Repositório ISCTE-IUL

Meat, beyond the plate: Data-driven hypotheses for understanding consumer willingness to adopt a more plant-based diet.

9   **Abstract**

10   A shift towards reduced meat consumption and a more plant-based diet is

11   endorsed to promote sustainability, improve public health, and minimize animal

12   suffering. However, large segments of consumers do not seem willing to make such

13   transition. While it may take a profound societal change to achieve significant

14   progresses on this regard, there have been limited attempts to understand the

15   psychosocial processes that may hinder or facilitate this shift. This study provides an in-

16   depth exploration of how consumer representations of meat, the impact of meat, and

17   rationales for changing or not habits relate with willingness to adopt a more plant-based

18   diet. Multiple Correspondence Analysis was employed to examine participant responses

19   (N = 410) to a set of open-ended questions, free word association tasks and closed

20   questions. Three clusters with two hallmarks each were identified: (1) a pattern of

21   disgust towards meat coupled with moral internalization; (2) a pattern of low affective

22   connection towards meat and willingness to change habits; and (3) a pattern of

23   attachment to meat and unwillingness to change habits. The findings raise two main

24   propositions. The first is that an affective connection towards meat relates to the

25   perception of the impacts of meat and to willingness to change consumption habits. The

26   second proposition is that a set of rationales resembling moral disengagement

27   mechanisms (e.g., pro-meat justifications; self-exonerations) arise when some

28   consumers contemplate the consequences of meat production and consumption, and the

29   possibility of changing habits.

30

31   *Keywords:* Plant-based diets; Meat; Consumer attitudes; Meat attachment;

32   Meat disgust; Moral disengagement.

33

34

Meat, beyond the plate: Data-driven hypotheses for understanding consumer willingness to adopt a more plant-based diet.

1 INTRODUCTION

During the last century there was a massive and unprecedented increase in the frequency and amount of consumption of animal-based products, materializing in an ongoing global approach to the standards and lifestyles of industrialized western countries (Delgado, Rosegrant, Steinfeld, Ehui, & Curbois, 1999). This transition characterizes a rise in the consumption of livestock products and a shift away from grains and vegetables as societies become more affluent (Pokpin, 2011). As a result, this global lifestyle change directly opposes the growing scientific consensus that plant-based diets (i.e., those diets which have the bulk of calories from plants sources while limiting or avoiding animal sources) are more sustainable (e.g., de Boer & Haiking, 2011; Pimentel & Pimentel, 2003), more healthy (e.g., American Dietetic Association, 2003; Sabaté, 2003), and alleviate animal suffering (e.g., Foer, 2010; Singer & Mason, 2006).

In spite of these benefits, large segments of consumers in western societies do not seem willing to eat a plant-based diet (Lea, Crawford, & Worsley, 2006a, 2006b) or reduce meat consumption (Latvala et al., 2012; Schösler, de Boer, & Boersema, 2012). Several scholars have been alerting that it may take a profound societal transition to achieve significant progresses on this regard (Dagevos & Voordouw, 2013; Schösler et al., 2012). However, evidence concerning the psychosocial processes which affect this shift remains sparse and insufficient relating to changes at the societal level (Cole & McCoskey, 2013; Stehfest et al., 2009). We believe that by converging two recent lines of research we will be able to provide new insights and improve theoretical integration

of consumer motivations, thus better explaining consumer willingness and resistance to

change. More specifically we refer to studies on willingness to eat plant-based diets and

meat substitutes, and findings on the different contexts in which consumers expect meat

as a food item. To provide an integrative framework from which to add to current

knowledge, pertinent research and propositions on each of these topics are briefly

summarized below.

1.1 Willingness to Eat Plant-based Diets and Meat Substitutes

To our knowledge, only a pair of studies conducted in Australia have

specifically addressed consumer willingness to eat plant-based diets (Lea et al., 2006a,

2006b). Although observing that some consumers perceived several benefits in such

diets, conclusions were that the large majority of the population was not ready to move

away from meat. Significant perceived barriers included lack of dietary information,

lack of desire to change habits, lack of options when eating out, and health concerns.

However, the majority of participants in these studies actually disagreed that these were

barriers to eating a plant-based diet, even though they were not following and not

willing to follow one. Lea et al. called for more research to further understand their

findings, and raised the possibility that there are other barriers to consumption that were

not assessed in their studies.

Although not specifically targeted at plant-based diets, another set of studies

exploring consumer acceptance of environmentally sustainable meat substitutes may

provide insight into this issue (Elzerman, Hoek, van Boekel, & Luning, 2011; Hoek et

al., 2011; Hoek et al., 2013; Schösler et al., 2012). For instance, persons who did not

use meat substitutes or had a "light/medium" usage (i.e., less than once per month; once

per month or more, but less than once per week) failed to accept the meat substitutes as

viable alternatives to meat despite acknowledging ethical and weight control advantages which may accompany higher use of meat substitutes (Hoek et al., 2011). The key barriers found to hinder meat substitute acceptance were related to the product, namely unfamiliarity and low sensory appeal compared to meat. In order to make meat substitutes more attractive to meat consumers, product developers are thus called to significantly improve the sensory quality and resemblance to meat (Hoek et al., 2011; Tucker, 2014). Likewise, the most promising pathways to encourage large-scale shifts towards more plant-based diets are likely the ones that do not challenge existing meal formats and hierarchies, in which meat occupies a central role (Schösler et al., 2012).

Indeed, meat still occupies a central position in Western food culture and is depicted as the centre of meals (Barrena & Sánchez, 2009; Fiddes, 1991; Holm & Møhl, 2000; Twigg, 1984). There is also evidence of the belief that meat is necessary and seen as an irreplaceable source of force and vitality, coupled with the idea that plant-based meals are nutritionally deficient (Lea & Worsley, 2001). Gender plays an important role in this issue, with studies consistently showing higher levels in frequency and amount of meat consumption among men, and higher willingness to eat plant-based meals among women (e.g., Beardsworth & Keil, 1991; Prättälä et al., 2007; Rothgerber, 2012; Ruby, 2012; Santos & Booth, 1996). Furthermore, consumers identify that meat has unique sensory properties in terms of texture and taste (Grunert, Bredahl, & Brunsø, 2004; Kenyon & Barker, 1999). Additionally, meat substitutes tend to rank lower than meat overall, but in particular the substitutes fail with regard to sensory appreciation and other attributes such as value and luxury (Hoek et al., 2011).

1.2 Meat in Context: Different Framings May Help Explain Incongruences

109 Following a review on consumer perceptions of risk and safety issues

110 surrounding meat, Korzen and Lassen (2010) commented on the conflict between

111 attitudes and behaviours, and the assumption in the reviewed studies that people should

112 be consistent in what they say and do. Likewise, several studies have been showing that

113 although many consumers express health, environmental and animal welfare-related

114 concerns about meat, their behaviour is often not in accordance with their concerns

115 (Holm & Møhl 2000; Hoogland, de Boer, & Boersema, 2005; Verbeke et al., 2010).

116 Introducing context as a methodological and analytical tool may facilitate a better

117 understanding of consumer perceptions and make sense of some of these apparent

118 inconsistencies (Korzen & Lassen, 2010). For example, meat in the context of everyday

119 food practices may emerge for consumers anchored in a particular frame of reference

120 (e.g., taste preferences, price, buying, or cooking), and exclude other framings

121 associated with the impacts of current patterns of production and consumption (e.g.,

122 environment, health, or animal welfare). Harmonizing concerns people have and the

123 choices people make as consumers may thus benefit from an improved understanding

124 on how these different framings interact.

125 Although to our knowledge no studies have specifically addressed these

126 interactions, recent evidence on what is called the "meat paradox" (i.e., people enjoying

127 eating meat but disapproving of harming animals; see Loughnan, Bastian, & Haslam,

128 2014) does provide some insights. Specifically, overlapping the framings of meat as

129 food and meat as animal seems to evoke dissonance in the moral domain. For instance,

130 categorization as food was found to reduce animals' perceived capacity to suffer and

131 restrict moral concern for animals (Baratanova, Loughnan, & Bastian, 2011). Likewise,

132 it was observed that eating meat reduces moral concern for animals in general, the

133 perceived moral status of animals used for meat, and the ascription of mental states

134 necessary to experience suffering (Loughnan, Haslam, & Bastian, 2010). In contrast,

135 having people first reflect on their own perceptions of animals' mental attributes

136 subsequently increases feelings of disgust at the thought of eating animals (Ruby &

137 Heine, 2012). Disgust is an emotional aversion and a critical factor in determining

138 people's willingness to ingest a given food (Rozin & Fallon, 1987). It also plays a key

139 role in moral judgment (Pizarro, Inbar, & Helion, 2011; Rozin, Markwith, & Stoess,

140 1997). Denying animals certain psychological characteristics has indeed been identified

141 as a mechanism of moral disengagement among meat eaters (Bilewicz, Imhoff, &

142 Drogosz, 2011).

143

144 *1.3 Current Study – Research Questions and Objectives*

145 Plant-based diets and alternatives to meat are increasingly associated with

146 several benefits, but a high consumption of meat and a low regard for meat substitutes is

147 still the dominant cultural pattern in most western societies. Most consumers do not

148 seem willing to shift towards a more plant-based diet. Our general aim is to contribute

149 to a further understanding of the psychosocial processes that hinder or facilitate this

150 transition. We will draw on qualitative data and use multiple correspondence analysis to

151 detect and represent underlying structures in the dataset, as a way to provide

152 opportunities to identify key issues, raise data-driven propositions and derive

153 hypotheses to be tested in further research. Specifically, we address three main research

154 questions regarding the representations, impacts and rationales of diet with regard to

155 meat consumption.

156

157 *1) How do representations of meat relate with willingness to adopt a more*

158 *plant-based diet?*

7

159   Meat's central role and special status are suggested to play a part in

160   hindering a large-scale shift towards plant-based diets, but moving down to the

161   level of the consumer, meat's role and status are only reflective of its appraisal

162   by individuals within a culture. Thus, moving beyond the abstract notion of meat

163   as the dominant food (alongside with other animal-based products), it is the core

164   of that appraisal that must be investigated (Fiddes, 1991). Our objective is to

165   unpack what specific thoughts, ideas and feelings about meat are associated with

166   personal willingness to follow a more plant-based diet. Here we contemplate

167   representations of meat framed in the context of everyday food practices.

168

169   *2) How do perceived impacts of meat relate with willingness to adopt a more*

170   *plant-based diet?*

171   We give sequence to the notion that putting meat in context may help

172   explaining consumer perceptions on its risks and impacts, and extend this

173   proposition to the understanding of meat substitution. By addressing this

174   question, our objective is to explore how perceptions on the impacts of meat (to

175   the environment, health, and animals) emerge associated with personal

176   willingness to follow a more plant-based diet. Here we contemplate

177   representations of meat framed in the context of its impacts.

178

179   *3) How do personal rationales for changing or not changing consumption habits*

180   *relate with willingness to adopt a more plant-based diet?*

181   Previous studies on willingness to eat a plant-based diet and on

182   acceptance of meat substitutes point towards several barriers among the majority

183   of consumers (e.g., Hoek et al., 2011; Lea et al., 2006), but these papers do not

184 consider how consumers may react to the consequences of meat consumption

185 when they are called upon to consider changing their habits. We intend to look at

186 the interplay between the different frames of reference for meat consumption

187 and discover how the rationales for eating meat emerge in response to changing

188 consumption habits – two key concepts not covered previously in the literature.

189

190 2 METHODS

191 *2.1 Participants and procedure*

192 In an effort to include a wider range of backgrounds and geographical locations

193 (Gosling, Vazire, Srivastava, & John, 2004), this study was conducted through an

194 internet platform and promoted through advertisements on social media. The survey

195 was hosted online by Qualtrics.com and advertised to Portuguese users. A brief

196 recruitment note presented the study as "exploring people's opinions on several issues

197 related with society and different social practices, lifestyles and consumption habits".

198 Participation was rewarded with the option of registering in a draw to win a 9" tablet.

199 To minimize self-selection biases, no references were made in the advertisement and

200 cover page to the specific goals of the study.

201 The survey was accessible for eight weeks between May and July 2013. During

202 this period 1180 people clicked on the link to the survey and 410 participants (aged

203 between 18 and 69 years, M = 30.2, SD = 10.9) completed all the measures from the

204 questionnaire. An overview of the sample's characteristics concerning gender, age,

205 education, occupation, place of residence, self-reported diet and eating habits is

206 provided in Table 1. There were concerns about the low completion rate and biases in

207 terms of gender, age and education level. The biases were in line with a trend found in

208 previous online studies and might be consequence of having chosen an online

9

209   recruitment platform (Cardoso et al. 2013; Geeroms, Verbeke, & Van Kenhove, 2008).

210   The low completion rate was possibly due to the nature of the survey (i.e., mostly

211   constituted by open-ended questions and word association tasks; see description of the

212   measures in section *2.2 Measurement*). With respect to other variables, the present

213   sample showed diversity in terms of employment status (i.e., employed, unemployed,

214   student) and covered a range of occupations, including administrative/technical staff

215   (e.g., customer support, office employees), skilled workers (e.g., teachers, computer

216   programmers) and sales/non-qualified staff (e.g. shop clerks, cleaning staff). Table 1

217   demonstrates that the sample pool was diverse in terms of background and meat

218   consumption.

219   We used two ways to address the four attributes of qualitative data: credibility,

220   transferability, dependability and confirmability (Shenton, 2004). We drew upon

221   established methods and analytic procedures to bolster the credibility of the research.

222   However, as this is new research, in order to boost the other three we have been explicit

223   and detailed regarding the measures and analytical procedures.

224

225   [INSERT TABLE 1]

226

227   *2.2 Measurement*

228   Data concerning representations of meat, perceived impact, behavioural

229   intentions, willingness to change and rationales used when facing impacts of meat were

230   collected using a set of free word association tasks, open-ended and closed questions.

231

232   *Meat Representations*. Participants' representations (i.e., ideas, thoughts, and

233   feelings or emotions) about meat were retrieved by means of two word association

234   tasks. Word association tasks have been widely used in the context of social

235 representations but also in studies on food related thinking based upon different

236 theoretical frameworks (e.g., Mäkiniemi, Pirttilä-Backman, & Pieri, 2011). Participants

237 were asked to write up to eight words or concepts that came to mind with the following

238 instructions: (1) "Meat makes me think, feel or imagine…" and (2) "If I was forced to

239 stop eating meat I would feel…". Below each stimulus were eight lines with bullet

240 points in which respondents could write their answers.

241

242   *Perceived Impact of Meat*. The perceived impact of meat was retrieved by means

243 of three open-ended questions. Participants were asked to briefly indicate their opinion

244 about how meat consumption may impact (1) nature and the environment, (2) public

245 health and (3) animals. Below each of the topics there were three lines in which

246 participants could write their answers.

247

248   *Behavioural Intentions: Willingness to Change and Rationales Used When*

249 *Facing Impacts of Meat.* In the end of the questionnaire participants read a small text

250 mentioning consequences associated with current meat production and consumption

251 standards. Below we quote from the text.

252   *In recent years several organizations, entities and scientific studies have been*

253   *associating current patterns of meat production and consumption to several*

254   *consequences. Among these consequences there are different impacts to:*

255   *• Animals: for instance, deprivation of outdoor contexts and contact with natural*

256   *living environments, impossibility of engaging in natural behaviours, mutilation,*

257   *overcrowding and inadequate living conditions, infliction of pain and suffering,*

258   *disruption of natural maternal cycles and offspring development;*

259   *• Nature and the environment: for instance, pollution of rivers and groundwater*

260   *tables, deforestation, less sustainability and higher environmental costs in*

261   *comparison with nutritionally equivalent plant-based foods;*

262   *• Public health: for instance, marked increase in heart diseases, high blood*

263   *pressure and overweight, and some types of cancer.*

264   After reading the text, participants were asked to indicate their intentions and

265 rationales to change or maintain habits: "Do you intend to maintain your current levels

266 of meat consumption?" Yes/No; "Please indicate the reasons that explain your choice"

267 Open-ended with three lines in which participants could write their answers; "Are you

268 willing to reduce your current levels of meat consumption, for example, by half?"

269 Yes/No; "Are you willing to follow a Plant-Based Diet (i.e., in which meat is

270 excluded/avoided or its consumption is infrequent and in small portions)?" Yes/No.

271

272   *Demographic Information and Eating Habits.* Demographic information

273 included participants' gender, age, current residence, place of birth (i.e., rural or urban)

274 and education (i.e., basic, secondary, or higher). Eating habits included self-reported

275 diet (i.e., omnivore, vegetarian, or vegan) and frequency of consumption of several food

276 items – "In an ordinary week, how often do you eat: red meat (e.g., pork, beef), white

277 meat (e.g., chicken, turkey), fish, fruits and vegetables, grain legumes (e.g., beans,

278 chickpeas), meat substitutes (e.g., tofu, seitan)". Response scale had three levels (1 –

279 Often/most days; 2 – Seldom/one or two times per week; 3 – Never).

280

281   *Additional Measures.* Additionally participants were asked in the beginning of

282 the survey to fill out a preliminary free word association task and write as many as six

283 short examples of good and bad practices regarding health, the environment, and

284 animals. However, initial analyses showed this question did not discriminate among the

285 participants. Given the lack of discriminatory value and to reduce the complexity of the

286 dataset this variable was not included in subsequent analysis.[1]

287

288 *2.3 Data Analyses*

289   Given the diversity of measures employed in the present study, different

290 analytical procedures were used in preparing the data for identification of patterns in the

291 dataset.

292   Data retrieved in the free word association tasks (i.e., representations of meat)

293 was converged firstly by putting words in the singular (noun) or infinitive (verb). A

294 total of 939 words (mentioned 2530 times) were retrieved. Words with only one

295 occurrence were then dropped. To ensure preservation of the meanings conveyed by the

296 participants, aggregation in categories occurred in words referring to the same meaning

297 (e.g., category "weak" aggregates "fragile" and "weak") or words from the same family

298 (e.g., category "food" aggregates "meal" and "steak"). A total of 375 words were thus

299 aggregated in 41 categories (mentioned 1703 times). Participants' answers were then

300 coded in the dataset according to the presence or absence of each category (1 =

301 mentioned; 2 = not mentioned).

302   Data from the open ended questions (i.e., perceived impacts of meat and

303 rationales used when facing impacts of meat) was thematically analysed using

304 MAXQDA v.10 and followed the five steps of the procedure proposed by Braun &

305 Clarke (2006): (1) initial data review by reading for meanings and patterns; (2)

306 generation of initial codes using semantic criteria; (3) search for themes by code

307 collation; (4) review and revision of the themes based on an adequate fit between the

---

[1] However, to meet the criteria for trustworthiness in qualitative research, the measure is nonetheless reported in this section.

thematic map and the data set; (5) naming of the data set themes by identifying the core

meaning of each theme. To ensure preservation of the original meanings conveyed by

the participants, in step three the collation of codes into potential themes was done using

semantic criteria (Boyatzis, 1998). A total of 42 themes (mentioned 2309 times) were

thus identified in the data from the four open-ended questions. Participants' answers

were coded as categories in the dataset according to the presence or absence of each

theme (1 = mentioned; 2 = not mentioned).

To favour a parsimonious solution and avoid residual categories that could be

problematic when running subsequent analyses, only the categories from the word

association tasks and open ended questions that were mentioned by at least near 10% of

the participants were retained, included in the analyses and considered for interpretation

purposes. The category system thus comprised 38 categories that were mentioned 2531

times (Table 2). To test the reliability of this category system we randomly selected 30

units of analysis from each measure (total of 180 units of analysis) that were

subsequently coded by an independent judge, enabling the determination of the inter-

rater agreement (Cohens' kappa ranging from .87 to 1, $p < .001$).

After determining the inter-rater agreement value we performed a multiple

correspondence analysis (MCA) and a hierarchical cluster analysis (HCA). MCA was

used to explore the interrelationships between the categorical variables (Greenacre,

2007) and the HCA was performed in order to validate the MCA pattern solution (Hair,

Black, Babin, & Anderson, 2010), while using MCA standardized object scores as input

variables (Bernardes et al., 2014). The HCA was suited by a k-means algorithm (non-

hierarchical clustering method). Analyses were performed using IBM SPSS Statistics

(version 20).

333 3 RESULTS

334   This study explored how representations of meat, perceived impacts of meat, and

335 rationales for changing/not changing habits emerge associated with willingness to adopt

336 a more plant-based diet (i.e., intention to change habits, willingness to reduce meat

337 consumption, and willingness to follow a plant-based diet). We began by providing a

338 brief description of the participants' answers in terms of frequency and semantic

339 content, and then proceeded to the interpretation of the dimensions identified in the

340 MCA. Finally, we presented the topological representation of the interrelationships

341 between categories and also described the results from the HCA.

342

343 *3.1 Descriptive Results*

344   Table 2 shows the most frequent categories that emerged from the participants'

345 responses to each of the tasks in study. In the first task (Table 2, Representations of

346 Meat - Meat) meat was mostly invested with hedonic feelings (i.e., Pleasure, Satiated)

347 and emerged as a symbol of food and eating (i.e., Food). But meat was also invested

348 with negative feelings (i.e., Suffering, Disgust) and associated with Death and Animals.

349 In the second task (Table 2, Representations of Meat – No Meat), the perspective of not

350 eating meat was mostly invested with negative feelings related with grief, pointing to an

351 emotional/affective connection with meat (i.e., Sad, Bad, Missing Something) feelings

352 of weakness (i.e., Weak), but also positive feelings and well-being (i.e., Well, Clear

353 Conscience). There were also more neutral expressions of acceptance and indifference

354 (i.e., Indifferent, Would Adapt). Concerning the perceptions on how meat impacts

355 animals (Table 2, Perceived Impacts – Animals), participants often referred to mass

356 production and artificial methods (i.e., Industry) and several negative consequences

357 (i.e., Suffering, Disrespect, Abuse, Poor Conditions). However, some also referred to

358 livestock animals as serving the purpose of meat extraction (i.e., Purpose) or

359 conditionally acknowledged impacts only if production/consumption is unregulated or

360 in excess (i.e., If Unregulated). Regarding perceived impacts on nature and the

361 environment (Table 2, Perceived impacts – Nature), most references concerned

362 pollution and depletion of natural resources (i.e., Pollution, Depletion), and mass

363 production and artificial methods (i.e., Industry). Some participants acknowledged

364 impacts to nature and the environment only if production/consumption is unregulated or

365 in excess (i.e., If Unregulated), while the denial of impacts was also observed (i.e., No

366 Impact). As to perceived impacts on health (Table 2, Perceived impacts – Health), most

367 references concerned risk for Diseases, Food Insecurity and Contamination. Again,

368 participants also referred to mass production and artificial methods (i.e., Industry) and

369 the denial of impacts to health was also observed (i.e., No Impact). Concerning

370 rationales to change/not change behaviour after reading a brief paragraph quoting

371 impacts associated with current meat production and consumption patterns (Table 2,

372 Rationales), answers referred to pro-meat justifications (i.e., Meat Necessary, Meat

373 Pleasure), self-exonerations (i.e., Not My Fault, No Alternative), but also references to

374 avoiding or minimizing harm to animals and public health (i.e., Animals, Health).

375   In terms of content, answers provided by the participants pointed towards the

376 existence of different patterns or profiles in relation to representations of meat,

377 perceived impacts, rationales and behavioural intentions. This possibility was

378 subsequently supported and revealed in the MCA.

379

380   [INSERT TABLE 2]

381

382 *3.2 Dimensions Identified in the MCA*

16

383   The MCA identified two relevant dimensions accounting for 16,5% and 6,1% of

384 the total variance, respectively. Both dimension one and two differentiate individuals

385 based on their relative affective connection towards meat and willingness to change.

386 However, dimension one measures the valence of the affective connection and

387 dimension two measures the intensity of the affective connection. Discrimination

388 measures of each variable for the two dimensions are presented in Table 2 (see

389 Dimensions column). When describing each dimension, values above inertia (variance

390 mean value) were considered, which are set in boldface. The coordinates for each

391 category were also considered in order to describe patterns of association and

392 opposition. Although these coordinates are not shown in Table 2, they are subsequently

393 illustrated in the topological representation provided in Figure 1.

394   Dimension one seems to differentiate individuals in terms of affective

395 connection towards meat and willingness to change. In one of the poles of the axis there

396 is an association between categories referring to feelings of disgust and signs of

397 negative affect towards meat, references to negative impacts and to animals as victims,

398 willingness to change consumption habits, and also the absence of meat consumption.

399 In opposition, in the other pole of the axis an association emerges among hedonic

400 feelings and signs of dependency towards meat, lack of willingness to follow a PBD and

401 to reduce meat consumption, and the intention to maintain current habits.

402   In turn, dimension two differentiates individuals in terms of intensity of the

403 affective connection towards meat, intentions to change and willingness to reduce meat

404 consumption. In one of the poles of the axis the most distinctive trait is a sign of

405 detachment towards meat, but also an association with references to mass production

406 systems and artificial methods, contamination and food insecurity, and the intention to

407 change consumption habits, specifically reducing meat consumption, as a way to

408   minimize harm to animals and health. The opposite pole includes categories referring to

409   the lack of willingness to reduce meat consumption and the intention to maintain current

410   habits, although not as distinctive attributes of this dimension.

411

412   *3.3 Topological Configuration and Projection of Clusters*

413   In order to identify different profiles of consumers with regard to the issues in

414   this study, we explored the intersection between the two dimensions that differentiated

415   participants. We used a topological display of the coordinates provided by the MCA.

416   For purposes of clarity the results are presented side by side in different frames due to

417   the high number of categories analysed. However, all frames refer to the same MCA.

418   Each frame presents a set of categories. Frame one (F1) shows categories that emerged

419   in representations of meat (i.e., "Meat makes me think, feel or imagine…" and "If I was

420   forced to stop eating meat I would feel…"). Frame two (F2) presents categories that

421   emerged based on the perceived impacts of meat (i.e., "Please indicate your opinion

422   about how meat consumption may impact: nature and the environment; public health;

423   and animals"). Frame three (F3) shows categories for the rationales and willingness to

424   change (i.e., "Do you intend to maintain your current levels of meat consumption?" ;

425   "Please indicate the reasons that explain your choice"; "Are you willing to reduce your

426   current levels of meat consumption, for example, by half?"; "Are you willing to follow

427   a Plant-Based Diet (i.e., in which meat is excluded/avoided or its consumption is

428   infrequent and in small portions)?"). Finally, frame four (F4) displays (*a posteriori*, as

429   passive variables, thus not actively contributing to the association patterns) the

430   coordinates from the three clusters identified in the space defined in the MCA.

431   While the graphic representation of Figure 1 includes all variables, in the brief

432   description of the results we consider the ones that contribute the most to the definition

433   of the two dimensions (i.e. variables that have a discrimination measure greater than the

434   inertia value for the respective dimension; and that the categories present higher

435   contributions taking as reference the average contribution – in this case 0.012 = 1/84,

436   one being the sum of the contributions for each dimension, and 84 the total number of

437   categories).

438

439   [INSERT FIGURE 1]

440

441   Figure 1 thus shows the topological configuration of the intersection between

442   dimension one (i.e., valence of affective connection towards meat; >0 referring to

443   positive affect, <0 referring to negative affect) and dimension two (i.e., intensity of the

444   affective connection; >0 referring to higher intensity, <0 referring to lower intensity).

445   The responses were nicely bounded into three groups in three main spaces along the

446   different frames, corresponding to the higher-right, higher-left and lower-left quadrants.

447   The border of each group is represented by a different hash pattern. In the higher-right

448   quadrant of each frame (i.e., positive affect and higher intensity) is group three,

449   combining categories referring to meat attachment (F1) and the denial and legitimation

450   of impacts (F2). This association also includes lack of willingness to reduce

451   consumption and the intention to maintain habits, using a set of pro-meat arguments as

452   rationale (F3). In opposition, in the higher-left quadrant of each frame (i.e., negative

453   affect and higher intensity) is group one, combining a set of categories referring to

454   disgust towards meat (F1), the affirmation of harm with an emphasis on animals as

455   victims (F2), and (more distantly) the absence of meat consumption by the time of

456   completion of the questionnaire (F3). In turn, near the lower-left quadrant but closer to

457   the centre in the axis of dimension one (i.e., neutral to negative affect and lower

458   intensity) is group two, combining detachment towards meat (F1) and the affirmation of

459   impacts with reference to mass production systems, artificial methods and food

460   insecurity (F2). This association also includes willingness to reduce meat consumption

461   and intentions to change habits, mentioning the avoidance/minimization of harm to

462   animals and health as rationales for change (F3).

463   Finally, the results of the HCA validated the MCA solution and yielded three

464   clusters of participants matching the three groups that emerged on the MCA (F4).

465   Cluster three included almost half of the participants and referred to the pattern of

466   attachment to meat, unwillingness to change, and a set of rationales when considering

467   impacts and the possibility of changing habits (group three). Cluster two included

468   around a third of the participants, referring to the pattern of low affective connection

469   towards meat and willingness to change habits to avoid or minimize harm for animals

470   and health (group two). Cluster one included a minority of participants and referred to

471   disgust towards meat and moral internalization (group one). Table 3 characterizes each

472   of the three clusters in terms of demographic variables and eating habits. Chi-square

473   analyses suggested significant differences between the three clusters in all variables

474   measured except place of residence (urban vs. rural).

475

476   [INSERT TABLE 3]

477

478   4 CONCLUSIONS

479   To our knowledge, this study is the first to provide an in-depth enquiry of

480   consumer representations of meat, perceived impacts of meat, and rationales used when

481   called upon to consider changing consumption habits after exposure to information on

482   the impact of meat. It explores how each of these relates with each other and with

483   willingness to follow a more plant-based diet. The findings raise two main propositions,

484   once concerning an affective connection and the other the rationales of meat

485   consumption.

486   The first proposition is that an affective connection towards meat relates to how

487   impacts of meat are perceived and to willingness to change consumption habits. In this

488   regard, three different clusters of consumers were identified, referring to a pattern of

489   attachment to meat (positive valence and higher affective intensity), a pattern of disgust

490   (negative valence and higher affective intensity), and a pattern of avoidance (neutral to

491   negative valence and lower affective intensity). A simplified graphic illustration

492   depicting the interplay between the variables and the positions of the clusters along the

493   axes of valence and intensity of affective connection is provided in Figure 2.

494   [FIGURE 2]

495   The existence of an affective connection towards meat has been previously

496   established, namely a pattern of disgust (e.g., Rozin et al. 1997). Results from the

497   present study add to this knowledge suggesting that affective connection towards meat

498   may actually be a continuum in which one end refers to disgust (i.e., negative affect and

499   repulsion, related with moral internalization), while the other shows an attachment

500   pattern (i.e., positive affect and dependency, related with feelings of sadness and

501   deprivation when considering abstaining from meat consumption) that may prevent a

502   change consumption habits.

503   The identification of three distinct profiles along the axes of intensity and

504   valence of affective connection to meat provides insights for increased understanding of

505   the psychology of meat consumption and meat substitution. Likewise, it points towards

506   the importance of designing tailored initiatives when encouraging a shift towards a

507   more plant-based diet. For instance, consumers holding a pattern referred to as meat

508   avoidance may be the segment of most interest, since it apparently is the most open to

509   information on the impacts of meat and the benefits of changing habits. Targeted

510   communication for this segment may include information on the issues surrounding

511   industrial production framed by health and animal concerns, since these emerged as

512   motivators to adopt a more plant-based diet. It is known, however, that changing eating

513   behaviours requires more than simply formulating intentions (e.g., Godinho, Alvarez,

514   Lima, & Schwarzer, 2014). The identification of this segment of consumers framed in

515   the axes of affective connection is merely a starting point. It calls for further studies to

516   explore the intersections among recent trends towards eating less meat that are being

517   observed and labelled under different terms in the literature (e.g., meat avoidance,

518   Beardsworth & Keil, 1991; meat-reduced diet, Hayley et al., 2015; flexitarianism,

519   Raphaely & Marinova, 2014; conscious omnivorism, Rothgerber 2015). Likewise, it

520   calls for more research to learn how to empower these consumers to effectively make

521   sustained and lasting changes in their habits.

522   As for consumers holding a pattern of attachment to meat, the results raise the

523   hypothesis that mere exposure to information on the impacts of current patterns of

524   production and consumption may not to be sufficient to elicit willingness to change.

525   Instead, as Rothgerber (2014) suggests, it is possible that some initiatives to encourage

526   reducing meat-eating may actually increase entrenchment in meat-eating justifications,

527   and it may be the case that this is particularly true among more attached consumers. If

528   so, it would be expected that trying to reach these consumers without triggering defence

529   or loss-aversion mechanisms should benefit from more indirect approaches, such as

530   facilitating structural changes that make plant-based meals more accessible and

531   increasingly mainstream (Vinnari & Vinnari, 2014). On this note, it is worth recalling

532   that large-scale transitions in food consumption patterns usually happen by way of

533   substitution with a food that can take over the function of the foodstuff that fell away

534   (Montanari, 1994). It has been established that besides meeting basic needs for energy

535   and nutrition, food habits play numerous other roles in people's lives (Fieldhouse,

536   1995). Likewise, choices and preferences are often anchored in values, meanings and

537   shared conventions going beyond the biological function they ensure (Beardsworth &

538   Keil, 2002). In terms of product development, if meat does play an affective role to

539   some consumers, one of the key challenges may be in creating alternatives that are also

540   invested with a special role beyond nutrition. For instance, when developing and

541   launching meat substitutes, it may be of relevance to pay special attention not only to

542   physical attributes such as taste and texture (Hoek et al., 2011; Tucker, 2014), but also

543   on how these products are marketed, positioned and distributed. Taking this hypothesis

544   one step ahead, perhaps for consumers exhibiting high attachment to meat, instead of

545   challenging the centrality of meat it may be a more fruitful first step to try to expand the

546   concept of meat in order to encompass also non-animal based substitutes (i.e., a small

547   portion of meat as a central protein source, surrounded by plant based proteins). More

548   research is needed to expand on these possibilities and increase understanding on these

549   consumers' perspectives about meat consumption, and the issues underpinning a

550   transition towards a more plant-based diet. Drawing from recent findings, these may

551   include volitional factors such as perceived behavioural control, changing deep-rooted

552   habits and beliefs about potential health benefits and challenges (e.g., Zur & Klöckner,

553   2014), but also ideological concerns such as dominance ideologies and resistance to

554   cultural change (e.g., Dhont & Hodson, 2014).

555   The second main proposition that this study raises is that different consumers

556   hold on to different rationales when contemplating the consequences of current meat

557   production and consumption patterns, and the possibility of changing habits. Previous

558   evidence provides support for the role of dissonance reduction in facilitating the practice

559   of meat eating (Loughnan et al., 2014). In this study, when the framing of meat as food

560   overlaps with the framing of meat as impacting animals, the environment and public

561   health, participants resolved the tension by two different paths. Specifically, individuals

562   holding a negative to neutral pattern of affective connection towards meat (i.e., the

563   cluster referred to as meat avoidance) appeared to resolve eventual dissonance by

564   expressing willingness to reduce consumption and to adopt a PBD. In contrast,

565   consumers with a pattern of attachment towards meat appeared to resolve this

566   dissonance by resorting to pro-meat justifications and self-exonerations resembling a

567   process of moral disengagement.

568   Moral disengagement theory proposes that individuals will be particularly

569   motivated to resort to disengagement mechanisms when adopting or maintaining

570   harmful behaviours that are valued and desired (i.e., self-serving) (Bandura, 1999&

571   2002). In line with the results from the present study, a considerable amount of evidence

572   on the centrality of meat in conventional (western) diets suggests that it is often invested

573   with a higher status in comparison to other food products (Fiddes, 1991; Schösler et al.,

574   2012). Assuming that individuals will be particularly motivated to use disengagement

575   mechanisms when adopting or maintaining harmful but cherished behaviours, moral

576   disengagement may indeed play a role when considering the damage currently

577   associated with meat in light of the possibility of changing personal habits.

578   Reflecting on the "meat paradox", Loughnan et al. (2014) note that most people

579   find animal suffering emotionally disturbing and do not want to see animals harmed, but

580   engage in a diet that requires them to be killed and usually to suffer (Herzog, 2010; Joy,

581   2010; Singer, 1975). Moral disengagement (as a process of preventing or reducing

582   dissonance in the moral domain) may thus create conditions for current patterns of meat

583   consumption to endure even among people who subscribe to concerns about animal

584 suffering, but also to the environment and/or public health. If this is the case, pro-meat

585 justifications (i.e., "Meat is necessary", "Meat is pleasure") may serve as cognitive

586 reframing in which the ends justify the means, and self-exonerations (i.e., "Not my

587 fault", "No alternative") may discard and displace personal responsibility concerning

588 harm and the possibility of changing habits. In addition, failing to acknowledge

589 consequences (i.e., "No impact") and excluding farm animals from the scope of moral

590 concern (i.e., "It's their purpose") may also operate to prevent or reduce dissonance in

591 the moral domain. Future research could thus explore the connection between an

592 affective connection towards meat (i.e., disgust vs. attachment) and the morality of meat

593 (i.e., moral internalization vs. moral disengagement). This research will add to the

594 knowledge of the role of self-consistency motives and dissonance reduction in meat

595 consumption and willingness to follow a plant-based diet (Bastian et al., 2012; Prunty,

596 & Apple, 2013; Rothgerber, 2014).

597   In this study we drew on qualitative data as a way to provide opportunities to

598 identify key issues, raise data-driven propositions and derive hypotheses to increase

599 understanding on the psychology of meat consumption and substitution. Beyond the

600 main propositions advanced, results echoed additional findings from previous studies

601 exploring this issue.

602   For instance, meat is often portrayed as a symbol of virility (Rothgerber, 2012;

603 Ruby & Heine, 2011) and tends to be depicted as a typical male food, in contrast with

604 fruits and vegetables, which are typically considered more feminine (O'Doherty &

605 Holm, 1999). Likewise, there is evidence suggesting that vegetarian men may be

606 subjected to efforts in reconciling their gender identity with their dietary identity

607 (Beardsworth & Keil, 1992; Rothberger, 2013; Ruby & Heine, 2011). In this study, the

608 clusters of participants mostly associated with willingness to avoid/reduce meat

609 consumption and follow a plant-based diet (i.e., no meat and meat avoidance) consisted

610 almost solely of women, while the cluster associated with unwillingness to change (i.e.,

611 attachment to meat) was more balanced in terms of participants' gender. The notion that

612 meat and meat substitution are not gender neutral thus found additional support in the

613 present results. Moreover, while our findings reinforce the view that meat's special

614 status may play a role in hindering a large-scale shift towards a more plant-based diet,

615 they also suggest that this status is possibly being challenged in emerging clusters of

616 consumers expressing higher awareness on the impact of meat and willingness to move

617 towards less animal-based diets (Schösler et al., 2012).

618   Given the exploratory nature of this work, it is important to highlight that all

619 propositions are tentative. Likewise, it is clear that much more research is needed to

620 keep advancing in the understanding of the psychosocial processes that may hinder or

621 engage a shift towards a more plant-based diet. Even so, one main limitation of this

622 work should be discussed from the outset, which is the bias in terms of participants'

623 gender, age and education. On the one hand, in generating data-driven propositions our

624 primary interest was to observe data structures, and there is no strong reason to believe

625 that the associations observed between the categorical variables may have been

626 compromised by this bias. Some of the smaller proportions of participants (e.g., males)

627 are nonetheless represented by considerable absolute numbers, and the identification of

628 three well-delineated segments with clearly distinguished patterns of response is an

629 indication of discriminatory value. Likewise, the current sample did show considerable

630 diversity in other variables, including meat consumption habits, and the skew towards

631 female, young, and higher educated participants was also observed in a previous online

632 study taken as indicative of the food preferences and patterns of the Portuguese

633 population (Cardoso et al., 2013). On the other hand, however, information on the

634 clusters' dimension and demographic characteristics would be different if a

635 representative sample had been used (e.g., considering the pattern of results, the third

636 cluster might be constituted mostly by men). Accordingly, a description on the

637 dimension and demographic characteristics was provided in the results but no inferences

638 were made in that regard. Still, the descriptive information must be read with special

639 prudence and future studies in this topic should strive to ensure the recruitment of more

640 balanced samples. As for the hypotheses advanced in this work, they open up several

641 possibilities for further research and ought to be tested in the near future.

642

643 **Acknowledgments**

648

649 **References**

650 American Dietetic Association (2003). Position of the American Dietetic Association

651 and Dieticians of Canada. Vegetarian diets. *Journal of American Dietetic*

652 *Association, 103*(6), 748–765.

653 Bandura, A. (1999). Moral disengagement in the perpetration of inhumanities.

654 *Personality and social psychology review*, *3*(3), 193-209.

655 Bandura, A. (2002). Selective moral disengagement in the exercise of moral agency.

656 *Journal of moral education*, *31*(2), 101-119.

657 Barrena, R., & Sánchez, M. (2009). Consumption frequency and degree of abstraction.

658 A study using the laddering technique on beef consumers. *Food Quality and*

659 *Preference, 20*, 144–155.

660 Bastian, B., Loughnan, S., Haslam, N., & Radke, H. R. M. (2012). Don't mind meat?

661   The denial of mind to animals used for human consumption. *Personality &*

662   *Social Psychology Bulletin*, *38*(2), 247–56.

663 Beardsworth, A. D., & Keil, E. T. (1991). Vegetarianism, veganism, and meat

664   avoidance: Recent trends and findings. *British Food Journal, 93*(4), 19-24.

665 Beardsworth, A., & Keil, T. (1992). The vegetarian option: varieties, conversions,

666   motives and careers. *The Sociological Review*, *40*(2), 253-293.

667 Beardsworth, A., & Keil, T. (2002). *Sociology on the menu: An invitation to the study of*

668   *food and society*. Routledge.

669 Bernardes, S. F., Silva, S. A., Carvalho, H., Costa, M., & Pereira, S. (2014). Is it a

670   (fe)male pain? Portuguese nurses' and laypeople's gendered representations of

671   common pains. *European Journal of Pain*, *18*(4), 530-539.

672 Bilewicz, M., Imhoff, R., & Drogosz, M. (2011). The humanity of what we eat:

673   Conceptions of human uniqueness among vegetarians and omnivores. *European*

674   *Journal of Social Psychology*, *41*(2), 201-209.

675 Boyatzis, R. (1998). *Transforming qualitative information: Thematic analysis and code*

676   *development*. Thousand Oaks: Sage.

677 Bratanova, B., Loughnan, S., & Bastian, B. (2011). The effect of categorization as food

678   on the perceived moral standing of animals. *Appetite*, *57*(1), 193–196.

679 Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative*

680   *Research in Psychology, 3*(2), 77–101.

681 Cardoso, C., Lourenço, H., Costa, S., Gonçalves, S., & Nunes, M. L. (2013). Survey

682   into the seafood consumption preferences and patterns in the portuguese

683   population. Gender and regional variability. *Appetite, 64*, 20-31.

684   Cole, J., & McCoskey, S. (2013). Does global meat consumption follow an

685   environmental Kuznets curve. *Sustainability: Science, Practice, & Policy*, *9*(2),

686   26-36.

687   Dagevos, H., & Voordouw, J. (2013). Sustainability and meat consumption: is reduction

688   realistic. *Sustainability: Science, Practice, & Policy*, *9*(2), 60-69.

689   de Boer, J., & Aiking, H. (2011). On the merits of plant-based proteins for global food

690   security: marrying macro and micro perspectives. *Ecological Economics*, *70*(7),

691   1259-1265.

692   Delgado, C., Rosegrant, M., Steinfeld, H., Ehui, S., Courbois, C. (1999). Livestock to

693   2020: the next food revolution. *IFPRI Food, Agriculture, and the Environment

694   Discussion Paper 28*. Washington, D.C.: IFPRI.

695   Dhont, K., & Hodson, G. (2014). Why do right-wing adherents engage in more animal

696   exploitation and meat consumption?. *Personality and Individual Differences, 64*,

697   12-17.

698   Elzerman, J. E., Hoek, A. C., van Boekel, M. A. J. S., & Luning, P. A. (2011).

699   Consumer acceptance and appropriateness of meat substitutes in a meal context.

700   *Food Quality and Preference*, *22*(3), 233–240.

701   Fiddes, N. (1991). *Meat: A natural symbol*. New York: Routledge.

702   Fieldhouse, P. (1995). *Food and nutrition: Customs and culture*. London: Chapman &

703   Hall.

704   Foer, J. S. (2010). *Eating animals*. London: Penguin Books.

705   Geeroms, N., Verbeke, W., & Van Kenhove, P. (2008). Consumers' health-related

706   motive orientations and ready meal consumption behaviour. *Appetite, 51*(3),

707   704-712.

708   Godinho, C. A., Alvarez, M. J., Lima, M. L., & Schwarzer, R. (2014). Will is not

709   enough: Coping planning and action control as mediators in the prediction of

710   fruit and vegetable intake. *British Journal of Health Psychology, 19*(4), 856-

711   870.

712   Gosling, S. D., Vazire, S., Srivastava, S., & John, O. P. (2004). Should we trust web-

713   based studies? A comparative analysis of six preconceptions about internet

714   questionnaires. *American Psychologist, 59*(2), 93-104.

715   Greenacre, M. (2010). *Correspondence Analysis in Practice*. London: CRC Press.

716   Grunert, K. G., Bredahl, L., & Brunsø, K. (2004). Consumer perception of meat quality

717   and implications for product development in the meat sector - A review. *Meat

718   Science*, *66*(2), 259-272.

719   Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data

720   analysis* (7th ed.). Englewood Cliffs: Prentice Hall.

721   Hayley, A., Zinkiewicz, L., & Hardiman, K. (2015). Values, attitudes, and frequency of

722   meat consumption. Predicting meat-reduced diet in Australians. *Appetite, 84*,

723   98-106.

724   Herzog, H. (2010). *Some we love, some we hate, some we eat: Why it's so hard to think

725   straight about animals*. New York, NY: Harper Collins.

726   Hoek, A. C., Luning, P. A, Weijzen, P., Engels, W., Kok, F. J., & de Graaf, C. (2011).

727   Replacement of meat by meat substitutes. A survey on person- and product-

728   related factors in consumer acceptance. *Appetite*, *56*(3), 662–73.

729   Holm, L., & Møhl, M. (2000). The role of meat in everyday food culture. An analysis of

730   an interview study in Copenhagen. *Appetite, 34*, 277–283.

731   Hoogland, C. T., de Boer, J., & Boersema, J. J. (2005). Transparency of the meat chain

732   in the light of food culture and history. *Appetite, 45*, 15–23.

733   Joy, M. (2010). *Why we love dogs, eat pigs, and wear cows: An introduction to carnism*.

734   San Francisco, CA: Conari Press.

735   Kenyon, P. M., & Barker, M. E. (1998). Attitudes towards meat-eating in vegetarian

736   and non-vegetarian teenage girls in England - An ethnographic approach.

737   *Appetite*, *30*(2), 185-198.

738   Korzen, S., & Lassen, J. (2010). Meat in context. On the relation between perceptions

739   and contexts. *Appetite*, *54*(2), 274–281.

740   Latvala, T., Niva, M., Mäkelä, J., Pouta, E., Heikkilä, J., Kotro, J., & Forsman-Hugg, S.

741   (2012). Diversifying meat consumption patterns: Consumers' self-reported past

742   behaviour and intentions for change. *Meat Science*, *92*(1), 71–77.

743   Lea, E. J., Crawford, D., & Worsley, A. (2006a). Consumers' readiness to eat a plant-

744   based diet. *European Journal of Clinical Nutrition*, *60*(3), 342–351.

745   Lea, E. J., Crawford, D., & Worsley, A. (2006b). Public views of the benefits and

746   barriers to the consumption of a plant-based diet. *European Journal of Clinical*

747   *Nutrition*, *60*(7), 828–837.

748   Lea, E., & Worsley, A. (2001). Influences on meat consumption in Australia. *Appetite*,

749   *36*(2), 127–136.

750   Lea, E., & Worsley, A. (2003). Benefits and barriers to the consumption of a vegetarian

751   diet in Australia. *Public Health Nutrition, 6*(05), 505-511.

752   Loughnan, S., Bastian, B., & Haslam, N. (2014). The Psychology of Eating Animals.

753   *Current Directions in Psychological Science*, *23*(2), 104-108.

754   Loughnan, S., Haslam, N., & Bastian, B. (2010). The role of meat consumption in the

755   denial of moral status and mind to meat animals. *Appetite*, *55*(1), 156–159.

756   Mäkiniemi, J. P., Pirttilä-Backman, A. M., & Pieri, M. (2011). Ethical and unethical

757   food. Social representations among Finnish, Danish and Italian students.

758   *Appetite*, *56*(2), 495-502.

759   Montanari, M. (1994). *The culture of food (La fame e l'abbondanza. Storia*

760   *dell'alimentazione in Europa)* (Carl Ipsen, Trans.). Oxford: Blackwell (Original

761   work published in 1993).

762   O'Doherty, J. K., & Holm, L. (1999). Preferences, quantities and concerns: socio-

763   cultural perspectives on the gendered consumption of foods. *European journal*

764   *of clinical nutrition*, *53*(5), 351-359.

765   Pimentel, D. & Pimentel, M. 2003. Sustainability of meat-based and plant-based diets

766   and the environment. *American Journal of Clinical Nutrition,* 78(S3), S660–

767   S663.

768   Pizarro, D., Inbar, Y., & Helion, C. (2011). On disgust and moral judgment. *Emotion*

769   *Review*, *3*(3), 267-268.

770   Popkin, B. (2001). The nutrition transition and its relationship to demographic change.

771   In R. Semba & M. Bloem (Eds.), *Nutrition and Health in Developing Countries*.

772   pp. 427–445. Totowa, NJ: Humana Press.

773   Prättälä, R., Paalanen, L., Grinberga, D., Helasoja, V., Kasmel, A., & Petkeviciene, J.

774   (2007). Gender differences in the consumption of meat, fruit and vegetables are

775   similar in Finland and the Baltic countries. *The European Journal of Public*

776   *Health*, *17*(5), 520-525.

777   Prunty, J., & Apple, K. J. (2013). Painfully Aware: The Effects of Dissonance on

778   Attitudes toward Factory Farming. *Anthrozoos: A Multidisciplinary Journal of*

779   *the Interactions of People & Animals*, *26*(2), 265-278.

780   Raphaely, T., & Marinova, D. (2014). Flexitarianism: Decarbonising through flexible

781   vegetarianism. *Renewable Energy, 67*, 90-96.

782   Rothgerber, H. (2013). Real men don't eat (vegetable) quiche: Masculinity and the

783   justification of meat consumption. *Psychology of Men & Masculinity*, *14*(4),

784   363-375.

785   Rothgerber, H. (2014). Efforts to overcome vegetarian-induced dissonance among meat

786   eaters. *Appetite*, *79*, 32-41.

787   Rothgerber, H. (2015). Can you have your meat and eat it too? Conscientious

788   omnivores, vegetarians, and adherence to diet. *Appetite, 84*, 196-203.

789   Rozin, P., & Fallon, A. (1987). A perspective on disgust. *Psychological Review, 94*(1),

790   23–41

791   Rozin, P., Markwith, M., & Stoess, C. (1997). Moralization and becoming a vegetarian:

792   the transformation of preferences into values and the recruitment of disgust.

793   *Psychological Science, 8*, 67–73.

794   Ruby, M. B. (2012). Vegetarianism. A blossoming field of study. *Appetite, 58*(1), 141-

795   150.

796   Ruby, M. B., & Heine, S. J. (2011). Meat, morals, and masculinity. *Appetite*, *56*(2),

797   447–450.

798   Ruby, M. B., & Heine, S. J. (2012). Too close to home. Factors predicting meat

799   avoidance. *Appetite*, *59*(1), 47–52.

800   Sabaté, J. (2003). The contribution of vegetarian diets to health and disease: a paradigm

801   shift?. *The American Journal of Clinical Nutrition*, *78*(3), 502S-507S.

802   Santos, M. L. S., & Booth, D. A. (1996). Influences on meat avoidance among British

803   students. *Appetite, 27*(3), 197-205.

804 Schösler, H., de Boer, J., & Boersema, J. J. (2012). Can we cut out the meat of the dish?

805 Constructing consumer-oriented pathways towards meat substitution. *Appetite*,

806 *58*(1), 39–47.

807 Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research

808 projects. *Education for Information, 22*(2), 63-75.

809 Singer, P. (1975). *Animal liberation: Towards an end to man's inhumanity to animals*.

810 New York, NY: HarperCollins.

811 Singer, P., & Mason, J. (2006). *The way we eat: Why our food choices matter*. Emmaus:

812 Rodale.

813 Stehfest, E., Bouwman, L., van Vuuren, D., den Elzen, M., Eickhout, B., & Kabat, P.

814 (2009). Climate benefits of changing diet. *Climatic Change, 95*, 83–102

815 Tucker, C. A. (2014). The significance of sensory appeal for reduced meat

816 consumption. *Appetite*, *81*, 168-179.

817 Twigg, J. (1984). Vegetarianism and the meanings of meat. In A. Murcott (Ed.), *The*

818 *Sociology of Food and Eating*. pp. 18–30. Farnborough: Gower.

819 Verbeke, W., Pérez-Cueto, F. J. A., de Barcellos, M. D., Krystallis, A., & Grunert, K.

820 G. (2010). European citizen and consumer attitudes and preferences regarding

821 beef and pork. *Meat Science, 84*, 284–292.

822 Vinnari, M., & Vinnari, E. (2014). A Framework for Sustainability Transition: The

823 Case of Plant-Based Diets. *Journal of Agricultural and Environmental Ethics,*

824 *27*(3), 369-396.

825 Zur, I., & Klöckner, C. A. (2014). Individual motivations for limiting meat

826 consumption. *British Food Journal, 116*(4), 629-642.

827

828 *Table 1. Sample characteristics of the respondent group to the internet*

829 *questionnaire (N = 410)*

Variable	Category	N	%
Gender	Male	123	30.1
	Female	285	69.9
Age	< 25	171	41.7
	25-40	168	41
	> 40	71	17.3
Education	Basic	10	2.5
	Secondary	133	32.6
	Higher	265	65
Employment Status/ Occupation	Administrative/ Technical staff	69	16.8
	Skilled workers	105	25.6
	Sales/ Non-qualified staff	21	5.1
	Other	21	5.2
	Unemployed	61	14.9
	Full-time student	133	32.4
Childhood Residence	Rural	113	28
	Urban	291	72
Current Residence	Rural	77	18.9
	Urban	330	81.1
Self-reported Diet	Omnivore	354	86.3
	Veg*n	56	13.7
Red Meat	Regularly	100	24.7
	Occasionally	211	52.1
	Never	94	23.2
White Meat	Regularly	175	43
	Occasionally	168	41.3
	Never	64	15.7
Fish	Regularly	105	25.9
	Occasionally	240	59.3
	Never	60	14.8
Fruits and Vegetables	Regularly	326	80.7
	Occasionally	72	17.8
	Never	6	1.5
Grain Legumes	Regularly	156	38.7
	Occasionally	218	54.1
	Never	29	7.2
Meat Substitutes	Regularly	55	13.5
	Occasionally	97	23.8
	Never	256	62.7

830

35

Table 2. Frequency, proportion and discrimination measures for each category

(Task) Categories	Meaning	Dimensions[a]		
		n (%)	1	2
(Representations of Meat) Meat				
Pleasure		169 (41.2)	**.285**	.000
Food		97 (23.7)	.110	.000
Animals		90 (22)	.083	.025
Death	[b]	60 (14.6)	**.184**	.001
Satiated		54 (13.2)	.090	.006
Suffering		46 (11.2)	**.278**	.048
Disgust		45 (11)	**.248**	.045
(Representations of Meat) No Meat				
Well		85 (20.7)	**.278**	.002
Sad		80 (19.5)	**.143**	.004
Bad		54 (13.2)	.078	.001
Missing Something	[b]	49 (12)	.061	.005
Clear Conscience		44 (10.7)	**.233**	.026
Indifferent		41 (10)	.000	**.078**
Would Adapt		41 (10)	.001	.026
Weak		40 (9.8)	.084	.018
(Perceived Impacts) Animals				
Industry	*References to mass production and artificial methods*	116 (28.3)	.054	**.059**
Poor Conditions	*Animals kept in poor conditions*	101 (24.6)	**.179**	.009
Suffering	*Animals suffer in production and/or slaughter*	74 (18)	**.295**	.018
Disrespect	*Animals disrespected, instrumentalised and/or victims of injustice*	64 (15.6)	**.313**	.052
Purpose	*Livestock animals serve the purpose of meat extraction*	55 (13.4)	**.149**	.051
Abuse	*Animals victims of abuse*	51 (12.4)	**.171**	.018
If Unregulated	*Impacts only if unregulated or in excess*	46 (11.2)	.025	.003
(Perceived Impacts) Nature				
Pollution	*Pollutes nature and the environment*	100 (24.4)	**.185**	.018
Depletion	*Erosion, disruption and depletion of natural resources*	80 (19.5)	**.275**	.039
Industry	*References to mass production and artificial methods*	73 (17.8)	.090	.001
If Unregulated	*Impacts only if unregulated or in excess*	56 (13.7)	.044	.000
No Impact	*Does not impact nature and the environment*	43 (10.5)	.114	.049
(Perceived Impacts) Health				
Diseases	*Diseases associated with meat*	71 (17.3)	**.167**	.021
Food Insecurity	*Unsafety and lack of control from authorities*	70 (17.1)	.003	**.100**

Contamination	*Contamination with chemicals, hormones and/or additives*	70 (17.1)	.027	**.106**
Industry	*References to mass production and artificial methods*	69 (16.8)	.017	**.104**
No Impact	*Does not impact health*	51 (12.4)	.127	.053
(Rationales)				
Not My Fault	*Reject/deny responsibility in harm*	89 (21.7)	.061	.004
Meat Necessary	*Frame meat as necessary*	62 (15.1)	**.135**	.051
Animals	*Avoid/minimize harm to animals*	55 (13.4)	**.250**	**.066**
Health	*Avoid/minimize harm to public health*	52 (12.7)	.102	**.148**
Meat Pleasure	*Meat is source of pleasure*	50 (12.2)	**.136**	.051
No Alternative	*Difficult/impossible to change meat consumption, alternatives are unrealistic and/or inaccessible*	38 (9.3)	.050	.002
(Behaviour)				
Intention-Change				
Yes		246 (60)		
No		111 (27.1)	**.667**	**.625**
No Meat[c]		51 (12.4)		
Willingness-Reduce				
Yes	[b]	200 (48.8)		
No		154 (37.6)	**.531**	**.562**
No Meat[c]		49 (12.4)		
Willingness-Plant Based Diet				
Yes		182 (44.4)	**.426**	.013
No		218 (53.2)		

Notes: a) Values in bold are above inertia for each dimension; b) Self-explanatory; c) Participants that indicated not eating meat by the time of completion of the questionnaire

Table 3. Cluster's characteristics: Chi-squares on the frequency/percentage of participants'

837   demographic characteristics and eating habits

		Cluster 1		Cluster 2		Cluster 3		
		N	%	N	%	N	%	x^2
Participants	N	58	14.1	150	36.6	202	49.3	-
Gender	Male	15	25.9	27	18	81	40.5	21.195*
	Female	43	74.1	123	82	119	59.5	
Age	< 25	9	15.5	58	38.7	104	51.5	23.313*
	25-40	33	56.9	64	42.7	71	35.1	
	> 40	16	27.6	28	18.7	27	13.4	
Education	Basic	2	3.4	6	4	2	1	21.288*
	Secondary	13	22.4	34	22.7	86	43	
	Higher	43	74.1	110	73.3	112	56	
Childhood Residence	Rural	12	21.4	48	32.4	53	26.5	2.867
	Urban	44	78.6	147	67.6	291	72.0	
Current Residence	Rural	12	21.1	30	20.1	35	17.4	.610
	Urban	45	78.9	119	79.9	166	82.6	
Self-reported Diet	Omnivore	12	20.7	140	93.3	202	100	250.154*
	Veg*n	46	79.3	10	6.7	0	0	
Red Meat	Regularly	0	0	28	19	72	35.8	217.629*
	Occasionally	2	3.5	90	61.2	119	59.2	
	Never	55	96.5	29	19.7	10	5	
White Meat	Regularly	0	0	61	41.2	114	56.4	307.333*
	Occasionally	4	7	77	52	87	43.1	
	Never	53	91.4	10	6.8	1	0.5	
Fish	Regularly	2	3.5	51	34.9	52	25.7	178.223*
	Occasionally	14	24.6	84	57.5	142	70.3	
	Never	41	71.9	11	7.5	8	4.0	
Fruits and Vegetables	Regularly	57	98.3	126	86.3	143	71.5	25.597*
	Occasionally	1	1.7	19	13	52	26	
	Never	0	0	1	0.7	5	2.5	
Beans	Regularly	46	79.3	61	42.1	49	24.5	58.262*
	Occasionally	11	19	75	51.7	132	54.1	
	Never	1	1.7	9	6.2	19	9.5	
Meat Substitutes	Regularly	34	58.6	15	10.1	6	3	151.028*
	Occasionally	21	36.2	39	26.4	37	18.3	
	Never	3	5.2	94	63.5	159	78.7	

838   * $p < .001$

839

Figure 1. Representations of meat, perceived impacts, behavioural intentions, willingness to change and rationales used when facing impacts: topological configuration and projection of clusters
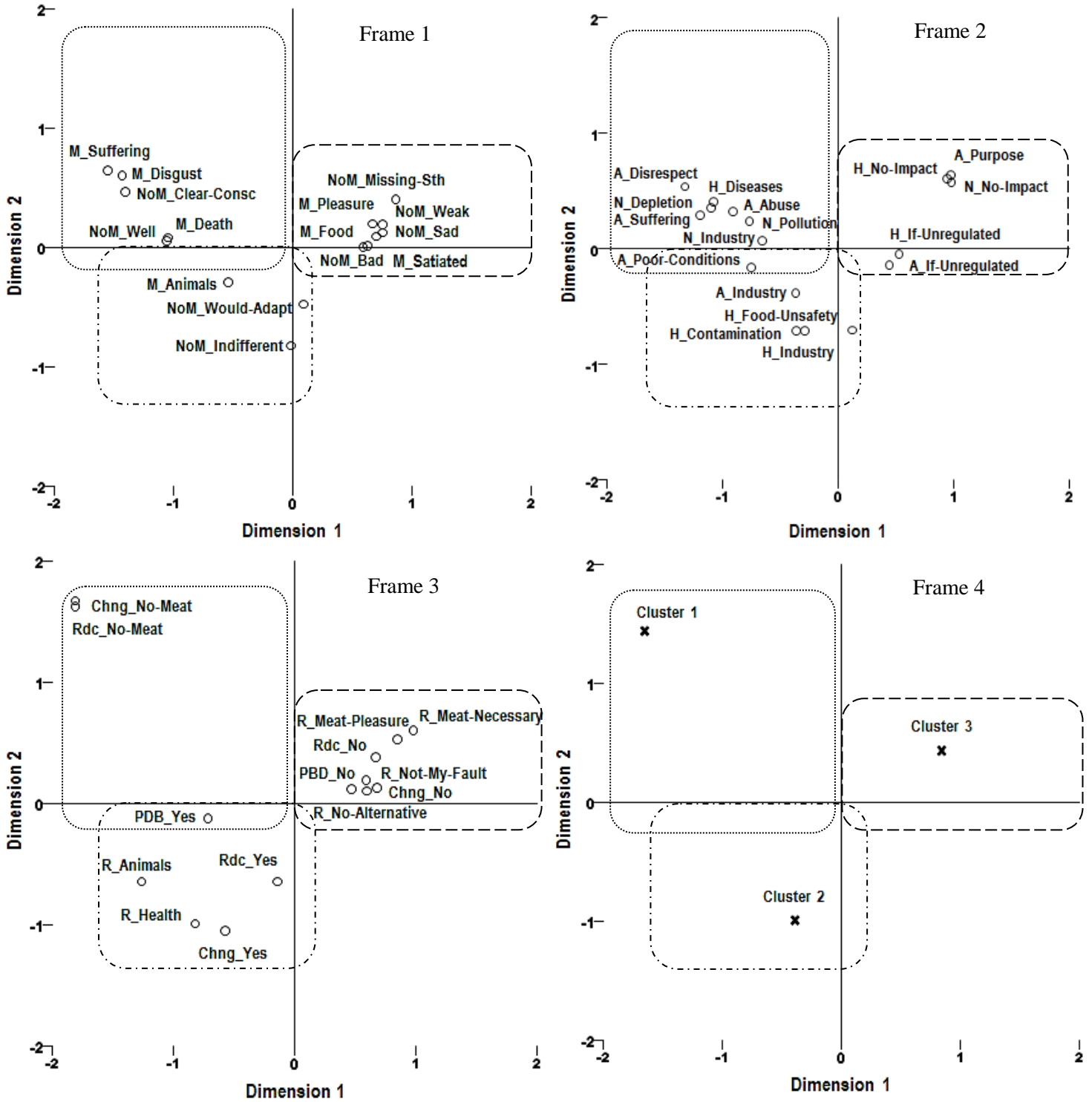
Notes: M = Meat; NoM = No Meat | A = Animals; N = Nature; H = Health | PBD = Plant-Based Diet;

Rdc = Reduce; Chng = Intention to change; R = Rationales

840

841

Figure 2. Simplified depiction of the interplay between representations of meat, perceived impacts, behavioural intentions and rationales for change

842

843

844

845

846

847

848

849

850

851

852

853

854

No Meat
- Signs of disgust and moral internalization;
- Affirms harm with emphasis on animals as victims;
- Excludes meat from diet.

Meat Attachment
- Signs of attachment and dependency;
- Denies/relativizes impacts;
- Unwilling to change habits and to follow PDB;
- Intentions to maintain habits framed in pro-meat arguments and self-exonerations.

Meat Avoidance
- Signs of detachment towards meat;
- Frames impacts mainly in mass production and food insecurity;
- Willing to reduce consumption and to follow PDB;
- Intentions to change motivated by health and animal concerns.

Intensity of affective connection

Valence of affective connection

40