

Halal compliance for alcohol in beverages.

Introducing a quantitative
proficiency test for low
concentrations.

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For the purposes of ensuring beverages are Halal compliant, it is important that laboratories are capable of detecting alcohol contamination at very low levels. Since 2016 Fapas® proficiency tests (PT) for Halal compliance have focused on testing for the presence/absence of low levels of alcohol in beverages (and for presence/absence of pork DNA in meat).

As part of Fapas® PT 3111 participants were given the option to also submit a quantitative result alongside their qualitative result. Fapas® used the quantitative data collected to investigate the possibility of carrying out a statistical assessment to provide an assigned value and z scores to participants in future Halal compliance PTs. The data was shown to be sufficiently robust and therefore future Halal compliance PTs will include both a qualitative and quantitative assessment of participants' results.

Halal refers to food and beverage products that are permitted under Islamic Law, which determines what is permissible, lawful and clean. It is important for Muslim consumers to know the Halal status of certain food products to ensure that the foods meet their requirements. The importance of protecting consumers from incorrectly labelled foodstuffs cannot be underestimated.

Through proficiency testing, a laboratory's testing ability can be accurately assessed, and thus provide evidence of competence to Halal certification bodies. Ordinarily, Halal certification is achieved only through inspection of food production premises. Increasingly, the inspection is supplemented with analytical data, the generation of which can be subject to audit as a laboratory method.

This paper investigates the possibility of permitting participants to report quantitative results for Halal compliance proficiency tests, which, if robust enough, will allow Fapas® to deliver a statistical assessment with an assigned value and z scores.

Proficiency Testing

For the purpose of Halal compliance, it is important to have the capability of detecting extremely low levels of alcohol (ethanol). Therefore, Fapas® Halal compliance proficiency tests for alcohol focus on the contamination of a beverage with trace levels of alcohol. This differs from other Fapas® PTs for alcohol beverage testing which are aimed at much higher concentrations in beverages intended to contain alcohol, which are generally subject to labelling and taxation laws.

Qualitative Results

Since 2016 Fapas® has been providing proficiency tests for the presence/absence testing of a beverage for low concentrations of alcohol. The results from Proficiency tests 3109 (2018) and 3111 (2019) are summarised below.

PT 3109

The orange juice was purchased from a retail source. Ethanol was spiked into test material A and test material C at 0.05% and 0.01% v/v respectively. Test material B was left at its natural levels. Test materials were verified for percent real alcohol (ethanol) content by direct measurement.

Analyte	Expected result detected/ not detected	Number of satisfactory assessments	Total number of assessments	Satisfactory/ agreement with expected result %
Alcohol (ethanol) TMA	Detected	26	28	93
Alcohol (ethanol) TMB	Not applicable	Not applicable	Not applicable	Not applicable
Alcohol (ethanol) TMC	Detected	25	28	93

Qualitative data were assessed as satisfactory or unsatisfactory for alcohol (ethanol) deliberately added during preparation to test materials A and C. Test material B was not assessed due to the very low level of alcohol naturally present in the orange juice, <0.001%.

PT 3111

The orange juice was purchased from a retail source. Ethanol was spiked into test material B and test material C at 0.01% and 0.05% v/v respectively. Test material A was left at its natural levels. Test materials were verified for percent real alcohol (ethanol) content by direct measurement.

Analyte	Expected result detected/ not detected	Number of satisfactory assessments	Total number of assessments	Satisfactory/ agreement with expected result %
Alcohol (ethanol) TMA	Not applicable	Not applicable	Not applicable	Not applicable
Alcohol (ethanol) TMB	Detected	35	40	88
Alcohol (ethanol) TMC	Detected	39	42	93

Qualitative data were assessed as satisfactory or unsatisfactory for alcohol (ethanol) deliberately added during preparation to test materials B and C. Test material A was not assessed due to the very low level of alcohol naturally present in the orange juice, <0.005%.

Quantitative Results

A formal proficiency test for quantitative analysis of alcohol for Halal compliance has not been run yet, however in PT 3111 participants were also given the opportunity to submit a quantitative result, along with their qualitative result, which they were informed would not be assessed for the purposes of the PT.

Seven test materials from each proficiency test sample, A, B and C were tested in duplicate to demonstrate that the individual subsamples were sufficiently homogenous. Fapas® uses the statistical procedure developed by Fearn and Thompson [i] to assess homogeneity. The stability of the test materials was assessed by direct comparison of the known preparation protocol, homogeneity data and PT data.

An investigation into the possibility of providing a statistical assessment of quantitative data, in order to provide an assigned value and z-scores, was undertaken. This investigation showed that the data was sufficiently robust to provide such an assessment. A histogram displaying participant z-scores produced from the statistical analysis is shown in Figure 1.

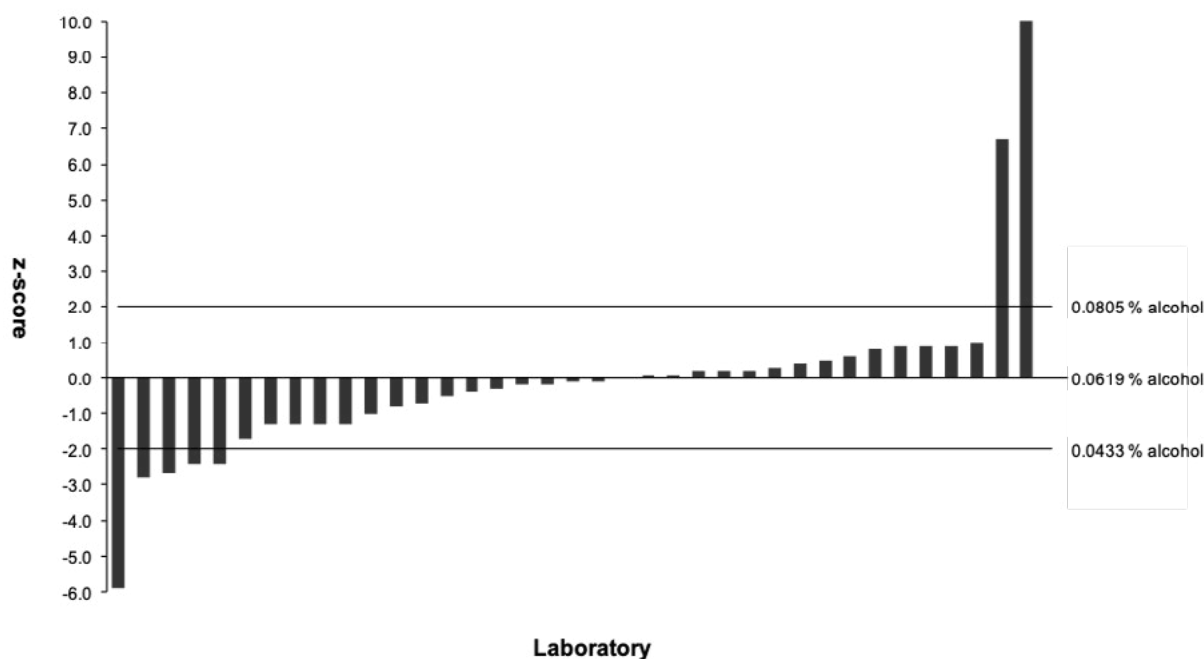


Figure 1. Results and z-Scores for Alcohol in Orange Juice

This histogram is provided for information and does not represent a formal assessment of any laboratory.

Conclusion

Statistical assessment of the quantitative results provided in Fapas® PT 3111 has shown that there is scope to include assessments for quantitative data in future proficiency tests.

Future PTs for Halal compliance for alcohol determination will include assessment of qualitative presence/absence results and also an assessment for quantitative results, where participants submit these.

[i] Fearn, T. and Thompson, M., 2001,
A new test for sufficient homogeneity, *Analyst*, 126, 1414-1417

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