to all-grain homebrewing. We were sent a collaboration kit, Woodforde’s Wherry, made and distributed by Muntons. The kit included two cans of liquid malt extract, yeast and instructions. The process for the kit is relatively straight-forward. We were required to stand the cans in hot water for five minutes. We lacked a cooking top so we filled the sink up with hot water (60°C) from the tap and kettle (the method worked perfectly). We then cleaned and sterilised a fermenter, added several litres of boiling water and then the liquid malt extract. The extract is already

hopped during the production process and therefore doesn’t require the addition of hops or any boiling process. The fermenter was topped up with cold water to 20L and left to ferment. This took seven days and then the beer was transferred to a pressure barrel (adding some priming sugar for carbonation) and once again after 14 days the beer was ready to drink.

Liquid malt extract is essentially condensed unfermented wort. The extract allows a homebrewer to make their first steps into learning some the principles of brewing: cleanliness, sterilisation, fermentation and packaging. Once mas-



Far left: All of the ingredients and equipment required. Above: The various flavour options available. Left: Pressure release valve on the mini-keg.



Top left: The Woodforde's Wherry kit. Middle: Opening the extract cans after heating. Top right: Pitching the yeast. Left: The Woodforde's range of kits from Muntions.

tered, brewers often begin to apply their skills by changing yeasts, adding more hops, or including mini-worts produced from specialty grains, advancing their skills and understanding while also creating a sense of ownership over the recipe. The use of extracts requires more equipment than the other all-in-one extract kits, involving the use of a fermenter and packaging material (bottles, kegs or pressure barrels). However, the process is still straight forward and allows you to follow the fermentation and understand gravity by taking measurements with a hydrometer. This is something the other extract kits do not focus upon due to their all-in-one nature and setup. Established in 1921, Muntions is one of the UK's largest maltsters and home-brew kit suppliers. It produces a portfolio of products worldwide, including malts, malt extracts, flours and flakes to the food and drinks industry.

Liquid malt extract

Liquid malt extract (LME) in brewing terms has uses for both the home and commercial brewer. Depending on its

intended use LME may be hopped or un-hopped. For the home brewer, LME often acts as basis of the wort to be fermented. In commercial operations LME can be used in the same way – as a primary source of extract, as a brew length extender (especially where there are brew house limitations) and probably most commonly for colour adjustment.

Similar to a standard brewing operation the malt recipe is dependent on the intended beer style, whereby specialty malts are added to change the colour and flavour of the resulting beer to create the intended style. The flavour and colour characteristics imparted by these malts will subsequently carry through to the LME and into the beer. The grist-liquor ratio is carefully controlled to produce high-gravity wort. A ratio that would produce weaker wort or lower efficiency would require further energy input in the evaporation stage; negatively impacting the economics of the operation. The mashing profile itself is aimed at high extraction and starch breakdown and thus carefully controlling time, temperatures, pH and calcium levels is imperative. The milling operation is often dependent on the use of a lauter tun (roller mill) or filter (hammer mill) – all of which is organised to ensure optimisation of the process.

During the lautering or filtering stage, the addition of water is closely monitored. Sparge water is used in a way to ensure extract efficiency while at the same time not diluting the wort. Again, the removal of the water in later stages is energy-intensive and thus often outweighs the additional extraction of sugars. It may be that the diluted wort is saved and utilised

in the following batches, thus maintaining extract efficiently. The wort at this stage is often anywhere between 15-30°P.

The wort may or may not be boiled at this stage. Hopped LME is often boiled to ensure hop utilisation and isomerisation of alpha-acids, although the use of hop products is quite common due to increased consistency and lower energy consumption in the brew house. Un-hopped LME does not require boiling, although it may be done for protein coagulation and trub formation if not done at a later stage. Overall, the boiling process achieves sterilization and stripping of volatiles such as DMS. Where boiling is implemented, trub can be removed via a filter, whirlpool or centrifuge.

The next stage is the thickening of the wort to around 80% solids through evaporation. Though malt extract could technically be concentrated in the kettle through boiling, this simplistic method would be



The Muntions vacuum evaporation system, showing multiple effects.

incredibly energy intensive (impacting upon costs) and also impact on colour and flavour of the extract. By comparison, a vacuum evaporator can operate at far lower temperatures (between 50-80°C) often consisting of multiple effects (columns) and operating with a fast and efficient throughput; lowering negative product quality impacts.

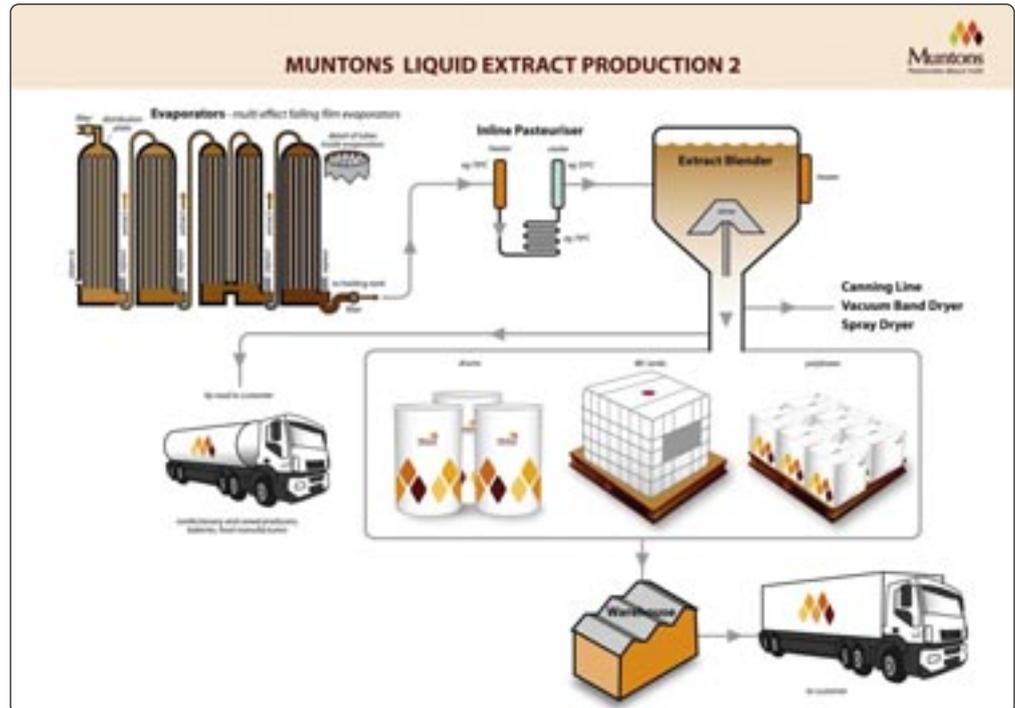
While many versions of vacuum evaporators are in operation, the focus here is on falling-film multiple-effect evaporators (a system based on using heat from steam to evaporate water) employing vapour recompression to assist in the creation of vacuum. The wort is boiled in a sequence of effects with a decreasing pressure pattern for the whole system whereby each effect is lower than the previous. The systems are clever in design; due to the boiling temperature of water decreasing as pressure decreasing the vapour boiled off in one effect can be used by the subsequent vessel to heat the next. The evaporation occurs under vacuum (-875 to -900 mbar) which allows boiling to occur at between 50-80°C as the wort passes through. This has the benefit of being more energy-efficient through reduced steam usage (the energy required to create the vacuum is offset by the reduction in steam required to boil the material) and also avoids excess caramelisation of the wort by restricting Maillard reactions, thus allowing the product to retain the desired flavours. Protein deposits can be left in the evaporator requiring a CIP using caustic with an acid de-scale on a regular basis. Depending on the operation, water removed by the evaporation process is also often stored and then re-used as mashing liquor.

The evaporation systems can be set up in varying ways, for example Muntons implement the following operation:

Line 1 which has four effects – with an inlet wort flow rate of 6000 litres per hour and has the capability to allow hopping of wort, spent hops are then removed by a filter prior to evaporator inlet.

Line 2 which has three effects and a final finisher – with an inlet wort flow rate of 12,000 litres per hour.

The process by operators such as Muntons is that production is manned 24 hours per day on a three-shift, seven-day basis for 365 days per year. The brew length is based on an average three hours (eight brews per day) primarily limited by the fact that the company runs high proportion barley brews (up to 92% of grist) for



the food industry, which are harder for the mash filters to filter.

Moonshine Drinks

Our final method tested, the all-in-one brew-in-a-bag method, is the most simplistic. The options provided are pre-set and provide a limited array of beer styles. The kit is delivered in a compact tube. We took out the bag which already contains the liquid malt extract. Once laid out flat, we removed the cap and added boiling water. We then shook the bag and topped it up with cold water and pitched the yeast. After 14 days the beer had finished fermenting and, following the instructions, was ready for drinking. The pressure control on the bag is maintained by a 'finger tight' screw cap which can be loosened to relieve pressure. The carbonation level of the beer is more akin to a cask beer; this is due to the pressure-holding capabilities of the bag.

Moonshine Drinks is an online



retailer that produces beer, cider and wine options in the same format. Two years in development

with academic partners (Nottingham Trent University and Nottingham University) has resulted in the system.

A lot of tasting to do!

By our reckoning we now have around 70 litres of beer fermenting away in various locations (and at various temperatures) around the office. The next step is possible the most interesting – tasting!

The second part of this report will review the systems for ease of use, costs per litre, flexibility in recipe and, most importantly, flavour and drinkability. Finally, thanks to Assistant Brewer Natalie Poulton for her invaluable assistance in preparing the brews. ■



Left: Moonshine Drinks Four Candles Bitter kit. Above: Filling the bag with water.