Would you buy vegan meatballs? The policy issues around vegan and meat-sounding labelling of plant-based meat alternatives

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Abstract:
Plant-based meat alternatives have grown tremendously in recent years, with an unprecedented increase in vegan and meat-sounding labelled products appearing on European Union shelves. However, a regulation clarifying what the "vegan" label means and if "meat-sounding" names should be allowed when referring to plant-based foods is still lacking. Led by opposite reasons, both vegetarian and meat producers' associations are demanding to fill this legal void. Our paper contributes to this debate by providing the results of two online experiments that measures how consumers perceive plant-based meat substitutes based on vegan vs. meat-sounding labelling. The results of the first study showed that meat-sounding labels applied to plant-based food altered perceived healthiness, but not other characteristics of the product. The second study indicated that vegan labelling exerted a negative effect on the consumers' perception of tastiness and healthiness, and willingness to buy of plant-based foods. Importantly, these effects were moderated by the consumers' attitudes towards meat-eating and veganism. In line with these results, we propose that the explicit use of the "vegan" label might be counterproductive to increase the sales of plant-based foods, and that the biasing impact of meat-sounding labels on plant-based food's perception is weak.

Keywords:
plant-based food; cognitive bias; halo effect; vegan food; food labelling; meat-sounding labelling

Summary

1. Introduction

The non-meat replacements for foods of animal origin have been marketed for decades to satisfy the niche of vegetarian and vegan consumers. However, the industry of plant-based meat alternatives (PBMA) has enormously grown only the last five years, responding to flexitarians and omnivorous consumers that aim at reducing their meat consumption (Aschemann-Witzel et al., 2020; Santo et al., 2020). In fact, the plant-based food market has been valued USD 4.3 billion in 2020 and estimated to reach USD 8.3 billion by 2025 (MarketsandMarkets™, 2020) with a compound annual growth rate of 27.5% until 2030 considering also other alternative proteins such as insects and cultured meat (UBS Report, cited in Choudhury et al., 2020). Given the positive market trend, more and more companies are entering the PBMA market, enlarging the variety of available products. Such products are often labelled using vegan and/or meat-sounding names, - such as *vegan meatballs* or *soy burger* - even in absence of a clear definition of what the term "vegan" refers to, and a regulation that clarifies if PBMA can be labelled using meat-sounding names (Domke, 2018). In the years of PBMA market affirmation, especially in the European Union, the legal vacuum represents an issue for both vegetarian and meat producers' associations, which demanded for governmental interventions to regulate the adoption of vegan and meat labelling on novel foods (Seehafer & Bartels, 2019). Two opposite solutions are proposed by the different stakeholders. On the one hand, the European Vegetarian Union asked for a clear definition of the use of "vegetarian" and "vegan" labels on foods to preserve their unicity and not to ban the use of "meat-sounding" names on PBMA because, they argue, these labels do not alter consumers perceptions of plant-based products (Domke, 2018). On the other hand, representatives of meat producers support an antithetical view and affirm that meat-sounding names are confounding and unfair; thus, they have firmly argued that meat-sounding labelling should be banned on PBMA (Bánáti, 2020)[1].

[1] For sake of completeness, the European Commission in 2017 stated that they had started working on vegetarian and vegan labelling regulation by 2019, however no decisions were officially taken since the present paper was sent for the publication. On the other hand, the vote on the Common Agricultural Policy reform in 2020 established that meat-related names can be used on plant-based foods.

The regulator has a difficult issue to solve; the vegetarian and meat producers' associations represent two opposite interests in support or against the growth of an interesting food niche respectively, and the discussion between the two parts is often conflicting (Alcorta et al., 2021). With the present paper, we aim at contributing to the solution of the debate between vegetarian and meat producers by presenting some new experimental evidence of the effect of vegan and meat-sounding labelling on consumers' perception of PBMA.

1.1. The power of labels: halo effect and feature transformation

It is well-known that the way in which things are labelled influence perception and categorization processes (Chernev & Chandon, 2010). Labels induce consumers to make inferences about properties or attributes that, although not directly observable, are meant to be possessed a target stimulus. This psychological phenomenon falls under the name of halo effect (Thorndike, 1920). Originally developed within the context of person perception, the halo effect is the tendency to base the overall evaluation of a target (e.g., a person, an object, or a product) on one specific attribute. The evaluation based on such an attribute influences the evaluations made on other attributes of the same target (Nisbett & Wilson, 1977; Beckwith & Lehmann, 1975). The halo effect of labels within the context of food products is widespread. This effect has been largely demonstrated with labels that are logically relevant for the to-be-evaluated attribute. For instance, people tend to infer that foods named as "low-fat" have less calories (Fernan et al., 2018) or that "fruit sugar" are healthier than (normal) "sugar" (Sütterlin & Siegrist, 2015). Importantly however, labels can influence our judgements also on attribute that are not necessarily relevant for the used label. For instance, the number of calories tend to be underestimated even when the product is presented as "organic", relative to "non-organic" (Schuldt & Schwartz, 2010; Besson et al., 2019). The halo effect has been recently conceptualized under the conceptual framework named "feature transformation" (De Houwer et al., 2019). This framework conceives the halo effect as the resultant of two classes of features shared by the same object. Take, for instance, the effect of organic labelling on inferences about calories content. This effect is an instance of assimilative feature transformation, whereby

being organic is the *source* feature, being less caloric is the *target* feature, and both the features belong to the same object (i.e., the target food, see also Hughes et al., 2020). Thus, feature transformation takes place whenever the source features of an object influence our beliefs about the target features of the same object.

In line with this reasoning, vegan and meat-sounding labelling might lead consumers to biased perceptions of PBMA. Specifically, consumers might rely on what a vegan or meat-sounding label evokes in their minds to value the plant-based food instead of building their evaluations on direct experience with the new product and the real characteristics of the product itself. As a case in point, Besson, Bouxom, and Jaubert (2020) tested the impact of vegan labels on attribution and behavioural choice in fast-food contexts. In a first study, they measured calorie perception of two McDonald's products, one meat-based (i.e., Big Mac) and the other plant-based (i.e., Grand Veggie) and the latter product was perceived as less caloric. In a second experimental study, they adopted an experimental approach and presented a bogus burger to two groups of participants: in one group, the burger was presented to be vegetarian (i.e., label and ingredients), whereas in the other condition it was meat-based. The effect on calorie perception replicated. However, seen from the perspective of the present paper, Besson et al.'s research suffers from two main limitations. First, the authors did not test the impact of using meat-sounding labels on plant-based products. Second, the investigation was confined to assumptions made from labels to caloric content and no other important precursor of food-related behaviour (e.g., perceived tastiness) was measured.

1.2. Previous literature on consumers' perception of plant-based meat alternatives

Despite the perceptive bias due to food labelling has been widely studied (see for example, Schuldt et al., 2010; Schuldt et al., 2012; Demartini et al., 2018; Richetin et al., 2021; Richetin et al., 2022) and has been recognized as a relevant issue in the food domain (Messer et al., 2017), research on the power of vegan and meat-sounding names to alter perception and evaluations is still at its early stages. This is especially the case for PBMA. Most of the recent research on PBMA is devoted to their acceptance (see for example, Apostolidis & McLeay, 2016; Slade, 2018; Bryant et al., 2019a;

Bryant et al., 2019b; Bryant & Sanctorum, 2021; Michel et al., 2021 Rondoni et al., 2021; Sogari et al., 2021; Caputo et al., 2022; Sogari et al., 2022), and reviews the opportunities and limitations of the development of these products as sustainable substitutes for food of animal origin (Hu et al, 2019; He et al., 2020; Onwezen et al., 2021; Tso et al., 2021).

However, few contributions analysed the effect of different labelling of PBMA on self-declared behaviours and preferences based on such labelling. For instance, a study conducted by the Federation of German Consumer Organisations (VZBV, 2017) found that only the 4% of the consumers interviewed declared that they accidentally bought a plant-based food instead of a meat product because of a meat-sounding name. Another research conducted by the European Consumer Organization (BEUC, 2020) found that only 1 out of 5 consumers were concerned about the use of meat-sounding names on PBMA, while, in a sample of American consumers, Van Loo et al. (2021) found that the preferred option would be to ban the use of the term "beef" for plant-based food. Despite the cited studies help to understand the role of labelling in the PBMA market, none of these aimed at disentangling and measuring objectively the impact of the labelling on specific food attributes and on the probability of purchase.

1.3. The psychological value of being vegan or a meat-eater

Furthermore, the literature demonstrates that both vegetarianism and meat eating are connected to psychological traits (Hoffman et al., 2013; Rosenfeld & Burrow, 2017; Rosenfeld & Burrow, 2018). For instance, vegetarians and vegans describes their diets as healthier and/or more ethical than the omnivorous diet (Fox & Ward, 2008; Lund et al., 2016). On the other side, meat eaters consider their choice as natural, normal, necessary, and nice (Piazza et al, 2015; Joy, 2020) and, even when they declare to love animals, they present a set of moral justifications to defend their diet (Monteiro et al., 2017; Hartmann & Siegrist, 2020). The opposing points of view sometimes result in conflicts between vegetarians and meat-eaters. For example, a study conducted in Malaysia found that almost the 40% of non-vegetarian consumers had negative attitudes toward vegetarian diets (Mohamed et al., 2017). Furthermore, Markowsky and Roxburgh (2019) found that vegetarian or vegan American

students often prefer not to declare their dietary choices or not to reduce meat eating to avoid stigmatization and difficult discussions with peers and families. Finally, a recent study by Bagci et al. (2021) showed that the two parts express negative opinions toward each other. Interestingly, the most conflicting issues were perceived discrimination among vegetarians and vegans, and perceived threat to the *status quo* among omnivorous. This aspect has direct implications for the halo effects. In fact, prior research has shown that the halo effect is stronger when participants express positive attitudes toward behavioral patterns that align with the used label (e.g., Schuldt & Schwartz, 2010, Sörqvist et al., 2015). For instance, Schuldt and Schwartz (2010) found that cookies presented to be organic where perceived as less caloric relative to cookies presented as non-organic, but this halo effect was more pronounced among participants who held positive pro-environmental attitudes. All these considered, it seems plausible to assume that vegetarians and vegans who do not like meat eaters might be negatively affected by meat-sounding names, and that omnivorous who do not like vegetarianism might be negatively affected by vegan names. However, despite the literature suggests that vegan/meat-sounding names might exert a more positive/negative effect depending on positive/negative consumers opinions about meat eating/vegetarianism, we could not find any research exploring this relationship as we propose in the present paper.

1.4. Aims and Hypothesis of the research

Building on the scientific antecedents, our research aims at contributing to the literature on PBMA in two ways. Firstly, we will provide a measure of the effect of vegan and meat-sounding labelling on consumers' perception and preferences for plant-based food. Secondly, we evaluate the role of individual attitudes towards veganism and meat-eating on the biasing effect of related labels. Given that extant literature does not provide clear evidence in favor of any halo effects exerted by vegan and/or meat-sounding labelling on consumers' perception of PBMA, our hypotheses directly tested the distinct concerns raised by either vegetarian or meat-based producers. According to the former, vegan labelling should lead to more positive evaluations of PBMA, while according to meat

producers, the meat-sounding labelling biases consumers perception and leads to more positive evaluations of PBMA. Thus, the first hypotheses are:

H1a. The vegan labelling will positively influence the consumers' perception and preferences for PBMA; and,

H1b. The meat-sounding labelling will positively influence the consumers' perception and preferences for PBMA.

Inspired by past research, we formulated a second hypothesis on the moderating role of individuals attitudes towards veganism and meat-eating on both labelling effects:

H2. Individual attitudes towards veganism and meat-eating should influence the effect of the vegan and the meat-sounding labelling (e.g., vegan labelling should be more impactful on pro-vegan/anti-meat consumers).

We conducted two online experiments in Italy to test our hypothesis. In the first experiment, we tested the effects of the two labels on a single food product using a between subject design. In the second experiment, we aimed at confirming and generalizing the effects using a within subject design in which four different foods were randomly named using vegan, meat-sounding, or neutral labels. In the first study, the effects were assessed by measuring the tastiness and healthiness attributed to the relevant food, as well as participants' attitudes and their willingness to buy it, while in the second study, only tastiness, healthiness, and willingness to buy were considered. Finally, in both the studies we administered a scale of "meat-eating-vs-vegan" identity to evaluate the role of the individual attitudes towards dietary habits on the effect of vegan and meat-sounding labels, while in the first study participants responded also to attitudinal scales related to neophobia and ethical consumption to explore the role of other potential antecedents of PBMA acceptance.

2. Study 1 - Evaluation of vegan meatballs

The first study aimed at exploring the biasing effect of both vegan and meat-sounding labelling and its relationship with consumers' attitudes towards PBMA. The experiment consisted in the

manipulation of the name of the food in Figure 1 that represents a vegan product shaped in form of meatballs. We employed a 2 (meat-sounding label: absent vs present) x 2 (vegan label: absent vs present) between subjects design, so that each participant was randomly assigned to one of the four treatments.

Figure 1. Picture of the vegan meatballs showed to respondents in Study 1

2.1 Method

2.1.1 Data collection: participants and procedure

The questionnaire was distributed online through social media and a final convenience sample of 757 participants completed the questionnaire (Mean *age* = 31.05, *SD* = 11.03, 580 women, 177 men). The median time of completion was 8 minutes and 5 seconds (Mean= 20 minutes and 13 seconds). The questionnaire was designed *ad hoc* on Qualtrcis XM platform for the research purposes and no compensation was provided to participate. The survey started with an informed consent sheet for data collection and analysis. Next, participants were briefly introduced to the survey and told that they would be asked to evaluate one food product on some specific dimensions. Participants were randomly assigned to one of the four treatment groups. As described in Table 1, in Treatment 1 both meat and vegan labelling were absent, thus the product was presented as a "*soy product*". Treatments 2 and 3 were designed such as only one of the meat or vegan labelling was present at a time, thus the product was named "*soy meatballs*" or "*vegan product*", respectively. Finally, in Treatment 4 the

product was labelled with both the meat-sounding word and the vegan label and the product was named "*vegan meatballs*". Participants then evaluated the product on a series of dimensions using likert scales. After the product evaluation, some information about attitudinal, meats and PBAMs consumption and socio-demographics characteristics of the respondents were collected.

Table 1. Experimental treatments and description of different conditions used in Study 1 translated from Italian

		Vegan labelling	
		Absent	*Present*
Meat-sounding labelling	*Absent*	Treatment 1 We are interested in your opinion about the **soy product** you can see in the picture	Treatment 3 We are interested in your opinion about the **vegan product** you can see in the picture
	Present	Treatment 2 We are interested in your opinion about the **soy meatballs** you can see in the picture	Treatment 4 We are interested in your opinion about the **vegan meatballs** you can see in the picture

2.1.2 Measures

The dependent variables

To explore the role of vegan and meat-sounding labelling, we investigated the perceived tastiness and healthiness of the plant-based product and the participants' general attitudes and willingness to buy it. To this aim, consumers rated the novel plant-based substitutes for meat product using 5 items, presented in a random order, on a 7-point Likert scale ranging from -3 *(not at all*) to +3 (*very much*), with 0 as mid-point, such that negative or positive values indicates negative or positive attitudes and willingness to buy, respectively. The items used for the evaluation were "*It is tasty*", "*It is healthy*", "*I would suggest it*", "*I like it*" and "*I would buy it*". The first and second items captured two fundamental determinants of food acceptance or avoidance, that relate to common bias measured in previous studies that explored the halo effect in the food domain (Schuldt et al., 2010; Richetin et al., 2021). The last three items were used as a measure of the general attitudes and willingness to buy the product as proposed in Demartini et al. (2019).

The attitudinal scales: Food Neophobia Scale, Ethical Food Choice Scale and Animal Welfare

Three scales widely used in food consumption research were administered to participants after the evaluation of the plant-based product to explore the antecedents of its acceptance. Firstly, since the PBMA considered in the analysis was a novel food, we wanted to test if food neophobia was related to consumers evaluation and hypothetical purchase as found in previous research in the food domain (Verbeke et al., 2015; Siegrist et al., 2018; Cavaliere and Ventura, 2018; Demartini et al., 2019). Thus, we administered the Food Neophobia Scale (FNS) (Pliner & Hobden, 1992). This scale consisted of ten items specifically designed to measure of consumers' tendency to avoid novel foods (e.g. "I am constantly sampling new and different foods", "I am afraid to eat things I have never had before"). Furthermore, as PBMA are often presented as a "cruelty-free" alternative to conventional meats, we tested the role of the ethical values, with a keen eye on the respect of animal welfare, in individual food purchase. To measures these dimensions, we used the Ethical Food Choice Scale (EFC) (Lindeman & Väänänen, 2000), and the Animal Welfare Scale (AnWe) (Kendal et al., 2006). The Ethical Food Choice Scale (EFC) (Lindeman & Väänänen, 2000) is composed of eleven items and measures the underlining motives for choice (or rejection) of food produced according to different moral rules (e.g. It is important that the food I eat on a typical day: "comes from a country I approve of politically", "Is not forbidden in my religion"). Finally, the Animal Welfare Scale (AnWe) (Kendal et al., 2006) is composed of eight items and considers the dimensions of the prevalent ethical concern related to food of animal origin production and issues linked to livestock production (e.g. "It is important that the food I normally eat has been produced in a way that animals' rights have been respected", "In general humans have too little respect for the quality of life of animals"). The AnWe scale has been previously used as antecedents of consumption of meat products (Buddle et al., 2018; Marescotti et al, 2020). Respondents expressed their agreement with each statement of each of the three Scales on a 7-point Likert scale ranging from 1 (not at all) to 7 (very much). The final scores used in the analysis are the mean of the FNS, EFC and AnWe scale respectively.

The measure of meat-eating-vs-vegan identity

To evaluate the role of individual attitudes towards dietary habits on the effect of vegan and meat-sounding labels we employed two attitudinal scales adapted from Monteiro et al. (2017), one measuring attitudes towards eating meat and the other measuring attitudes towards veganism. Each scale was composed of six items that were administered after the completion of the FNS, EFC and AnWe scales. Three items assessed participants' opinions about people performing the pertinent behavior (i.e., eating meat vs. following a vegan diet). For the meat-eating attitudes scale, the items were “they are endangering their own health”, “they don't respect animals” and “they show no ethics” (all the items were reverse coded in the analysis); for the vegan-eating attitudes scale, the items were “they show particular attention towards the environment and animals”, “they made a correct healthy choice” and “they made a correct ethical choice”. Respondents were asked to express their agreement with each item on a 7-point Likert scale ranging from 1 (not at all) to 7 (very much). For both the scales, three additional items captured participants' feelings toward either meat or vegan food: respondents reported their feelings on three items per scale using a 7-point bipolar scale ranging from 1 to 7 ("Unpleasant/Pleasant”, “Disgusting/Gratifying” and “Unpleasing/Pleasing”). We firstly computed the average scores that reflected participants' attitudes towards eating meat vs. following a vegan diet. Next, a differential score between the two scales was calculated to capture individuals' meat-eating-vs-vegan identity (MVI). A median split was used to discriminate between respondents with a low MVI (i.e., preference for veganism over meat-eating, referred as “pro-vegan” or “anti-meat” consumers), and respondents with a high MVI (i.e., preference for meat-eating over veganism, referred as “pro-meat” or “anti-vegan” consumers). Accordingly, the dichotomous score was used also in the statistical analysis.

Consumption habits and demographics

A last block of questions investigated (i) whether respondents were responsible for their daily food purchase, (ii) whether they were following a particular diet at the time of compiling the questionnaire and (iii) the frequency of purchase of meat and meat products and vegan and

243 vegetarian products. Finally, socio-demographic information about age, gender, household monthly
244 income, number of components and type of components of the household were collected.
245 *2.1.3 Analytical strategy*
246 To estimate whether the vegan and meat-sounding labelling influenced the outcome variables we
247 fitted five General Linear Model including experimental factors and confounders. Specifically,
248 vegan, meat, MVI, and their interaction were considered as main factors, while the FNS, EFC and
249 AnWe scales, and age, gender, education, and income were included as confounders. For all the
250 variables we use Gaussian distribution with (canonical) identity link, except for "I would buy it",
251 were a binomial distribution with a (canonical) logit link was adopted. Adequacy of the
252 assumptions of the statistical models was checked by visual inspection of the residuals (i.e. Q-Q
253 plot and Leverage vs Standardized Residuals) and quantitative indices (e.g. Cook's distance).
254 Statistical significance of main factors and interaction, together with their effect sizes were used to
255 test H1a, H1b and H2.
256 **2.2 Results**
257 *2.2.1 Characteristics of the sample and reliability of the scales*
258 The socio-demographic characteristics of the sample of Study 1 are presented in Table 2, while Meat
259 and Vegan food consumption data are resumed in Table 3. Respondents were mainly female (76.6%),
260 aged between 18 and 35 years (74.1%) and resident in flat areas (61.7%). More than a half of the
261 sample possessed a high school degree (57.2%), lived in a household with no more than four members
262 (86.6%), nor children between under 12 years old (79.1%). Most of the sample declared they were
263 responsible for their daily meal purchase and almost a tenth of the overall sample declared that they
264 were vegetarian (7.5%) or vegan (2.1%).
265 Considering the consumption habits (Table 3), the 75.4% and the 84.0% of the respondents reported
266 consuming fresh red (beef and/or pork) and white meat (poultry and/or rabbit) once every two weeks
267 at least respectively, while the 77.5% eat cured red meat once every two weeks at least. Almost a
268 third of the sample (30.6%) reported eating vegan foods such as plant-based meatballs, hamburgers,

sticks at least once every two weeks, but 40.3% of consumers never introduced these products in their diet. The latter datum is in line with (Corrin & Papadopoulos, 2017; Rosenfeld & Burrow, 2017a; Ruby, 2012) that two to ten percent of people living in developed countries identify themselves as vegetarians.

Before computing the meat-eating-vs-vegan identity (MVI), the Cronbach's α test (Cronbach, 1951) was used to estimate the internal reliability consistency of the scales measuring the attitudes towards meat-eating and veganism. The results of the tests were 0.90 for the meat attitudinal scale and 0.85 for vegan scale, which is greater than the threshold value of 0.60 for a satisfactory scale (Marescotti et al. 2019; Verbeke & Vackier, 2004) suggesting that the mean score of the two scales can be used as an individual measure for meat and veganism liking respectively and thus used to calculate the MVI score.

280 **Table 2. Socio-demographic characteristics of the sample in Study 1**

	n.	*%*		*n.*	*%*
Age			**Household income (€ per month)**		
18-25 years	326	43.06	< 1.000	66	8.72
26-35 years	235	31.04	1.000-2.000	279	36.86
36-45 years	93	12.29	2.001-4.000	279	36.86
over 45 years	103	13.61	4.001-6.000	66	8.72
Gender			> 6.000	67	8.85
Male	177	23.38	**Household size (number)**		
Female	580	76.62	1	74	9.78
Education			2	201	26.55
First and secondary school	70	9.25	3	204	26.95
High school	433	57.20	4	199	26.29
Bachelor's degree	126	16.64	5+	79	10.44
Master's Degree or higher	128	16.91	**Children in the household 0–12 years**		
Residence Area			No	599	79.13
Coastal	121	15.98	Yes	158	20.87
Inland flat	467	61.69	**Children in the household 13–18 years**		
Inland hilly/mountainous	169	22.32	No	378	49.93
Dietary habits			Yes	379	50
Omnivorous	684	90.36	**Responsible for daily meal purchase**		
Vegetarian	57	7.53	No	136	17.97
Vegan	16	2.11	Yes	621	82.03
Number of subjects= 757					

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Table 3. Meat and Vegan food consumption of the sample in Study 1

	Fresh red meat		Cured red meat		Fresh white meat		Vegan products	
	Beef and/or pork		*Beef and/or pork*		*Poultry and/or rabbit*		*Plant-based meatballs, etc…*	
	n.	*%*	*n.*	*%*	*n.*	*%*	*n.*	*%*
Never	84	11.10	91	12.02	70	9.25	305	40.29
No more than 3 times per year	20	2.64	15	1.98	7	0.92	108	14.27
Once per month	82	10.83	64	8.45	44	5.81	112	14.80
Once every two weeks	133	17.57	117	15.46	72	9.51	60	7.93
Once per week	261	34.48	227	29.99	252	33.29	84	11.10
Two or three times per week	177	23.38	243	32.10	312	41.22	88	11.62
Number of subjects in the survey= 757								

According to our results, participants overall preferred meat over vegan products (Mean *MVI*= 1.29, *SD* = 2.07, Median 1.50). The same approach has been applied for Food Neophobia (FNS), the Ethical Food Choice (EFC) and the Animal Welfare (AnWe) scales. The Cronbach's α test for FNS is 0.81; thus, the mean score of the scale's items per each respondent has been used as individual measure of food neophobia which indicated that most of the consumers in the sample can be considered not neophobic (Mean *FNS*= 3.32, *SD* = 1.23, Median 3.33). Also the reliability of EFC satisfied the threshold value, in fact, the EFC Cronbach's α is 0.77 and we used the mean score of the scale per subject in the estimated models (Mean *EFC*= 4.82, *SD* = 0.95, Median 5.73). Finally, the AnWe Cronbach's α is 0.72, thus also in this case the individual mean score for animal welfare attitudes was used for estimation, indicating that the respondents were generally highly concerned about animal welfare (Mean *AnWe*= 5.90, *SD* = 0.96, Median 6.12). For sake of brevity, the descriptive results of the psychometric scales are reported in the Appendix A.

2.2.2 The effect of the vegan and meat-sounding labelling on vegan meatballs evaluation

The results of the first study are presented in Table 4. According to the statistical estimations, the vegan labelling did not exert any effect on respondents' evaluation of the plant-based food considered in the survey (all *p*s> 0.085), the meat-sounding labelling caused only an increase in perceived healthiness of the product (β= 0.134; *p*= 0.024; Cohen's *d*= 0.08), and the interaction between the two factors were not significant across all the dependent variable considered (all *p*s>

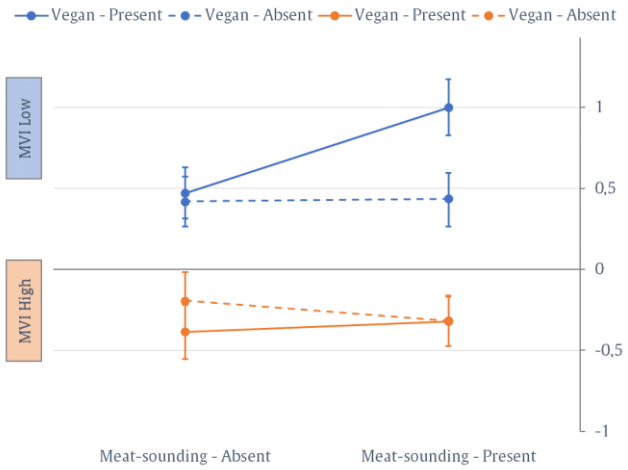
303 0.107). A significant effect was found in the interaction between vegan labelling and the meat-
304 eating-vs-vegan identity (Vegan*MVI) which demonstrated that respondents showing negative
305 attitudes towards veganism thought that the vegan labelled food was less healthy (β= -0.223; p<
306 0.001; Cohen's d= -0.13) and would not recommend it to other people (β= -0.174; p= 0.005;
307 Cohen's d= -0.09) or buy it (β= -0.206; p= 0.004; Cohen's d= -0.09). The analysis of the role of
308 attitudinal characteristics of the respondents on the outcome variables show that the meat-eating-vs-
309 vegan identity (MVI), and the concern about animal welfare (AnWe) predicted consumers
310 perception, attitudes, and willingness to buy of the plant-based food. In fact, the more the
311 participants loved meat-eating the less they like the considered PBMA (all βs< 0; all ps< 0.001; -
312 0.33< Cohen's ds<-0.14), and the more they are concerned about animal welfare the more they like
313 it (all βs> 0; all ps< 0.003; 0.12< Cohen's ds<0.19). Also, the food neophobia (FNS) showed the
314 expected outcome, i.e. on the average the more the respondents were neophobic the less the liked
315 the vegan food. Specifically, FNS showed a significant role in explaining the respondents' taste
316 perception of the product (β= -0.122; p= 0.008; Cohen's d= -0.09), their willingness to suggest (β= -
317 0.108; p= 0.033; Cohen's d= -0.07) or buy it (β= -0.224; p< 0.001; Cohen's d= -0.13), and how
318 much they like it (β= -0.173; p= 0.005; Cohen's d= -0.10). On the contrary, the ethical food choice
319 scale (EFC) was not related to participants' responses (all ps> 0.057).
320 Finally, also the socio-demographic traits of respondents were considered in the models. According
321 to our estimates, being older decreased the perceived tastiness (β= -0.015; p= 0.008; Cohen's d= -
322 0.10) and the willingness to suggest (β= -0.011; p= 0.047; Cohen's d= -0.07) or to buy (β= -0.016;
323 p= 0.015; Cohen's d= -0.08) of the product, while being female increased the overall like (β= 0.443;
324 p= 0.022; Cohen's d= 0.09) and the willingness to buy of the product (β= 0.356; p= 0.047; Cohen's
325 d= -0.07). Finally, the more educated are the respondents the less they perceived healthy (β= -0.243;
326 p< 0.001; Cohen's d= -0.13) and would suggest the plant-based food (β= -0.210; p= 0.003; Cohen's
327 d= -0.10), while the higher was their income the more they perceived it healthy (β= 0.162; p=
328 0.005; Cohen's d= -0.10).

Table 1. Estimates of the effect of the vegan and meat-sounding labelling in Study 1

Dependent variable: Perceived Taste

Coefficients	Estimate	Std. Error	*t* value	Pr(>|*t*|)		Cohen's *d*
Main factors - Labelling						
Meat	0.061	0.056	1.085	0.278		0.04
Vegan	0.052	0.057	0.920	0.358		0.03
Meat*Vegan	0.087	0.056	1.551	0.121		0.05
Interaction with MVI						
Meat*MVI	-0.076	0.056	-1.343	0.180		-0.04
Vegan*MVI	-0.102	0.057	-1.779	0.076		-0.06
Meat*Vegan*MVI	-0.040	0.056	-0.718	0.473		-0.02
Attitudinal covariates						
MVI	-0.443	0.063	-7.041	0.000	***	-0.26
FNS - Food Neophobia	-0.122	0.046	-2.646	0.008	**	-0.09
EFC - Ethical Food Choice	0.104	0.065	1.591	0.112		0.06
AnWe - Animal Welfare	0.264	0.071	3.725	0.000	***	0.15
Socio-demographics						
Age	-0.009	0.005	-1.697	0.090		-0.06
Gender *(Ref. Male)*	0.272	0.145	1.879	0.061		0.07
Education	-0.059	0.064	-0.927	0.354		-0.03
Income	0.039	0.055	0.706	0.480		0.02
Intercept	-1.619	0.561	-2.885	0.004	**	0.00

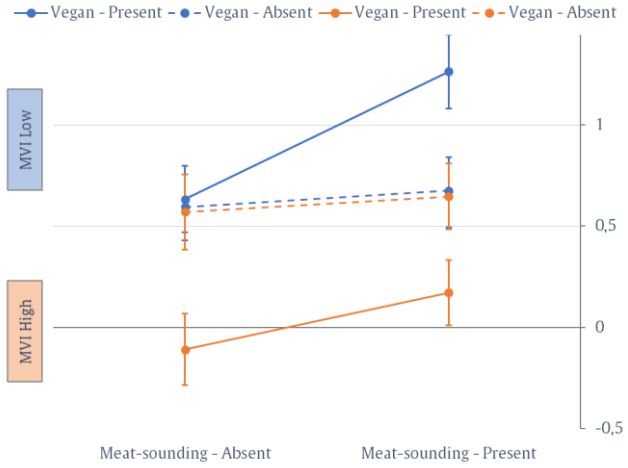
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05



Dependent variable: Perceived Healthiness

Coefficients	Estimate	Std. Error	*t* value	Pr(>|*t*|)		Cohen's *d*
Main factors - Labelling						
Meat	0.134	0.059	2.267	0.024	*	0.08
Vegan	-0.066	0.059	-1.111	0.267		-0.04
Meat*Vegan	0.095	0.059	1.599	0.110		0.06
Interaction with MVI						
Meat*MVI	-0.044	0.059	-0.747	0.456		-0.03
Vegan*MVI	-0.223	0.060	-3.716	0.000	***	-0.13
Meat*Vegan*MVI	-0.043	0.059	-0.733	0.464		-0.03
Attitudinal covariates						
MVI	-0.236	0.066	-3.576	0.000	***	-0.14
FNS - Food Neophobia	-0.051	0.049	-1.054	0.292		-0.04
EFC - Ethical Food Choice	-0.098	0.068	-1.432	0.153		-0.05
AnWe - Animal Welfare	0.331	0.074	4.455	0.000	***	0.19
Socio-demographics						
Age	-0.015	0.006	-2.662	0.008	**	-0.10
Gender *(Ref. Male)*	-0.161	0.152	-1.057	0.291		-0.04
Education	-0.243	0.067	-3.611	0.000	***	-0.13
Income	0.162	0.058	2.789	0.005	**	0.10
Intercept	0.385	0.589	0.654	0.513		0.01

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05



Dependent variable: I would suggest it

Coefficients	Estimate	Std. Error	*t* value	Pr(>|*t*|)		Cohen's *d*
Main factors - Labelling						
Meat	0.044	0.061	0.722	0.470		0.02
Vegan	-0.036	0.062	-0.583	0.560		-0.02
Meat*Vegan	0.088	0.061	1.428	0.154		0.05
Interaction with MVI						
Meat*MVI	-0.069	0.061	-1.120	0.263		-0.04
Vegan*MVI	-0.174	0.062	-2.799	0.005	**	-0.09
Meat*Vegan*MVI	-0.038	0.061	-0.622	0.534		-0.02
Attitudinal covariates						
MVI	-0.534	0.069	-7.791	0.000	***	-0.29
FNS - Food Neophobia	-0.108	0.050	-2.138	0.033	*	-0.07
EFC - Ethical Food Choice	0.135	0.071	1.905	0.057		0.07
AnWe - Animal Welfare	0.298	0.077	3.855	0.000	***	0.15
Socio-demographics						
Age	-0.011	0.006	-1.987	0.047	*	-0.07
Gender *(Ref. Male)*	0.126	0.158	0.798	0.425		0.03
Education	-0.210	0.070	-3.013	0.003	**	-0.10
Income	0.111	0.060	1.838	0.067		0.06
Intercept	-1.571	0.612	-2.567	0.010	*	0.00

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05

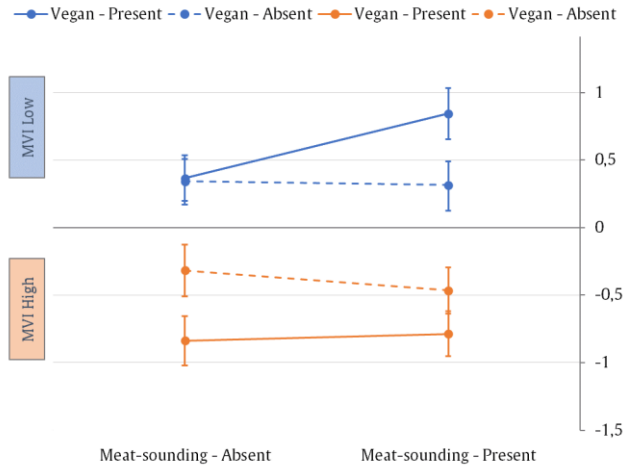
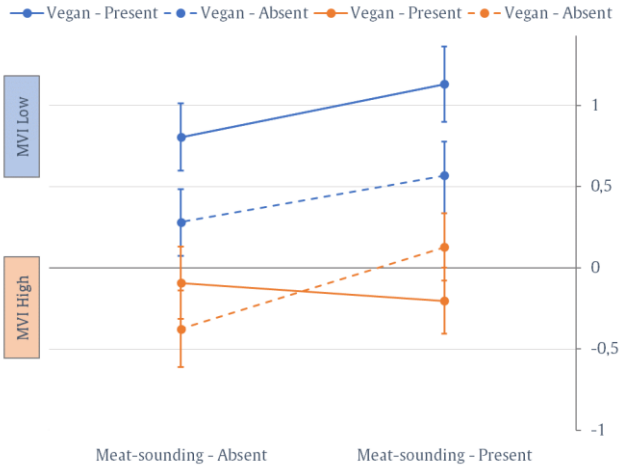


Table 1 (Continues from previous page)

Dependent variable: I like it

Coefficients	Estimate	Std. Error	*t* value	Pr(>|*t*|)		Cohen's *d*
Main factors - Labelling						
Meat	0.126	0.075	1.686	0.092		0.06
Vegan	0.130	0.075	1.725	0.085		0.06
Meat*Vegan	-0.072	0.075	-0.959	0.338		-0.03
Interaction with MVI						
Meat*MVI	-0.027	0.075	-0.366	0.715		-0.01
Vegan*MVI	-0.142	0.076	-1.867	0.062		-0.07
Meat*Vegan*MVI	-0.082	0.075	-1.090	0.276		-0.04
Attitudinal covariates						
MVI	-0.416	0.084	-4.978	0.000	***	-0.19
FNS - Food Neophobia	-0.173	0.061	-2.812	0.005	**	-0.10
EFC - Ethical Food Choice	-0.015	0.087	-0.172	0.863		0.01
AnWe - Animal Welfare	0.302	0.094	3.209	0.001	**	0.13
Socio-demographics						
Age	-0.006	0.007	-0.787	0.432		-0.03
Gender *(Ref. Male)*	0.443	0.193	2.299	0.022	*	0.09
Education	-0.127	0.085	-1.496	0.135		-0.05
Income	0.103	0.074	1.406	0.160		0.05
Intercept	-1.309	0.746	-1.755	0.080		0.00

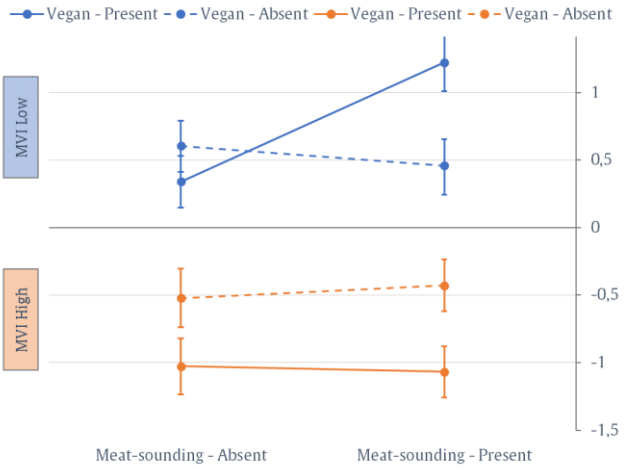
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05



Dependent variable: I would buy it

Coefficients	Estimate	Std. Error	*t* value	Pr(>|*t*|)		Cohen's *d*
Main factors - Labelling						
Meat	0.099	0.069	1.425	0.155		0.05
Vegan	-0.081	0.070	-1.158	0.247		-0.04
Meat*Vegan	0.112	0.070	1.615	0.107		0.05
Interaction with MVI						
Meat*MVI	-0.086	0.070	-1.232	0.218		-0.04
Vegan*MVI	-0.206	0.070	-2.917	0.004	**	-0.10
Meat*Vegan*MVI	-0.146	0.069	-2.098	0.036	*	-0.07
Attitudinal covariates						
MVI	-0.709	0.078	-9.136	0.000	***	-0.33
FNS - Food Neophobia	-0.224	0.057	-3.929	0.000	***	-0.13
EFC - Ethical Food Choice	0.088	0.080	1.100	0.272		0.04
AnWe - Animal Welfare	0.264	0.087	3.015	0.003	**	0.12
Socio-demographics						
Age	-0.016	0.007	-2.440	0.015	*	-0.08
Gender *(Ref. Male)*	0.356	0.179	1.992	0.047	*	0.07
Education	-0.131	0.079	-1.655	0.098		-0.06
Income	0.105	0.068	1.538	0.124		0.05
Intercept	-1.263	0.693	-1.824	0.069		0.00

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05



3. Study 2 – Evaluation of vegan foods

The experimental evidence from Study 1 indicated that, except for an effect of meat labelling on perceived healthiness, on the average the vegan or the meat-sounding labelling seem not able to exert a significant effect on consumers' beliefs, attitudes and willingness to buy towards a plant-based food. Nonetheless, individual attitudes towards veganism and meat-eating (MVI) are strongly related to the considered outcome variables. Specifically, MVI interacted with vegan labelling in predicting most of the outcomes. In fact, a negative attitude towards veganism led to a negative impact of the vegan label. This is the first experimental proof in the literature that the meat-sounding labelling does not bias consumers' perception of PBMA, whereas the vegan labelling influences negatively food perceptions and intentions among "anti-vegan" consumers.

To confirm and extend these results, we conducted the Study 2. Two main changes were introduced at the experimental design level. First, we broadened our investigation to a larger set of food items. Second, we adopted a within-subjects design where all participants saw four food items presented in one specific labelling condition, derived by crossing vegan labelling and meat labelling. The experiment consisted in the manipulation of the name of the foods in Figure 2 that represent four PBMA produced to resemble different meat products, namely salami, meatballs, hotdogs, and hamburger. A pre-test was conducted to select these images as explained in Appendix B. The name of each product was randomly assigned to be vegan, meat-sounding, or neutral. Each product-labelling assignment was counterbalanced between participants. A second operational change was made on the variables investigated. In fact, as in Study 2 respondents had to evaluate four different products instead of one, to reduce the respondents' fatigue (Savage and Waldman, 2008) we decided to collect only three dependent variables and to introduce a direct measure of the economic effect of the labelling of the PBMA on their market. Thus, the measures of attitudes towards the product and the willingness to buy it were replaced by a measure of willingness to pay (WTP) for each of the product considered in Study 2. Furthermore, as the focus of the second research was to confirm the moderating role of the MVI constructs on the effect of labelling, to further mitigate the

efforts for the completion of questionnaire, we avoided collecting information about individual neophobia, ethical consumption and attitudes towards animal welfare in Study 2.

Figure 2. Pictures of the vegan products showed to respondents in Study 2

			
Vegan meatballs	Vegan salami	Vegan hotdogs	Vegan hamburger

3.1 Method

3.1.1 Data collection: participants and procedure

The questionnaire for Study 2 was distributed online through social-media and a final convenient sample of 318 participants completed the survey (Mean *age* = 32.87, *SD* = 12.89, 218 women, 99 men, 1 prefer not to say). The median time of completion is 6 minutes and 20 seconds (Mean= 18 minutes and 20 seconds). The questionnaire was distributed as described in Study 1. As in Study 1, participants evaluated the four plant-based foods immediately after the acceptance of the informed consent to participate to the data collection. The foods were randomly labelled such that all the four possible combinations of 2 (meat-sounding label: absent vs present) x 2 (vegan label: absent vs present) names were presented to each participant, i.e., each food was randomly named using one of these combinations. Given the different combinations deriving from the experimental framework presented in Table 5, the full design consisted in 24 blocks made up of the possible set of labels (see Appendix C).

Table 5. Experimental labels used in Study 2 translated from Italian

	Meat-sounding labelling		**Vegan labelling**	
	Absent	*Present*	*Absent*	*Present*
Product 1	Plant-based product	Plant-based meatballs	Vegan product	Vegan meatballs
Product 2	Plant-based product	Plant-based salami	Vegan product	Vegan salami
Product 3	Plant-based product	Plant-based hotdogs	Vegan product	Vegan hotdogs
Product 4	Plant-based product	Plant-based burger	Vegan product	Vegan burger

392 *3.1.2 Measures*

393 **The dependent variables**

394 The dependent variables investigated in Study 2 were similar to those considered in Study 1. In fact,
395 we explored the perceived tastiness and healthiness of the plant-based products using the same
396 approach used in the first analysis. However, given that in Study 2 each respondent evaluated four
397 products instead of one, to reduce the respondents' efforts, we excluded the measure of general
398 attitudes from the survey. With regard to the fifth dependent variable used in the first research,
399 namely the willingness to buy, in the second study we measured it as willingness to pay (WTP) for
400 the product. This allowed us to build a more realistic scenario compared to study 1, also considering
401 the price of the product. In practical terms, with this new approach we could measure the
402 willingness to buy the product splitting our respondents in two groups: those who declared a
403 positive WTP as "buyers", and those who declared that "would not buy the product", as "not-
404 buyers". The WTP was measured using the contingent valuation (CV) method (Mitchell & Carson,
405 1989) with a payment card elicitation format. Respondents were asked to indicate their maximum
406 WTP for each proposed product, considering a list of six prices presented using the payment card
407 format (see Appendix C for detailed prices). The prices were selected according to the real prices of
408 each plant-based foods considered in the analysis.
409 Despite other hypothetical elicitation methods could have been used in the survey, the CV method
410 presents the great advantage to be very easy to understand and transparent for the respondents and,
411 in fact, is widely used in economic research for marketing valuation (Anderson et al., 2007;
412 Gabrielyan, et al. 2016; Vecchiato et al., 2021). The information collected with the CV questions
413 were used to discriminate between subjects that would participate to the market declaring any
414 positive WTP for the plant-based food from those indicating that they would not buy the food. It is
415 worth being emphasized that we decide to look at the willingness to buy (WTB), rather than WTP,
416 because we believe that, from a policy perspective, the main motivation for the banning of the meat-
417 sounding labelling is grounded in the need to avoid the potential reduction of market quotas (and

consequently the revenue) of meat products due to a purchase-shift to PBMAs. In fact, the meat-sounding labelling can have a certain appeal to meat consumers that decide to buy PBMAs rather than meat-based products. In this sense, from a policy perspective it seems more important to understand how a meat-sounding labels can modify the probability of purchase of a PBMA, rather than to understand if its use grants a premium-price to the producers.

The measure of meat-eating-vs-vegan identity, consumption habits and socio-demographics

Given the results obtained in Study 1 and to reduce the respondents' efforts, in Study 2 we decided to reduce the collection of personal information to the meat-eating-vs-vegan identity, while the FNS, EFC and AnWe scales were not considered in this survey. The food consumption habits, and socio-demographic characteristics analyzed were the same used in the first study.

3.1.3 Analytical strategy

To estimate whether the vegan and meat-sounding labelling influenced the outcome variables we fitted three General Linear Mixed Model considering the main factors vegan, meat, MVI, and their interaction as fixed effects, and considering the subject and the plant-based product as two independent random factors. Given the within-subjects design, the subject-related confounders included in the first experiment are implicitly modeled by the subject-specific random effects of the mixed model. As for the Study 1, a Gaussian distribution with (canonical) identity link was used for the variables of taste and healthiness perception, while a binomial distribution with a (canonical) logit was adopted for the willingness to buy outcome variable. The adequacy of the assumptions of the statistical models was checked by visual inspection of the residuals (i.e. Q-Q plot and Leverage vs Standardized Residuals) and quantitative indices (e.g. Cook's distance). Statistical significance of main factors and interaction, together with their effect sizes were used to test H1 and H2.

3.2 Results

3.2.1 Characteristics of the sample and reliability of the scales

The socio-demographic characteristics of the sample in Study 2 are presented in Table 6, while Meat and Vegan food consumption data are resumed in Table 7. The results show that the sample of Study 1 and Study 2 are similar. As in Study 1, respondents in the second survey were mainly female (68.5%), aged between 18 and 35 years (67.0%) and resident in flat areas (80.2%). Approximately half of the sample possessed a high school degree (49.7%), lived in a household with no more than four members (88.0%), nor children between under 12 years old (83.3%). Moreover, most of the sample declared that they were responsible for their daily meal purchase and few respondents declare that they are vegetarian (4.1%) or vegan (1.0%). Finally, the proportion of respondents that reported being either vegetarian or vegan was in line with the previous literature (Corrin & Papadopoulos, 2017; Rosenfeld & Burrow, 2017a; Ruby, 2012).With regard to the consumption habits, Table 7 shows that the 82.7% and the 91.2% of the respondents declared they consumed fresh red (beef and/or pork) and white meat (poultry and/or rabbit) once every two weeks at least respectively, while the 86.2% ate cured red meat once every two weeks at least. In line with Study 1, slightly more than one fourth of the sample in Study 2 (28.0%) reported they ate vegan foods such as plant-based meatballs, hamburgers, sticks at least once every two weeks, but 45.3% of consumers never introduce these products in their diet.

Finally, as in Study 1, we firstly computed the Cronbach's α of the meat and vegan attitudinal scale, which showed suitable results (Cronbach's α *meat*= 0.86; Cronbach's α *meat vegan*= 0.87) for the calculation of the MVI score. In line with what we found in Study 1, participants in the second study exhibited a preference for meat over vegan products (Mean *MVI*= 1.54, *SD* = 2.41, Median 1.67).

Table 6. Socio-demographic characteristics of the sample in Study 2

	n.	*%*		*n.*	*%*
Age			**Household income (€ per month)**		
18-25 years	155	48.74	< 1.000	15	4.72
26-35 years	58	18.24	1.000-2.000	92	28.93
36-45 years	27	8.49	2.001-4.000	139	43.71
over 45 years	78	24.53	4.001-6.000	39	12.26
Gender			> 6.000	33	10.38
Male	99	31.13	**Household size (number)**		
Female	218	68.55	1	30	9.43
Prefer not to say	1	0.31	2	55	17.30
Education			3	85	26.73
First and secondary school	20	6.29	4	110	34.59
High school	158	49.69	5	25	7.86
Bachelor's degree	63	19.81	5+	13	4.09
Master's Degree or higher	77	24.21	**Children in the household 0–12 years**		
Residence Area			No	265	83.33
Coastal	3	0.94	Yes	53	16.67
Inland flat	255	80.19	**Children in the household 13–18 years**		
Inland hilly/mountainous	60	18.87	No	102	32.08
Dietary habits			Yes	216	67.92
Omnivorous	302	94.97	**Responsible for daily meal purchase**		
Vegetarian	13	4.09	No	97	30.50
Vegan	3	0.94	Yes	221	69.50
Number of subjects= 318					

Table 7. Meat and Vegan food consumption of the sample in Study 2

	Fresh red meat		**Cured red meat**		**Fresh white meat**		**Vegan products**	
	Beef and/or pork		***Beef and/or pork***		***Poultry and/or rabbit***		***Plant-based meatballs, etc…***	
	n.	*%*	*n.*	*%*	*n.*	*%*	*n.*	*%*
Never	24	7.55	19	5.97	17	5.35	144	45.28
No more than 3 times per year	10	3.14	9	2.83	2	0.63	39	12.26
Once per month	21	6.60	16	5.03	9	2.83	46	14.47
Once every two weeks	70	22.01	27	8.49	35	11.01	31	9.75
Once per week	134	42.14	134	42.14	130	40.88	42	13.21
Two or three times per week	59	18.55	113	35.53	125	39.31	16	5.03
Number of subjects in the survey= 318								

3.2.2 The effect of the vegan and meat-sounding labelling on vegan foods evaluation

According to our results (Table 8), the meat-sounding names did not exert any effect on respondents' evaluations of the products (all *p*s> 0.269), while the use of the vegan label caused a decrease in respondents' perception of tastiness (β= -0.249; p< 0.001; Cohen's d= -0.13) and healthiness (β= -0.167; p< 0.001; Cohen's d= -0.09), and the estimated probability to buy the PBMA (β= -0.323; p< 0.001; Cohen's d= -0.04). It should anyway be noted that, according to the Cohen's *d*, all these effects are small. Furthermore, the meat-eating-vs-vegan identity (MVI) caused a decrease in respondents' perception of tastiness (β= -0.599; p< 0.001; Cohen's d= -0.31) and healthiness (β= -0.364; p< 0.001; Cohen's d= -0.20), and the estimated probability to buy the PBMA (β= -0.934; p< 0.001; Cohen's d= -0.33). Finally, the MVI directly moderated the effect of the meat labelling (Meat*MVI) on the evaluation of the product tastiness (β= -0.095; p= 0.030; Cohen's d= 0.05) and moderated the effect of the vegan labelling (Vegan*MVI) on the evaluation of the product tastiness (β= -0.095; p= 0.030; Cohen's d= 0.05) and healthiness (β= -0.107; p= 0.005; Cohen's d= 0.06), while no direct effect was found when looking at either vegan or meat-sounding labelling on the willingness to buy for the products.

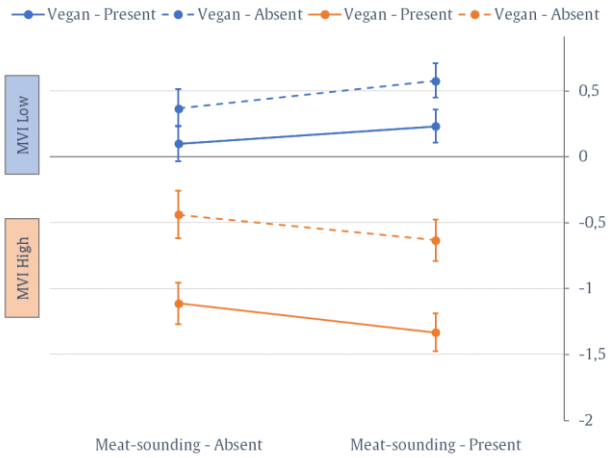
Overall, the second study partly confirmed the results found in study 1. In fact, we were able to replicate the role meat-eating-vs-vegan identity in explaining consumers acceptance of PBMA, and its direct influence on the effect of perceived healthiness of the plant-based products when they were labelled using a vegan name. However, we also found a negative effect of the vegan labelling *per se* on the three outcome variables, and the moderating effect of MVI on the negative effect of both vegan and meat-sounding labelling.

Table 8 - Estimates of the effect of the vegan and meat-sounding labelling in Study 2

Dependent variable: Perceived Taste

Coefficients	Estimate	Std. Error	df	*t* value	Pr(>|*t*|)		Cohen's *d*
Main factors - Labelling							
Meat	-0.009	0.044	945.19	-0.206	0.837		0.00
Vegan	-0.249	0.044	945.49	-5.691	0.000	***	-0.13
Meat*Vegan	-0.013	0.044	945.13	-0.297	0.767		0.01
Interaction with MVI							
Meat*MVI	-0.095	0.044	945.71	-2.174	0.030	*	-0.05
Vegan*MVI	-0.095	0.044	945.32	-2.178	0.030	*	-0.05
Meat*Vegan*MVI	0.006	0.044	946.01	0.140	0.889		0.00
Attitudinal covariate							
MVI	-0.599	0.069	316.00	-8.686	0.000	***	-0.31
Intercept	-0.280	0.126	4.46	-2.221	0.084		0.00

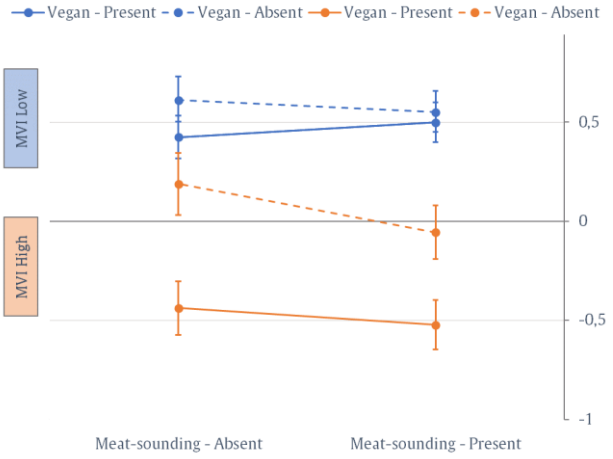
Signif. codes: '***' 0.001 '**' 0.01 '*' 0.05



Dependent variable: Perceived Healthiness

Coefficients	Estimate	Std. Error	df	*t* value	Pr(>|*t*|)		Cohen's *d*
Main factors - Labelling							
Meat	-0.039	0.038	945.29	-1.044	0.297		-0.02
Vegan	-0.167	0.038	945.74	-4.418	0.000	***	-0.09
Meat*Vegan	0.037	0.038	945.19	0.981	0.327		0.02
Interaction with MVI							
Meat*MVI	-0.043	0.038	946.05	-1.134	0.257		-0.02
Vegan*MVI	-0.107	0.038	945.48	-2.836	0.005	**	-0.06
Meat*Vegan*MVI	0.003	0.038	946.48	0.085	0.932		0.00
Attitudinal covariate							
MVI	-0.364	0.073	316.00	-4.994	0.000	***	-0.20
Intercept	0.157	0.101	7.83	1.559	0.158		0.00

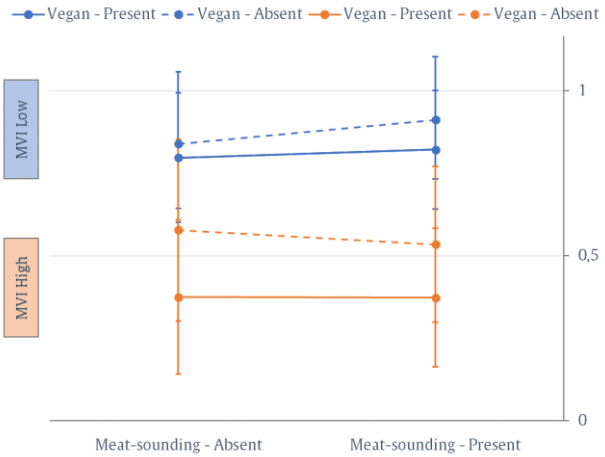
Signif. codes: '***' 0.001 '**' 0.01 '*' 0.05



Dependent variable: Willingness to buy

Coefficients	Estimate	Std. Error	*z* value	Pr(>|*t*|)		Cohen's *d*
Main factors - Labelling						
Meat	0.083	0.075	1.107	0.269		0.05
Vegan	-0.323	0.076	-4.257	0.000	***	-0.04
Meat*Vegan	-0.045	0.075	-0.598	0.550		-0.08
Interaction with MVI						
Meat*MVI	-0.128	0.075	-1.712	0.087		0.07
Vegan*MVI	-0.049	0.075	-0.649	0.516		-0.06
Meat*Vegan*MVI	0.087	0.075	1.165	0.244		0.05
Attitudinal covariates						
MVI	-0.934	0.128	-7.319	0.000	***	-0.33
Intercept	0.790	0.180	4.389	0.000	***	0.00

Signif. codes: '***' 0.001 '**' 0.01 '*' 0.05



4. Discussion & Policy Implications

The recent commercial success of PBMA has caused the request of specific regulations for the labelling of these products. In the European Union, vegan and meat producers' associations support two opposite policy interventions. The formers asked to regulate the use of the vegetarian and vegan labelling and to add no restriction to the use of meat-sounding names, while meat producers asked to ban the use of meat-sounding names on PBMA. Despite the European Commission momentarily preferred to maintain the *status quo* and decided not to introduce new rules for vegan and vegetarian foods labelling, nor to ban the use of meat-sounding terms on plant-based products (Domke, 2018; Seehafer & Bartels, 2019; Bánáti, 2020), the debate around the PBMA labelling remains opened and seems to be puzzling, as it concern the protection of the economic and social role of meat industry, and the support to the public campaign promoting greener diets with a health and environmental objectives.

The role of labelling in food markets legitimizes both the point of views. As highlighted by Messer et al. (2017), in fact, food labels might exert positive or negative effects on consumers' choices. In the first case, food producers positively use claims on their products to inform consumers about the characteristics of their food and finally persuade them to buy. In the second case, when mis-used, food names might confuse consumers about the characteristics of the product and/or prevent them from purchasing. In line with this reasoning, vegan associations want their labels to be recognized and promoted by the Institutions, while according to meat producers' associations there is an urgent need to ensure that plant-based food cannot be confused with proper meat products to protect the consumer and the products of the animal origin industry. On the other hand, given the economic potential of vegetarian and vegan products and the costs of the introduction, implementation, and management of new regulations (Caswell & Padberg, 1992; Sunstein, 2021), it seems necessary to study whether these labels would produce any effect on consumers' perception of PBMA.

To answer this question, we conducted two experiments aimed at measuring the effect of vegan and meat-sounding labelling on different products of plant origin. The research is based on the halo

effect and the feature transformation framework (Thorndike, 1920; De Houwer et al., 2019). According to the theory, consumers tend to rate a characteristic of an object using the opinion they hold over another characteristic. Thus, if the vegan or meat-sounding name is considered as good, consumers will be inclined to rate the PBMA positively also on other (unrelated) food dimensions, while the opposite is predicted if the vegan or meat-sounding name is considered as bad. Considering the possible heterogeneity of the individual response to experimental manipulation, the research also considered the role of personal attitudes towards meat-eating and vegetarianism. According to the results obtained in the first study, the meat-sounding name increased only the perceived healthiness of the plant-based food, while no effect on the other outcome variables considered emerged. Furthermore, the vegan labelling *per se* had no effect on respondents' average evaluations of the PBMAs. Different results were found in the second study. In this research consumers' perception of tastiness and healthiness and their willingness to buy the PBMA were negatively affected by the vegan labelling, while using a meat-sounding label did not impact any of the outcome variables. Notably, the "unhealthiness" halo effect of vegan labelling found in our research seems the opposite found by Besson et al. (2020) that measured the calorie perception of burgers and found that respondents rated the plant-based burgers as containing less calories than meat burgers. Yet, we acknowledge two major elements of discrepancy that separate our research form Besson et al.'s (2020) and that might account for the divergent findings. First, whereas Besson *et al.* compared veggie and meat products, we confined our investigation to food products that were constantly presented as plant-based. Thus, it might be that the type of food compared sets a specific reference that affects the direction and the magnitude of this halo effect. Second, in Besson *et al.* the halo effect was estimated on calorie perception, whereas our studies assessed a more general attribution of healthiness. Further research is needed to test (i) whether the effect of vegan labelling on perceived healthiness is limited to specific comparisons between food items, and (ii) what characteristic of the food product are affected by such labelling to influence consumers' perception of healthiness.

Furthermore, it is worth emphasizing that given the within-subjects design, in the second study the respondents had to evaluate four products, each holding a different name. This might have elicited a direct comparison between vegan and meat-sounding labels, that resulted in more negative ratings of vegan-labelled products. Even if these results might be partly related to the experimental framework *per se* (Charness et al., 2012), similar evidence were found for example in Richetin et al. (2021) that focused on the halo effects induced by "industrial" and "traditional" names on foods and measured higher and stronger biases in the within compared to the between framed experiments. Interesting insights are also gained by the analysis of the role of the individual attitudes towards meat-eating and veganism on the effect of vegan and meat-sounding labelling. Specifically, in the first and second study, the respondents' perception of healthiness of the product decreased among pro-meat and anti-vegan consumers, while the willingness to suggest or buy or the perceived tastiness decreased in the same group of respondents only in study 1 or in study 2 respectively. On the contrary, the moderating effect of meat-eating-vs-vegan identity was never found for the meat-sounding labels. Even if the second study did not perfectly confirm the first experiment, the evidence suggests that the attitudes towards different dietary habits are well predictors of consumers' response to the vegan name, especially if consumers love to eat meat and do not approve vegan diets. These results are in line with the previous research conducted on other labels that found, for example, that the ethical or ecological identity moderate the halo effect of fair-trade (Schuldt et al., 2012) or organic (Schuldt et al., 2010) labelling respectively. Furthermore, they relate to the research that found that average consumers tend to stigmatize vegetarianism and veganism (Markowsky & Roxburgh, 2019), because consider plant-based diets as inadequate and unhealthy (Crnic, 2013), naïve (Burgess et al. 2014), feminine (Ruby & Heine, 2011) or less tasty (Pohjolainen, 2015) than diets that include animal-based food.

Importantly, our results provide a first experimental contribution to the debate about the vegan and meat-sounding names regulations for plant-based meat alternatives. Our estimates have direct market and policy implication for vegetarian and vegan associations. In fact, we considered the

concurrent signs, dimensions, and effect sizes of the estimates of the second study as a first proof that the use of vegan labels on plant-based foods might be counterproductive as it could prevent non-vegan consumers to buy plant-based meat alternatives. Remarkably, the null effect of the use of meat-sounding name on PBMA (except for the perception of healthiness in the first study) suggested that consumers are by and large unbiased by such a labelling, and that they can still discriminate between plant-based and proper meat. With all the limitations that narrow experimental research presents, this is a first proof that the arguments that vegetarian associations use to ask to continue to use meaty-sounding names on vegan foods are more valid than those that meat producers' associations use to support their ban.

Building on our results, we cautiously warn PBMA producers to carefully consider whether to use or not vegan labelling to support the growth of sales of their products in the conventional supermarkets and we do not see a strong rational reason to propose a new regulation aimed at banning meat-sounding names on plant-based food. On the other hand, the best protection for the meat sector seems to be the use of the "vegan" name on vegan products because this label positively affects the evaluation of the vegan enthusiasts and negatively affects anti-vegan consumers' perceptions, which means that meat consumers probably would not substitute proper meats with PBMA in case of the use of vegan names.

Of course, some limitations of the research must be considered to qualify the value of our results. First, the study has been conducted in Italy on a convenience sample of young and mostly female respondents; thus, even if the statistical analysis accounts for the sociodemographic characteristics of the participants, our results should not be considered as definitive evidence for the proposal or rejection of new European regulations for the vegan and meat-sounding labelling of plant-based foods. Furthermore, as the experiment was hypothetical and based only on explicit attitudes, no conclusion can be outlined regarding the effects of these labels on consumers' choices and their sensory liking of vegan products. Thus, given the value of the plant-based food sector, the costs and benefits of any food regulations and the need to protect meat producers' investments and

603 consumers' rights to correct information, cross-national, multi-product, multi-disciplinary, and real
604 on field investigations on this argument should be conducted.

Competing interests' statement

Authors declare they have no competing financial, professional, or personal interests that might have influenced the performance or presentation of the work described in this manuscript.

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