Blowing the Lid off Sherry Casks

Let other poets raise a fracas
"Bout vines, an' wines, an' drucken Bacchus,
An' crabbit names an'stories wrack us,
An' grate our lug:
I sing the juice Scotch bear can mak us,
In glass or jug.

O thou, my muse! guid auld Scotch drink!
Whether thro' wimplin worms thou jink,
Or, richly brown, ream owre the brink,
In glorious faem,
Inspire me, till I lisp an' wink,
To sing thy name!

Let husky wheat the haughs adorn,
An' aits set up their awnie horn,
An' pease and beans, at e'en or morn,
Perfume the plain:
Leeze me on thee, John Barleycorn,
Thou king o' grain!

Robert Burns (1785)
Scotch whisky is an alcoholic beverage enjoyed not only by the Scots, but also by many in the Jewish community. However, it can present serious כשרות problems, because it is often aged in casks which previously contained sherry or other non-kosher wine (סתם יינש).

**Historical overview**

It is stated in Tractate שבת ד: that if regular wine and תרומה wine are inadvertently mixed, the resulting mixture is permitted to drink if the proper שיעור של שימור is attained. In the times of the הגמרא, wine was normally diluted in a ratio of 3 parts water to 1 part wine. According to one interpretation of the gemara, the 3 parts water added to the regular wine and the 3 parts water added to the תרומה wine when combined are מבטל the one part תרומה wine, with the regular wine not counting in the calculations (because of the principle אינוכאילו the heterogeneous wine, and then it is treated as one wine cup when combined with water, the resulting mixture is permissible to drink if the amount of water is at least six times that of the wine. The הערוך שולחן ערוך indeed rules this way. It also permits the drinking of other beverages aged in casks which previously contained יינש and יינש, as long as an extra condition is fulfilled – that the wine in the cask’s walls detracts from the taste of the beverage within. Much evidence exists to indicate that this last require-

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2 שולחן ערוך ייד" التجارية קולב: ויד" التجارية קולב.
3 ויד" التجارية קולב.

While there can be halachic differences between יין ומיץ, all wine discussed here is assumed to be יין ממית.
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ment is generally not satisfied for scotch aged in sherry casks. In any case, wine casks used for the purpose of improving the taste can be problematic regardless of whether the taste is in fact improved.  

In what many considered to be a tremendous חידוש, Rav Moshe Feinstein, זצ"ל, extended the ש"ח נו"ז 6:1 rule to the case of wine intentionally added to whiskey, even if it improves the taste and even if the wine itself can be tasted. However, the חידוש addressing both wine poured into whiskey and scotch aged in sherry casks, disagreed, adding an extra condition: in addition to the 6:1 whisky-to-wine ratio, it must be true that even an expert cannot detect the actual taste of the wine. With regard to scotch aged in sherry casks, the חידוש's advisors felt this second condition is always satisfied, and he ruled only assuming it is indeed true. However, in reality, it could actually depend on what types of cask were used. For example, scotch aged exclusively in a first-fill sherry cask (i.e., one used for the first time after containing sherry), and even more so if it is cask strength (not diluted by water before bottling) may have a much stronger sherry taste than a scotch aged in a second or later fill, or one aged in a combination of ex-sherry and ex-bourbon casks (the latter type of cask presenting no Kashrut concerns). Expert tasting notes for heavily sherried scotch share many of the descriptions given to pure sherry. Additionally, it should be noted that the aroma of oloroso sherry, the most common sherry used for casks in the scotch industry, is quite strong, much stronger than that of other wine, and thus perhaps more easily detectable in the scotch.

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5 For a discussion, see ש"ח נו"ז ס"ק תוכן צ"ח פ"ז. Already matured scotch finished in wine casks may be particularly problematic.

6 אגרות חברת ע"י י.ד. א.ס-פ ד-ד
Entire thickness vs. kdei klipa

The history up to this point is well known; however, there is a misconception that Rav Moshe’s famous רשות רוח in שולח תריע Requires that the show of ביווי be attained against the entire thickness (volume) of the cask, since we don’t know how far the wine penetrated into the cask walls. (This is similar to the halachic requirement for a vessel that had non-Kosher food cooked in it and then was used to cook Kosher food, except in that case 60:1 is needed.) So accepting the 6:1 ratio as the שיעור for ביווי, the liquid capacity of the cask must be at least six times the volume of the walls of the cask.

There is another opinion, namely that of the צבי חכם, which holds that wine never penetrates into a vessel farther than קליפה כדי (a thin scrape’s worth), a literal reading of the ערוך שולח. According to this view, 6:1 would easily be attained since it is measured only against the קליפה of the cask walls. Rav Moshe explains this in depth in ג”דカラー ווורה מלה. In any case, the predominant view among פוסקים is not to rely on this opinion. Furthermore, one could argue that relying on קליפה כדי in this particular case of wooden wine casks, even in conjunction with other קולות, may be particularly problematic, since it can be demonstrated (by breaking open a wine cask stave and observing the visible wine stain line) that the wine indeed penetrates much farther than כל קליפה.
There are those who attempt to save this view even in this particular case by saying it must be that the area beyond the קֵלֶפֶם has no effect on the cask’s contents and so halachically can be ignored. However, such an assumption would be highly questionable. First of all, scholarly wine journal articles suggest significant interaction between the wine-stained wood and the liquid contents of the cask, as evidenced by the tannins extracted from the wood in this region and the effects on the wine. More importantly, it is interesting to see how the איש חזון (נה דעה קוה אשתו כמו ואיש), one of the few prominent ארגונים who support the קֵלֶפֶם view, addressed a few questions on this view. Alohath בֵּית הָעֵצָה (מ) suggests 1/6 of the total contents penetrates into the cask walls. To this he was forced to say that 1/6 is actually the size of the קֵלֶפֶם. And due to an opinion of the הרוא תוספות that says the contents of a typical קוה אשתו like has a volume sixty times that of the קֵלֶפֶם, the איש חזון was forced to say that there is evaporation within the קֵלֶפֶם, leaving only part of the קֵלֶפֶם against which the שיעור ביטול is measured. That is, he was not willing to entertain the possibility that קֵלֶפֶם allows penetration beyond the קֵלֶפֶם. This is so even though the answers he gave would mean that the interior diameter of the long-term wine storage vessels in מציעא בבא תדנָה could be no more than an inch or so wide, which is difficult to assume. And then there is the יוארי מעשה (תנורו המזרך לר.ה) which says that the suggestion to kosher the wine cask by using a tool to scrape out a קֵלֶפֶם’s worth inside the cask since wine penetration allegedly is only up to קֵלֶפֶם does not work because “We plainly see red wine stains penetrating farther than this measurement.” That is, he accepts the common sense


interpretation of לאפכ. Note also he did not offer as a solution that one could simply scrape out up to the visible wine stain.

The result of all this is that for scotch aged in sherry casks, even Rav Moshe himself might require 6:1 against the entire thickness of the כלי. So what is the actual ratio of the liquid capacity of a sherry cask to the volume of the cask’s wood? While many intuitively believe the actual ratio must be far, far greater than 6:1, a simple and convincing geometric argument is to approximate the wood volume of the cask as the difference in volume between two cylinders—the one which includes the wood of thickness as measured at the cask’s bilge (that is, at its thinnest) and the one which does not include the wood—of the same height and head diameter (see illustration) as the cask in question, and compare that to the stated liquid capacity. Since the calculated wood volume for the case of the cylinder will be less than for the actual cask (which has bulging walls and varying wood thickness), this will give an upper bound on the ratio.

Illustration from:
http://www.rootsweb.ancestry.com/~flbbm/heritage/cooper/barmaking.htm
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Dimensions of a sherry butt

The internal dimensions obtained for an old sherry butt (the most common type of sherry cask) are head diameter $d = 25.8'' (65.532 \text{ cm})$, bilge diameter $D = 32.0'' (81.28 \text{ cm})$, height $h = 42.4'' (107.696 \text{ cm})$.\(^{12}\) While there can be minor variations in these parameters, the approximate size and shape, selected to fit on old Spanish galleons, has not changed much in centuries.\(^{13}\) While often rounded in the literature to 500 liters, the exact standardized capacity for a butt is 490.7 liters\(^{14}\) or equivalently, 490,700 cu cm. A prominent distillery, in response to an email query, stated that the stave thickness of its butts is 3.0 cm at the bilge and 3.3 cm at the head for Spanish oak, and 2.6 cm at the bilge and 2.8 cm at the head for American oak. The head thickness was assumed to be equal to the lower of each pair of numbers (a conservative assumption based on research). The chime will not be included in the wood volume calculations.

Upper bound on the liquid-to-wood ratio for a sherry butt using cylinders

The formula for the volume of a cylinder is just $\pi r^2 h$, where $r$ = the radius, and $h$ = the height. So for Spanish wood, a conservative approximation for the wood volume is $\pi\left(\frac{65.532}{2}+3.0\right)^2\left(107.696+2\times3.0\right) - \pi\left(\frac{65.532}{2}\right)^2\left(107.696\right) = 93,673 \text{ cu cm}$, so an upper bound on the liquid-to-wood ratio is $490700/93673 = 5.2$. For American wood, a conservative approximation for the wood volume is $\pi\left(\frac{65.532}{2}+2.6\right)^2\left(107.696+2\times2.6\right) - \pi\left(\frac{65.532}{2}\right)^2\left(107.696\right) =$

\(^{12}\) \url{http://home.clara.net/rabarker/Barrels.htm}

\(^{13}\) \url{http://www.whisky-distilleries.info/Fabrication_EN.shtml}

\(^{14}\) \url{http://www.winebarrels.com/bitspiecesnew.html}
80,367 cu cm, so an upper bound on the liquid-to-wood ratio is $490700/80367 = 6.1$.

**Barrel volume approximation formula**

However, we can do much better than that. There is a well known, remarkably accurate formula approximating the volume of a wine barrel by assuming its sides are bent to the arc of a parabola:\(^{15}\)

Given height $h$, bilge diameter $D$, and head diameter $d$, the formula for volume $V$ of a barrel is

$$V = \left(\frac{1}{60}\right) \pi h [8D^2 + 4Dd + 3d^2].$$

Using this formula on both the interior (without the wood) and exterior (with the wood) dimensions of various casks (bourbon, Bordeaux, Burgundy, hogshead, Cognac, puncheons, Madeira, sherry butt, port pipe) produces ratios in the range of around 3.8-5.2 to 1. The most common wine cask used for aging Scotch, the sherry butt, produces a ratio of around 4.3 using Spanish wood and 5.0 using American wood:

**Liquid-to-wood ratio for a sherry butt using the volume approximation formula**

First let's see how well the formula approximates the liquid capacity: $\left(\frac{1}{60}\right) \pi 107.696 \left[8\times81.282 + 4\times81.28\times65.532 + 3\times65.532^2\right] = 490,818 \text{ cu in} = 490.8 \text{ liters}$. Amazing! The external volume using Spanish wood is $\left(\frac{1}{60}\right) \pi (107.696 + 2\times3.0)$

\(^{15}\) Solution to Problem 341, *The American Mathematical Monthly*, Vol. 21, No. 4 (Apr 1914), pp. 127-128. See also [http://cambelt.com/cs/pl=tr_math_volume/barrel&toc=trtoc](http://cambelt.com/cs/pl=tr_math_volume/barrel&toc=trtoc). The appropriateness of the formula for the cask in question can be verified by comparing the formula-produced interior volume to the stated capacity. The formula works rather well for all casks tested. It should be noted that the actual capacity of a cask can differ somewhat from the stated capacity since the staves forming the cask are bent into shape by hand.
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\[ 8x(81.28 + 2x3.0)^2 + 4x(81.28 + 2x3.0)(65.532 + 2x3.3) + 3x(65.532 + 2x3.3)^2 = 605,635 \text{ cu in} = 605.6 \text{ liters}. \] So the Spanish wood volume = 605.6 – 490.7 = 114.9, and the liquid-to-wood ratio is 490.7/114.9 = 4.3. The external volume using American wood is \((1/60) \pi (107.696 + 2x2.6) [8x(81.28 + 2x2.6)^2 + 4x(81.28 + 2x2.6)(65.532 + 2x2.8) + 3x(65.532 + 2x2.8)^2] = 588,849.7 \text{ cu in} = 588.8 \text{ liters}. \] So the American wood volume = 588.8 – 490.7 = 98.1, and the liquid-to-wood ratio is 490.7/98.1 = 5.0.

So for all casks in question, the 6:1 ratio is not attained, even allowing for a significant margin of error. There are other barrel approximation formulas in the literature, some more and some less suited to the particular shapes of the casks considered, but most give rather similar results.

Chaticha Na'aseit Neveila

Up until now, the discussion has been regarding scotch aged exclusively in sherry casks. But most scotches are aged in a combination of ex-sherry and ex-bourbon casks (the latter type generally presenting no halachic problems). In this case, do we need 6:1 against just the wood of any sherry-cask aged scotch, or do we need 6:1 against all the sherry-cask aged scotch? This seems to depend on whether we apply the rule of \( \text{_halachic principle which says that when a permitted entity absorbs the taste of a forbidden food and becomes forbidden as a result, the entire entity becomes transformed into a forbidden object. For the object to become forbidden, subsequently, the quantity required for becalcm would need to be calculated against the entire absorbing entity, and not merely the amount of issur that was absorbed.} \)
percentage of sherry casks in the mixture to attain 6:1 would be one part sherry cask-aged scotch for every six parts bourbon cask-aged scotch, that is, $1/(1+6) = 1/7 = 14.3\%$, and if we don’t, the percentage would rise to around 65% or higher, depending on the thickness of the sherry cask wood. Both of these numbers would rise a bit further for all but cask strength whiskies due to water dilution before bottling.

**Label issues**

Given the new openness of distilleries, as well as easy and increased access to information the internet provides, for a particular scotch one can often find out not only that sherry casks are used, but sometimes even the exact proportion. The easy access to information may put into question today’s application of Rav Moshe’s dictum that if the bottle label doesn’t say anything, one has no obligation to find out more information. It’s one thing to have to visit, mail or phone a distillery, quite another to make a few clicks on its web site to find out what everyone else already knows. It also happens to be true that the vast majority of bottlings—whether sherry casks are mentioned on the label or not—are a vatting from a combination of ex-bourbon and ex-sherry casks in varying proportion depending on the bottling.\(^7\)\(^8\)

\(^7\) “Contrary to popular belief, very few whiskies are aged exclusively in bourbon barrels – most ex-bourbon aged malts are vatted with a (varying) percentage of whisky which was aged in ex-sherry barrels.” [http://inebrio.com/thescotchblog/?p=138](http://inebrio.com/thescotchblog/?p=138)

\(^8\) “We can achieve consistency by vatting about 100 casks prior to bottling. These will all be pre-selected; those that are not selected go for blending. We also have a cask type mix recipe, specifying the proportion of various types of cask. Throughout the company we have about 10% sherry casks but the usage varies from brand to brand. We don’t bottle a 100% sherrywood whisky as we feel that the sherry masks the flavour of the whisky itself. When we select a style, Lagavulin or Dalwhinnie for example, we will also select a cask recipe. Having
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Research shows there are numerous reasons why, despite a sherry cask costing almost ten times as much as a bourbon cask, a distillery might choose not to advertise this, even though it clearly values sherry casks in the recipe. The differing policies of kashrut organizations making various inferences from a label not mentioning sherry casks when no such inference seems to exist can be hard to fathom. For example, there are scotches known to be 100% or near-100% aged in sherry casks whose label makes no mention of sherry casks. So what is the kashrut status of such a whisky? The current kashrut guidelines for single malt and blended scotch whisky were devised in an era when information was lacking or very hard to come by. In this new era of increased openness and easier access to information, perhaps these guidelines need to be revised.

Dried out or rejuvenated casks

Some seem to think it takes perhaps a year from the time sherry casks are emptied of sherry until they are filled with scotch, and so halachically these casks would be considered dried out. This assumption simply is not true in general. Others seem played with it we will decide that, say, one in five casks should be sherry wood—20% is quite high for us. We will also specify refill and Bourbon casks...We’re trying to produce a malt that tells you about a distillery and reflects the character of that distillery, and keep it consistent from year to year. That involves everything, from the buying of barley, the mix of casks, to the age of maturation.” Excerpt of an autumn 1994 interview with Dr. Alan Rutherford, head of the production subsidiary of United Distillers and responsible for 27 malt distilleries, http://www.lfw.co.uk/whisky_review/swr15/article15-3.html

19 “Prior to being shipped, each cask receives ‘one for the road’ in the form of 5 litres of wine, helping to maintain freshness during a 4-6 week journey to Scotland. (This is of course emptied prior to filling with spirit in Scotland).” “Let’s do the char char,” Whisky Magazine Issue 34 (Oct 2003)
to think a rejuvenation process (scraping out and scorching the inside of the cask) is applied to all casks and that this would render them kosher for use. Again, both assumptions seem not to be true.

20 “Seasoned casks are kept fresh en route to Scotland by giving them four to five litres of ‘transport sherry’ (emptied of course prior to filling with new make spirit in Scotland).” “No Spain no Grain,” Whisky Magazine Issue 53 (Jan 2006)

21 “My requirement is that the cask must not have been sitting around and be all dried out. Ideally the wine is emptied out completely, the cask resealed and shipped to Scotland within a couple of weeks. Most arrive dry but they do have a lining of crystals of tartrate and such like. The fortified wine casks are dry to moist but none of our casks has any lees swilling about in it. If that was the case you could ask if the flavour was coming from that but there must be some wood maturation for success. Any wine in the cask would be strictly against the law and the rules of the Scotch Whisky Association as it would potentially be considered as an additive.” Interview with Dr. Bill Lumsden of Glenmorangie, http://www.lfw.co.uk/whisky_review/Intro_Edition/Intro_8.html

22 Concerning bourbon barrels, “A barrel may have stood in the open for several weeks, even up to a year in the case of ‘cull’ barrels [lower grade barrels expected to need repairs] before being shipped, which progressively reduces the level of residual liquid. Meanwhile, the fastest door to door service is around 21 days.” “America—the stave,” Whisky Magazine Issue 52 (Nov 2005). But sherry casks from Spain have a much shorter trip to Scotland than bourbon barrels from the United States, perhaps accounting for some of the average time difference between the two casks. Distance aside, a delay in the delivery of sherry or other wine casks could mean the cask will be teeming with dangerous bacteria caused by the wine. Casks expected to sit too long before arrival may have to be subjected to sulphur candle treatment, which can impart an unpleasant odor into the scotch and lower its value. So it behooves the distilleries to expedite their sherry cask shipments. See, e.g., “Wood is Where the Magic Happens (Or Is It),” http://bruichladdichblog.wordpress.com/2008/08/06/wood-is-where-the-magic-happens-or-is-it/

23 “The more you use the cask, the less extract there is, which is why producers like Glenmorangie and Macallan only use first and second-fill casks for their
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malts. Third-fill casks are either sold on or used for grain whisky or fillings for blends.” “A suitable cask for treatment,” Whisky Magazine Issue 2 (Mar 1999)

24 “For the port, sherry and Madeira [finishing casks] we get one fill and that’s it, we can’t use them again and I then sell the old casks. They are very expensive casks and there are potential savings to be made by refilling with wine to revitalize them but it is not our practice at the moment; as a whisky purist I am uneasy about going down that route.” Spring 1999 interview with Dr. Bill Lumsden of Glenmorangie, http://www.lfw.co.uk/whisky_review/Intro_Edition/Intro_8.html

25 “However, first fill casks not delivering The Macallan’s required range can be withdrawn (and used for blends), while star-performing second fills may go on to provide a third fill. When no longer appropriate for ageing malt, certain second fill Macallan casks are utilised as marrying vessels (being essentially inert with a minimal wood extractive influence)...There don’t seem to be any shortcuts in rejuvenating Spanish oak casks. We’re better off buying fresh wood stocks from Spain, rather than sending an empty cask to Spain for dechar, rechar, dechar and putting it into a bodega system for three years.” David Robertson of The Macallan, “Lets do the char char,” Whisky Magazine Issue 34 (Oct 2003)

26 “The whisky industry frequently subjects used casks to various rejuvenation treatments to increase their effect on the maturing distillate[1, 36]. Most often this will be a recharring procedure sometimes in conjunction with the scraping out of the exhausted inner layer of wood. The change from using ex-sherry casks to used bourbon barrels has led some Scotch whisky manufacturers to specially treat their casks before using them for whisky maturation. Cask wood may be treated with white wine or allowed to absorb a very sweet, dark sherry under pressure. This has been reported to raise levels of total esters and sugars in the cask and claims to result in the mature whisky being mildly flavoured by the previous beverage. Other methods involve the use of steam, wine or ammonia treatments to simulate sherry cask flavour.” Mosedale, JR, Peuch, J-L, Wood Maturation of Distilled Beverages, Trends in Food Science & Technology, Volume 9, Issue 3, March 1998, Pages 95-101, available at www.sciencedirect.com

27 “How ex-sherry casks are treated, once whisky distillers get their hands on them, differs by distiller. Most will empty the cask of any residual sherry, nose
Summary

This article presents what is hoped to be a clear, concise summary of the problem of scotch whisky aged in sherry casks, and raises some new issues as well. For further reading on the sherry cask problem, see the thorough treatment given in http://bit.ly/sherrycasks2 by Akiva Niehaus.

the cask (to ensure the casks smells fresh, and then fill with new spirit. Dave Robertson doesn’t believe any one would char fresh sherry casks unless the sherry cask does not smell "right", in which case they might char, or may simply reject the cask.” http://inebrio.com/thescotchblog/?p=138

28 “Recharred casks can either be filled with spirit, or undergo additional 're-seasoning.' European oak casks, for example, may be filled with sherry to help 'recreate' the original influences, prior to filling with spirit.” “Let’s do the char char,” Whisky Magazine Issue 34 (Oct 2003).

29 A halachic requirement for the scorching of the inside of the cask to be considered a kashering is that the outside of the cask would at some point be at the temperature יד חמישה (too hot to touch); see see ומכור יד חמשה, פ" ד מ" שיר ד" חמשה. It is debatable whether this is so; videos of the process seem to show the handlers holding on to the cask. Furthermore, the level of scorching for an ex-sherry cask (toasting) is lower than that for an ex-bourbon cask (charring).