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Could Animal Welfare Claims and Nutritional Information Boost the Demand for Organic Meat? Evidence from Non-hypothetical Experimental Auctions

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Abstract:

The future of organic agriculture will, to a large extent, depend on consumer demand. As a result, the last three decades have witnessed a considerable increase in the number of papers that have attempted to identify the determinants of organic food consumption and whether organic foods are competing with other ethical food products such as local foods, animal-friendly foods, healthier foods and free-from foods (e.g., dairy free, gluten free, nut free). This study went a step further and assessed the use of animal welfare and nutritional information to increase the demand for and the competitive power of organic foods using a non-hypothetical experimental auction. Overall, the results showed that the demand for organic animal products could be improved not only by selling better its superiority in terms of sustainability but also by promoting its advantages in terms of other attributes that are known to be highly valued by consumers such as animal welfare and nutritional content. Therefore, producers and marketers of organic animal products should be fully aware of the potential of their products and ready to exploit all their advantages if they want to improve their competitive power as well as their demand.

Key Words: Organic meat, Animal welfare, Nutritional content, Willingness to pay, Experimental auctions

1. Introduction

The food sector faces significant challenges in providing food security to an increasing world population while reducing negative environmental and health impacts (McMichael et al., 2007; Reisch et al., 2013). This considerable challenge is increasingly urging stakeholders and policy makers to shift to more sustainable, healthy and less natural resource-intensive food production and consumption (Reisch et al., 2013; Thøgersen, 2014).

Following an initial period that considered organic food production as a threat to food security and the environment alike in the 1970s and 1980s (Lockeretz, 2007), the Food and Agriculture Organization of the United Nations (FAO) recognised organic food as a sustainable choice associated with a potentially decreasing risk of soil and underground contamination as well as with improving local food security by increasing farmers' income, especially in developing countries (FAO, 1999). Furthermore, organic farming is regarded not only as an effective way to reduce the external cost of agricultural activity to society and satisfy the increasing demand for environmentally-friendly foods, but also as a powerful strategy of product differentiation (Reganold and Wachter, 2016). These factors, and others such as concerns about the side effect of non-organic and modern agricultural production (e.g., healthiness of foods, animal wellbeing), have contributed to a significant increase in the production and the consumption of organic food products.

Recent statistics published by the Research Institute of Organic Agriculture FiBL and IFOAM-Organic international (2016) showed that the global market of organic food and drinks has expanded more than fivefold between 1999 and 2014 (Willer and Lernoud, 2016). Despite these considerable changes as accompanied by positive attitudes showed by most interviewed consumers toward organic food products (e.g., Saba and Messina, 2003; Kihlberg and Risvik, 2007), only 1% of the global agricultural land is organic. Even in countries with a large market share of organic food and drinks, the share of agricultural land that is organic has not yet exceeded 5% (e.g. 2.4% in Europe) (Willer and Lernoud, 2016). The question therefore remains: what is hindering further growth of the supply and demand of organic food and drinks?

To answer this question, knowledge on the determinants (e.g. opportunities, barriers) of the supply and demand of organic food and drinks is needed. There is an extensive literature on the determining factors of consumer demand for organic food products (e.g., Hughner et al., 2007; Akaichi et al., 2012; Schleenbecker and Hamm, 2013). The results from this literature showed that consumers buy organic food and drinks mainly because they think they are more environmentally and animal friendly, healthier and safer. Higher prices, lack of availability and competition with other sustainable food products are the main barriers to the purchase of organic food and drinks. The main objective and contribution to the literature on animal welfare of this paper is to empirically show how the use of other food attributes such as animal welfare and healthiness of the food can actually increase consumers' price premium for organic food products and may, as a result, decrease their perception of its high retail price.

It is possible that food products labelled as organic, animal-friendly, healthy or local compete in real markets as reported in, e.g., Meas et al. (2015), Gerini et al. (2016). In fact, consumers who positively value these attributes might be indifferent between choosing, e.g., meat that is labelled as organic (but not labelled as animal-friendly)

and non-organic meat that is labelled as animal-friendly (e.g., Conventional-plus products, compromise products, see De Jonge et al, 2015). This may result in purchases of non-organic meat that is labelled as animal-friendly if its retail price is cheaper than its organic counterpart. However, such a purchase decision may change if the organic meat is additionally labelled as animal friendly (or as healthy or local).

This is not only important because bundles of attributes may attract a higher price premium as opposed to attributes in isolation, but also because of the following two reasons. First, animal welfare was reported in many studies as a major reason for buying organic food and drinks and, hence, consumers think that organic foods are more animal friendly than their non-organic counterparts. Second, as claimed by the Soil Association¹, animals raised organically enjoy high welfare standards. In fact, animals raised organically (1) must have access to pasture and are truly free range, (2) must have plenty of space to reduce stress and diseases, and (3) must graze and forage naturally on organic pasture. Therefore, labelling organic meat and dairy products as animal friendly could be an effective way to increase the demand for these products².

Interestingly in real markets, at least in the UK, organic meat, mostly certified by the Soil Association, is typically not labelled as animal-friendly. To back this statement we used the Mintel Global New Products Database (GNPD), which provides information about the characteristics of new products launched in the UK between 1997 and 2016. We found that only 8.8% of the 295 organic processed meat products that have been launched in the UK market since 1997 were additionally labelled as animal friendly (mainly Free Range)³. Despite the extensive literature on consumer demand for organic meat, very little has been done to investigate how the use of labels for other desirable food attributes (e.g., animal welfare, local) affects consumers' acceptance and purchases of organic meat.

To contribute to filling this gap, we conducted a non-hypothetical experimental auction to assess whether additional claims about animal welfare and healthiness of organic meat can boost demand. The experimental auction was conducted in four rounds. No information was provided in the first round. Information on products' labels, animal welfare standards and nutritional content of the products was provided to participants in round 2, 3 and 4, respectively. All participants were shown the different types of information in the same order. In each round, participants were asked to report their willingness to pay (WTP) for three samples of bacon (i.e., conventional bacon, animal-friendly bacon and organic bacon). The rounds differed in terms of information provided to participants, allowing us to: (1) measure

¹ Soil Association is the UK's leading organic certification body – certifying over 70% of the growing organic market.

² Obviously, this is valid only for organic animal products that are proven to actually have higher animal welfare

³ The detailed results are available from the authors upon request.

consumers' WTP for the three products only based on their appearance; (2) assess the effect of animal welfare and organic labels on consumers' WTP; (3) investigate whether providing consumers with additional information regarding animal welfare and nutritional content of organic bacon could help increasing consumer demand.

The effect of the additional information on consumers' WTP for animal-friendly bacon and conventional bacon is also assessed. We additionally investigate whether consumers' response to the provided information is affected by their attitudes and socio-demographic traits. To the best of the authors' knowledge, this is the first paper to investigate these four research questions at the same time using a non-hypothetical value elicitation method. The results constitute a significant contribution to the literature on the demand for organic food and drinks, and are useful for stakeholders interested in improving the uptake of such food products.

The remainder of this paper is organized as follows. In the next section, we describe how the economic experiment was designed and conducted and how the collected data were analysed. In the third section, the main findings are reported and discussed, whilst the final section presents the implications of the results and the conclusion of the study.

2. Methods

2.1. Experimental auction

To measure consumers' WTP, we conducted non-hypothetical Vickrey auctions (i.e. second-price auctions) (Vickrey, 1961). In Vickrey auctions, the bidder with the highest bid buys the product and pays a price equal to the second-highest bid. Theoretically, it has been shown that Vickrey auction is an incentive compatible auction mechanism in the sense that a bidder's optimal bidding strategy is to report a bid equal to his/her true WTP (Krishna, 2010). In fact, if a participant bids more than the auctioned product is worth to him/her, he/she may end up buying the product for more than what he/she actually wants to pay. Conversely, if a participant bids less than the product is actually worth to him/her, he/she may end up not winning the auction even though he/she could have bought the product at a price he/she was actually willing to pay. Due to its incentive compatibility and the simplicity of its implementation, Vickrey auction has been the most widely used auction mechanism in empirical applications on consumers' WTP for food attributes (see Lusk and Shogren (2007) for a detailed discussion).

In the experiment, participants were asked to bid for three samples of bacon weighting 200g each: (1) conventional bacon that is neither animal friendly nor organic, (2) Freedom Food⁴ bacon, and (3) organic bacon. Participants were not shown the real package of each product as sold in the market to avoid brand effects

⁴ Freedom Food is the RSPCA's (Royal Society for the Prevention of Cruelty to Animals) ethical food label dedicated to farm animal welfare.

(see Figure 1). Participants were randomly assigned to 12 experimental sessions. Each participant was allowed to participate in only one session of approximately one hour and was paid a £35 participation fee.

In total, 120 consumers were recruited from the city of Edinburgh and its metropolitan areas. The recruitment of participants was carried out by a market research company. The company was asked to recruit a representative sample of the UK population of shoppers of food products. In fact, when measuring consumers' WTP for private products, the population of interest is the population of people who actually purchase the product and not the general population. Otherwise, the sample is likely to include consumers who consume what other people buy for them and, hence, their revealed WTP might bias the results.

The market research company was required to adhere to the following criteria in recruiting participants: (1) each participant must be the main responsible for the purchase of food products in the household; (2) compared with the UK population, female participants must be overrepresented; (3) only participants older than 18 years old could be recruited; and (4) the sample should be representative of the UK population in terms of employment status and household income. Not all of the predefined quotas were fully achieved, because some participants did not show up and they had to be replaced by other participants who were randomly recruited in the vicinity of the experimental lab's location. For example, compared with the UK population the sample is over representing participants with a high education level. A summary of participants' socio-demographic and economic characteristics is displayed in Table 1.

Furthermore, the size of the sample used in this study is low compared with similar studies that used *hypothetical* value-elicitation methods to collect data. Nonetheless, it is a typical sample size for *non-hypothetical* value-elicitation methods such as experimental auctions due to the high cost of carrying out this type of lab experiment. Furthermore, we opted to use a within-subject design so participants' WTP were collected before and after giving information. As a result, in all the analyses we carried out, the number of participants per treatment was 120⁵.

The Vickrey auction was conducted in four rounds. Before starting the auction, participants were told that each one of them would receive £35 as a participation fee at the end of the experiment. One of the main determinants of success of data collection using an experimental auction is a thorough understanding by participants of the incentive compatibility of the auction mechanism. To achieve this goal, participants were given a detailed oral explanation about the operating procedures in a Vickrey auction. During the explanation, participants were free to ask questions to dissipate any doubts about the process. The auction starts only after being sure that

⁵ In between-subject designs, participants are assigned to different treatments resulting in a lower number of participants per treatment compared with the within-subject design, given the same total number of participants. This in turn is likely to increase the variance of the obtained results.

all participants fully understood how the auction mechanism works and why it is in their best interest to reveal their true WTP. Before conducting the actual auction, a training session was carried out, auctioning four brands of candy bar to mimic the bacon auction and to further facilitate the learning process. After finishing the training session the actual auction was conducted in four rounds.

In round 1 and before receiving any kind of information on bacon's attributes, participants were invited to physically examine the three samples of bacon (See Figure 1). Once all participants finished inspecting the product, each participant was asked to indicate how much he/she would be willing-to-pay for each of the three bacon samples (the bidding card is displayed in Figure 2) based on appearance alone⁶. Asking participants to report their WTP solely based on the appearance of the bacon is important for at least two reasons. It allows us to: (1) assess whether consumers have preferences for a specific bacon only based on its appearance; and (2) quantify the net effect of the information provided in posterior rounds on the bacon's attributes by comparing consumers' WTP before (i.e. WTP based on the appearance) and after providing additional information (e.g. labels).

In round 2, the label corresponding to each bacon (i.e. no label for the conventional bacon, "Freedom Food" label for the animal-friendly bacon, and "Organic" label for the third sample of bacon (see Figure 3)) was revealed to participants who were then asked to report their WTP for each bacon sample considering the new information provided. In round 3, participants received additional information on animal welfare standards of each one of the three products (see Figure 4 for details⁷) and were again asked to report their WTP based on the appearance, the label and the additional information on animal welfare standards corresponding to each sample of bacon. In round 4, respondents received information on the nutritional content (i.e. calories, fats, salt and sugar) of each bacon sample (see Figure 5⁸). After reading the information, participants were asked to report how much they are willing to pay for each product based on the information provided in all of the rounds.

At the end of round 4, participants were told that the results of the auction would be determined after they finish completing a short questionnaire about various aspects related to farm animal welfare as well as their socio-demographic characteristics, for the purpose of characterizing the sample and analysing their attitudes and purchase habits. After completing the questionnaire, one of the participants was randomly chosen to randomly draw the binding bacon sample and the binding round (i.e. only the bids for one product in one round were considered to determine the buyer and the price to pay). Then, the experimenter ranked participants' bids (WTPs) for the

⁶ To minimize wealth effects, participants were told that at the end of the auction, one of the three bacon samples in the binding round will be randomly chosen as the "binding product" which would be actually sold at the end of the auction.

⁷ This information was provided by Dr. Rick D'Eath and Dr. Emma Baxter (Scotland's Rural College) based on their research on pigs' animal welfare.

⁸ The information was based on what was displayed on the back of the product package.

binding product in the binding round from the highest to the lowest and the owner of the highest bid buys the binding bacon and pays a price equal to the second highest bid. Then, each participant received £35 for his/her participation. The experiment ended by handing the binding bacon to the buyer who had to pay a price equal to the second highest bid.

2.2. Data analysis

To assess the effect of the different types of information on participants' WTP, we compared their WTP before and after receiving information. In other words, we carried out a within-subjects analysis which necessitates the use of the repeated-measures ANOVA. The repeated-measures ANOVA was followed up by a post hoc test: Bonferroni correction. Furthermore, to check the robustness of the repeated-measures ANOVA to the possible non-normality of the WTPs' distributions, we ran the Friedman test, which is the non-parametric version of the repeated-measures ANOVA. The Friedman test was followed by a Fisher-Pitman permutation test, as the non-parametric post hoc test. The p-values obtained from Fisher-Pitman permutation test are reported in parentheses to differentiate them from the p-values obtained from Bonferroni post hoc test. The results of the analysis of participants' WTP are displayed in Table 2 (columns 3-5).

In addition to assessing the effect of the different types of information on participants' WTP for each bacon sample, we also analysed the effect of the provided information on participants' price premiums (Table 2, columns 6-8). We did so because the assessment of the effect of information on each bacon sample separately allows capturing only part of the real and total effect. In fact, participants were asked to report their WTP for three bacon samples before and after receiving information. As a result, it is likely that after receiving the information, participants made a comparison between the bacon samples and may have taken a decision that affected several bacon samples at the same time. For example, after receiving information on labelling, a participant could have increased her/his WTP for the organic bacon and decreased it for the conventional bacon. Therefore, the whole effect is better measured by the difference between the WTP for the organic bacon and the WTP for the conventional bacon which in turn represents the price premium that participants are willing to pay for organic bacon. Since participants were asked to report their WTP for three bacon samples, three different price premiums were computed (i.e. "WTPFF-WTPCON", "WTPORG-WTPCON" and "WTPORG-WTPFF"). Within-subject analysis was also performed, using the repeated-measures ANOVA and Friedman test and their respective post hoc tests, to investigate the effect of the provided information on participants' price premiums for organic and Freedom Food bacon.

Previous papers showed that consumers' preferences and WTP for organic food products are affected by their attitudes and socio-demographics characteristics (e.g., Kihlberg and Risvik, 2007; Verain et al., 2012). Therefore, in addition to investigating the effect of the information provided to participants, we also assessed the robustness of the information effect after controlling for the effect of participants' attitudes and socio-demographics characteristics. Towards this end, we estimated two random-effects generalized least-squares regression models (i.e. two models: one for the price premium for organic bacon with respect to conventional bacon ($WTP_{ORG} - WTP_{CON}$), and a second model for the price premium for Freedom Food bacon with respect to conventional bacon ($WTP_{FF} - WTP_{CON}$)).

Formally, the random-effect generalized least squares model is expressed as follows:

$$y_{irj} = \beta_j x_{irj} + u_{ij} + \varepsilon_{irj}$$

$$\forall i = 1, \dots, N; r = 1, 2 \text{ and } j = 1, 2$$

where j indexes the two price premiums; i indexes cross-section units such that $i = 1, 2, \dots, N$ (N is the number of participants); and r indexes the number of rounds (time series units) such that $r = 1, 2$. The matrix x_{irj} is of dimension $(2N \times K)$ and contains data on the observable explanatory variables of the model for the price premiums j . y_{irj} is the price premium j that participant i revealed to be willing to pay in round r . β_j are vectors of parameters to estimate. The effects of relevant unobservable variables and time-invariant factors are captured by the vector u_{ij} . The stochastic disturbances of the model for the price premiums are captured by the vector ε_{irj} .

We also corrected for heteroskedasticity⁹ that was found to be a significant issue in the data. The dataset used in the estimation is a balanced panel where the time dimension is represented by the auction rounds 1 and 4. The dependent variables are the price premiums computed based on participants' WTP for the three types of bacon obtained in round 1 and round 4. The independent variables were constructed based on the information collected in the questionnaire on consumers' attitudes and socio-demographic characteristics. To avoid the bias of omitting the effect of the information provided to participants during the auction, we specified a dummy variable (i.e. INFORMATION) that takes a value of 0 in round 1 (i.e. participants did not receive any information) and 1 in round 4 (i.e. participants were provided with information on labels, animal welfare standards and nutritional content).

⁹ The estimation was carried out using STATA. We used the panel command "**xtgls**" that fits panel-data linear models by using feasible generalized least squares. To allow estimation in the presence heteroskedasticity across panels, we used optional commands "**panels(heteroskedastic)**" (that specifies heteroskedastic error structure with no cross-sectional correlation).

In addition to the variable INFORMATION, eleven dummy variables were also considered (i.e., ENVIRONMENT, ANIMAL WELFARE, LABELLING, HEALTH, TASTE, PRICE, GENDER, AGE, EDUCATION, INCOME, CHILDREN¹⁰). The descriptions of these independent variables are displayed in Table 3 and the results obtained from the estimation of the two the random-effect generalized least squares models are reported in Table 4.

3. Results and discussion

In this section, we will first present and discuss the effects of providing different types of information on participants' WTP and their price premiums for organic and Freedom Food bacon. Then, we turn to present and discuss the results on the effect of participants' attitudes and socio-demographics on their price premiums for organic bacon and Freedom Food bacon.

3.1. Appearance

During the first round of the experimental auction, participants were asked to report their WTP for each one of the three unlabelled bacon samples based only on their appearance. Results, displayed in Table 2 (round 1), show that participants revealed to be willing to pay a lower price for organic than for Freedom Food bacon and conventional bacon. In other words, in the absence of labels that allow consumers to identify organic and freedom food from conventional bacon, the results suggest that consumers are more likely to buy conventional or Freedom Food bacon than organic bacon if these three products are sold at the same price.

During the experiment period, we noticed that organic bacon sold in the major UK supermarkets is darker than conventional bacon (which also applied to the sample used in the experimental auction), but that the degree of darkness of organic bacon varied across supermarkets. Warriss et al. (1983) and Latorre and Rodríguez-Sánchez (2010) reported that the meat from pigs reared outdoors is darker than meat from pigs reared in confinement. Gondret et al. (2005) explained the greater darkness of organic pork by the increased muscular activity and a shift towards an oxidative muscular metabolism due to more outdoor access and increased space allowance for pigs raised in organic farms. Nonetheless, other studies (e.g., Klont et al., 2001; Gentry et al., 2002a; Álvarez-Rodríguez et al., 2015) found that organic and conventional pork do not significantly differ in colour.

Therefore, although the results on the negative effect on consumers' WTP of the appearance of organic bacon can't be generalized, they still suggest that appearance of bacon *matters* and that relying solely on the appearance of organic

¹⁰ Please note these variables are generate using the information collected on participants' level of agreement/disagreement with several statements that are related issues like environment, animal welfare, and labelling. However, readers should be aware that measurement error is generally higher when measuring attitudes than when measuring, e.g., individuals' demographics. Therefore, the obtained results should be interpreted and used with caution.

bacon to attract consumers seems to be a risky strategy. Furthermore, the results show that in the absence of labels, organic bacon is competing not only with other ethical bacon such as animal-friendly bacon but also with its conventional counterpart. Nonetheless, in real markets, most of organic food products are labelled as organic. As it will be shown shortly, labelling ethical food products is an essential tool that it is used not only to inform buyers about the ethicality of the product but also to increase their willingness to pay a higher price for this type of products.

3.2 Labels

To investigate the effect of organic and animal-welfare claims that were shown to participants in round 2, we compared their WTP in round 2 with their WTP in round 1. The results displayed in Table 2 show that providing participants with information on the products' labels significantly increased their WTP and price premiums for both Freedom Food and organic bacon but decreased WTP for conventional bacon. Thus, as reported in several other studies (see for e.g., Olesen et al., 2010; Gracia et al., 2014; Gerini et al., 2016), organic and animal welfare labels are essential to inform consumers about the superiority of organic and animal-friendly food products in terms of sustainability and animal welfare, respectively, and, as a result, motivating them to pay higher prices.

More interestingly, our results show that even after labelling the organic bacon, participants' WTP is still significantly higher for Freedom Food bacon than for organic bacon. At the individual level, the analysis of the WTP data showed that after respondents were shown the labels, only 31% of them revealed to be willing to pay a higher price for organic bacon than for Freedom Food bacon¹¹. This suggest that both products are competing and that consumers are more likely to buy animal-friendly bacon than organic bacon, especially given that the retail price of the latter is significantly higher than the retail price of the former. The results are in line with previous studies on similar topics (e.g., Gracia et al., 2014; Van Loo et al., 2014; Gerini et al., 2016). For example, Gracia et al. (2014) conducted a choice experiment in Spain to investigate whether the attributes method of production (free range/organic) competes with the attribute origin. Their results showed that most of the respondents reported a higher marginal WTP for free range eggs than for organic eggs. Van Loo et al. (2014) also found that Belgian consumers value significantly more animal welfare claims than sustainable claims (i.e. organic, carbon footprint). Gerini et al. (2016) found that consumers who said to be occasional purchasers of organic foods (64% of the sample) reported a higher WTP for enhanced animal welfare eggs than for organic eggs. However, respondents who revealed to be regular buyers of organic foods (18% of the sample) reported higher WTP for organic eggs.

¹¹ 51% of participants reported higher WTP for Freedom Food bacon than for organic bacon.

Overall, the price premiums participants were found to be willing to pay are still considerably below the price premiums set by the major retailers in the UK (Tesco, Asda, Sainsbury's, Waitrose and Morrisons). The average retail price premiums for 200g of Freedom Food and organic bacon are £1.30 and £3.05, respectively¹². Comparing these retail price premiums with respondents' price premiums in round 2, the results suggest that 21% of participants reported a price premium equal to or higher than the retail price premium for Freedom Food bacon. However, none of the participants was found to be willing to pay the retail price premium for organic bacon. This result partially explains the low market share for organic food products whose retail price was mentioned in the literature as the major barrier to their purchase (e.g., Akaichi et al., 2012; Aschemann-Witzel et al., 2015).

We have seen, so far, that respondents' WTP for Freedom Food bacon is higher than their WTP for organic bacon even after they have been shown the labels of these products. However, would the dominance of Freedom Food attribute be maintained even after consumers realized that organic bacon is not only environmentally friendly but also animal friendly?

3.3 Additional information on animal welfare

To answer the question whether the Freedom Food attribute continues to attract a higher price premium after conveying to consumers that organic bacon is also animal friendly, we compared respondents' WTP between round 2 and round 3. Interestingly, the results displayed in Table 2 (rows 5-7) show that the provision of additional information on animal welfare standards significantly decreased participants' WTP for conventional and significantly increased their WTP for organic bacon. In particular, participants' price premium for organic bacon increased threefold (from £0.53 to £1.66). The results also show that the provision of additional information on animal welfare had a higher effect on participants' WTP (from £1.84 to £2.22) than the effect of the label "Organic" itself (from £1.59 to £1.84). These results clearly suggest that informing consumers on the superiority, if any, of organic meat in terms of animal welfare is likely to result in a significant increase in their WTP. Therefore, animal-welfare claims should be used by sellers of organic meat to inform consumers, increase the competitiveness of organic meat and ultimately increase the demand for this product¹³.

In saying this, it is important to highlight that it remains to be seen whether it is feasible to display all the information presented in Figure 4 on organic products' packages. This concern was not addressed in this study, but we think that it is of relevance and should therefore be investigated in future studies. At the time of writing this paper, an audit of the major UK retailers by the authors showed that

¹² The average retail prices are £1.28, £2.58 and £4.61 for 200g of conventional, Freedom Food and organic bacon, respectively

¹³ Obviously, this only applies in case organic meat is proven to be more animal-friendly than conventional meat.

animal-friendly meats that carry the RSPCA logo on the front of the package also display on the back of the package the following information: “The outdoor pork on this product comes from producers inspected to RSPCA welfare standards by the RSPCA’s independently certified farm assurance scheme”. This additional information could help consumers to see the link between animal welfare and the ambiguous label “Freedom Food”. However, we think that this information falls short of providing buyers with explicit information on how the meat labelled as Freedom Food is coming from farm animals that were treated significantly better than animals kept in conventional farms. Wansink’ (2003) finding based on a controlled study suggested that “combining short health claims on the front of a package with full health claims on the back of the package leads consumers to more fully process and believe the claim”.

The results reported in Table 2 also show that when participants were given the information described in Figure 4, they increased their price premium for Freedom Food bacon twofold (from £0.74 to £1.41). This is an interesting result for at least two related reasons. First, the increase in participants’ price premium for Freedom Food bacon is a result of a decrease in their WTP for conventional bacon and not an increase in their WTP for the Freedom Food bacon. In line with the theory of the law of demand and substitution effects, the result highlights that consumers’ purchase decision is affected not only by the attributes of the product of interest but also by the attributes of its substitutes. This, in turn, points out the crucial importance of considering buyers’ product of reference when investigating their response to a variation in product quality (e.g., increase in animal welfare). For instance, if the conventional bacon was not included in the experiment, measuring participants’ price premiums and, hence, capturing the full effect of the provided information would be impossible.

Second, respondents decreased their WTP for conventional bacon, which in turn increased their price premium for Freedom Food bacon. This happened because participants, who received additional information on pigs’ wellbeing in the three systems, could clearly see the inferiority of conventional bacon in terms of animal welfare standards. Nonetheless, as animal welfare labels are not mandatory in the UK, information on animal welfare is not displayed on conventional pork for obvious reasons. Therefore, it is likely that different results could be obtained if participants had not been given animal welfare information for all of the products. This leads to an obvious question. Should animal-welfare labelling be mandatory to increase the demand for animal-friendly meat and incentivise/force producers of conventional meat to improve the wellbeing of their animals?

Most participants in this study (53%) agreed with the statement that the government must ban animal production systems that do not guarantee high welfare levels for farm animal even if such a policy leads to an increase in animal product prices. 32% of participants preferred that the government should first ask citizens through a

referendum whether conventional husbandry systems should be banned, and 16% said that animal-welfare labelling should not be mandatory and the government should not interfere. However, a UK ban of husbandry practices that are considered less animal friendly (e.g., tail docking, castration, confinement) is likely to reduce the competitiveness of UK pork sold alongside with cheaper pork imported from countries (e.g. East Europe) with lower animal-welfare records (at least in the eyes of UK pig farmers). This debate becomes more complex with Brexit. We think that this topic is of great interest and thus a relevant area of future research.

Regarding the effect of the provided information on the competitiveness between organic and Freedom Food bacon, the results show that the provision of additional information reverted the superiority of Freedom Food bacon. In fact, the difference between participants' WTP for organic bacon and their WTP for Freedom Food increased from £-0.21 to £0.25. Furthermore, at the individual level, the analysis of the WTP data showed that after participants were given additional information on animal welfare, the percentage who revealed to be willing to pay a higher price for organic bacon than for Freedom Food bacon increased from 31% to 64%. Therefore, providing consumers with information on the superiority of organic meat in terms of animal welfare is expected to increase its competitive power, with respect to both conventional and animal-friendly meat, and, as a result, is likely to augment its demand by consumers. Finally, it is noteworthy that even with the large increase in participants' price premium for organic bacon following the provision of additional information on animal welfare standards; it is still significantly below the current retail price premium of £3.05. In fact, only 5% of participants reported a price premium higher than current retail price premium for organic bacon. Thus, the high retail price is expected to continue to be a major barrier to the purchase of organic meat, although labelling it as animal friendly is likely to result in an increase in the number of buyers who will opt to buy organic meat labelled as animal friendly.

3.4. Additional information on nutritional content

As discussed above, health was found to be one of the main motives for buying and consuming organic foods (e.g., Shepherd et al., 2005; Chen, 2009; Akaichi et al., 2012). However, some scientific papers (e.g., Zörb et al 2006; Dangour et al 2009) showed that, generally, there are no significant differences between organic foods and their conventional counterparts in terms of safety and nutritional content. These studies also claimed that if some differences were found, they were related to the place and the conditions of the setting in which the experiments had taken place and, therefore, conclusions could not be generalized. In this study, we tested the effect of providing participants with information on the nutritional content (see Figure 5) of each of the three products. The information provided is identical to the information that was displayed on the original packages of the three products used in the experimental auction. The information displayed in Figure 4 shows that organic bacon has lower calories, fat and salt than conventional and Freedom Food bacon.

To investigate the effect of the nutritional information, we compared participants' WTP between round 3 and round 4.

As expected the results reported in Table 2 show that the provision of nutritional information significantly increased participants' WTP for conventional and organic bacon and decreased their WTP for Freedom Food bacon. This result is consistent with findings from previous studies (e.g., Makatouni, 2002; Chen, 2009; Akaichi et al., 2012) that showed that health is a key determinant of consumers' WTP for organic food products. The results also show that the attribute health is competing with the attributes label and information on animal welfare. In fact, in the case of organic bacon the information on health complemented the information on label and animal welfare and the three pieces of information together resulted in an increase of participants' WTP (price premium) for organic bacon from £1.59 to £2.30 (£-0.26 to £1.60). However, in the case of Freedom Food bacon, the negative effect of the information on nutritional content of the product together with the additional information on animal welfare offset the positive effect of the label "Freedom Food".

These results show the importance of considering the attributes that can complement or substitute the attribute of main interest, especially when assessing consumers' preferences and WTP. Doing so not only it mimics the conditions of the real market better, but also allows the researcher to identify the trade-offs that buyers may make when they have to choose between food products with competing attributes.

Finally, the results show that the provision of the nutritional information also increased the competitiveness of organic bacon with respect to Freedom Food bacon. In fact, the difference between participants' WTP for organic bacon and their WTP for Freedom Food bacon increased twofold (from £0.25 to £0.50), although this final price premium represents less than a third of the actual retail price premium (£1.75). These results suggest that the healthiness of organic meat, if any, should be used by producers and marketers alike to increase its demand, especially given that there is strong empirical evidence that most consumers buy organic foods because they perceive them to be healthier.

3.5. Determinants of consumers' price premiums

Overall, the results obtained from the estimation of the two random-effect generalized least squares models (see Table 4) show that participants' price premiums for organic and Freedom Food bacon are not only affected by the information provided to participants during the auction, but also by their attitudes and socio-demographic traits. The sign and the value of the estimated effect of the variable INFORMATION are consistent with the results of the bivariate analysis (Table 2) in showing that the total effect of the three types of information on participants' price premiums for organic and Freedom Food bacon is significantly positive and slightly higher in the case of organic bacon. Thus, the positive effect of

information on the superiority of organic meat in terms of sustainability, animal welfare and nutritional value remained significant even after controlling for the effect of participants' attitudes and socio-demographics.

Regarding the effect of participants' attitudes on their price premiums, the results displayed in Table 4 show that participants who revealed to "buy animal-friendly food products because they think they are more environmentally friendly" are willing to pay a higher price premium for both organic and Freedom Food bacon. The results also show that participants who agreed with the statement that "the most important food attribute I consider when deciding which food product to buy is animal welfare" reported a significantly higher price premium for organic bacon.

Furthermore, the results show that participants who revealed that "the product's label is the main source of information on animal welfare" are willing to pay a significantly higher price premium for both products. Interestingly the results displayed in Table 4 show that participants who agreed or disagreed with the statement that "I buy animal friendly food products because I think they are healthier" were found to pay similar price premium for both organic and animal-friendly bacon. This is not surprising since the analysis of data collected in the questionnaire showed that only 21% of participants in the experimental auction said they mainly buy animal-friendly foods because they think they are healthier than their conventional counterparts. Interestingly, the results also show that participants who said that they buy animal friendly food products because I think they taste better, reported significantly higher price premium for both organic and animal-friendly bacon. This is important due to the fact that most of the published studies, including ours, on consumers' demand for organic and animal-friendly did not measure consumers' WTP before and after tasting the considered food product. however, the fact consumers show interest for buying and consuming animal-friendly food products may stop purchasing them if they find that they don't taste equal of better than conventional food products. Finally, the results show that participants who agreed with the statement "I don't buy animal-friendly food products because they are too expensive) are willing to pay a significantly lower price premium for Freedom Food bacon but not for organic bacon (marginal effect).

These results are consistent with findings from previous studies (e.g., Verain et al., 2012; Schleenbecker and Hamm, 2013; Lee and Yun, 2015; Sudbury-Riley and Kohlbacher, 2016; Monier-Dilhan and Bergès, 2016) that showed that higher interest in environment, animal welfare, and health are the main drivers of consumers demand for organic foods and that the price is the main barrier to the purchase of these food products. Furthermore, These results together with the results displayed in Table 2 suggest that stakeholders wanting to increase the demand for animal-friendly meat as an ethical alternative to conventional meat need to tackle the crucial issue of price as a major barrier to expanding the consumption of animal-friendly meat. Saying this, it is also of equivalent importance that the marketers of organic

and animal-friendly food products are aware of the important role that consumers' attitudes play in shaping their demand for food products with desirable attributes (e.g., organic, local, animal friendly). This for example implies that marketing strategies that are implemented to boost the demand for organic and/or animal-friendly food products should target, in first place, ethical-minded consumers who have high interest in ethical products and are willing to bear the additional costs of searching, buying and consuming this type of products.

Regarding the effect of participants' socio-demographic characteristics, the results presented in Table 4 show that female participants are willing to pay a significantly higher price premium for both organic and Freedom Food bacon. These gender results give credence to previous studies (e.g., Stobbelaar et al., 2007; Gracia et al., 2011; Gerini et al., 2016) that reported that females are more likely to buy organic and animal-friendly food products and place a higher value on them. We also found that participants' price premium for both products is negatively correlated with their age. In line with the results from previous studies on consumers' preferences for organic and animal-friendly food products (e.g., Toma et al., 2010; Van Loo et al., 2011; Akaichi et al., 2012), the results displayed in Table 4 show that participants with high education level (low income) are willing to pay a higher (lower) price premium for both organic and Freedom Food bacon. Finally, the results that the premiums for both organic and Freedom Food bacon were not found to be significantly different between participants who have children and those who do not.

In summary, the results show that participants with higher price premiums for organic and Freedom Food bacon are those with high interest in the environment, animal welfare, and food labels. These participants are mostly females with high education level and medium or high income. Therefore, in addition to understanding the main determinants of consumers' price premium for the product, marketers of organic foods may use this information to segment consumers into groups with homogeneous characteristics. This can contribute to enhancing the effectiveness of their marketing strategies (e.g. claims on animal welfare and health) by tailoring them to specific groups of consumers and thus to make the best use of their limited marketing resources.

4. Conclusions

The future of organic agriculture will, to a large extent, depend on consumer demand. As a result, the last three decades have witnessed a considerable increase in the number of papers that have attempted to identify the determinants of organic food consumption (e.g., labelling, consumers' attitudes, information, taste, and consumers' socio-demographics). In the same period, several research studies documented a sizable increase in consumers' interest for other ethical food products such local foods, animal-friendly foods, healthier foods and free-from foods. This motivated some researchers to investigate whether these ethical food products are competing with its organic counterparts. This study went a step further and assessed

the use of animal-welfare and health claims to increase the demand for and the competitive power of organic foods using a non-hypothetical experimental auction.

As suggested in earlier studies, labelling organic foods as “Organic” is essential. The label “Organic” informs consumers about the environmental friendliness of the organic food which in turn was found to significantly increase the price premium consumers are willing to pay for it. In addition, the results of this study showed that the label could, at least partially, reduce the negative effect of organic bacon’s appearance if it is perceived to be unappealing in comparison with the appearance of conventional bacon. Interestingly, consumers were found to place a higher value on animal-friendly bacon than on organic bacon even after being shown the products’ labels. This result concurs with the conclusions of Akaichi and Revoredo-Giha (2016) who carried a demand analysis for meat using the Kantar Worldpanel dataset for Scotland. They found that animal-friendly bacon and organic bacon are competing and that the per capita consumption of animal-friendly bacon is higher than that of organic bacon.

We found that informing consumers that organic bacon is also animal friendly significantly increased their price premium for organic bacon with respect to both conventional and animal-friendly bacon. This suggests that labelling organic meat as animal friendly is likely to increase its competitive power and its demand at least by ethical-minded consumers. Nonetheless, it is important to mention that organic meat is not superior to non-organic meat on all the aspects of animal welfare. For instance, from our discussion with animal welfare scientists, we understood that, at least for pigs, the welfare rules for organic are more stringent when it comes to space requirements, outdoor access and access to enrichment materials or pasture than they are even for RSPCA’s schemes. However, the tendency to reluctantly apply pharmaceuticals in organic farms might mean that health-related aspects of welfare may be compromised for sick or injured pigs. Therefore, if organic meat is labelled as “Animal Friendly”, additional information should be provided to buyers, e.g., on the back of the product’s package, to explain what exactly makes the meat more animal friendly (e.g., more space, more outdoor access). In addition to being more informative, this information is expected to make the animal welfare claim more consistent and less misleading.

As expected, informing consumers that organic bacon is nutritionally superior to conventional and animal-friendly bacon significantly increased their WTP and price premium for organic bacon. Currently, non-organic bacon labelled as “50% less fat” is being sold in UK major supermarkets. This reduction is mainly achieved by removing the external layer of fat (subcutaneous and intermuscular fat) which is technically feasible not just for bacon but also for other meat products such as minced meat and fresh meat. However, this may negatively affect the taste of meat and, hence, should be used carefully depending on the targeted segment of consumers.

To sum up, the demand for organic animal products could be improved not only by selling better its superiority in terms of sustainability but also by promoting its advantages, if any, in terms of other attributes that are known to be highly valued by consumers such as animal welfare and nutritional content. Therefore, producers and marketers of organic animal products should be fully aware of the potential of their products and ready to exploit all of its advantages if they want to improve its competitive power as well as its demand.

Like any other empirical study, the research work described in this paper has some limitations. For example, we did not investigate the robustness of our findings when: (1) other food products are used (e.g., eggs), (2) the three types of information are given in a different order, and (3) other dimensions of sustainability (e.g., greenhouse gas emissions) and animal welfare (e.g., the use of medicine and the treatment of injuries) are considered. We were aware of these limitations before conducting the experiment. However, conducting a non-hypothetical experimental auction considering more types of products and information and controlling for the order effect would necessitate at least the triplication of the number of participants making the implementation of the experimental auction costly challenging. As a result, the economic experiment was designed and implemented in a way that the collected data are appropriate to answer the paper's research questions, leaving to future research studies checking the robustness of this paper's results when the aforementioned limitations are controlled for.

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Table 1: Socio-demographic characteristics of participants

Characteristics	Groups	(%)
Gender	Female	59
	Male	41
Age	Under 25	3
	25-34	36
	35-44	15
	45-54	13
	55-64	23
	over 64	10
Education	Did not complete secondary school	5
	Secondary school graduate or GED	30
	Some post-secondary school training	18
	Bachelor's degree or higher	47
Working status	Full-time employed	56
	Part-time employed	14
	Self-employed	4
	Full-time education	1
	Others (retired, unemployed, housekeeper)	25
Annual household's income (£)	Less than 10.000	4
	10.000 - 24.999	24
	25.000 – 39.999	42
	40.000 - 59.999	21
	60.000 – 99.999	8
	More than 100.000	1

Table 2: Effect of information on consumers' WTP and price premium for organic and Freedom Food bacon

Information	Round	WTP _{CON}	WTP _{ORG}	WTP _{FF}	WTP _{ORG} – WTP _{CON}	WTP _{FF} – WTP _{CON}	WTP _{ORG} – WTP _{FF}
Label	Round 1	1.84	1.59	1.90	-0.26*	0.05	-0.31*
	Round 2	1.32	1.84	2.06	0.53*	0.74*	-0.21*
	<i>p-value</i>	.00 (.00)	.00 (.00)	.02 (.00)	.00 (.00)	.00 (.00)	.94 (.16)
Animal Welfare (AW)	Round 2	1.32	1.84	2.06	0.53*	0.74*	-0.21*
	Round 3	0.55	2.22	1.96	1.66*	1.41*	0.25*
	<i>p-value</i>	.00 (.00)	.00 (.00)	.52 (.09)	.00 (.00)	.00 (.00)	.00 (.00)
Health	Round 3	0.55	2.22	1.96	1.66*	1.41*	0.25*
	Round 4	0.71	2.30	1.81	1.60*	1.10*	0.50*
	<i>p-value</i>	.07 (.01)	.00 (.00)	.00 (.00)	.99 (.35)	.00 (.00)	.00 (.00)
Label + AW + Health	Round 1	1.84	1.59	1.90	-0.26*	0.05	-0.31*
	Round 4	0.71	2.30	1.81	1.60*	1.10*	0.50*
	<i>p-value</i>	.00 (.00)	.00 (.00)	.87 (.14)	.00 (.00)	.00 (.00)	.00 (.00)

Note 1: WTP_{CON} is the average WTP for the conventional bacon; WTP_{ORG} is the average WTP for the organic bacon; and WTP_{FF} is the average WTP for the Freedom Food bacon. The three last columns of the table the differences between the WTPs for the three type of bacon.). “WTP_{ORG}-WTP_{CON}” is the difference between participants’ WTP for organic bacon and conventional bacon. WTP_{FF}-WTP_{CON}” is the difference between participants’ WTP for Freedom Food bacon and conventional bacon. “WTP_{ORG}-WTP_{FF}” is the difference between participants’ WTP for organic bacon and Freedom Food bacon

Note 2: * indicates that the corresponding value is statistically different from zero at 5% or less. A two-tailed t-test was used to test whether participants’ price premiums are significantly different from zero.

Table 3: Description of the independent variables used in the estimations

Independent variables	Descriptions
INFORMATION	Dummy variable that takes the value 1 if the participant received information on labels, animal welfare, nutritional facts of the bacon (Round 4); and 0 if participant neither received information nor tasted the product (Round 1).
ENVIRONMENT	Dummy variable that takes the value 1 if participant agreed with the statement “I buy animal-friendly food products because I think they are more environmentally friendly”; 0 if she/he disagreed with this statement
ANIMAL WELFARE	Dummy variable that takes the value 1 if participant agreed with the statement “The most important food attribute I consider when deciding which food product to buy is animal welfare”; 0 if she/he disagreed with this statement
LABELLING	Dummy variable that takes the value 1 if participant agreed with the statement “For me, the product’s label is the main source of information on animal welfare”; 0 if she/he disagreed with this statement
HEALTH	Dummy variable that takes the value 1 if participant agreed with the statement “I buy animal friendly food products because I think they are healthier”; 0 if she/he disagreed with this statement
TASTE	Dummy variable that takes the value 1 if participant agreed with the statement “I buy animal friendly food products because I think they taste better”; 0 if she/he disagreed with this statement
PRICE	Dummy variable that takes the value 1 if participant agreed with the statement “I don’t buy animal-friendly food products because they are too expensive”; 0 if she/he disagreed with this statement
Gender	Dummy variable that takes the value 1 if participant is female; 0 if he is male
Age	Continuous variable that takes a value equal to participant’s age in years
Education	Dummy variable that takes the value 1 if participant has at least a bachelor’s degree; 0 otherwise
Income	Dummy variable that takes the value 1 if participant’s annual household income is less than £25,000; 0 if it is higher
Children	Dummy variable that takes the value 1 if participant has children; 0 otherwise

Table 4: Results of the estimation of the random-effects GLS models

VARIABLES	WTP_{ORG} – WTP_{CONV}	WTP_{FF} – WTP_{CONV}
CONSTANT	0.008	0.111
INFORMATION	1.000 ***	0.984 ***
ENVIRONMENT	0.324 **	0.384 ***
ANIMAL WELFARE	0.126 **	0.105 **
LABELLING	0.141 ***	0.155 ***
HEALTH	0.016	0.048
TASTE	0.118	0.191 **
PRICE	-0.123	-0.125 **
GENDER	0.107 **	0.096 **
AGE	-0.005 ***	-0.006 ***
EDUCATION	0.180 ***	0.208 ***
INCOME	-0.189 ***	-0.151 ***
CHILDREN	0.076	0.054
Number of observations	240	240
Number of groups	120	120
Time periods (Rounds)	2	2
Wald chi2(9)	963.69	742.02
P-Value	0.00	0.00

*** (***)denote statistical significance at 1% AND (5%) level, respectively

Figure 1: The display of the three bacon samples in one of the auction sessions.

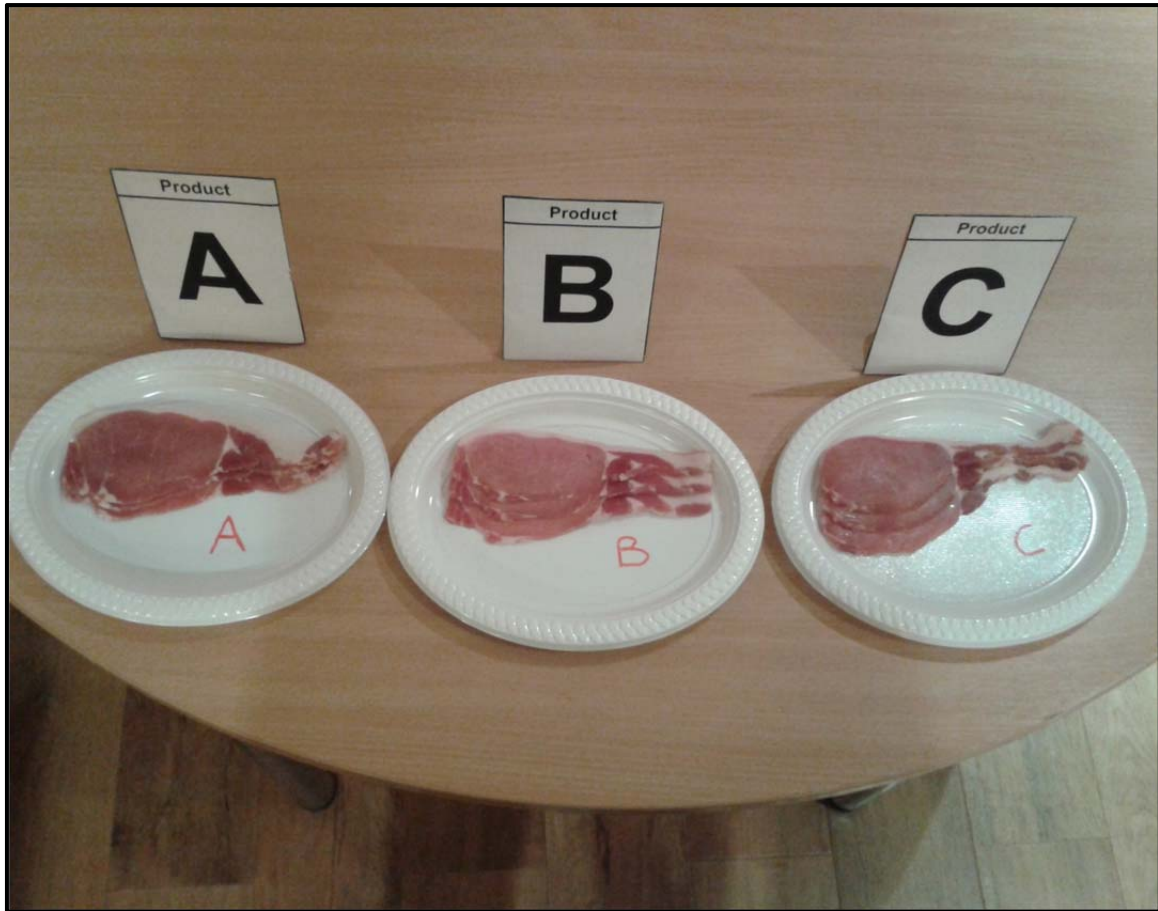


Figure 2: Example of a bidding sheet used in the experimental auction

ROUND 1		IDENTIFICATION NUMBER:	
Please indicate your willingness to pay for each product			
Your Willingness to pay	PRODUCT A	PRODUCT B	PRODUCT C
	£ <input type="text"/>	£ <input type="text"/>	£ <input type="text"/>

Figure 3: Products' labels

Attributes	PRODUCT A	PRODUCTS B	PRODUCT C
Labels	NO LABEL		

Figure 4: Information on animal welfare standards

Attributes	PRODUCT A	PRODUCTS B	PRODUCT C
Space allowance per growing pig up to 101kg (m2/pig)	0.65	0.75	1.3 (625 outdoor)
Floor- minimum solid area (% of pen)	0	66	50
Tail docking and tooth resection	Widespread	Not permitted	Not permitted
Bedding	No bedding at all	Comfortable absorbent bedding	Comfortable absorbent bedding
Free Range	No free range	Free range with shelter	Free range with shelter
Type of Feed	Non-organic	Non-organic	Organic

Figure 5: Information on the nutritional content (per 100g) of the bacon samples

Nutritional facts per rasher	PRODUCT A	PRODUCTS B	PRODUCT C
Calories (cal)	63	65	47
Fat (g)	4.9	5.5	3.8
Salt (g)	1.12	0.86	0.7
Sugar (g)	0.2	traces	0.2