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Standard Guide for Sensory Evaluation of Beverages Containing Alcohol¹

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1. Scope

1.1 This guide provides guidelines specific to the sensory and consumer evaluation of beverages containing alcohol, alcoholic beverages, including beer, wine, coolers, cocktails, ~~liqueurs, ready to drinks, liqueurs, hard ciders,~~ and distilled spirits.

1.2 This guide addresses safety, legal, panel selection, sample preparation, and test procedures specific to beverages containing alcohol, test procedures, and code of conduct specific to alcoholic beverages.

1.3 This guide does not recommend a specific test method.

1.4 The guide does not purport to address all of the nuances of testing throughout the world. Different countries have different guidelines while some countries do not have their own guidelines. The definition of a standard drink (or unit of alcohol) also differs from country to country. This guide is generally focused on testing within the US (and to an extent Canada); and even within these regions, laws could change over time. This guide covers what is generally in place currently in these areas and is suggested for countries that generally have no guidelines of their own. It is the responsibility of the user to be aware of their local laws and regulations, corporate policies and procedures, and apply them as needed. Some useful resources are also cited in this guide (Refs **(1 and 2)**²).

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate ~~safety~~ safety, health, and ~~health~~ environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 This guide does not recommend a specific test method.

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Significance and Use

2.1 The procedures recommended in this guide can be used for the sensory evaluation of beverages containing alcohol, alcoholic beverages.

2.2 This guide provides practical suggestions to maximize panelist safety and to minimize the risks and liabilities of the person or corporation responsible for administering the sensory evaluation of beverages containing alcohol, alcoholic beverages.

2.3 This guide also provides practical suggestions when dealing with various government agencies that are involved in distributing alcoholic beverage ~~alcohol~~-test products.

2.4 This guide uses a research example (**Appendix X1**) to frame the safety and regulatory considerations when conducting sensory evaluations of alcoholic beverage products.

NOTE 1—See also **Appendix X1** and STP 913 **(3)**.

3. Safety

NOTE 1—See also **Fig. 1** and STP 913 **(1)**.²

3.1 *Medical Condition*—Potential panelists must be in good medical condition with no serious health problems. Inform them that they should not participate on panels if they are taking prescription or over-the-counter medications, which are contraindicated

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² The boldface numbers in parentheses refer to the list of references at the end of this standard.

when combined with alcohol. It is recommended that women who are pregnant, may be pregnant, or nursing should not participate. Recruiting should be conducted in such a way to ensure that those not meeting these medical requirements are excluded from participation.

3.2 Sample Size—Limit the sample volume for evaluation to an amount which will ensure the respondent will not have a blood alcohol level greater than a legal limit (see 8.3.1.3).

3.3 Home-Use Testing:

3.3.1 Home use tests with beverages containing alcohol—Home-Use Tests (HUTs) with alcoholic beverages are often used to determine product acceptance and how products are consumed, typically used. Transportation and storage of high proof spirits are very important. In addition to an informed consent form (see 5.2.1), it is recommended that the following statements accompany products used in home-use testing:

3.3.1.1 The sponsor of this study is a well-known major manufacturer who considers the health and safety of research participants and the public to be of the utmost importance.

3.3.1.2 Specific—Some suggested guidelines that must be followed while participating in this product test may be given to participants are listed as follows. Compliance with these the guidelines is given are necessary to ensure that the alcoholic beverage alcohol-product you are being given is consumed in a responsible manner. Please read and follow these guidelines carefully. Update this list based on local laws and regulations.

(1) Do not open test product(s) until you arrive home.

(2) If you are driving, you must transport driving with test product(s) in your vehicle, store the test product to your home in the trunk of your car, securely, safely, and well out of reach of any potential user (for example: in a cardboard box in the trunk of your vehicle).

(3) Do not drive or operate heavy machinery after sampling test product(s).

(4) Do not leave the test product(s) in a place where it is accessible to individuals under the legal drinking age.

(5) If there is a need to return used beverage containers, you must empty the container completely because it is illegal to transport open containers of beverage alcohol, containers or return a defective market sample, you must (based on local laws and regulations, this could be emptying containers, putting containers out of reach, etc.).

3.4 Central Location or Intercept Testing:

3.4.1 Safety is most critical—Central Locations Tests (CLTs) or Intercept Tests are often used for product evaluations under controlled conditions. Safety is essential in situations where consumers evaluate alcoholic beverage alcohol-products at a central location. There are several steps that can be taken to ensure respondent safety:

3.4.1.1 Provide transportation—It is recommended that transportation of the assessors to and from the test location-location be provided. Some countries or states, or both, require it. Taxi, arranged services (for example, Uber, Lyft) or other public transportation vouchers may be provided; in more rural areas, participants may be asked to get a friend to pick them up from the testing facility in which case an extra incentive needs to be provided. In cases where a designated driver is used, a routine check to ensure such driver has a valid driver's license is recommended.

3.3.1.2 Have a certified bartender or highly trained professional provide each respondent with the test products. Instruct the bartender or professional not to serve respondents whom exhibit any signs of intoxication. The Hotel, Tavern, and Restaurant Association in each state offers techniques in alcohol management courses. It is recommended that all servers complete this course.

3.4.1.2 Limit the sample volume for evaluation to an amount which will ensure the respondent will not have a blood alcohol level greater than a legal limit (see Participants may not consume any alcohol prior to coming to the testing location.8.3.1.3).

3.5 Employee Panels:

3.5.1 When employees evaluate product(s) at their workplace, the sensory professional has additional control. This control involves scheduling panels such that employees can remain at the workplace until their blood alcohol content is reduced below legal limits (see 8.3.1.3) to drive or operate machinery. Conducting sensory evaluations early in the day is highly recommended.

3.5.1.1 Special considerations need to be taken when panelist's work involves the operation of equipment or any work task that can jeopardize the safety of others;others. Either do not allow these employees to be panelists, or arrange with employee management "waiting times" after product evaluation before these employees can resume work involving these safety related work activities.

3.4.2 Do not allow these employees to be panelists.

3.4.3 Arrange with employee management "waiting times" after product evaluation before these employees can resume work involving these safety related work activities. Require a blood alcohol (breath analyzer) test prior to allowing the employee to resume safety-related work activities.

3.5.2 Limit the sample volume for evaluation to an amount which will ensure the employee will not have a blood alcohol level greater than a legal limit (see 8.3.1.3;) or that will otherwise impair the user.

4. Regulatory

4.1 Investigate and meet federal, state, state/provincial, and local regulations whenever studies are to be conducted that include the storage, handling, shipping, serving, or consumption of beverages containing alcohol, alcoholic beverages.

4.2 Some ~~state~~jurisdictions or local communities do not allow testing of ~~beverage alcohol~~alcoholic beverage. Those ~~states~~jurisdictions that do allow testing of alcoholic beverage ~~alcohol~~ each have different regulations and procedures. The following guidelines are recommended:

4.2.1 Determine if the facility is required to have a liquor license or be bonded to conduct the study. This information is available from local ~~State~~ agencies such as beverage control commissions and from federal agencies like the Tax and Trade Bureau (TTB). Check the situation in your local community as needed.

4.2.2 Research and meet ~~State~~State/provincial and Federal regulations for the shipping, handling, receiving, storing and disposing of alcoholic beverages. Some relevant agencies are: ~~State~~State/Provincial liquor control boards, Tax and Trade Bureau (TTB), Food and Drug Administration (FDA), and Occupational Safety and Health Administration (~~OSHA~~)(OSHA), and CFIA (Canadian Food Inspection Agency).

4.2.3 Research and meet regulations for the serving of ~~beverage alcohol~~alcoholic beverages. For example, some ~~states~~jurisdictions require the use of a certified bartender. See 8.3.1.3 for an example of legal consumption levels. Note that these levels may change from state to state and from country to country.

4.2.4 Store material safety data sheets (MSDS) for ethanol on the study site premises, and make available upon request from participants. Also make available MSDS sheets for compounds used as reference standards or sensory training.

5. Legal Liability

5.1 There is a risk of legal liability whenever alcoholic beverages ~~containing alcohol~~ are tested. To minimize these risks, it is recommended that the guidelines in 5.2 and 5.3 be used.

5.2 Consent Forms:

5.2.1 Prepare consent forms for each product evaluation session or test (see ~~Fig. 1~~Appendix X1 – Appendix X3).

5.2.1.1 Describe the nature of the study. For example, the sentence, “You may or may not be served beverages that contain alcohol,” can be used to obtain informed consent.

5.2.1.2 Outline the time period over which testing will be conducted.

5.2.1.3 Include all the federal alcohol warning information (see ~~Fig. 1~~Appendix X1).

5.2.1.4 Indicate that in order for the candidate to participate in the study they must be in good health and are willing to participate as evidenced by the signing of the informed consent form.

5.2.1.5 Indicate that participants ~~can~~may be excluded from the study for specific reasons including pregnancy, taking prescribed medications, current illnesses, and alcohol abuse. Furthermore, indicate that if any of the exclusion circumstances arises during the course of the study it is the participant’s responsibility to bring it to the organizer’s attention. This is particularly important for long-term studies, where periodic reviewing and signing of consent forms may be necessary.

5.2.1.6 Under certain circumstances, include a list of ingredients on the consent form mentioning all of the products to be tested. ~~For example, ingredients not commonly associated with alcoholic beverages such as caffeine, Aspartame,™~~Such ingredients will be those required to be listed as per your local regulatory regulations, for example caffeine, Aspartame™ or capsiem should be identified on the consent form, capsiem, nuts, sulphites, or other allergens.

5.2.1.7 Include statements indicating that participants can be removed from the study without consent at any time. Statements should also be included stating that the participant can withdraw at any time.

5.2.1.8 Each participant is required to provide appropriate validation of legal age to consume ~~beverages containing alcohol~~alcoholic beverages. Record this validation on the consent form. Note that laws concerning legal drinking age vary from country to country and may vary within a country.

5.2.1.9 Upon completion of reading the consent form, ensure that the participant understands the form and has no questions. After being allowed ample time to review the contents of the consent form, the participant must sign and date the consent form in the presence of a witness.

5.3 Other:

5.3.1 Review and follow the items described in Section 3 to further reduce the risk of liability.

~~5.3.2 For in home-use studies, label each product as a test sample and not for sale.~~

5.3.3 Post government warnings for the consumption of alcoholic beverages on test premises and on test products.

~~5.3.3 In home-use studies, label each product as a test sample and not for sale.~~

6. Panel Selection

6.1 Consider safety, regulatory, and liability issues as discussed in Sections 3 – 5 when selecting participants specifically for ~~a~~an alcoholic beverage ~~alcohol~~ panel. For general information on panel selection criteria, consult MNL 26 and STP 758 (~~24 and 35~~).

6.2 Special Considerations on Panel Selection Criteria:

6.2.1 ~~Age~~—All panelists must be of legal drinking age. Confirm their age by using picture identification cards, such as a driver’s ~~license~~license, passport, or other photo identification card (only if date of birth is listed on the card).

6.3 *Drinking Habits*—Product abuse is a criterion for exclusion for all alcoholic beverage alcohol-tests. Do not use individuals who indicate that they consume more than two 1-oz drinks of high-proof spirits daily or daily, one bottle of wine daily, a six-pack of beer a day, or a four-pack of wine breezers/coolers a day.

6.4 *Recruitment*—Contact the potential panelist directly (for example, e-mail, phone, 1:1 interview) to reduce the risk of including individuals with alcohol abuse problems. For example, it is not recommended that panelists be recruited through means such as media advertisements, flyers, word of mouth, etc. Also, the recruiter must be fully aware of the legal, safety, and specific panel considerations prior to running the test.

6.5 *Religious and Moral Considerations*—Do not use individuals if drinking beverage alcohol interferes alcoholic beverages interfere with or contradicts their religious or moral beliefs.

7. Sample Preparation

7.1 Proper sample preparation and presentation for sensory analysis is critical to generating consistent and meaningful information. Use of the sample preparation guidelines in 7.2 – 7.8.27.7.2 are therefore recommended.

7.2 In general, prepare samples ~~in the same way that consumers would use the product.~~ Evaluate beverage alcohol at standard temperatures—based on the test objective, for example, a consumer study may require serving the samples as they are most typically consumed, whereas a Quality Control (QC) study may require the samples to be served to a specific dilution. Evaluate alcoholic beverages at controlled temperatures: for sensory analytical testing at ambient temperature; for affective testing at temperature normally consumed.

7.2.1 Present cold alcoholic beverage alcohol-products at approximately 3 to 7°C.

7.2.2 Present room ambient temperature alcoholic beverage alcohol-products at approximately 21 to 24°C.

7.2.3 Present hot alcoholic beverage alcohol-products at approximately 66 to 71°C.

7.2.4 If ice is added to the alcohol product, the number and size of the ice cubes must be controlled. Ice cube trays can be used to accomplish this. Water recommendations listed under 7.4.2 should also be used when making ice cubes.

7.3 ~~Beverage alcohol~~ Alcoholic beverage products that are used with mixes can be presented straight or in the mix. When a mix is to be used, it is recommended that a master batch of the mix be prepared to a volume that can be used for the entire study. If this is not possible, the mix should be screened before use for flavor consistency throughout the study.

7.4 ~~Beverage alcohol~~ products that are used with other food products can be presented for evaluation straight or with the food product. Screen these food products for consistency before each sensory evaluation.

7.4 Dilution:

7.4.1 In some alcoholic beverage alcohol-products, dilution is recommended to reduce the ethanol bite and burn that can interfere with sensory analysis.

7.4.2 Common diluting liquids include spring water, demineralized water, or distilled water which all contribute little to the flavor of the alcoholic beverage alcohol-product being evaluated.

7.4.3 Dilution levels should be determined according to the percent ethanol in the product.

7.4.3.1 In general, beer and wine products do not require dilution.

7.4.3.2 A 50/50 dilution is recommended for most distilled spirits. More or less dilution may be required depending on the proof of the sample.

7.5 Glassware:

7.5.1 Samples should be presented in clean, odor- and flavor-free containers that are consistent with common practices. For example, wine can be evaluated using wine glasses and brandy snifters.

7.5.2 Glass containers should be used whenever possible.

7.5.3 Containers made of other materials, including plastic resins, can be used as long as they are prescreened and found to contribute no odor or prescreened. Prescreening shall include interactions between container and alcohol that results in harmful chemicals or contributions of odor and flavor to the alcoholic beverage alcohol-sample.

7.5.4 Containers may be chilled or heated to the same temperature that the alcoholic beverage containing alcohol-will be evaluated to avoid extreme changes in the sample's temperature.

7.6 Timing:

7.6.1 Samples should be evaluated in a timely fashion and consistent with the product's use.

7.6.2 Samples that require heating or cooling should be presented for analysis as quickly as possible after preparation to ensure the evaluation is conducted within the acceptable temperature ranges as described in 7.2.1 – 7.2.3.

7.6.3 Some products, such as certain wines, should be allowed to sit for a standard amount of time after they are opened before they are presented for sensory evaluation.

7.6.4 ~~Carbonated Beverage alcohol;~~ Alcoholic beverages, such as beer-beer, sparkling wine, and wine coolers, should be presented for evaluation as quickly as possible after preparation to reduce the risk of large changes in the carbonation which can dramatically alter the sensory attributes.

7.7 Pouring:

7.7.1 ~~Beverage alcohol~~Alcoholic beverage samples should be poured into evaluation vessels carefully and consistent with usage.

7.7.2 It is recommended that beer be poured directly down the center of the glass to result in half a glass of liquid and a quarter glass of foam. This helps to standardize the liberation of flavor aromatics through foaming.

8. Procedure

NOTE 2—Refer to MNL 13 and STP 433 (46, 57).

8.1 In addition to good sensory practices, there are special considerations when testing ~~beverages containing alcohol~~alcoholic beverages. These special considerations are listed as follows.

8.2 *Palate Cleansing*—~~Distilled, demineralized, or deionized~~Bottled or filtered water, seltzer, or club soda or 0.2 % salt rinse, can be used as a rinse between product tasting. ~~Any~~Either one of these rinses can be used with unsalted crackers to clean the ~~palate~~plate. In each case expectorate as needed and have a final rinse with water to eliminate any cracker crumbs or salt.

8.3 Alcohol Burn and Safety Factors:

8.3.1 There are ~~two~~a number of factors that limit the number of samples and sample volumes that can be tested.

8.3.1.1 *Number of Samples Tested*—The number of samples should be limited as much as possible to reduce sensory fatigue (for example, the effects of alcohol ~~burn~~burn, strong flavors or mouthcoating; where flavor or mouthfeel, or both, could be more of a concern than mouthburn especially when testing low proof products) and to avoid exceeding recommended consumption guidelines (Tables 1 and 2, with a worked example after Table 2).

8.3.1.2 *Interstimulus Interval*—The interstimulus interval or the time between sample tasting, is determined by the alcohol content of the product and the test objectives. Generally, the higher the alcohol content, the longer the interstimulus interval. The longer interval, plus palate cleansing with crackers and rinse, will help to dissipate the alcohol burn of high-proof spirits.

8.3.1.3 *Multiple Sample Limitations*—The number of samples that a panelist is allowed to evaluate in one session should be limited to remain within the consumption guidelines published in Tables 1 and 2. Also, the number of sessions throughout the course of a day should be limited based on a number of factors including, but not limited to, the total amount of alcohol ~~consumed~~evaluated, the length of time of each session, the total time spent at the testing facility, the total number of samples presented, the time of day, and panelist fatigue. Table 1 shows the percent of alcohol in the bloodstream (Blood Alcohol Concentration or B.A.C.) as a function of body weight and number of drinks consumed. Table 3 shows the recommended serving volume per sample per session. Table 3 indicates that time is the only way to reduce your blood alcohol level. The legal driving under the influence (DUI) B.A.C. varies from state to state in the United States and varies from country to country. In the United States, depending on the state, the legal DUI B.A.C. is either 0.08 or 0.10 (as of September 1, 1999). In some countries, the legal DUI B.A.C. is as low as 0.02. ~~varies among states and countries.~~ The researcher is responsible for checking the local laws where alcoholic beverage alcohol testing is to be conducted. Table 2 shows the recommended serving volume per sample per session. To minimize risk, the serving volumes indicated in Table 2 are recommended. If the recommendations in Table 2 are followed, then no one will reach the current legal DUI B.A.C. in any state in the United States.

8.4 *Time of Day*—~~Beverages containing alcohol can be tested any time of day. It is not advisable, however, to test right~~It is highly recommended to conduct employee tests at a designated amount of time before employees leave for the day because of the danger of drinking and driving. It is recommended that testing end 1 h before quitting time. Also, because people generally are more tired later in the day and ethanol is a central nervous system depressant, it is best not to serve alcohol at the end of the employee's day to ensure they can drive safely and in accordance with local laws. Time of day is less important for consumers who have driving arrangements.

8.5 *Panelist Instructions*—When evaluating ~~beverages containing alcohol~~alcoholic beverages, instructions as to how the samples should be evaluated are very important, for example, swallow, expectorate, or as normally consumed. Panelist compliance can be verified by monitoring the amount consumed or requesting comments on taste, flavor, or aftertaste.

TABLE 1 Blood Alcohol Concentration (B.A.C.) Chart (Percent of Alcohol in Bloodstream)

Your Weight (lb)	Number of Drinks ^A Consumed								
	1	2	3	4	5	6	7	8	9
100	0.029	0.058	0.088	0.117	0.146	0.175	0.204	0.233	0.262
120	0.024	0.048	0.073	0.097	0.121	0.145	0.170	0.194	0.219
140	0.021	0.042	0.063	0.083	0.104	0.125	0.146	0.166	0.187
160	0.019	0.037	0.055	0.073	0.091	0.109	0.128	0.146	0.164
180	0.017	0.033	0.049	0.065	0.081	0.097	0.113	0.130	0.146
200	0.015	0.029	0.044	0.058	0.073	0.087	0.102	0.117	0.131
220	0.014	0.027	0.040	0.053	0.067	0.080	0.093	0.106	0.119
240	0.012	0.024	0.037	0.048	0.061	0.073	0.085	0.097	0.109

^A One drink equals: 1 oz of 80 proof alcohol: 12-oz bottle of beer; 2 oz of 20 % wine; 3 oz of 12 % wine. Entries represent typical values in adults.

TABLE 2 Recommended Serving Volume Per Sample in Liquid Ounces (29.6 mL)/Session

NOTE 1—Alcohol strength in U.S. proof is twice the content by volume. For example, a product labeled 80 % proof contains 40 % v/v alcohol.

Sample Proof Alcohol by Volume	Number of Samples				
	1 oz	2 oz	3 oz	4 oz	5 oz
5	20.00	10.00	6.67	5.00	4.00
10	10.00	5.00	3.33	2.50	2.00
15	6.67	3.34	2.22	1.67	1.33
20	5.00	2.50	1.67	1.25	1.00
25	4.00	2.00	1.33	1.00	0.80
30	3.33	1.67	1.11	0.83	0.67
35	2.86	1.43	0.95	0.72	0.57
40	2.50	1.25	0.83	0.63	0.50
45	2.22	1.11	0.74	0.56	0.44
50	2.00	1.00	0.67	0.50	0.40
55	1.82	0.91	0.61	0.46	0.36
60	1.67	0.84	0.56	0.42	0.33
65	1.54	0.77	0.51	0.39	0.31
70	1.43	0.72	0.48	0.36	0.29
75	1.33	0.67	0.44	0.33	0.27
80	1.25	0.63	0.42	0.31	0.25
85	1.18	0.59	0.39	0.30	0.24
90	1.11	0.56	0.37	0.28	0.22
95	1.08	0.54	0.36	0.27	0.22
100	1.00	0.50	0.33	0.25	0.20
105	0.95	0.48	0.32	0.24	0.19
110	0.91	0.46	0.30	0.23	0.18

A Worked Example Using the Formula

1. A researcher wants to have panelists evaluate two vodka samples, each of which is 86°.

2. $SP1 \times SV1 = SP2 \times SV2$

SP1 = sample proof = 86°

SV1 = total volume to be given to panelists = unknown

SP2 = "standard drink" proof = 100°

SV2 = "standard drink" volume = 1 oz (~30 mL)

3. $86 \times SV1 = 100 \times 1$

4. $SV1 = 100/86$

5. $SV1 = 1.16$ oz

6. $1.16 \text{ oz}/2 \text{ samples} = 0.58 \text{ oz/sample}$.

7. Thus, the researcher should serve each panelist two vodka samples of 0.58 oz each.

How To Use the Recommended Serving Volume Table

1. Determine the proof of the sample that you want to test. Proof is expressed in alcohol by volume and is twice the percent alcohol level. For example an 80° product is 40 % alcohol.

2. Determine the number of samples that you wish to be evaluated.

3. The value in the table is the maximum recommended amount of each sample in ounces. This value is based on "the standard drink." "The standard drink" is one ounce of 100° product or equivalent.

3. The value in the table is the maximum recommended amount of each sample in ounces. This value is based on "the standard drink." "The standard drink" is one ounce of 100° product or equivalent.

4. For values not on the table, use the following formula to calculate the recommended total serving volume for one sample. You can then divide the SV1 value by the number of samples you want your panelists to evaluate.

$$SP1 \times SV1 = SP2 \times SV2$$

where:

SP1 = sample proof

SV1 = total volume to be given to panelists

SP2 = "standard drink" proof = 100°

SV2 = "standard drink" volume = 1 oz (~30 mL).

A Worked Example Using the Recommended Serving Volume Table

1. A researcher wants to have panelists evaluate three liqueur samples, each of which is 30°.

NOTE—If the samples vary in proof, either take the mean proof or use the highest proof to calculate sample volume.

2. The Recommended Serving Volume Table indicates that each panelist should receive three samples of 1.11 oz each.

8.6 Experimental Design—Unlike many other products, beverage alcohol is alcoholic beverages are unique in that there is a recommended serving volume per sample (see Table 2). When designing experiments to test beverage alcohol, alcoholic beverage, keep in mind that there is a limit to the amount of sample that each panelist can consume/evaluate at a given time. This requirement especially is constraining when designing screening, mixture, or response surface experiments. In cases where the number of samples in the study exceeds the number of samples that a participant can evaluate, a couple of options are possible: participants may come back for several sessions or a balanced incomplete block design—where each participant evaluates a subset of the samples—may be used. When participants come back for several sessions, ensure that the presentation order of the samples is randomized across all the sessions and ensure participants receive their incentive at the completion of all the sessions. When using