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Fresh Meat and Traceability Labelling: Who Cares?

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Abstract

Within the framework of European food safety measures, Reg. 1760/2000 and 1825/2000 have introduced mandatory traceability and relevant labelling into the beef sector. The paper analyses whether information on meat labels can be considered a useful instrument for consumers, facilitating the verification of quality. The purpose of the paper is, first, to evaluate whether meat information is used during food purchase, and secondly, by focussing on specific meat information, to assess consumer interest in some mandatory and voluntary information cues and to identify the determinants affecting the use of such cues. Data were collected by a telephone questionnaire in a survey conducted in the Lombardy region of northern Italy. The sample consisted of 1,025 consumers. We estimated 4 models based on the literature, and for all the equations we used a binary logit model. The analysis revealed that most consumers tend to use the meat label and also most of the mandatory and voluntary information reported. With regard to mandatory meat labelling, the most important information was considered to be the country of animal origin, in accordance with other empirical studies. With regard to voluntary information, some, like the system of cattle breeding and cattle feeding, seems to be of interest to the Italian consumer. The empirical analysis suggests two different consumer types. The consumers who declare they use meat labels tend to be young people, of female gender, with a low income, and who use the media as their principal source of information. These consumers could have a lot of time available for food purchasing and probably the possibility of reading most of the information reported on the food label, even if they do not have the capacity to process all the information. On the other hand, those consumers who read specific labelled information tend to have a good level of food knowledge or education and weight problems. This second type of consumer probably does not have much time for food purchasing and they select only that information in which they are mostly interested. Moreover, the analysis reveals that consumers tend to read only information that is quickly understood, and that can help them to evaluate the quality of meat products.

Keywords: *traceability, meat, consumer preferences, logit analysis*

1. Introduction

In recent years, repeated scares within the food sector have lead to increasing consumer concerns which have resulted in a strengthening of vertical coordination along food supply chains and a reinforcement of control by public authorities (Angulo and Gil, 2007). At industry and retailing level, the reorganisation of vertical relationships has involved the introduction of private standards and other forms of supply chain governance that have led to the centralization of supply chain management, all aimed at guaranteeing the safety of food products (Banterle and Stranieri, 2008a; Viaene and Verbeke, 1998). At the public level, within the framework of food safety measures, the European Union has introduced a general mandatory system for all food

products by Reg. 178/2002, while Reg. 1760/2000 and Reg. 1825/2000 enforce a more stringent policy for beef traceability and product labelling.

The different prescriptive treatment of meat products is the result of loss of confidence by specific European consumers after the BSE crisis. Indeed, EU food policy related to meat traceability is more developed than those of other countries like the US where consumer perception of food product quality and safety is quite different (Dickinson and Bailey, 2005). Given the importance of traceability systems to maintain or regain consumer trust, it is important to understand the kind of information consumers really need to address their purchasing preferences. In Europe, meat labelling can include both mandatory and voluntary information. Labelling only the most important information allows the producer to communicate effectively the meat product attributes to consumer in order to meet his preferences, thus reducing information asymmetry and avoiding the risk of information overload (Verbeke and Viaene, 1999). In fact, information overloading is a source of potential danger as it tends to deter consumers from making optimal decisions, or leads them to use only some of the available labelled information because of the opportunity costs of information processing (Verbeke and Ward, 2006).

This paper analyses whether the voluntary and mandatory information on beef labels provided by European regulations can be considered a useful instrument for consumers, facilitating the verification of the quality attributes of products. The purpose of this paper is first to evaluate whether, during the purchase of meat, the labelled information is used, analysing the variables that can influence consumers in their use of the meat label, and secondly, to focus attention on specific meat information. In this latter case, we assess consumer interest in some of the mandatory and voluntary information cues, and identify the determinants affecting their use.

The paper is organised as follows: background information on beef labelling is presented in section 2; section 3 examines the economic literature related to consumer use of meat labelled information; the survey conducted and the methodological issues are described in section 4; the results are analysed in section 5 and the concluding evidence is set out in the last section.

2. Background

Food safety and quality issues are among the main concerns of consumers and those setting up food industry and retailing strategies and policy interventions. Beef safety and quality attributes are required by consumers in order to allow choices based on their expectations and preferences on meat and to be reassured with regard to the safety characteristics of meat products. Moreover, consumers are becoming more heterogeneous in their quality perceptions, and there is increasing demand for beef that is labelled with credence attributes that seem to enhance the consumer's perception of quality (Henson and Northen, 2000; Golan *et al.*, 2004).

The implementation of food quality and safety standards is also very important for the food industry and retailing as their strategies are driven by consumer expectations, and the implementation of tools assessing quality and safety involves the reorganization of vertical relationships within the supply chains (Issachou, 1996; Banterle *et al.,* 2006).

Interest in safety and quality intervention concerns both public and private policies, even if, nowadays, a proliferation of private standards characterizes the markets of developed countries (Henson and Reardon, 2005). Thus, it is important to distinguish between mandatory and voluntary labelling systems. In the former, the systems aim at correcting market inefficiencies connected to information asymmetry, whereas in the latter the instruments are adopted for quality differentiation of food products (Golan *et al.*, 2001).

With regard to meat traceability, the European beef traceability labelling policy is mandatory and concerns the establishment of a system aimed at identifying, registering and labelling beef products. Mandatory labelling concerns the identification of credence attributes like the country of animal origin and the country in which the slaughterhouses and cutting halls are located. The

EU regulations also allow each single member state to introduce additional voluntary information on labels. In Italy, this labelled voluntary information concerns the characteristics of the animal (date of birth, gender and cattle breed), its breeding (the kind of breeding and feeding e.g. GMO-free, no antibiotics and so on), and details of the firms along the meat chain (Banterle and Stranieri, 2008b).

EU beef labelling represents a more extensive regulation than that provided by other countries where different traceability systems have been introduced but without giving precise indications of the information to be labelled on meat products. For example, in the US there is still ongoing debate on the level and the type of traceability to adopt. To date, no mandatory animal identification system has yet been implemented and the labelling of animal origin (COOL) is voluntary (Loureiro and Umberger, 2007). In accordance with Smith *et al.* (2005), traceability systems are used to facilitate the retracing of products and to differentiate one product from the others on the market.

In Canada, in 2002 after the verification of some BSE cases, the Canadian Cattle Identification Agency introduced a mandatory national cattle identification system for a short time, only ten months, aimed at facilitating the retracing of meat products in the event of food safety problems (Hobbs *et al.*, 2005). Also in Australia, Brazil and Argentina the implementation of traceability system is voluntary. In these countries traceability systems become mandatory only to comply with export international rules, though the systems are not really comparable in depth with that of the EU (Souza-Monteiro and Caswell, 2004).

Due to the differences between the European beef labelling system and those of other countries, it is crucial to understand if the European mandatory labelling system is a good instrument to reduce market inefficiencies; in other words, if the information required by European beef legislation is really important to reduce information asymmetries between consumers and producers.

3. Consumer and Meat Labelled Information

As mentioned above, the information reported on labels can be considered an instrument that improves consumer perception of meat quality, and this makes it easier for the consumer to choose a product on the basis of preferences (Bredhal, 2004; Banterle and Stranieri, 2008b). Extrinsic cues are one of the principal means of informing consumers on the credence attributes of beef products, and thus reduce consumer information costs (Olson and Jacoby, 1972).

Quality signalling, like beef traceability labelling, can transform credence attributes into search attributes and strengthen consumer trust, allowing the reduction of consumer perceived risk towards meat quality and safety and of information asymmetry between consumer and producer (Nelson, 1970; Mojduszka and Caswell, 2000). Several studies have demonstrated that the labelling of meat safety and quality attributes can positively affect the consumer's perception of meat products (Issanchou, 1996; Bredhal, 2004; Loureiro and Umberger, 2007).

In this study, the interest in labelled information is related to the fact that meat products have been perceived as being of significant risk by consumers because of the recent crisis in the sector (Burton and Young, 1996). For this reason, fresh meat can be considered a product that leads to consumer involvement, in spite of most other food categories which cause low consumer involvement because of their low potential to reflect on self-image, low cost and low social pressure (Verbeke and Vackier, 2004).

Given the potential effects of labelled information on consumer behaviour, different safety and quality attributes reported on labels are often ignored or misinterpreted (Grunert, 2005). Despite the different types of information available to consumers, which can reduce uncertainty with regard to food safety, many consumers fail to read or process the labelled information (Verbeke *et al.*, 2007). An explanation of such consumer behaviour toward labelled information could be related to the difference between the consumers' risk perception, associated with specific food

safety concerns, and the actual risk, or to the provision of too detailed information on food products that can entail an information overload risk (Salaün and Flores, 2001; Verbeke, 2005). Indeed, information overload can lead to consumer confusion or a lack of interest. This problem can be connected to the 'rationally ignorant consumer hypothesis' in which consumers do not consider all the information available on the food product, even though such information is free; this is because the opportunity costs of acquiring all the provided information would be too high (McCluskey and Swinnen, 2004).

Hence, the core of the present debate lies in understanding the way consumers make food quality judgements under uncertainty, and in identifying which kind of information consumers really need to address their purchasing preferences. There is no clear framework for the conceptualisation of the information required by meat consumers and how such consumers use meat labels (Banterle and Stranieri, 2008b).

Bernués *et al.* (2003) found that the most important information for the European meat consumer was the origin and expiry date of the meat, while other important elements concern nutritional features, type of cut, traceability and quality controls. Consumer preference towards meat origin was also confirmed by Roosen *et al.* (2003) in a survey conducted in Germany, France and the United Kingdom. Differently, Hobbs *et al.* (2005) suggest that Canadian consumers consider traceability to be an important system to guarantee food safety, especially if associated with other quality assurances, but results show that traceability does not reduce the information asymmetry between producer and consumer with respect to quality attributes. Moreover, Verbeke and Ward (2006) stress the difference between the importance consumers give to the information on labelled meat and the effective use of such information. Probit analysis shows consumer interest to be low for traceability, but higher for origin and meat quality indications. Verbeke (2005) also suggests that for traceability labelling the best way to achieve consumer approval and appreciation is to provide quality labels with only one single cue referring to traceability rather than a vast amount of different kinds of information. These results are also confirmed by Dickinson and Bailey (2005) whose analysis conducted in several countries highlighted that consumers, like the American, Canadian, British and Japanese, were ready to pay a nontrivial price for red meat traceability. However, the certification of other beef quality characteristics like animal welfare, safeness, and other intrinsic cues are more valued than traceability alone.

Based on recent literature, the present research aims at evaluating the kinds of cues consumers really consider important in the mandatory and voluntary information provided by European beef Regulations; such cues would lead to a better understanding of the behaviour of meat consumers, and help firms utilise the correct strategies for their products. Moreover, we have tried to design different consumer profiles based on the type of information consumers use during their food purchasing.

4. Methodology

Data were collected by a survey employing a telephone questionnaire in the Lombardy region of northern Italy, corresponding to a sampling fraction of 0.3‰. The sample consisted of 1,025 consumers, and these were divided by the interviewees' variables of gender, age, and residence. Out of all the households contacted, the refusal rate to participate in the survey was about 12% while no contact rate was 20%. A previous pilot survey had been made to test the questionnaire, the aim being to maximise response rate and minimise the error rate in answers. The questions were arranged in a multiple-choice answer format with rating scales, and were processed by means of four binary logistic regressions.

In accordance with recent economic literature concerning consumers and food labelled information (Drichoutis *et al.,* 2005; Nayga, 1996), we can assume the following functional relation-

ship among the groups of variables:

$$MI_v = f\,(Sd_g, Pb_h, Hl_r, Ks_s, Fs_z) \qquad [1]$$

MI_v - Meat Information where v=1, ...4 is represented by four dependent variables:

-MI_1 - Meat label use;

-MI_2 - Mandatory information concerning country of animal origin;

-MI_3 - Voluntary information concerning the system of cattle breeding;

-MI_4 - Voluntary information concerning cattle feeding.

The independent variables are 24 and are connected to different aspects:

-Sd_g where g=1,…6 represents variables related to socio-demographic and individual characteristics of the consumers, i.e. age, gender, income, education, being a shopper and BMI;

-Pb_h where h=1, ...8 represents variables related to purchasing behaviour towards food products, i.e. price, origin of products, traceability, quality certifications, product freshness, nutritional properties, ingredients, expiry date;

-Hl_r where r=1, ...3 represents variables connected to healthy life attitude, i.e. dietary habits, sports habits, smoking status;

-Ks_s where s=1, ...4 represents variables related to nutrition knowledge and source of information, i.e. information by media, information by experts, information by friends; the nutrition knowledge variable, measured by a scale 0-4 (from uninformed consumer to very informed consumer), measures the level of consumer knowledge through some questions regarding the principal nutritional items; the source of information variables contain questions about the different levels of nutritional information channels; the survey considers possible sources of nutrition information to be media (TV, radio, newspaper), experts (doctors, health authorities/agencies) and relatives or friends; also no interest in this kind of information is considered;

-Fs_z where z=1, ...3 represents variables connected to food safety attitude, i.e. attention to food safety issues, the level of food safety perceived by consumers, and meat consumption variation after the BSE crisis.

We estimated 4 models based on [1] and, for all the equations, we used a binary logit model as the dependent variable expressed in a dichotomic way. This model takes the form (Bohrnstedt and Knoke, 1994):

$$logit(p_i) = \ln\left(\frac{p_i}{1-p_i}\right) = \alpha + \sum_j \beta_j X_{ji} \qquad [2]$$

where:

i =1, ...1025; corresponding to number of consumers interviewed;

p_i = probability of the dependent variable taking a value of 1;

j = 1, ...24; corresponding to the number of independent variables;

X_{ji} = independent variables;

α = constant;

β_j = regression coefficients.

5. Results

Most consumers believe labelled information to be very important when purchasing meat: 69% of the sample read the meat label. With regard to mandatory meat labelling, the most important information was considered to be the country in which the animals were born (84%), in accordance with other empirical studies (Bernués *et al.* 2003; Roosen *et al.* 2003) (figure 1). Moreover, among the voluntary information that can be provided on meat labels, the system of cattle-breeding (79%), cattle-feeding (76%) and the date of slaughtering (82%) are considered important factors by consumers.

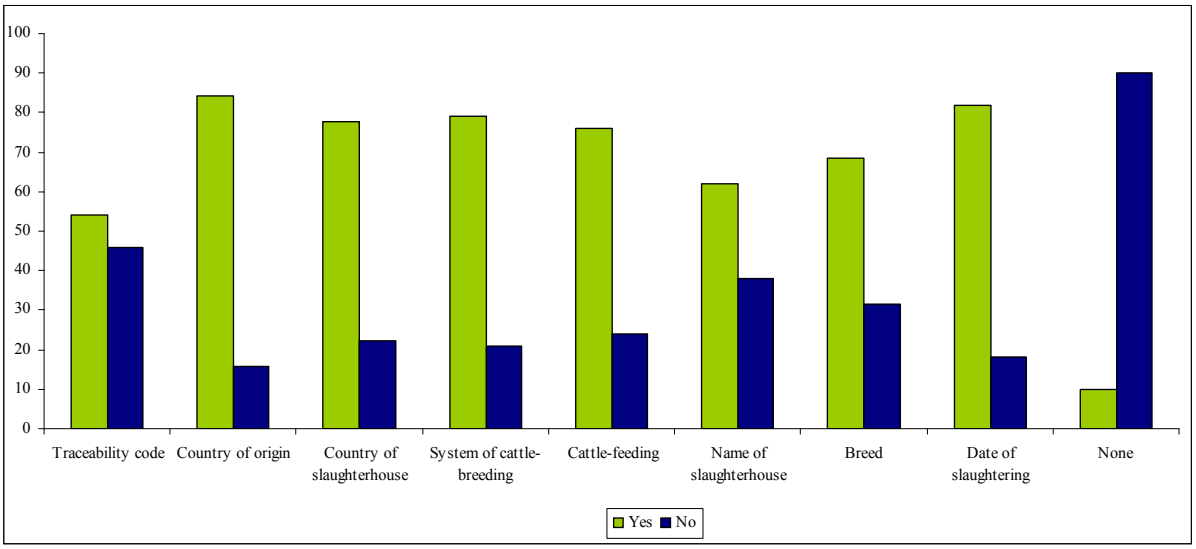

Figure 1: The importance of information labelled on fresh meat (%)

Equation [2] was estimated using the maximum likelihood estimation method, and the results are shown in table 1. Pearson's Chi-Square Statistics confirm that all the models with included independent variables are significantly better than those models with just intercepts, and Nagelkerke's R^2 indicates an adequate goodness of fit (table 1).

All the models reveal statistically significant relations with some variables connected to food safety attitude and 'certifications'; part of the variables affecting consumer behaviour suggest that consumers using meat labelled information pay particular attention to the safety and quality of fresh meat.

MI_1 - Meat label use

Model MI_1 shows that some socio-demographic variables, like age (-0.154), gender (0.314) and income (-0.138), significantly affect the dependent variable 'meat label use'. The analysis highlights that young people, females, and consumers without a high income are more likely to use the meat label. According to other empirical studies (Drichoutis *et al.*, 2005) the negative sign of income can be connected to the time pressure of high revenue consumers.

Table 1.Estimates of the 4 models

	Meat label use (MI_1)		Country of origin (MI_2)		System of cattle-breeding (MI_3)		Cattle-feeding (MI_4)	
	β	Sig.	β	Sig.	β	Sig.	β	Sig.
α	-3.508	*0.005*	-4.280	*0.004*	-3.171	*0.019*	-2.737	*0.030*
Socio-demographic and individual characteristics								
age	**-0.154**	*0.008*	-0.109	*0.135*	-0.079	*0.224*	**-0.168**	*0.007*
gender	**0.314**	*0.072*	**0.749**	*0.001*	**0.493**	*0.013*	**0.311**	*0.094*
income	**-0.138**	*0.087*	-0.020	*0.843*	-0.035	*0.702*	-0.028	*0.742*
education	0.032	*0.740*	0.111	*0.365*	0.020	*0.853*	**0.196**	*0.059*
shopper	-0.099	*0.596*	-0.283	*0.236*	-0.041	*0.847*	0.050	*0.804*
BMI	0.073	*0.523*	**0.247**	*0.093*	**0.556**	*0.000*	**0.450**	*0.000*
Purchasing behaviour of food products								
price	0.050	*0.493*	0.053	*0.559*	0.005	*0.951*	0.033	*0.665*
origin	-0.044	*0.586*	0.125	*0.199*	-0.029	*0.740*	0.110	*0.180*
traceability	**0.156**	*0.073*	0.098	*0.339*	**0.246**	*0.008*	0.104	*0.243*
certifications	**0.153**	*0.067*	**0.422**	*0.000*	**0.226**	*0.012*	**0.282**	*0.001*
freshness	**0.632**	*0.089*	-0.318	*0.488*	**0.626**	*0.093*	0.283	*0.446*
nutritional properties	-0.108	*0.253*	-0.122	*0.302*	0.074	*0.461*	-0.012	*0.905*
ingredients	**-0.669**	*0.000*	-0.323	*0.137*	**-0.421**	*0.027*	**-0.531**	*0.003*
expiry date	**2.335**	*0.000*	**1.268**	*0.007*	**0.702**	*0.097*	0.583	*0.158*
Healthy life attitudes								
special diet	0.281	*0.128*	0.221	*0.342*	0.137	*0.517*	0.184	*0.349*
sport habits	0.220	*0.169*	**0.404**	*0.048*	-0.030	*0.866*	-0.244	*0.147*
smoke	-0.047	*0.347*	**-0.118**	*0.059*	-0.088	*0.118*	-0.038	*0.478*
Nutritional knowledge and source of information								
infomedia	**0.296**	*0.062*	0.197	*0.326*	0.277	*0.121*	0.108	*0.524*
infoexpert	0.245	*0.148*	0.332	*0.134*	0.261	*0.177*	0.155	*0.393*
infofriends	-0.035	*0.831*	0.021	*0.921*	-0.122	*0.506*	0.175	*0.319*
food knowledge	0.087	*0.291*	**0.359**	*0.001*	0.039	*0.676*	0.072	*0.413*
Food safety attitude								
Attention to food safety issue	0.042	*0.692*	0.095	*0.451*	0.115	*0.315*	0.123	*0.261*
Level food safety perceived	0.089	*0.322*	-0.103	*0.363*	**-0.250**	*0.015*	-0.086	*0.366*
Bse effect	**0.221**	*0.056*	**0.276**	*0.069*	**0.241**	*0.066*	0.058	*0.625*
Chi-Square (Sig. 0,000)	130.43		102.14		106.38		99.41	
Nagelkerke R Square	0.18		0.18		0.17		0.15	

Source: our survey

The longer the time a person spends working, the lower the probability that he/she reads meat labels. Similarly, young people usually have more time to spend purchasing food. The variables connected to healthy life attitude do not affect the dependent variable whereas, among the variables affecting food product purchasing behaviour, 'traceability' (0.156), 'certification' (0.153), 'product freshness' (0.632), and 'expiry date' (2.335) play an important role in the model. This seems to highlight that consumers who read labelled meat information generally pay attention to most of the information reported on food products and their characteristics. Regarding food safety attitude, the variable connected to the decrease in meat consumption after the BSE crisis is positive and statistically significant (0.221). Moreover, those respondents who obtained food information by media were more likely to use the meat label (0.296). According to Lichtenstein *et al.* (1978), the media provides misleading information, and low levels of consumer information can result in biased risk perception. Moreover, several studies demonstrate that unfavourable news regarding food safety weighs heavily on consumer decision-making (Herrmann *et al.*, 1997; Rozan *et al.*, 2004). Therefore, this regression seems to indicate consumers who are easily influenced by the media.

MI_2 - Mandatory information concerning country of animal origin.

Model MI_2 shows a significant relation to variables connected with sports habits (0.404) and smoking status (-0.118), and a positive link with the level of consumer food knowledge (0.359), suggesting that those who have good food knowledge and who pay particular attention to having a healthy life care about having information concerning the origin of the animals. Moreover, the variable 'BMI' is positive and statistically significant (0.247).

MI_3 - Voluntary information concerning the system of cattle breeding.

Model MI_3 concerning cattle breeding gives a profile of the consumer who pays particular attention to the quality attributes of products. The regression analysis shows relations with variables 'traceability' (0.246), 'certifications' (0.226), 'freshness' (0.626), and 'expiry date' (0.702). Moreover, consumers who read this type of information also tend to have a high level of food safety attitude: the regression reveals that such consumers have a low level of food safety perceived (the coefficient of the variable 'level of food safety perceived' is –0.250) and the more consumers are interested in this voluntary information, the greater is the probability that they have decreased the quantity of meat purchased after the BSE crisis (the variable 'BSE effects' is 0.241).

MI_4 - Voluntary information concerning cattle feeding

Finally, model MI_4 concerning cattle feeding points especially to 'age' (-0.168), 'education' (0.196), and 'certification' (0.282) as significant variables. The analysis reveals that young people, especially those with a high level of education and with a high interest in product certification, are more likely to read this information. In this case the positive association between the level of education and the use of this voluntary information could indicate that certain types of information are understood and considered important only by consumers who have followed a certain educational path.

Concluding remarks

The present analysis reveals that Italian consumers make wide use of the meat label in the formulation of their purchasing preferences. In fact, since the BSE crisis, the meat label appears to be a tool that reinforces consumer trust towards meat safety. In general, the survey revealed that most consumers tend to use the meat label and also most of the mandatory and voluntary information reported. This confirms the recent literature on consumer behaviour towards certain kinds of meat product information, especially with regard to the country of animal origin.

With regard to voluntary information, some, like the system of cattle breeding and cattle feeding, seems to be of interest to the Italian consumer. This is in accordance with a wide body of empirical evidence that points out that consumers tend to appreciate, and increasingly demand, some credence attributes of meat products, such as respect for animal welfare and environmentally friendly production.

The empirical analysis reveals that consumers who care about meat information have a certain food safety attitude. Moreover, the consumers who declare they use meat labels tend to be young people with a low income, with different product attributes affecting their purchasing behaviour, and who use the media as their principal source of information about nutritional characteristics of food. On the other hand, those consumers who read specific labelled information during the purchasing decision tend to have a good level of food knowledge or education

and weight problems. This seems to suggest that specific meat information can be appreciated only by those consumers who understand the meaning of specific cues.

Hence, the empirical work suggests two different consumer types. One can be identified as being prevalently young people, of female gender and with a low income. These consumers could have a lot of time available for food purchasing and probably the possibility of reading most of the information reported on the food label, even if they do not have the capacity to process all the information as they do not use specific information sources for their nutritional knowledge. Instead, the second type of consumer probably does not have much time for food purchasing, but they have more specific food knowledge and more specific weight problems, thus they select only that information in which they are mostly interested.

Another interesting aspect of this empirical analysis is that there is quite a large difference between the question of 'meat label use' (MI_1) and the others concerning specific information (MI_2, MI_3, MI_4) among consumers. Most of the consumers state they use the meat label before purchasing (69%) but a higher percentage of them claim to use mandatory (84%) and voluntary information (79% and 76%) related to meat traceability. This could suggest that consumers prefer to concentrate their attention on specific product information but do not read all the cues reported on labels. Thus the search for specific kinds of information can be connected to economic literature that studies the problem of information overload. Consumers tend to read only information that is quickly understood, and that can help them to evaluate the quality of meat products.

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