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Environmental friendly food. Choice experiment to assess consumer's attitude toward "climate neutral" milk: the role of communication

Ginevra Virginia Lombardi [a, *], Rossella Berni [b], Benedetto Rocchi [a]

[a] Department of Economics and Management, University of Florence, Florence, Italy
[b] Department of Statistics, Computer Science and Applications, University of Florence, Italy

ABSTRACT

The livestock sector has a high impact in terms of carbon footprint. Lowering GHG emission from the livestock sector deals with implementing climate neutral production techniques in a cost effectiveness way and with developing market communication to make carbon free diary products competitive with alternative products. This study aimed at analyzing how information and communications could impact or affect the consumer's attitude toward climate neutral fresh milk. The research focused on a case study carried out in Tuscany among a sample of supermarket customers, to assess consumer attitude toward fresh climate neutral milk using choice experiments methods. The participants were asked to attend a focus group meeting made of four different sessions. During the first session participants were asked to fill a background questionnaire and to watch a short documentary video about the climate change risks. A second session consisted in a choice experiment in which participants were presented with 12 choices, each describing a scenario in which the milk key attributes were planned at different levels (price, organic labeling and carbon footprint labeling). During the third session the focus group discussions was developed following a semi-structured debate about environmental labeling, climate neutral labeling and the environmental impact of individual's purchasing behavior. In the fourth session participants were asked to express their preferences on the choice-sets with the same scenarios presented in the second session, in order to assess variation in individual willingness to pay (WTP) toward climate neutral and organic milk. Results show that communication could play a role in changing consumer attitude toward carbon free products.

1. Introduction

Climate change and global warming are having growing interest in the scientific debate and in the policy agenda at global level. The concerns about greenhouse gas (GHG) emissions from production activities have produced multilateral effort to address actions in order to mitigate the global warming impacts. Human activities are responsible for GHG emission: every economic activity contributes to climate change. Reducing GHG emission asks for raising public awareness about climate change risks, for improving production technologies, for implementing market communication and for changing consumer's behavior.

According to the United Nations Framework Convention on Climate Change (UNFCCC), agricultural GHG emissions account for almost 14% of global GHG emissions. In the EU zone the agricultural sectors is responsible for 9.2% of total EU GHG emissions. At farm level, the GHG emission is mainly due to the livestock rearing (manure, urine and ruminant digestion). Livestock represent around the 50% of total agricultural emission, with methane and nitrous oxide accounting for around 5% and 4.3% of total European GHG emissions (Fellmann, 2012). This assessment dismisses agricultural emissions due to fuel consumption, fertilizers and pesticides production and land use change. Furthermore, the food chain produces emission in all its stages from the farms through industry and distribution up to the waste disposal. Actually, the food accounts for 31% of the total GHG production in Europe (Environmental Impact of Products, 2006). Food consumption is responsible for GHG emission in an accountable proportion; changing individuals' food consumption patterns can have a deep effect in mitigating GHG emission. In other words influencing consumer's behavior toward a more sustainable and climate neutral purchasing pattern could represent an effective option to

* Corresponding author.
    E-mail address: ginevravirginia.lombardi@unifi.it (G.V. Lombardi).

substantially reduce global GHG emission. In many studies has emerged that the consumers experienced a lack of information with regards to product related environmental problems and to the environmental impact of their purchasing choices (Leire and Thidell, 2005). Public opinions and attitudes regarding climate change must be enhanced; information and communication are key issues to empower consumers to adopt the needed changes in purchasing decision. At the same time the economic system must adopt climate neutral production techniques providing the market with carbon free products. The "carbon" characteristics of these products must be properly included in the labeling schemes to allow consumer to get the information needed to make more climate conscious decisions. The consumers' response toward carbon labeling schemes is crucial to allow suppliers to obtain a competitive advantage in disclosing "GHG contents" of their products.

This study aimed at analyzing how information and communications could impact on the consumer's attitude toward climate neutral fresh milk. The livestock sector has a high impact in terms of carbon footprint (Guerci et al., 2014). Lowering GHG emission from the livestock sector deals with implementing climate neutral production techniques in a cost effectiveness way and to develop market communication to make carbon free milk competitive with alternative products. The research focused on a case study carried out in Tuscany among a sample of supermarket customers, to assess consumer attitude toward fresh climate neutral milk using choice experiments methods. The participants were asked to attend a focus group meeting made of four different sessions. During the first session participants were asked to fill a background questionnaire and to watch a short documentary video about the climate change risks. In the second session, choice-sets were administered to participants; the 12 choice-sets were built through the planning of a choice experiment, where each choice-set describes a scenario in which the milk key attributes were presented at different levels and in different combinations (price, organic labeling and carbon footprint labeling). During the third session the focus group discussions was developed following a semi-structured debate about environmental labeling, climate neutral labeling and the environmental impact of individual's purchasing behavior. In the last fourth session participants were asked to express again their preferences on the same scenarios presented in the second session to assess variation in individual WTP toward climate neutral and organic milk. Multinomial discrete choice models were applied in order to evaluate attitudes and WTP variations; the model results show that information could play a role in changing consumer attitude toward carbon free products.

This paper is organized as follows: Section 2 illustrates the whole survey and data collection; in Section 3 the theory related to the applied statistical models is reported; results are shown in Section 4, conclusions follow and end the paper.

2. Choice experiment, questionnaire and data collection

Research focused on a dairy product since agricultural GHG emission contribution is largely due to the livestock sector. Lowering GHG emission for the sector asks for cost effectiveness production techniques and market communication to make the carbon neutral milk competitive with other alternative milk. Since there is no footprint label scheme for food in the Italian market, we selected milk, among other dairy products, given that milk is a habitual purchased product. Thus it is conceivable that consumers are familiar with milk standard attributes and price and they are able to make their choice between product's well-known attribute (i.e. price) and the new hypothetical attribute (carbon free). By this way individuals could focus more on the perceived value of the

carbon label, making a more conscious decision. The survey was conducted on a sample of 39 voluntarily recruited supermarket customers in rural and urban areas of Tuscany; at the end of the meeting to each participant was given an attendance token. The participants were asked to attend four different sessions of the focus group meeting; each session involved a specific step of the survey. More precisely:

i) the first session was related to the administering of the background questionnaire and to the projection of a 5 min video about climate change risks;
ii) the second session was dedicated to the administering of the 1st choice experiment;
iii) the third session was on the discussion on consumer behavior impact on climate change risk;
iv) the fourth session was related to the administering of the 2nd choice experiment consisting of the same choice sets administered in the second session.

The choice experiment was planned on the basis of a factorial design, with three attributes (carbon free, organic and price) at two levels: organic (yes/no); CO_2 reduction (yes/no); price (0.84/1.64 €). Furthermore, the planning of the factorial design has been carried out by considering the problem issues linked to the redundant alternative and the balancing of the experimental design, lastly the design orthogonality. In Table 1, an example of the supplied binary choice-set is reported: each row (A or B) is an alternative, that represents a scenario. The consumer is asked to express his/her preference by choosing between the two alternatives. The binary choice-sets are then composed by grouping all the alternatives in pairs.

When considering the whole survey procedure described previously, undoubtedly the sample size is quite small, and this situation may be considered as a critical point for the study; nevertheless, two positive remarks may be underlined: i) each respondent is asked to give his/her preference only on twelve choice-sets for each session (e.g. the second and the fourth session); therefore, each respondent has to express his/her judgment on a considerably small group of choice-sets (twelve binary choice-sets for each session); ii) moreover, each hypothetical scenario (alternative) includes three attributes; therefore, each scenario becomes reasonably conceivable.

Furthermore, in the literature a large debate is recently emerged (Rose and Bliemer, 2013; de Bekker-Grob et al., 2015) relating to the sample size requirements for choice experiments, especially when the sample size is ranging from 25 to 100 (Vecchio and Annunziata, 2015). Undoubtedly, a large sample size may assure good properties for the estimation of coefficients in the modeling step, especially when the applied statistical model is rather complex. Nevertheless, the problem of a small sample size should be evaluated in conjunction with the planned experimental design (Johnson et al., 2013). A complex design which does not comply standard design properties (such as orthogonality and balancing) could imply estimation problems if the sample is also small. In our case-study we planned a fractional factorial design satisfying all the cited design properties. In addition, the response efficiency has been easily

Table 1
One of the administered binary choice-set.

Id = 3	CO₂	Price	organic	CHOICE
A	YES CO_2 reduction	0.84 €	NO organic	
B	YES CO_2 reduction	1.64 €	YES organic	