



*Research article*

## **Innovation in craft beer packaging: Evaluation of consumer perception and acceptance**

**Valentina Maria Merlino\***, Simone Blanc, Stefano Massaglia and Danielle Borra

Department of Agricultural, Forest and Food Sciences, University of Turin, Largo Paolo Braccini 2, 10095 Grugliasco, Italy

\* **Correspondence:** Email: [valentina.merlino@unito.it](mailto:valentina.merlino@unito.it); Tel: +390116708622.

**Abstract:** Craft beer is an authentic product characterised by unique sensory features that distinguish it from industrially produced beers. The typical consumer also closely associates craft beers with the concept of traditional products, also in terms of consumption habits and the manner in which they are packaged. In this research, 482 beer consumers were interviewed face-to-face using a paper questionnaire during the Oktoberfest (Piedmont-Northwest Italy), a traditional beer festival that draws thousands of craft beer fans. Two consumer samples were defined on the basis of individual statements regarding their preferred method of beer packaging: The “traditional” consumer, loyal to the conventional beer packaging material (glass bottle) and the “innovative” consumer more inclined to packaging innovation (the use of aluminium cans). The preference scores towards beer attributes of the two identified samples were assessed using a 5-points Likert scale. In addition, the individual socio-demographic characteristics, together with craft beer consumption habits were recorded during the data collection phase. Significant differences between the two consumer samples were found using a non-parametric test; the Mann-Whitney Wilcoxon. In particular, traditional and innovative consumer groups expressed different preference levels towards beer clarity, colour, bitterness and body. For both samples, taste intensity resulted as the top attribute for beer evaluation, highlighting that, even when canned, the consumer is able to evaluate and appreciate the aromatic and quality characteristics of the product. Therefore, although glass remains the preferred packaging material for craft beer consumers, given the increasing acceptance of canned packaging by the traditional consumer, brewers could conceivably focus on canned product lines in order to exploit the inherent logistical and marketing advantages (i.e. graphical communications).

**Keywords:** craft beer; packaging innovation; consumer perception; sensory attributes

---

## 1. Introduction

In 2018, global beer production amounted to 1.94 billion hectolitres, mainly produced in China, the United States and Brazil [1]. At European level, Germany was the main brewer with an annual production of 93 million hectolitres, followed by the United Kingdom and Poland (respectively producing 40.5 and 40.4 million hectolitres) [2], whereas Italy was the ninth largest brewer in Europe, recording a beer production in 2018 equal to 16.4 million hectolitres (+4.7% compared to 2017).

In Italy, 70% of the total beer production derives from 13 industrial breweries, that alone cover the majority of the national domestic market (approximately 70% of national consumption), operating a total of 16 production plants, located in different regions of Northern and Southern Italy. Small brewers and brewpubs cover the remaining 30% of Italian beer production. More than 1,500 imported brands are also sold on the Italian market [3]. Italian beers are also increasingly appreciated abroad (more than 15% of their production goes to foreign exports), with an increase in exports of 6.6% in 2018 compared to the previous year, especially towards the United Kingdom (48.9%), the United States (7.7%) and Australia (7.6%).

Beer consumption in Italy has also increased in recent years, with per capita consumption rising to the level of 33.6 litres per year in 2018. However, this figure is still inferior when compared to the per capita consumption of other European countries, for example the Czech Republic (138 litres/per capita/year) [2]. AssoBirra, the Association of Italian Brewers and Malsters has determined the beer consumer profile, highlighting the individual propensity to drink beer (77%), especially at home (64%), with food and on social occasions. In addition, the same research shows an increasing interest by female consumers towards beer; in fact, 70% of the female Italian population consumes beer, 30% of them do so at least twice a week and 42% say they drink more than they did five years ago [2]. Regarding the beer market in Italy, the craft beer sector is currently experiencing evident expansion and recognition on the national market. This expansion could be due to a number of factors, ranging from its growing accessibility in large retail chain distribution, also at competitive prices, to the adoption of good promotion and marketing strategies [6] and to the high level of differentiation on the market [7], both in terms of image and product taste. Currently, 862 microbreweries and brew-pubs exist, with a production of 504,000 hectolitres of craft beer, an increase of 4.3% on 2017. These producers are heterogeneously distributed in several Italian regions, particularly in the North. As specified by Italian law (n. 1354 dated 16<sup>th</sup> August 1962), craft beer is defined as being produced by small independent breweries and not subject to pasteurisation and microfiltration processes during the production phase. Said ‘small independent breweries’ must consist of “a brewery which is legally and economically independent of any other brewery, which uses facilities physically distinct from those of any other brewery, which does not operate under licence to use the intangible property rights of others and whose annual production does not exceed 200,000 hectolitres, including in this quantity quantities of beer produced on behalf of third parties” [4]. The rich and composite sensory profile of craft beers denote the uniqueness of this product that loyal consumers clearly distinguish from industrial productions. From a sensory point of view, craft beers have a carbonation, foam, taste and colour that make them superior in perceived quality, when compared to industrial beers [5]. The typical properties of this product derive from the choice of ingredients, which may be unconventional and of local origin, and also from the production process, which does not traditionally include pasteurisation and filtration [6]. The production of craft beer follows two main strands: that of tradition, attributable to old traditional recipes, and that of

innovation in taste and style. In fact, craft beers containing unconventional ingredients such as aromas, spices or fruits are supported by innovative brewing techniques that reinterpret ancient styles [8–10]. Therefore, craft beers may not be fully appreciated by drinkers as they present a deviation from their sensory expectations and when compared to their consumption habits [6]. The two production lines (traditional vs. innovative) are however supported by different clusters of consumers defined by Assobirra in terms of the degree of knowledge, preferences and product use [2]. Similar to other products, also in the case of craft beer a target of expert consumers, connoisseurs and scholars of the product can be defined, linked to this product, that can be differentiated in taste, but which maintains the typical flavour of beer. These expert consumers, who are strongly against any additives that modify the flavours of the product, are generally not very inclined to product innovation, in all its components [7,8]. This attitude is also applicable to other products strongly linked to tradition, such as grappa [9]. More specifically, for this target of consumers, connoisseurs of products that make consumption a real ritual, innovation is not always appreciated, whether this changes the intrinsic characteristics of the product or those related to packaging. However, again from Assobirra's study [2], a significant part of their sample was positively inclined towards experimentation, innovation and beer taste diversification. Packaging influences consumer acceptance and preference towards different types of food products [10–12]. In the case of craft beers, which are present on the market at large distribution channels, but also at breweries, glass (bottles) is predominantly used due to its recyclability [13,14] (the recycled material is equal to 20-30% in typical beer glass bottles), and due to its influence on beer quality perception by the consumer. In fact, glass is positively correlated to overall product quality perception by beer consumers in Italy, which makes it their preferred packaging material [15,16]. However, from a sustainability point of view, the problem with glass is its weight. Glass bottles have a large CO<sub>2</sub> footprint due to transportation [17]. They require a large amount of cardboard packaging to avoid breakages. According to a study by Koerner [18], transporting a bottle emits 20% more greenhouse gases than transporting a can. By contrast, cans are much lighter, resistant and, unlike glass, less fragile, easier to store than bottles because they are stackable, determining a lower environmental impact, and also require less packaging for transport. In addition, cans have a much higher recycling rate than glass. According to the Aluminium Association [19], cans are typically made of 70 percent recycled material, and people recycle cans 20 percent more often than glass. In addition to its environmental sustainability, aluminium is waterproof and does not allow light and oxygen to filter through, thus not compromising the product quality during storage; in fact, oxidation and light negatively affect beer sensory integrity [20]. The higher thermal conductivity, which allows more rapid beer cooling in refrigerated environments, represents another advantage of aluminium [21]. Especially in the American and English markets, the marketing of craft beer in aluminium cans is increasing, also to align to the acceptance by new consumer targets towards this innovative craft product packaging [22]. Aluminium packaging enables drinks to be consumed outdoors, as they do not break and therefore do not represent a community safety hazard. Finally, the external aluminium surface can be screen-printed with any image and colour, which is not possible in glass packaging where the labels can only be glued onto the bottle [20,23].

Currently, Italian consumers still do not seem very inclined to accept beer in aluminium cans [16] and, in particular for craft beer, as this is linked to a lower quality and to conventional products [24].

This consumer attitude towards canned craft beer was also confirmed by Barnett et al. (2016), in

which a negative consumer perception emerged towards canned craft beer taste in comparison to bottled ones. However, the authors highlighted how the beer taste evaluation by consumers changed without seeing the packaging: in practice, individuals cannot perceive any difference between the two differently packaged products [24].

The can is a phenomenon in continuous growth and affirmation in many countries around the world, including Italy [26–28]. However, now in the national context its use appears sustainable only for medium-large companies (i.e. the Piedmont Company Baladin and the Mister B Brewery of Mantua), probably due to the major costs arising from can production [25]. Conversely, at European and global level there are many companies that adopt this type of packaging: Oskar Blues and Sierra Nevada in Lagunitas, Stone Brewing in the United States and Brewdog in the United Kingdom [25].

In this context, the aim of our study was to investigate and compare consumption and preferences of two craft beer consumer targets considering a specific geographical area of Northwest Italy. The first consumer group involved individuals loyal to the traditional beer packaging material (glass bottle), while the second subjects inclined to packaging innovation (the use of aluminium cans). Face-to-face interviews were made involving a consumer sample selected at the drink and food event Oktoberfest, which took place in Cuneo (Piedmont - Northwest Italy) in 2019, during which both large-scale beer producers vs. craft breweries participated. The difference between the two consumer targets regarding craft beer sensory characteristics was statistically tested.

## 2. Materials and methods

A choice experiment was conducted in order to identify whether significant differences exist between two consumer targets (innovative vs. traditional) in the perception towards a set of attributes defining beer sensory quality. Face-to-face interviews were performed during the Italian version of the Oktoberfest (Cuneo, Piedmont-Northwest Italy), the 12-day event from the 26<sup>th</sup> of September to the 7<sup>th</sup> of October 2019, that hosted brewers, from the more traditional ones to new brewers who focused on new products innovative in packaging and taste. Almost 120,000 visitors attended the 2019 edition [29]. The questionnaire used in the data collection phase was structured in two main sections: the first investigated the individual socio-demographic characteristics (gender, age, family size, employment status, educational background and annual average household income), while the second part included questions about craft beer consumer purchasing and consumption habits. In particular, this section investigated the craft beer packaging habitually chosen by the involved individuals (glass bottle or aluminium can), in addition to the preference levels assigned by the sample towards 9 sensory characteristics of beer (Table 1), evidenced using a 5-point Likert scale. The selected attributes were chosen by means of an in-depth literature research. The respondents were required to indicate their preference score, from 1 (not at all important), to 5 (very important), for each beer attribute. The preference level towards each beer attribute was analysed by comparing the two consumer groups identified on the basis of the individual response regarding their habitual choice of beer container material. Thus, we identified, group 1 - innovative consumers (who declared to choose beer in aluminium cans) and group 2-traditional consumers (who declared they only purchased craft beers in glass bottles). Based on this evidence, the authors developed the research hypothesis (H0) in which the two sub-samples (different in terms of beer container material choice, glass or aluminium) express no significant different preferences towards the identified sensory beer attributes. A non-parametric test, the Mann-Whitney Wilcoxon, was applied to compare the

differences between the two independent consumer groups, deriving from the same population [30,31], in order to highlight whether a different preference towards the beer container, the can (innovative trend) or the glass bottle (traditional trend), influences the evaluation of the sensory characteristics of the craft product. Prior to this, a classic assumption of normality test (Shapiro-Wilk test) and Levine's Test for variance homogeneity assessment were applied. After this first step, the inequality of variances and non-normality of data were checked.

### 3. Results

Among the total respondents ( $n = 482$ ), 25% chose craft beer in cans, while the remaining 75% consumed beer only in glass bottles. The two consumer groups (group 1 = innovative; group 2 = traditional consumers) socio-demographic characteristics are summarised in Table 2.

The two consumer groups differed statistically in terms of gender, age (considering the youngest subjects), employment status and, finally, in terms of the medium range of annual average income. More specifically, the interviewees were almost equally distributed between the two genders (56% men and 44% women) in the group of traditional consumers, while they were mainly male for the innovative group. In both groups, there were mainly young people, in particular between 18 and 25 years of age for the innovative group. In general, the consumers interviewed were mostly students in group 1, whereas mainly employees in group 2. Finally, the two groups accounted for the majority of individuals with an average annual household income and differed statistically from each other in this respect.

By analysing the results of the Mann-Whitney Wilcoxon-Test it is possible to state that the initial hypothesis ( $H_0$ ), which assumed that the choice of beer container (aluminium can or glass bottle) does not affect the sensory craft beer preferences of consumers, cannot be completely rejected. In fact, as reported in Table 3, the two consumer groups are in agreement regarding the evaluation of some of the identified sensory beer attributes. In particular, the level of preference expressed for beer sweetness, alcohol content, taste intensity and aroma, attributes detectable by the consumer when tasting the product, by means of the palate, is not significantly different between the two groups. In addition, no differences emerged regarding beer turbidity evaluation between groups 1 and 2.

On the contrary, the result of the Mann-Whitney Wilcoxon test showed that the innovative and traditional consumers differed statistically in terms of perception of beer colour, bitterness, body and clarity. Therefore, not only in terms of attributes that can be assessed through direct observation of the product, but also in terms of attributes that can be assessed during beer tasting. The probability of rejecting the hypothesis  $H_0$  is below the threshold of 5% ( $p < 0.040$ ) only in the case of beer bitterness, whereas in the case of the other attributes evaluated differently by the two groups, the threshold was equal to 10%. In general, for all of these attributes the mean preference scores (average score) were always higher for traditional consumers, highlighting a major relevance expressed by these individuals, in comparison to the innovative consumers, except for the alcohol content, assessed as most important for group 1. The intensity of beer taste was the attribute with the highest level of importance for both consumer groups, although it is still higher among bottled beer drinkers (4.39) than among canned beer drinkers (4.32). Turbidity and sweetness emerged as the least important attributes for both consumer groups.

**Table 1.** Craft beer attribute description used in the 5-points Likert scale. For each attribute the description and the references are reported.

Sensory attributes of craft beer	Description	References
Alcohol content	The alcohol content plays an important role both at the time of the choice of purchase and at the time of consumption. Consumers tend to attribute higher alcohol content to darker coloured beers than to lighter coloured ones.	[5,32–34]
Aroma	When the consumer chooses a craft beer at the expense of an industrial one, the motivation often concerns the selection of aromas (e.g. malted barley, chestnut, honey beers). This enables the consumer to perceive the craft beer as being of superior quality compared to a large-scale produced beer. In addition, a driver of craft beer consumption is also the uniqueness of the proposed flavour that is able to represent an experience.	[5,6,35]
Bitterness	The bitterness of beer is an element derived mainly from hops and is a characteristic feature of this product but not all consumers appreciated it. According to a study conducted in North-East America, consumers generally prefer milder beers.	[10,36–38]
Body	A distinction by gender shows that women prefer milder beers, while for men bitterness is not a negative factor. The body, together with the malty flavour, is one of the attributes on which consumers base their choice; it is also able to influence the pleasantness of beer in a positive way. In addition, the perception of body in beer shows a positive correlation with both bitterness and the intensity of astringency. Consumers who choose ale beers prefer full-bodied beers.	[39,40]
Clarity	The clarity of beer is an important element that can influence consumer preferences and it is preferred to the possible presence of turbidity.	[41,42]
Colour	Craft beer colour is usually darker than industrial ones. Consumers attach greater importance to the colour attribute than to factors such as price and the presence of foam, both at the time of purchase and consumption. Therefore, consumers consider it an important visual element.	[5,32,33,36]
Sweetness	Studies mainly addressing female preferences analysed the sweetness of beer, namely the type of consumer who prefers the milder beers. In fact, sweetness has a positive effect on the agreeability of beer for these consumers, and they appreciate beers that are sweeter and less bitter.	[43]
Taste intensity	Taste and intensity are two of the main drivers of purchase together with price, alcohol content and colour. In fact, the diversity of taste is often the main driver for the consumers who consume craft beers. However, consumers often claim that the taste of beer is better when bottled rather than when it is canned. The act of drinking the beer directly from the can could accentuate this perception.	[24,36]
Turbidity	Turbidity is the presence of suspended particles that make the beer opaque and this is often associated with a low-quality beer. Industrial filtration and clarification processes eliminate turbidity.	[41,44]

**Table 2.** Summary of socio-demographic characteristics of the two consumer groups: 1 = innovative; 2 = traditional.

Characteristic	Category	Traditional (n = 361)	Innovative (n=121)	p-value <sup>1</sup>
Gender	Male	57%	63%	0.032
	Female	44%	37%	0.049
Age	18–25	47%	51%	0.025
	26–35	43%	41%	0.015
	36–45	9%	6%	0.126
	>45	2%	2%	n.d
Family size	1 component	11%	8%	0.099
	2 components	14%	10%	0.105
	3 components	24%	35%	0.117
	4 components	42%	33%	0.076
	>=5 components	10%	14%	0.105
Employment status	Student	38%	51%	0.033
	Employee	43%	31%	0.037
	Self-employed worker	9%	10%	0.092
	Looking for a job (unemployed)	9%	8%	0.102
	Housewife	1%	0%	0.500
Educational background	Middle school	3%	0%	0.500
	High school	62%	65%	0.015
	Degree	35%	35%	n.d.
Average annual household income (€)	<25.000 €	32%	20%	0.144
	25.000–40.000 €	36%	45%	0.050
	40.000–60.000 €	4%	10%	0.257
	>60.000 €	1%	2%	0.207
	No answer	27%	22%	0.064

Note: <sup>1</sup> Significant values of p-value (threshold of 5%) are highlighted in bold.

**Table 3.** Results of the Mann-Whitney Wilcoxon-Test: Beer attributes preferences of the two consumer groups (1-innovative; 2-traditional consumers).

Craft beer attributes	Number of observations <sup>1</sup>		Sum of scores		Average scores		Mann-Whitney Test	
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2	Z	p-value
Colour	121	361	461	1419	3.81	3.94	-1.868 <sup>b</sup>	+
Aroma	121	361	477	1446	3.94	4.02	-0.695	n.s
Bitterness	121	361	398	1245	3.31	3.46	-2.047 <sup>a</sup>	*
Body	121	361	419	1302	3.49	3.61	-1.751 <sup>b</sup>	+
Clarity	121	361	378	1169	3.15	3.26	-1.886 <sup>b</sup>	*
Alcohol content	121	361	443	1294	3.69	3.59	-1.433	n.s
Sweetness	120	361	372	1161	3.10	3.22	-1.456	n.s
Taste intensity	121	361	519	1582	4.32	4.39	-1.307	n.s
Turbidity	121	360	376	1096	3.13	3.05	-1.318	n.s

Note: <sup>1</sup> Consumer groups: 1) innovative consumers, 2) traditional consumers; n.s. not significant coefficient; p-value is the level of statistical significance: \*\*\* < 0.001, \*\* < 0.01, \* < 0.05, + < 0.1, no value if not significant; <sup>a</sup> Significant coefficient at the threshold of 5%; <sup>b</sup> Significant coefficient at 10% threshold.

#### 4. Discussion and conclusions

This study describes how the choice of craft beer packaging material, glass or aluminium, influences the perception of the sensory characteristics of the product by two innovative and traditional consumer targets. Although, as mentioned above, the use of the can has several logistical advantages and does not negatively affect the sensory quality of the product, this research shows that most consumers normally drink beer from glass containers. This choice could be related to a habitual and traditional aspect of the consumption of this product. In addition, it appears more difficult to enjoy the nuances of aromas and flavors of beer consumed from the can, compared to the mug. Another reason could be that breweries traditionally flavor the consumption of beer in a mug, making the can generally unattractive. However, among the total number of individuals considered in this research, 25% were defined as “innovative” in accordance with their choice of beer packaging, oriented towards an unconventional craft beer packaging material, aluminium. This innovative packaging for this craft product is therefore more interesting for the consumer than in the past, also for this type of “special” product that aims to differentiate itself from large-scale industrial production. In this research, the comparison of preference scores for each beer attribute highlighted some significant differences between the two innovative and traditional consumption targets regarding the evaluation of beer clarity, colour, bitterness and body. Both groups considered the attributes of intensity of taste, aroma and colour as the most important attributes. It must be stressed that among these, colour is the only element that the consumer can assess before purchasing the product (and only when packaged in transparent containers), while the others are attributes of “experience”, an element that can only be assessed during and after the experience of drinking beer [45,46]. Turbidity emerged as the least important attribute for both consumer groups, whereas, as described in a previous research [7], and also evidenced in our research, alcohol content is not a predominant driver of choice for the two different targets of beer consumers. Although several authors in literature have described alcohol content as an element influencing the decision to



consume beer [36,47], the consumers involved in this study did not consider it as such, probably because they were focused on the evaluation of sensory aspects which, despite sensory aspects also being influenced by the alcohol content, can be evaluated during the tasting of beer (color, aroma, bitterness, etc.). Aroma is considered important for craft beer consumers because it imparts a uniqueness and complexity of particular flavours to the product, increasing their perceived quality compared to industrial beers [7,37]. However, in our research “traditional” consumers considered this attribute to be more relevant compared to the innovative group. Previous studies have shown that consumers maintain that beer in glass bottles has a better aroma and taste than beer in cans [22], confirming how packaging can have a psychological impact on consumer perceptions of product quality [38]. Although clarity is not evaluated as an important attribute during craft beer choice, differences in its evaluation emerged between the two consumer groups. In particular, the “innovative” consumer evaluated this aspect as less important. This result can be linked to the consumption habits of these individuals (they drink canned craft beer) that justifies their disregard for visually assessable attributes. The transparency of the container enables the consumer to check the product quality directly, providing them with a greater degree of confidence, compared to packaging that does not allow the product to be viewed [39,40]. In fact, beer colour is also assessed as an important characteristic by traditional, but not by the “innovative” consumer. The bitter taste and body of the beer (positively correlated with bitterness [30,32,33]) have a similar importance both for traditional and innovative craft beer drinkers. On the contrary, although it is among the least important attributes for the whole sample, beer sweetness is evaluated as more important by the traditional group.

In conclusion, this research shows how a target of consumers accepts the use of the can for craft beers. The can is therefore a key positive element for innovation as, not only could it be accepted by consumers, but it can accommodate attractive graphics, and provides other logistical advantages over glass, for example: possibility of stacking, lower risk of breakage, lower weight and greater ease of use, disposal (as it consists of a single material) and lower environmental impact. Concerning sensory perceptions, it may be important for craft brewers, not only to differentiate and characterise their product, but also to inform the consumer that there are no qualitative and sensory differences between bottled and canned beer. In fact, the only difference between these is the consumer's previous perception. From our research, the two groups of consumers do not differ significantly regarding sensory preferences. This result evidences that even from the can, the consumer can evaluate and appreciate aromatic and quality characteristics that make a product, such as craft beer, unique. Craft brewers could also communicate the advantages of using the can instead of the glass bottle.

Further, research conducted among Spanish beer consumers [48] reveals that, perceived quality, particularly of locally produced beers, is a key factor in consumer assessment of brand value. While unrelated to craft beer production, this finding has nevertheless significant implications. Indeed, through innovative practices resulting in perceived higher product quality, added to local production, craft breweries could progressively expand their market share and awareness among consumers. This notion is partly supported by Tremblay, Iwasaki, and Tremblay (2005), who posit that domestic craft brewers are able to provide fresher products to consumers, as opposed to imported products, and can cater better to both local and regional tastes [32]. However, among the limits of this work, there is a gap in the evaluation of the potential costs of implementing an alternative packaging system that, in some cases, could be too expensive for small producers. In addition, due to the fact that the

information collected was expressed by a sample of consumers interviewed in a specific geographical area and during an event dedicated to beer, it would be interesting in future research to increase the sample of respondents, as well as to implement a cost/benefit analysis.

In general, people who choose craft beer consume a traditional product with a uniqueness and authenticity in taste that enables the creation of product identity [28]. Craft beers can also be considered as an expression of the identity of a geographical area, an element capable of enhancing local production [4].

### Conflict of interest

The authors declare no conflict of interest.

### References

1. World beer production, In Statista (2020) Available from: <https://www.statista.com/statistics/270275/worldwide-beer-production/>.
2. AssoBirra, Annual report (2018) Available from: [https://www.assobirra.it/wp-content/uploads/2019/05/AnnualReport\\_2018\\_PagineSingole.pdf](https://www.assobirra.it/wp-content/uploads/2019/05/AnnualReport_2018_PagineSingole.pdf).
3. Muraca P (2020) Beverfood.com, Mercato Birre Italia 2019: i principali competitori, 2020. Available from: <https://www.beverfood.com/mercato-birre-italia-2019-principali-competitori-wd/>.
4. GURI (1962) Gazzetta Ufficiale No. 234 of 17th September 1962 containing the Law No. 1354 of 16th August 1962–Hygienic discipline of the production and commerce of beer, amended by the Laws No. 329/74 and 141/89, D.L. 109/92 and DPR 272/98.
5. Aquilani B, Laureti T, Poponi S, et al. (2015) Beer choice and consumption determinants when craft beers are tasted: An exploratory study of consumer preferences. *Food Qual Prefer* 41: 214–224.
6. Donadini G, Porretta S (2017) Uncovering patterns of consumers' interest for beer: A case study with craft beers. *Food Res Int* 91: 183–198.
7. Köster EP, Mojet J (2007) 4-Theories of food choice development, In: Frewer L, van Trijp H (Eds.), *Understanding Consumers of Food Products*, Woodhead Publishing, 93–124.
8. van Trijp HCM, van Kleef E (2008) Newness, value and new product performance. *Trends Food Sci Technol* 19: 562–573.
9. Merlino VM, Massaglia S, Borra D, et al. (2019) New consumer targets towards a traditional spirit: the case of Grappa in Piedmont (northwest Italy) Italy. *Ital J Food Sci* 31: 652–668.
10. Sester C, Dacremont C, Deroy O, et al. (2013) Investigating consumers' representations of beers through a free association task: A comparison between packaging and blind conditions. *Food Qual Prefer* 28: 475–483.
11. de Silva AR, Bioto AS, Efraim P, et al. (2017) Impact of sustainability labeling in the perception of sensory quality and purchase intention of chocolate consumers. *J Clean Prod* 141: 11–21.
12. Blanc S, Massaglia S, Brun F, et al. (2019) Use of Bio-Based Plastics in the Fruit Supply Chain: An Integrated Approach to Assess Environmental, Economic, and Social Sustainability. *Sustainability* 11: 2475.
13. FEVE ECGF (2012) Good Practices in collection and closed-loop glass recycling in Europe, Brussels, Belgium.

14. Koelsch Sand C (2019) Feeding Tomorrow Foundation, A Classic Resurges: Glass. Available from: <https://www.ift.org/news-and-publications/food-technology-magazine/issues/2019/december/columns/a-classic-resurges-glass>.
15. Donadini G, Spigno G, Fumi MD, et al. (2008) Evaluation of Ideal Everyday Italian Food and Beer Pairings with Regular Consumers and Food and Beverage Experts. *J Inst Brew* 114: 329–342.
16. Spigno G, Donadini G, Fumi MD, et al. (2005) Indagine di mercato sui criteri di acquisto di birre lager in Italia. S. Porretta (Ed.), *Ricerche e innovazioni nell'industria alimentare*, Torino, Chiriotti Editore.
17. Cimini A, Moresi M (2018) Mitigation measures to minimize the cradle-to-grave beer carbon footprint as related to the brewery size and primary packaging materials. *J Food Eng* 236: 1–8.
18. Koerner B (2008) Slate Magazine, The eco-guide to responsible drinking. Available from: <https://slate.com/technology/2008/03/the-eco-guide-to-responsible-drinking.html>.
19. Study Finds Aluminum Cans the Sustainable Package of Choice. The Aluminum Association. (2020) Available from: <https://www.aluminum.org/news/study-finds-aluminum-cans-sustainable-package-choice>.
20. Baladin S Birre artigianali in lattina o in bottiglia? (2020) Available from: <https://www.baladin.it/blog/birre-artigianali-in-lattina-o-in-bottiglia>.
21. Amienyo D, Azapagic A (2016) Life cycle environmental impacts and costs of beer production and consumption in the UK. *Int J Life Cycle Assess* 21: 492–509.
22. Elzinga KG, Tremblay CH, Tremblay VJ (2015) Craft Beer in the United States: History, Numbers, and Geography. *J Wine Econ* 10: 242–274.
23. Tapper D (2014) The rise of canned beer: anyone fancy a tinnie? *The Guardian*.
24. Barnett A, Velasco C, Spence C (2016) Bottled vs. canned beer: Do they really taste different? *Beverages* 2: 25.
25. Birre artigianali in lattina con gli impianti low cost *Il Sole 24 ORE* (2020) Available from: <https://www.ilsole24ore.com/art/birre-artigianali-lattina-gli-impianti-low-cost-ACtTL3i>.
26. In verità a vi dico: le lattine sconfiggeranno la birra industriale (2011) *Cronache di Birra*. Available from: <https://www.cronachedibirra.it/opinioni-e-tendenze/4481/in-verita-vi-dico-le-lattine-sconfiggeranno-la-birra-industriale/>.
27. Le lattine: il più grande fenomeno craft degli ultimi 15 anni (2018) *Cronache di Birra*. Available from: <https://www.cronachedibirra.it/opinioni-e-tendenze/21202/le-lattine-il-piu-grande-fenomeno-craft-degli-ultimi-15-anni/>.
28. La lattina piace sempre di più anche ai birrifici artigianali Available from: <https://www.bargiornale.it/vino-birra/tutto-il-fascino-della-lattina/>.
29. Oktoberfest Cuneo (2020) Available from: <https://www.oktoberfestcuneo.it/>.
30. Aydogdu MH, Kaya F (2020) Factors affecting consumers' consumption of organic foods: A case study in GAP-Şanlıurfa in Turkey. *J Agric Sci Technol* 22: 347–359.
31. Di Vita G, Blanc S, Mancuso T, et al. (2019) Harmful compounds and willingness to buy for reduced-additives salami. An outlook on Italian consumers. *Int J Environ Res Public Health* 16: 2605.
32. Tremblay VJ, Tremblay VJ, Tremblay CH (2005) *The U.S. brewing industry: Data and economic analysis*, MIT Press.
33. Poelmans E, Rousseau S (2017) Beer and organic labels: Do Belgian consumers care? *Sustainability* 9: 1509.

34. Reinoso-Carvalho F, Dakduk S, Wagemans J, et al. Dark vs. light drinks: The influence of visual appearance on the consumer's experience of beer. *Food Qual Preference* 74: 21–29.
35. Gómez-Corona C, Escalona-Buendía HB, García M, et al. (2016) Craft vs. industrial: Habits, attitudes and motivations towards beer consumption in Mexico. *Appetite* 96: 358–367.
36. Orth UR, Lopetcharat K (2006) Consumer-based brand equity versus product-attribute utility: A comparative approach for craft beer. *J Food Prod Mark* 11: 77–90.
37. Kaneda H, Kobayashi N, Watari J, et al. (2002) A new taste sensor for evaluation of beer body and smoothness using a lipid-coated quartz crystal microbalance. *J Am Soc Brew Chem* 60: 71–76.
38. Spearot JW (2016) Influence of beer color of perception of bitterness. Master Thesis, Faculty of Drexel University.
39. Porretta S, Donadini G (2008) A preference study for no alcohol beer in Italy using quantitative concept analysis. *J Inst Brew* 114: 315–321.
40. Mejlholm O, Martens M (2006) Beer identity in Denmark. *Food Qual Prefer* 17: 108–115.
41. Poreda A, Zdaniewicz M, Sterczyńska M, et al. (2016) Effects of Wort Clarifying by using Carrageenan on Diatomaceous Earth Dosage for Beer Filtration. *Czech J Food Sci* 33: 392–397.
42. Van Doorn G, Timora J, Watson S, et al. (2019) The visual appearance of beer: A review concerning visually-determined expectations and their consequences for perception. *Food Res Int* 126: 1–11.
43. Muggah EM, McSweeney MB (2017) Females' attitude and preference for beer: a conjoint analysis study. *Int J Food Sci Technol* 52: 808–816.
44. Medoro C, Cianciabella M, Camilli F, et al. (2016) Sensory profile of Italian craft beers, beer taster expert versus sensory methods: A comparative study. *Food Nutr Sci* 07: 454–465.
45. Fenko A, Heiltjes S (2016) Towards a sensory congruent beer bottle: Consumer associations between beer brands, flavours, and bottle designs, Brighton, UK, Design Research Society, 10.
46. Carvalho FR, Moors P, Wagemans J, et al. (2017) The influence of color on the consumer's experience of beer. *Front Psychol* 8.
47. Meyerding SGH, Bauchrowitz A, Lehberger M (2019) Consumer preferences for beer attributes in Germany: A conjoint and latent class approach. *J Retail Consum Serv* 47: 229–240.
48. Porral CC, Lévy-Mangín J-P, Bourgault N (2013) Domestic or imported beer brands? Analysis and assessment of brand equity in the Spanish market. *J Int Food Agribus Mark* 25: 324–347.



AIMS Press

2020 the Author(s), licensee AIMS Press. This is an open access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>)