*. Ирландский*

*The brewing programme involves conversion stands at 55 °C, 65 °C, and 72 °C*

*and a final heating to 76 °C, just before transfer to the lauter tun. Full starch conversion, as indicated by an iodine check, is not usually complete at the end of the 65 °C*

*stand and usually requires the 72 °C stand for completion. This is probably due to*

*additional gelatinisation of small starch granules and their subsequent conversion at*

*the higher temperature. This additional conversion is necessary to ensure good drainage in the lauter tun*

*Fermentation*

*will typically take 60 hours and give a wash of 10% alcohol by volume (abv) from an*

*initial specific gravity of 1.074*

*The first fermented wash at 10% abv is transferred from the cold wash charger in the*

*fermenter to the hot wash charger in distillation, where it is preheated prior to charging the wash still. Each of the two wash pots takes a charge of 285 hL and can be distilled into a range of different types of low wines, depending on the final pot distillate*

*style being produced. For traditional pot still spirit, all of the alcohol is effectively*

*distilled, giving low wines of approximately 22% abv. For other styles, stronger low*

*wines are produced, in some cases closer to 45% abv. In this case, residual alcohol*

*left in the spent wash is recovered by using a two-column unit to produce a lightly*

*flavoured feints stream.*

*The second distillation combines low wines with recycled weak feints, which*

*charges the feints still with a combined volume in the range of 225 to 400 hL, depending on the style of pot distillate. A heads faction is taken based on time (20*

*minutes), before cutting to strong feints. This distillation will last about 6 hours,*

*producing strong feints at typically 72% abv. The distillation then cuts to weak feints*

*and continues to completion, giving a quantity of weak feints for a subsequent second distillation.*

*The strong feints continue forward into the spirit still for the third and final distillation. Again, a heads fraction is taken based on time, before cutting to spirit. The*

*spirit distillation will typically require 13 hours before cutting to strong feints. Distillation will continue on strong feints until a preset distillate strength is achieved,*

*before the final cut to weak feints.*

*In some cases, again depending on the style of pot distillate being produced, a*

*rider of weak feints, or low wines plus weak feints, is added to the still to ensure that*

*sufficient quantities of strong feints are produced. The final distillate will have an*

*alcoholic strength of 82 to 85% abv, depending on the style of pot distillate*

*Scotish*

*During mashing,*

*the grist is mixed with hot mashing liquor (sparge), which is usually recovered from*

*the previous mash and transferred to a mash tun (traditional, semi-lauter, or lauter tun)*

*where the starch is gelatinised and converted to fermentable sugars by starch-degrading*

*enzymes present in the malt at the standard mashing temperature (63.5 to 64°C). The*

*final stage is wort separation, where the sweet wort is filtered from the grains in the*

*mash tun and then pumped to the fermenter.*

*The traditional mash tun was originally designed to work at relatively low original gravities, ranging from 1040 to 1050° IOB (10 to 13° Plato) (Dolan, 1976). In*

*modern use, higher wort original gravities in the range of 1055 to 1060° (14 to 15°*

*Plato) are more typical. Modern lauter and semi-lauter tuns are capable of working*

*routinely at much higher gravities (1065 to 1070°; 16 to 18° Plato), and at least one*

*distillery aims at a target original wort gravity of up to 1080° (20° Plato).*

*The fermentation progresses rapidly*

*during the first 30 hours, and the specific gravity decreases to about 1000; the starting*

*pH of 5.2 to 5.3 decreases to about pH 4.2 and can rise later in the fermentation due*

*to bacterial metabolism.*

*Because the wort has not been boiled, some bacterial growth is to be expected.*

*However, the wort mashing temperature of 63 to 65°C will have reduced the bacterial load considerably. Contamination by bacteria late in the fermentation can make*

*a positive contribution to the flavour congeners*

*A small reservoir for cold water is provided for carrying out the demisting test.*

*This test is used to distinguish between foreshots and true potable spirit. By mixing*

*foreshots with water to a strength of 46% abv, a time is reached when the normally*

*milky/turbid mixture becomes clear at this strength and pure spirit is flowing. It is*

*this test that determines the primary cut point, while the second cut point is chosen*

*according to the desired bouquet and strength of the final collected spirit, usually 68*

*to 70% abv*

*The foreshots are the first runnings of the spirit distillation. In most cases, they are*

*not deemed worthy of collection as potable spirit, as they contain highly volatile and*

*aromatic compounds such as ethyl acetate. The time on foreshots is usually about*

*15 to 30 minutes, when the incoming strength of the distillate (∼85% abv) drops to*

*75% abv.*

*Normally, a demisting test is carried out that involves mixing foreshots with water in a hydrometer jar in the safe and reducing the strength of the foreshots to 45.7%*

*abv (old Sykes proof 80°). Initially, the mixture is turbid, with a milky appearance*

*not unlike the reaction between anis and water. This turbidity is caused by displacement of the water-insoluble, long-chain fatty acids and esters (C14 and above) that*

*have remained attached as a film to the inner surfaces of the still and in the residual*

*subpool at the bottom of the spirit still condenser from the previous distillation. Being soluble in the high-strength incoming foreshots, they are flushed into the hydrometer jar. When the mixture of foreshots and water clears at the stated strength,*

*the spirit is deemed potable. The flow of foreshots is redirected from the low wines*

*and feints receiver to the spirit receiver by means of the swivelling spout and is collected as new spiri*

*Some blenders and distillers have abandoned the time-honoured demisting test,*

*preferring to collect the foreshots as new spirit after a timed run, with no resort to the*

*demisting test, regardless of the potability of the spirit. Such final distillates are high*

*in fatty acid ester concentration, making future chill proofing of mature whisky more*

*difficult. Regardless of the way in which the spirit is deemed potable, collection of*

*new spirit lasts for about 2½ to 3 hours, during which time the strength drops from*

*72 to 60% abv, depending on the chosen final cut point.*

*The amount of heat applied to the still (as foreshots distil) and during the spirit*

*distillation affects spirit quality. Too harsh an application of heat will result in a fiery*

*spirit that has not benefited from a gentle natural reflux on the sides of the swan neck.*

*To avoid adverse flavour notes, both foreshots and middle cut collections should be*

*subjected to the delicate action of heat. On the other hand, feints can be treated like a*

*wash distillation, following the initial collapse of the froth. The feints can be driven*

*hard, reaching a distillation endpoint of 1% abv, and the resulting residue (spent lees)*

*can be discharged while observing the safety procedures adopted for discharging the*

*wash still. Chemical cleaning of the heating surfaces of a spirit still is rarely necessary to avoid disrupting the internal patina, the disruption of which is implicated in*

*flavour reactions in the still.*

*. To enhance the phenol concentration in*

*the new spirit, the strength of the second cut point in the middle cut can be reduced,*

*but not at the expense of producing a feinty spirit. A cut point of not less than 60%*

*abv would be acceptable.*

*It must be emphasised that an adequate supply of cold water to condensers or*

*worm tubs should be maintained. Inadequate cooling (>20 °C) will lead to spirit*

*endowed with an aroma reflecting higher concentrations of compounds associated*

*with the feints. This is also true of forced or too rapid distillation. Warm weather,*

*with resultant warmer cooling condenser water, demands that the distillation rate be*

*reduced to allow the spirit to be collected at the desired temperature (20 °C). Prolonged distillation times will have an adverse effect on production schedules (e.g.,*

*mashing, fermentation)*

*TRIPLE DISTILLATION*

*Within the Scotch malt whisky industry, there are at least two distilleries that practise*

*triple distillation. This technique ensures a lighter final spirit at higher natural strength*

*than double-distilled whiskies and is primarily carried out in lowland distilleries.*

*It is similar to the distilling practice in Ireland. In principle, there is a wash still from*

*which two fractions are derived—strong low wines and weak low wines—and are*

*separately collected. A second still, the low wines still, is charged with the weak low*

*wines. From this low wines still, two fractions are similarly collected: strong feints*

*and weak feints (tails). The strong feints are presented to the third still, the spirit still,*

*and the weak feints are redistilled in the low wines still.*

*The distillates from the spirit still are divided into three collected fractions: the*

*foreshots or heads, the new spirit, and the tails (which, with the heads, are collected*

*and returned for redistillation in the spirit still). This recycling of the various fractions*

*derived from the low wines and spirit stills impacts on the final bouquet and strength*

*of the new spirit. This is collected at a strength in excess of that of normal doubledistilled products, which are usually in the region of 68 to 72% abv. The triple-distilled*

*product can approach a strength of 90% ABV. The Irish distillers boast very large pot*

*stills in comparison to the double-distilling techniques of their Scottish counterparts*