



TOPIC: PRODUCT INNOVATION, QUALITY

CHALLENGES WITH SENSORY ANALYSIS OF NON-ALCOHOLIC BEERS

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As Non-Alcoholic (NA) Beers continue to increase in popularity, many breweries are making new beers that are entering this category for the first time. Brewers large and small are jumping on the trend to bring a more drinkable and flavor-forward NA options than have ever been available on the market before. There are examples of many new styles and brands that run the gamut of drinkability and quality. NA beers are substantially different from standard beers in the sense that they have no ethanol, and therefore have fundamentally different characteristics which require different criteria for evaluation.

One of the more useful sensory analysis techniques is Trueness-to-Type tasting (1). It is useful in that it evaluates each beer sample relative to a clearly-defined standard. That concept, when applied to a beer style could be called “Trueness-to-Style”. This standard is useful when a known type or style exists, such as a Munich-Style Dunkel or West Coast IPA. The standard expected taste and aroma profiles exist for over 100 universally accepted styles of beer via the Brewers Association (BA) style guideline (2), however there are no universally accepted standards for each style’s NA counterpart, in other words, there is no “Trueness-to-Style” available for these NA counterparts.

How to characterize the expected flavors of various non-alcoholic styles has been the topic of a few studies over the recent years. Lafontaine et al (3) did a great job of correlating “beer-like” flavors with consumer preference. It will be important to further develop and define the process of evaluating NA beers relative to the methods brewers use in their existing sensory analysis programs.

What is the practical brewer to do when creating a beer unlike any they have made before that does not fit into any existing style as defined by the beer universe – how does that brewer evaluate the sensory properties of this new beer relative to expectations?

Sensory Evaluation Goals & Methods

To approach this conundrum of evaluating a new product where there are no well-agreed-upon criteria or standards it is important to consider the goals of a sensory program. Aiken & Spedding (4) define the primary goal of a sensory program as a proactive approach to brewery quality. They also emphasize the importance of building a lexicon within the panel and training the panel members to be able to use that lexicon. The goal of a sensory panel is to provide useful and actionable information to the brewery regarding the quality of the beer being produced. Much of the focus of sensory panels is reliably identifying defects, such that plans can be enacted to correct those defects based on that information. Sensory panels also provide useful information when developing new products – this is especially true when the desired profile of a new product is clearly defined.

Having a proactive approach to the quality and sensory attributes of a new category of beer requires defining the desired characteristics of the profile. The Beer Flavor Map™ by DraughtLab (Lean Sensory Systems) is an excellent training tool for sensory panel members and can also be quite helpful in evaluating existing brands. The ASBC also provides detailed sensory analysis methods, including the Flavor Terminology and Reference Standards.

In evaluating commercially available NA beers it may be a struggle to find the words to describe the sensory differences that are encountered in evaluating these beers. For instance, terpenes and esters might be present at some level that may or may not reach the sensory threshold, but there will be none of the alcohol, or at least very little. The muted aromas and the overall balance can seem out of character for the “parent” (alcohol-containing) particular style. New descriptors may be necessary to assess the overall profile. The descriptors may be different depending on the technology used to make the NA beer, e.g., arrested fermentation vs alcohol removal such as vacuum distillation. Identifying those descriptors to clearly define the sensory targets for the innovation team is a critical goal for the sensory panel.

Ethanol contributions to flavor and aroma

The role of ethanol in the perception of beer flavor is explained well by Piornos et al (5). Alcohol influences the volatility of aroma compounds as well as having its own unique flavor and trigeminal sensation —the perception of heat. Without alcohol or in the presence of very low alcohol there is no burn, no bite, often a lack of body, and altogether different aromatic characteristics in the beer. These differences make the sensory evaluation of certain styles of NA beers quite difficult – an IPA without the bite and burn of ethanol will not taste or smell the same as its full-bodied, full-alcohol cousin – even if it is brewed with the same malts and dry-hopped with the same varieties of hops at the same rate. The brewer may also intentionally lower the bitterness target or raise the dry-hopping rate for a beer of this style to bring it into balance – this needs to be considered in evaluating the flavor of the beer and the targets associated with those variations. Ramsey et al (6) analyzed NA stouts and lagers and determined that retro-nasal perception was necessary to differentiate aromatics. The NA beer was perceived as having more maltiness, with reduced fruitiness, lower sweetness, less fullness/body and a lack of alcohol warming sensations. All of these factors must be considered when developing taste panel standards for each iteration of a new beer – particularly when it is in a new category altogether. Another consideration that merits further research is the evaluation of the sensory stability of NA beers. This is particularly important as it appears that NA beers have half of the reduction power compared to regular beers (7), thus making them less flavor stable.

The absence of alcohol in any given beer style has a dramatic impact on the flavor and aroma of that beer. In describing these beers, brewers typically use the same words that they often use to describe beer attributes and defects in their full-strength beers, e.g. words like worty, vegetal, dull, and bready – all these words fit comfortably within the existing range of expected beer descriptors; however, they don't always adequately describe the intentions of the brewer when creating a non-alcoholic beer. No brewer sets out to make something that is worty, vegetal and dull. New descriptors are needed to properly communicate the intended outcome of the NA beer. Drinking an IPA without the alcohol “bite” is an entirely different experience than drinking a full alcohol version at 6% alcohol or higher, but there is some common sensory terminology ground to be found. For brewers to develop new beers of any style that do not readily fit into existing categories it is important to have a suitable lexicon to adequately describe these beers as well as a sensory program that identifies the desired outcome for the agreed-upon attributes that the brewery desires to have present in their beers. It is only by being able to measure these attributes that the brewer will be able to produce a consistent NA beer.

References:

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