



An investigation of matches of bottom fermented red beers with cheeses



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ARTICLE INFO

Article history:

Received 5 July 2014

Accepted 3 November 2014

Available online 11 November 2014

Keywords:

Food pairing

Beer

Cheese

Liking

ABSTRACT

This study was designed to explore the hedonic response of consumers to cheese and beer pairings by tasting in a typical social environment of consumption. Ninety-six regular beer and cheese consumers hedonically rated all fifty-six pairings of eight bottom fermented red beers and seven cheeses (Parmigiano Reggiano, Fontina, Taleggio, Smoked Provola, Mozzarella, Caprino, and Gorgonzola).

Preference varied across samples ($p < 0.001$). One consumer out of two appreciated all of the pairings, yet pairings with Mozzarella were liked moderately. One consumer out of three appreciated pairings with Parmigiano, were neutral in their hedonic response to pairings with Fontina and disliked moderately the remaining pairings but those including mozzarella were extremely unappealing to them. One consumer out of six disliked all the pairings tested but some matches with Parmigiano were liked slightly. Liking of cheese and bottom fermented red beer pairings is biased by the type of cheese partnered with beer (Parmigiano most liked and Mozzarella least liked); by the type of beer partnered with cheese, and by the liking of the sensory properties of the beers and of the cheese tasted alone. However, consumers do not simply enjoy a combination of their most preferred beer and cheese. They identified some flavors that harmonize better than do others. Also, significant correlations between mean liking scores and sensory characteristics of the fifty-six pairings were found. Beer flavor is modified largely by prior cheese consumption. Each cheese has an effect on beer flavor and this effect is consistent over the eight different beers. In general all of the cheeses decreased the intensity of fruitiness, sweetness, perceived level of carbonation, perceived level of alcoholicity, caramel-like, licorice-like and burnt notes. Bitterness, astringency, and burnt notes were reduced by most of the cheeses but Fontina and Smoked Provola increased the perception of these attributes. For brewers to profitably exploit the potential of the science of cheese and beer pairing the choice of a suitable beer and of a suitable cheese in terms of liking and sensory properties and the identification of a proper target audience familiar to the beers paired with cheese are essential.

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1. Introduction

Pairing cheese and beer might appear to be a relatively new trend, especially when compared to cheese and wine pairing. Yet, it has a remarkably long history. People in Central Europe have been enjoying their cheese with their beer since the Middle Ages, when beer and cheese were dietary staples (Teuteberg, 1986).

In the last decade, the acceptability of wine and cheese pairings has been studied, as have the flavor interactions that take place when cheese is consumed with wine (Bastian, Payne, Perronoud, Joscelyne, & Johnson, 2009; Bastian, Collins, & Johnson, 2010; Carlucci, Caporale, & Monteleone, 2008; Harrington & Hammond, 2005; Harrington & Hammond, 2006a, 2006b; Harrington, 2007; Harrington, 2008; Harrington, Miszczak, & Ottenbacher, 2008; Harrington, McCarthy, & Gozzi, 2010; Harrington,

Koones, Gozzi, & McCarthy, 2012; Harrington, Seo, & Min, 2013; Madrigal-Galan & Heymann, 2006; King & Cliff, 2005; Nygren, Gustafsson, & Johansson, 2002; Nygren, Gustafsson, & Johansson, 2003a; Nygren, Gustafsson, & Johansson, 2003b. Sequential and mixed tasting techniques have been used (Nygren et al., 2002; Nygren et al., 2003a, 2003b; King & Cliff, 2005; Harrington et al., 2008; Carlucci et al., 2008; Bastian et al., 2010).

In contrast, comparatively little is known about beer and cheese complementarity. Italy is a good environment in which to explore the relations among beer and cheese. Beer has become increasingly popular in the last three decades, thanks to its positive image. Beer is seen as a drink that is natural, refreshing, easy to digest, pleasantly bitter, and low in alcohol that is suited for many and diverse occasions (Assobirra, 2013).

In a country in which over six million people are categorized as “foodies,” beer consumers are more knowledgeable than ever. They value flavor, experimentation and local identity of food in their everyday beer choice. The practice of matching food and beer has gathered pace thanks to the craft beer “explosion” that familiarized Italian consumers with beers brewed from a range of alternative raw materials and in styles mostly unknown hitherto (Savastano, 2011). It comes as

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little surprise that beer adaptability to food is one of the most important factors behind beer consumption in Italy (Assobirra, 2011). Loyal to the Mediterranean diet tradition of consuming fermented alcoholic beverages with food, nine out of ten Italians say they drink beer only with their meals, just as recommended by nutritionists, and enjoy beer as much as wine at lunch or dinner in restaurants. Italians are particularly inclined to experiment with beer and food pairing if restaurants advise patrons of the best pairings (Makno-Assobirra, cited by Donadini, Spigno, Fumi, & Pastori, 2008).

In a flat Western European beer market, brewers are trying to capitalize on a confluence of trends in palates, cooking, economics and demographics to consolidate their business (The Brewers of Europe, 2013). Similarly, research is exploring patterns of consumer preferences for beer through an integrated approach in an attempt to provide brewers with practical ways to respond to consumers' demands.

Food and beverage pairing is valued by consumers and appears to be an innovative and profitable strategy to meet consumers' demands (Assobirra, 2013; Bastian et al., 2010; Harrington et al., 2010). Accordingly, food and beer pairing has been part of our past investigations of beer (Donadini et al., 2008; Donadini, Fumi, & Lambri, 2013).

Donadini et al. (2008a), evaluated the preferences of Italian consumers for food and beer matches and showed that some dishes of Italian cuisine are suitable beer matches while others are less ideal partners of beer because, in consumers' views, some flavors harmonize better than do others, independent of the personal preference for the beer when drunk alone.

More recently Donadini et al. (2013) explored Italian consumers' preferences for a range of cheese and beer matches. The study was designed to determine whether beer is an enjoyable partner of cheese and to identify the most influential factors among cheese type, beer type, cheese liking, beer liking and their two-way interactions in driving consumers' hedonic responses to cheese and beer matches. To mirror the sensory structure of the Italian beer market presented by Donadini and Fumi (2010), Donadini et al. (2013) included one bottom fermented standard lager of average alcoholicity, one amber Bock, one Vienna Lager, and one top fermented Hefeweizen. Of interest, the authors reported on the effect of prior and mixed consumption of four cheeses (i.e. Parmigiano Reggiano, Smoked Provola, Gorgonzola and Mozzarella) on beer flavor and tested whether variation in beer flavor induced by prior cheese consumption has an effect on beer liking. Donadini et al.'s results showed that cheese is liked by consumers in combination with beer, although the hedonic experience of consumers varies considerably across cheese types, beer types and cheese and beer combinations; mixed consumption of cheese and beer has a hedonic valence for consumers' drinking experience such that consumers appreciate a beer paired with cheese more than the same beer consumed alone; cheese reduces the intensity of unpleasant beer flavors and modulates beers that are too acidic, too phenolic, or too carbonated to be fully appreciated alone.

In the study described here, we explored preferences for cheese and BFRB matches obtained from the combination of the eight BFRBs used in Donadini, Fumi, and Newby-Clark (2014) and seven cheeses readily available on the Italian market. We tested Parmigiano Reggiano, Smoked Provola, Gorgonzola and Mozzarella (previously tested by Donadini et al. (2013), and Fontina, Taleggio and Caprino (not previously tested). Beer and cheese samples were chosen to expand upon Donadini et al. (2013), whose preliminary results cannot be due to the limited number of cheeses and beers tested.

To reach this goal, a panel of ninety-six beer consumers were asked to hedonically rate all possible pairings of eight bottom fermented red beers and seven cheeses (56 pairings in total) on a 9-point hedonic scale in a natural and social environment of consumption. To understand the relationships between consumers' liking and the sensory properties of the fifty-six pairings, expert panellists were asked to quantify the sensory profiles of the eight beer without prior consumption of

cheese along with the sensory profiles of the fifty-six pairings by means of Descriptive Analysis (DA). In this way the authors explored how beer flavour changes under the effect of mixed cheese consumption and attempted to identify what sensory attributes, if any, drive pairing acceptance.

2. Materials and methods

2.1. Beer samples

Eight BFRBs were selected for this study. They included the same beer brands selected by Donadini et al. (2014) to explore patterns of consumers' preferences for beer in the Italian market. The beers selected represented the most sold BFRBs of the Italian market and spanned a wide range of sensory characteristics as reported in Donadini et al. (2014). All the samples under test had the same remaining shelf life and belonged to the same batch of the samples used by Donadini et al. (2014). Beer identifiers in the text are capital letters from A through H.

2.2. Beer preparation before serving

The beer samples were bought from a local supermarket (B, A, G, D) or supplied by the brewer (E, H, C, F). They were stored in a dark environment at approximately 15 °C during the trials. The beer samples were refrigerated to 10 ± 2 °C prior to serving. Each sample (30 mL beer) was coded with a three-digit random number, poured into a tulip-shaped glass covered with a Petri dish to preserve volatiles and were presented with approximately the same level of foam, thus avoiding a potential source of bias in flavor perception (Donadini et al., 2011b).

2.3. Cheese samples

Seven cheeses were selected for this study: Parmigiano Reggiano (24 months of ripening, cow milk, hard cheese, hereafter called Parmigiano), Gorgonzola (cow milk, soft cheese, blue veined cheese), Smoked Provola (cow milk, smoked cheese, pasta filata cheese), Fontina (cow milk, semi-cook, semi-soft cheese), Caprino (goat cheese, fresh soft cheese), Taleggio (cow milk, semi-soft, washed edible rind cheese), and Mozzarella (cow milk, fresh cheese, pasta filata cheese). Parmigiano, Gorgonzola, Taleggio and Fontina are Protected Denomination of Origin (PDO) cheeses (EC Regulation 1107/96), whereas Mozzarella is a Traditionally Specialty Guaranteed (TSG) cheese (EC Regulation 2527/98). These cheeses are among the most commonly available and eaten cheeses in Italy. Moreover, they were chosen to maximize differences in flavors and textures.

Parmigiano, Gorgonzola, Smoked Provola and Mozzarella had the same remaining shelf life and belonged to the same batch/rind of the samples used by Donadini et al. (2013).

2.4. Cheese preparation before serving

Cheeses were prepared for serving as was reported in Donadini et al. (2013). Caprino cheese samples were prepared without removing the outer layer and a wheel-shaped slice of 25 g. was served.

2.5. DA of the eight beers

Please note that the sensory characteristics of the eight BFRBs had been already quantified in our 2014 study on beer preference for BFRBs of the Italian market and the mean intensity ratings of the descriptors used in this study were taken from that study. To aid in replication, the procedure used to determine the sensory profiles of the eight beers is described briefly below.

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