Sugars in Whisky

Executive summary

Whisky made under EU rules naturally contains very small amounts of sugars from the wooden casks it matures in and from plain caramel, which may be used for colour adjustment only. Adding any quantity of sugars to whisky is not allowed. Maturation in some casks, like those that held sweet wines, can result in sugars like glucose and fructose in the whisky. Maturation in such casks is traditional and normal practice for whisky and other spirits. However, if sucrose (e.g. table sugar) is found in significant amounts, it usually signals a counterfeit product, since elevated levels do not derive from maturation or the use of plain caramel. Testing whisky for the presence of sugars is complex and requires deep knowledge of both the whisky production process and how maturation in different types of casks affects the spirit.

Introduction

Production of whisky in accordance with the EU definition set out in Regulation 2019/787 results in a spirit containing low levels of certain simple sugars. These sugars are naturally present in the final spirit only because of the traditional production process and are derived from two sources:

i) maturation[1] of the spirit in wooden casks (usually oak); and
ii) from the addition of any E150a plain caramel.

The general terms 'sugars' or 'total sugars' is used to refer to the sugars present in the spirit, regardless of their source. In some spirit categories higher levels of sugars may be present as the result of permitted addition for sweetening or rounding as part of the production process. In the case of whisky, any such addition for sweetening or rounding is prohibited under Regulation (EU) 2019/787.

To determine whether sugars are present naturally in whisky or have been added illegally requires expertise in both whisky production and maturation science. This paper is supported by information provided by The Scotch Whisky Research Institute ("SWRI")[2], which is an

[1] Maturation is defined in article 4(11) of Regulation 2019/787 and 'means the storage of a spirit drink in appropriate receptacles for a period of time for the purpose of allowing that spirit drink to undergo natural reactions that impart specific characteristics to that spirit drink"
[2] www.swri.co.uk

spiritsEUROPE asbl – BE 0451407613

rue Belliard, 12 – Bte 5 | 1040 Brussels, Belgium

Tel.: +32 (2) 7792423 | info@spirits.eu| @spiritsEUROPE | www.spirits.eu

accredited and internationally recognised laboratory responsible for scientific research and authenticity analysis on Scotch Whisky and on whisky in general.

Sugars Extracted from Wood During Maturation

Sugar molecules in wood are mostly found in compounds in its structure called cellulose and hemicellulose. The release of some sugar molecules from the wood will depend on a range of factors including but not limited to:

- The type of wood. For example, levels of sugars may vary between American and European oak.
- Cask size. The whisky industry uses a wide range of casks from around 50 litres upwards (with cask size not exceeding 700 litres) which results in very different surface to liquid ratios.
- Length of time the spirit in question is maturing in cask.
- Cask manufacture processes. A range of cask treatments to prepare and rejuvenate a used cask are deployed, including heat treatment (e.g. charring and toasting processes), all of which will affect the character provided by the cask during subsequent maturation.
- The type of cask, whether it is new oak or has been previously used to mature other alcoholic beverages. Further details are set out below.

Use of Casks Previously Filled with other Alcoholic Beverages

Unlike US Bourbon whisky, which must use new (virgin) oak casks only, it has been traditional practice for many decades to mature Scotch Whisky, Irish Whiskey and other European whiskies in casks previously used for other spirits, wines and beers. There is no EU regulatory requirement as to the type of wood but in practice it is traditional to use oak because it contributes desirable characteristics for the spirit, it provides a strong but malleable cask and it is not porous. Scotch Whisky must, by law, use only oak casks but Irish Whiskey can use other types of wood, In practice, most of the whisky is matured in previously used oaks cask of one type or another.

Casks which previously held Sherry, Port or other fortified and still wines have been used for maturing whisky since at least the 19th century. It is estimated that more than 800,000 Sherry oak casks are currently used by the whisky industry in Europe. Rums, brandies and other spirits are also matured in a range of casks which have been previously used for other wines and spirits. The use of casks which previously held other alcoholic beverages contribute different effects to the final spirit, including the presence and levels of certain types of sugars.

The use of such casks is clearly long-standing and the fact that some types of cask create different levels of compounds, such as certain types of sugars, is a natural part of ageing in used casks. The Opinion of the (then) European Community's Economic and Social Committee of 23 March 1983 on discussions about the first definition of whisky stated that it: "*endorses the definition proposed by the Commission, particularly the minimum 3 years ageing. The absence of flavouring, which would seem to be implied, should be spelt out in the definition. Storage in wooden casks previously having contained whisky or fortified wine (Sherry) is not regarded as flavouring*."[3]

Use of used casks helps with wood sustainability by giving them a long life, provides a marketplace for wine and other producers who can sell their used casks and creates wider consumer choice. It is a virtuous circle.

Maturation in wood can create a complex trace sugars profile but it is the two most abundant sugars in whisky that are typically measured for product profiling. These are glucose and fructose. Their concentration will be influenced by how the cask was previously used. For example, whisky that has been matured in a cask formerly used for producing sweet wines or sweet fortified wines will contain higher levels of glucose and fructose than if matured in a similar cask that previously held a spirit distillate. Traditional maturation in ex-Bourbon casks typically results in low levels of glucose and fructose, whereas whiskies matured in ex-Sherry, Port, Marsala and Sauternes casks will have higher levels. The same influence on the concentration of sugars will often be seen in whiskies that undergo a period of additional maturation in a different cask[4]. Such products are known as 'cask finished' whiskies.

Concentrations are also influenced by the variability in production of sweet wines/fortified wines, even within a category such as Pedro Ximénez Sherry.

Influence of Plain Caramel E150a on Sugars Content

Plain caramel E150a[5] is the only additive (along with water) legally permitted in whisky. It is used only for the adjustment of colour. Trace levels of glucose and fructose may also be present in whisky from the addition of plain caramel E150a.

[3] Para 2.2.3(b) of C 124/16 : https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:51983AC0320&qid=1752689007029
[4] The influence of the sugar contents of the previous cask fills are cumulative.
[5] Plain caramel E150a is prepared by the controlled heat treatment of sugars such as glucose and sucrose.

Detection of Sucrose in Counterfeit Whisky

A common feature of counterfeit whisky is the addition of sugars, in particular sucrose, to mimic the complex sweetness of a naturally matured whisky and to produce a more palatable counterfeit spirit. Since sucrose is not detected as a wood sugar, some counterfeiters claim that significant levels of sucrose detected in their products is due to the use of plain caramel. However, based on levels of sucrose observed in commercially available plain caramel E150a, sucrose is unlikely to be detectable in whisky based on plain caramel addition. Some have also argued that its presence could come from the previous cask fill's interaction with the wood. However, analysis of genuine cask finished products has shown that where sucrose is present, the level is significantly less than the concentration of glucose and fructose. Analysis of counterfeit whisky has shown that where sucrose is added, its concentration is significantly higher than that of glucose and fructose, which counterfeiters often consider necessary to make a poor-quality spirit palatable.

Conclusion

Given the complexity behind the presence of sugars resulting from the traditional production process, it is not possible to define specific parameters for particular sugars. The variability of factors, including cask construction, type, size, and previous use, all contribute in different ways. An assessment of authenticity requires scrutiny of the relevant facts, knowledge of the traditional production process as defined in EU law and expertise in maturation science. spiritsEUROPE can facilitate the investigation and analysis of any suspect sample through the expertise of its industry members.

spiritsEUROPE asbl – BE 0451407613

rue Belliard, 12 – Bte 5 | 1040 Brussels, Belgium

Tel.: +32 (2) 7792423 | info@spirits.eu| @spiritsEUROPE | www.spirits.eu