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Green marketing strategies in the dairy sector: Consumer-stated preferences for carbon footprint labels*

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Abstract

Italian consumers' serveyed revealed a generally positive willingness to pay for milk labeled for lower carbon footprint. Green marketing and related sustainable labels are important devices to convey information to consumers about more sustainable business models. Italian consumers' willingness to pay for milk with lower carbon footprint analyzed through a pilot survey is positive and significant. Consumers' willingness to pay also depends on the importance consumers assign to climate change, price sensitivity, as well as on income.

1 | INTRODUCTION

Responsible consumption and production are one of the 17 sustainable development goals of the 2030 Agenda for Sustainable Development of the United Nations (2015), which states that "It's in businesses' interest to find new solutions that enable sustainable consumption and production patterns." Indeed, analyzing the value chain of a product and identifying hot spots of the life cycle where interventions have a great potential to reduce environmental impacts often lead to economic advantages (Coderoni, Valli, & Canavari, 2015).

In Europe, the EU Sustainable Development Strategy sets out the aim of promoting sustainable consumption and production patterns. Its main objectives are decoupling economic growth from environmental degradation, addressing social and economic development within the carrying capacity of ecosystems. The key of this challenging process is the alignment between the behavior of producers and consumers: on one side, producers should always aim to improve their business performance by introducing more sustainable business models, on the other side, consumers should be conscious of the consequences of their consumption choices and adapt their behavior accordingly. For this reason, it is fundamental that consumers have access to information about the environmental sustainability of production processes. Therefore, businesses willing to actively target consumers who are interested in more sustainable products should implement appropriate green marketing strategies.

The idea of green marketing emerged in the 1980s, and over the years, a large body of literature highlighted the growing environmental awareness and consumers' interest in green products or their willingness to pay (WTP) for more sustainable products (Mintel, 1991; Worcester, 1993).

The most common instruments to support changes in consumption patterns are the so-called "sustainable labels," that is, types of labels that are designed to convey to the consumer concepts related to sustainability, considering the environmental, ethical, and social elements involved (Padel, Zander, & Gössinger, 2010; Vermeir & Verbeke, 2006; Zander & Hamm, 2010).

Sustainable labels, for instance, can help orienting the consumer toward buying more greenhouse gases (GHG) saving products and therefore mitigating their contribution to global warming. To this extent, they are referred to as "carbon footprint" (CF) labels, as they indicate the grams of carbon dioxide equivalent (CO_{2e})[1] emitted into the atmosphere along all the life cycle of a product or service, which comprises production, transport, transformation, distribution, and purchase (Kohnle, 2013).

Globally, agriculture is responsible for 24% of emissions in 2010 (IPCC, 2014) and therefore climate change mitigation is one of the key environmental goals of agricultural production worldwide.

At European level, climate action is one of the main priorities of the Common Agricultural Policy (CAP), which gives incentives to farmers to adopt GHG mitigation options. However, according to

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[1]CO_{2e} is a term that describes different greenhouse gases in a common unit. A quantity of non-CO_2 GHG can be expressed as CO_{2e} by multiplying the amount of the GHG by its global warming potential (GWP).

many studies in this field, supply-side options—that is, options that tackle production aspects of GHG mitigation—are not sufficient to reach the ambitious mitigation targets set by European and international policy agenda (European Commission, 2011; European Commission, 2012). Demand-side mitigation options rely upon more sustainable consumption patterns, could be fundamental to curb GHG emissions by promoting more sustainable food consumption habits that ultimately lead to reduced agricultural emissions (Bajželj et al., 2014; Brunelle, Coat, & Viguié, 2017; Canavari, Castellini, & Spadoni, 2010; Coderoni et al., 2015; Creutzig et al., 2016).

Therefore, it would be very important to understand to what extent consumers are willing to pay for agricultural products with lower CF more valuable than the less sustainable option and what drives their choices, to analyze the market uptake of this kind of products and the possibility to create value for more sustainable business models. Furthermore, in the agricultural sector, green product growth continued strongly from the mid-1990s, against a slowdown in the trend of green marketing initiatives (Peattie & Crane, 2005), signaling a stronger consumers' preference for "greener" agricultural products.

While there are many studies exploring the production side of climate change mitigation for the Italian agriculture, both at micro and macro level (see among others: Baldoni, Coderoni, & Esposti, 2017, 2018; Coderoni & Esposti, 2014), the demand side has been less explored, despite its relevant role in helping tackling climate change.

Studies in this area are aimed at analyzing consumers' preferences for purchasing products with a lower CF label or their WTP for these products. This scientific literature is still limited, especially for the Italian case. In this field, this article presents the preliminary results of a pilot study on WTP for dairy products with a CF label. Milk is an appropriate representative product since it is widely consumed and because livestock products have long been in the center of the debate at international level (Gerber et al., 2013) for their higher GHG emission compared to plant-based products (de Boer, de Witt, & Aiking, 2016; Goodland & Anhang, 2009).

The article is structured as follows: the next section introduces the concepts of green marketing and sustainable labels, referring specifically to CF labels; then, we provide a brief summary of the relevant literature. Then, we illustrate methods and results of the pilot online survey carried out with Italian consumers, and finally, we draw some conclusions and we discuss the policy implications.

2 | GREEN MARKETING AND CF LABELS

Since the early 1990s, Western European markets have witnessed growing consumer interest in sustainability and sustainable development. The concept of sustainability is an evolution of the environmentalist approach dating back to the 1970s (Kumar, Rahman, Kazmi, & Goyal, 2012) and it is more comprehensive, since it includes different aspects: the economic objective of establishing affordable prices for consumers and at the same time ensuring a fair profit for producers, the conservation environmental resources, and the consideration of

social aspects (Vermeir & Verbeke, 2006). Sustainable products are those products whose characteristics allow better performances regarding the aforementioned aspects (Vackier, Vuylsteke, Verbeke, & Van Huylenbroek, 2002). On the consumer's side, sustainable consumption is based on a decision-making process that takes into account not only individual's needs and wants, but also the responsibility for the economic, environmental, and social consequences of individual's behavior.

Like many studies have found, everyday consumption practices are still deeply driven by convenience, value for money, habit, personal health concerns, hedonism, and individual responses to social and institutional norms (FSA, 2000; SDC, 2003) and most importantly, they barely change (Vermeir & Verbeke, 2006). An important driver for changes to occur, particularly with respect to sustainability concerns, is the tendency of the ethical consumer that feels responsible toward society and expresses these feelings by means of his purchase behavior (De Pelsmacker, Driesen, & Rayp, 2003).

Green marketing strategies are thus fundamental channels to convey to consumers the commitment of firms toward more sustainable business models (UNEP, 2015). Besides, these strategies allow companies to create value (Bajželj et al., 2014; Brunelle et al., 2017; Creutzig et al., 2016; Peattie & Crane, 2005).

One of the most important instruments to declare a business commitment to environmentally sustainable productions is labels and trademarks related to the concept of sustainability.

In particular, the so-called "sustainable labels" are types of labels that are designed to convey aspects related to sustainability, both regarding environmental and ethical or social issues (Padel et al., 2010; Vermeir & Verbeke, 2006; Zander & Hamm, 2010). The European Commission has identified 129 information plans (both public and private) concerning the concept of sustainability in the agri-food sector (Grunert, Hieke, & Wills, 2014).

In the case of food labels focused on sustainability, we can mention those referred to organic farming (also known as "bio"), which certifies food produced according to organic agriculture standards; labels that indicate the use of more environmentally friendly farming techniques, for example, blue agriculture or "LEAF" (Linking Environment and Farming); labels that express the local origin of the product or the miles the food traveled to reach the market; environmental impact labels such as "carbon footprint" (CF), "water footprint," and "energy footprint" (Bazzani & Canavari, 2017; Sirieix, Delanchy, Remaud, Zepeda, & Gurviez, 2013).

For agri-food products, the "bio" brand is the most widely used sustainable label on the Italian market.

According to Haas, Canavari, Pöchtrager, Centonze, and Nigro (2010), since the 1990s the number of organic farms has highly increased in some European countries and, in 2009, Europe was the biggest and most mature market for organic food and drink in the world, accounting for 54% of all global sales (Sahota, 2009: 60). This increasing importance was due to constant governmental support as well as growing consumer demand and active marketing of retail chains (Haas et al., 2010). On this latter aspect, Haas et al. (2010)

underline that one of the most important drivers of organic foods diffusion is given by marketing policies and advertising realized by different kind of branding, both public (from regional to EU authorities), collective (associations or consortia), and private one (retailer's, producer's and certification body's brand). In particular, the entry of large retail companies in the organic food market and the creation of important groups improved the marketing and the distribution of such foods.

In Italy, the organic food sector is very relevant. Since the 90s, its relevance has increased becoming nowadays the first country in Europe for what concerns the number of organic farms and the second (after Spain) for cultivated surfaces.[2] The specialized shops such as national and regional franchising chains still play a dominant role in a market share of 55% (Van Osch, Schaer, Strauch, & Bauer, 2008: 378). Also, the local production is gaining popularity among Italian consumers, even though a universal label has not yet been established because of the unclear definition of such products (Bazzani & Canavari, 2013, 2017).

CF labels, instead, gained attention only recently, due to the relevance of climate change issues worldwide; therefore, their content is not so familiar to the consumers. Retailers have a very significant role in mainstreaming and promoting green products in general and CF in particular (Cohen & Vandenbergh, 2012). Sustainability is high on the agenda for retailers across Europe and, according to Carr-Shand, Staafgard, Uren, and Johnson (2009), carbon emissions reduction is the strongest driver for environmental sustainability across the European retail sector. In this respect, addressing the CF in-store and with private label suppliers and fostering branded suppliers to do the same for their products, represents a top priority (Carr-Shand et al., 2009).

In the third phase of the Retailers' Environmental Action Plan initiative,[3] among the commitments for the period 2016–2018, there are "initiatives for helping the consumer reduce his carbon footprint" as one of the eight different ways to influence consumer behavior (Joas, Romagnoli, Karigl, & Stoifl, 2015).

3 | A BRIEF LITERATURE REVIEW

Despite some interest in the media, only recently consumers have occasionally had access to information about the CF of food products both in Italy and in most European countries, CF labels are rarely present in the agri-food market.[4] Consequently, the analysis of consumers' preferences for this kind of labels has not yet been widely explored in the literature, and a few formal evaluations of consumer response to carbon labeling have been published (Vanclay et al., 2011).

A literature review carried out to examine the works that so far have analyzed consumer preferences and WTP for CF label confirms that the topic is not yet widely explored (Canavari & Bazzani, 2016). In fact,

among the approximately 250 articles that have been consulted (including references from Scopus and Web of Knowledge, plus articles from other sources), we found only 20 articles on this area. In particular, for the Italian market, this topic was investigated only by Caputo and co-authors (Caputo, Canavari, & Nayga, 2012; Caputo, Vassilopoulos, Nayga, & Canavari, 2013), Vecchio (2013), Vecchio and Annunziata (2015) and Lombardi et al. (2017).

These studies suggest that consumers tend to be more willing to buy products with a lower CF label compared to conventional ones. However, Vanclay et al. (2011) found that carbon labels are most effective when combined with low prices.

Moreover, Akaichi, Nayga, and Gil (2013) and Onozaka and Mcfadden (2011) highlighted that consumers have been particularly likely to buying lower-CO_2 emission products in case they were also labeled with local origin.

The preference for low CF product has been found analyzing both animal-based and plant-based products. Only Echeverría, Moreira, Sepúlveda, and Wittwer (2014) analyzed the WTP of Chilean consumers for both a plant-based product (bread) and an animal-based product (milk). The results showed that respondents were more likely to pay for lower CF for milk than for bread, showing greater sensitivity when evaluating animal-based products.

Regarding the methodologies, the literature review revealed that WTP for low CF products was primarily estimated by hypothetical choice experiments. In only seven studies non-hypothetical methods were used, namely, experimental auctions in four cases (e.g., Chen, Zhang, Huang, & Zheng, 2017) and a real choice experiment in three cases (e.g., Drichoutis, Lusk, & Pappa, 2016; Drichoutis, Vassilopoulos, Lusk, & Nayga, 2017).

4 | A PILOT ONLINE SURVEY IN ITALY

The survey focuses on consumer habits when purchasing dairy products and assesses respondent's understanding, preference, and valuation for low-carbon products. The main objective was to estimate consumer's WTP for the purchase of 1 L of fresh milk with a lower CF label respect to a conventional one.

The study was conducted administering a survey to Italian consumers from December 2016 to February 2017, using an online questionnaire to gather information on consumption choices and socio-economic characteristics. The questionnaire dealt with consumer habits, environmental awareness, environmental and CF labels, and personal information of the respondent Canavari et al., 2018.

The use of the Internet to send the questionnaire facilitates reaching a sufficient number of potential respondents in short time, but it raises the issue of representativeness of the sample because this sampling method tends to have a rather low response rate and to gather self-selected respondents. As a consequence, it usually generates a biased sample, in which younger people with a higher level of education or web literacy are overrepresented (Canavari, Nocella, & Scarpa, 2005). Therefore, the sample cannot be considered representative of Italian consumers; nevertheless, it allows obtaining quite interesting information.

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[2]Source: http://www.sinab.it/ (accessed on January 2018).

[3]The Retail Forum (launched in 2009), is a voluntary multi stakeholder platform with the aim to reduce the environmental impact of the retail sector and its supply chain, to promote more sustainable products and to better inform consumers about "green" purchasing opportunities.

[4]Instead, for other products (like home appliances, paper products, detergents, etc.), there is abundance of eco-labelling initiatives and standards of calculation.

TABLE 1 Sociodemographic characteristics and attitudes of the participants

Variable	Type of variable	Obs.	Description	Possible values	Percentage
Gender	Dichotomous	178	Sex of the respondent	Female (0)	73.03
				Male (1)	26.97
Age	Ordered	178	Age of the respondent	20–29	39.89
				30–39	16.85
				40–49	9.55
				50–59	26.4
				60–69	5.62
				70–79	1.69
Education	Ordered	178	Level of education	Primary school diploma	2.25
				Middle school	7.30
				High school diploma	52.25
				University degree	38.20
Income	Dichotomous	178	Income class of the respondent	Low and medium	75.28
				High	24.72
Climate change importance	Dichotomous	178	Importance the respondent gives to climate change	Extremely important (1)	38.76
				All other responses (0)	61.24
CF knowledge	Dichotomous	178	If a respondent knows the concept of CF	Yes (1)	24.16
				No (0)	75.84
CF importance	Dichotomous	178	Importance of CF when purchasing products (from 1 to 5)	Extremely important (1)	38.76
				All other responses (0)	61.23
Price importance	Ordered	178	Importance of price when purchasing products (from 1 to 5)	Not at all important	15.17
				Scarcely important	18.54
				Moderately important	35.96
				Very important	16.29
				Extremely important	14.04
Certification importance	Dichotomous	178	Importance of certification (including organic) when purchasing products (from 1 to 5)	Extremely important (1)	20.79
				All other responses (0)	79.22
Organic importance	Dichotomous	178	Importance of organic food in mitigating climate change (from 1 to 5)	Extremely important (1)	23.03
				All other responses (0)	76.96

Altogether, 178 consumers completed the questionnaire. The non-stochastic, convenience sample includes consumers from 20 to 79 years old of both genders (with a clear majority of female respondent: 73%); 40% are consumers between 20 and 29 years; 52% of the respondent have a high school diploma, of which 38% have a university degree (Table 1).

As regards the focus of this analysis, 39% of respondents think that it is very important to include information on CF in the label; 23% believe that organic food products are extremely important in fighting climate change, and 97% declare to be willing to pay a premium price for low-impact products. Besides, 21% of interviewed declared to give high importance to certification (including organic) when purchasing products. However, 76% declared not to know the meaning of the CF concept.

To estimate the WTP, a hypothetical purchase situation has been proposed by comparing product 1 (milk bottle with CO_{2e} emissions of 200 g) at the price of 1.30€ with a product 2 (bottle of milk with CO_{2e} emissions equal to 150 g, that is a 25% reduction in carbon emissions) in which each time the consumer was asked to respond according to a price variation (of 0.10€) of product 2 (with a maximum value of 2.00 €). On average. the respondents stated they were willing to pay a price premium higher than 30%.

Though some variables were originally ordinal, like the importance of certification, the role of organic in reducing the CF, as well as the importance of CF reduction, after careful consideration of their distribution and performance in the following model, they have been converted into dichotomous variables, with value one when respondents judge the characteristics analyzed being "extremely important" (original response equal to 5) and value zero to all other responses (original response from 0 to 4). The variable income has been also converted assigning value 0 to the first two responses (low and medium) value one to the high-income class of respondents. Those changes let emerge the behavior of the respondent that gives extreme importance to the specific characteristic, or belong to higher income

TABLE 2 Estimation results of the interval regression model

Variable	Coefficients estimates	Standard errors
Gender (male)	−0.133***	0.046
Income (high)	0.113**	0.049
Climate change importance (extreme)	0.138***	0.002
Organic importance (extreme)	0.101***	0.053
CF importance (extreme)	0.138***	0.043
Price importance (1–5)	−0.059***	0.017
Certification importance (extreme)	0.164***	0.056
Constant	0.529***	0.060

Double, and triple asterisks (*) denote significance at the 5%, and 1% levels, respectively.

classes; however, results do not change notably when considering the original responses as categorical variables.

The WTP individual amount has been modeled as dependent on the explanatory independent variables listed in Table 1 and an interval regression model has been estimated to investigate the determinants of consumers' WTP for products with lower CF. The interval regression model was chosen because, like in other studies on this topic (Drichoutis et al., 2016, 2017), the estimates are easier to interpret and the variance of WTP is directly estimated (Hanemann & Kanninen, 2001). Table 2 summarizes the model estimates.

Results provide quite interesting insights. Being a male seems to reduce the WTP for lower CF products. Consumers that are more liable to buy certified food and consumers who believe that organic food can highly help mitigating climate change are more willing to pay for lower CF products. Results confirm that there is a core group of sustainable consumers in the agri-food sector that is very interested in the mitigation of negative externalities of farms and at the same time, relies on labels (whether organic or certification) to orient consumption choices.

The importance that the respondent assigns to CF information on the product label positively affects WTP. This result fits with what we expected: if a consumer is aware of the importance of a sustainability parameter, she is more likely to value it when purchasing products. Instead, the only knowledge of the CF concept seems to not be relevant in purchasing decisions. Also, age and education seem to not affect the WTP of consumers.

Sociodemographic variables also play a role. The coefficient associated to the variable "importance of price" has a negative sign, meaning that respondents who are more sensitive to price when buying products, tend to be willing to pay less for products with a lower CF label; this confirms what other authors in this field have found (see among others Vanclay et al., 2011).

Coherently, a consumer with a higher income shows a positive WTP for CF-labeled products.

5 | CONCLUDING REMARKS AND POLICY IMPLICATIONS

CF labels represent an important tool to convey to consumers information about the impacts of the products they purchase, in terms of GHG emissions. This tool could help mitigating negative externalities by means of more sustainable business models while allowing companies to generate value using green marketing strategies.

Despite the relevance of this instrument for climate change mitigation, the presence of CF labels is still scarce in the Italian food sector. As a result, also studies aimed at investigating consumers' WTP for products with lower CF are quite rare.

The explorative survey we presented focused on consumer habits when purchasing dairy products (namely, milk) and assessed consumer understanding and preference for lower-carbon products.

Results, though preliminary and based on a non-representative sample, suggest that a positive WTP for products with lower CF exists for those consumers that consider the climate change challenge extremely important, are more prone to value certification when buying products, and think that organic farming can help fighting climate change.

Besides, consumers' WTP is influenced also by the price sensitivity and the income of the respondents: higher price sensitivity lowers the WTP and higher income positively affects the WTP.

As in the agricultural sector, there are many options to mitigate GHG emissions and also saving costs, a win-win situation could emerge if adequately supported by a coherent set of incentives and information campaigns.

Given the importance of economic variables, coupling CF labels with lower product prices, could probably strongly increase the uptake of these labels (Vanclay et al., 2011). This kind of intervention could be realized with a joint and coordinated action from both the supply side (both farmers and retailers) and the policymakers.

Obviously, it requires investments in sustainability-oriented design and in smart technology (Hay & Duffy, 2017) in order to ensure also the economic sustainability. From the suppliers' side, in fact, the hypothesis of reducing products' prices, while curbing GHG emissions, is not unrealistic since, as many studies have confirmed (see among others Coderoni et al., 2015), the reduction of the CF of a product is often associated with a reduction of the production costs (e.g., with energy and packaging costs savings). These costs savings could partly be reflected in prices reduction, thus allowing more consumers to buy products with lower CF.

However, often, in the agricultural sector, there are many barriers to the adoption of climate change mitigation options that can be related to different social, economic, or technical aspects (UNFCCC, 2008). Policymakers should then facilitate the uptake of these mitigation options in different ways: helping to spread knowledge about CF reduction and also giving subsidies to farms that are willing to evaluate their CF. The CAP provides some of the incentives to farmers to adopt these actions (e.g., agri-environment-climate measure; product valorization measures; incentives to collaborate in the environment

and climate change field, etc.), however, these funds compete with many other objectives in the Rural Development Programmes and, as a consequence, their potential can be lessened.

Besides, whenever price reductions are not possible, public policy could work to democratize lower CF products consumption, by promoting green public procurement or offering these products in schools, similarly to what is proposed by Aschemann-Witzel and Zielke (2017) for the organic sector.

A major field of intervention, however, is from the demand side, where both retailers and policymakers should increase consumers' awareness about sustainability parameters.

As Haas et al. (2010) have found for the organic sector, in fact, one of the most important drivers of its diffusion was given by marketing policies and advertising realized by both public, collective, and private branding.

As regards retailers, for example, as suggested also by the Retail Forum on Sustainability (2011), they could design consumer incentive programmes (e.g., bonus on loyalty cards, discounts, etc.) to encourage the uptake of environmentally friendlier products or favor the deployment of new IT technologies for displaying environmental information of products.

The policymakers, from their side, should not only raise the awareness of citizen of the role they play in curbing emissions toward their purchase behaviors, but also ensure that policies that address production and consumption patterns complement each other and drive harmonization of standards for calculating the CF of products, avoiding the proliferation of different approaches that confuse consumers.

Recently, remarkable initiatives have been set up by the agri-food sector in Europe, with the aim to involve citizen in the transformation of the sector into a more competitive, sustainable and trusted one, by focusing on nutrition for healthy and sustainable diets, climate-smart, circularity, digitalization, animal welfare, and resource efficiency (FoodNexus, 2018).

If all these private and public intervention are coordinated and coherent, promoting green marketing strategies in the agricultural sector could help mitigating negative externalities of farms, while creating business opportunities that could couple with consumers need to spend the same or less to buy more sustainably.

From a methodological point of view, it must be noticed that generally, hypothetical methods like the one used in this study tend to overestimate the WTP. A more in-depth and reliable analysis is needed to accurately estimate the WTP for CF labels. Future research could, for example, focus on experimental economics techniques, such as experimental auctions (Lusk and Shogren, 2007) and on larger stochastic samples, in order to ensure the picture drawn is representative and accurate.

6 | ACKNOWLEDGMENTS

Finally, developing outreach requires obtaining resources by successful marketing. One of the suggested directions in SE is to see how ritual and narratives might support the creation of social value and how the notion of image and identity uses marketing and organization behavior.

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