

Are consumers willing to pay for in-vitro meat? An investigation of naming effects

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1
2 **Are Consumers Willing to Pay for In-vitro Meat?**
3 **An Investigation of Naming Effects**

4 Daniele Asioli¹, Claudia Bazzani² and Rodolfo M. Nayga, Jr³

5 **ABSTRACT**

6 Currently, there is an ongoing debate about whether “in-vitro meat” (IVM) should be labeled and
7 communicated differently from conventional meat. Naming and labeling IVM can have significant
8 implications and consequences for consumers’ acceptance of this new product as well as for future
9 labeling policies. We provide, for the first time, information on how the use of different terms (i.e.,
10 “cultured,” “lab-grown,” and “artificial”) shapes United States consumers’ preferences and marginal
11 willingness to pay for IVM. Using a choice experiment involving chicken meat products that vary
12 across four attributes (i.e., production method, carbon trust label, antibiotics use, and price), our
13 results show that consumers prefer chicken meat produced through the conventional production
14 method and tend to generally reject IVM. However, the term “cultured” is less disliked than the terms
15 “lab-grown” and “artificial,” while “artificial” is less disliked than “lab-grown”. Results also indicate
16 that consumers’ valuations are heterogeneous over differing consumer attitudes. Our findings provide
17 insights into the psychology of consumers’ level of acceptance and attitudes, which can be useful in
18 communicating the nature of the IVM to the public. They also have important implications for future
19 labeling policies.

20
21 **Key words:** Chicken meat; Consumers’ willingness to pay; In-vitro meat; Labeling policy; Naming
22 effects; United States.

23 **JEL classifications:** C93, D12, D91, Q02, Q18, Q21

24
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25

26 **1. INTRODUCTION**

27 Continuing growth in world population, incomes, and urbanization has significantly increased the
28 demand for meat products (OECD-FAO, 2013). Meat production, however, can generate large
29 greenhouse gas emissions (Gerber et al., 2013), and is a major user of land, energy, and water (FAO,
30 2006). There are also increasing societal concerns about food safety, human health issues related to
31 meat consumption (Godfray et al., 2018), and animal welfare (Lymbery and Oakeshott, 2014).

32

33 For these reasons, there is increasing interest in innovative alternatives to conventional meat. While
34 plant-based food, mycoproteins, or insect food products are starting to enter in the food market,
35 consumer desires for meat similar to conventional meat is encouraging the development of what is
36 termed “in-vitro meat” (IVM) (Post and Hocquette, 2017). IVM is the result of recent scientific
37 advances in regenerative medicine techniques, where muscle-specific stem cells are taken from an
38 animal and then grown to form muscle tissue as edible meat (Yuan, 2018).

39

40 In the last few years, a growing number of new start-up businesses (e.g., Memphis Meat, Mosa Meat)
41 as well as large companies such as Tyson Foods Inc., Google, and Cargill have invested large amounts
42 in developing IVM (CBS News, 2018; Garfield, 2018). While several companies are aiming to sell
43 IVM in the coming years (Shapiro, 2018), Singapore has recently approved the sale of IVM chicken
44 produced by the company Eat Just, Inc. (Noyes, 2020).⁴

45

46 One of the key advantages of IVM technology is that it could produce meat in unlimited quantities
47 that could potentially be produced more sustainably in terms of lower greenhouse gas emissions, land
48 use, and water use (Mattick, Landis, and Allenby, 2015)⁵. In addition, IVM should not raise any

⁴ On December 16, 2020, the first world commercial sale of IVM chicken was served in the restaurant “1880” in Singapore (Ho, 2020).

⁵ However, recent research has been inconclusive as to the environmentally sustainable advantages of IVM over conventional meat (Lynch and Pierrehumbert, 2019). Specifically, the lower environmental impact of IVM compared to conventional meat production depends on the availability of decarbonized energy generation and the specific production systems that are realized. Indeed, initially IVM results in less warming compared to conventional meat production, but this gap narrows in the long term and in some cases the latter causes far less warming. This is because CH₄ emissions from conventional meat production do not accumulate, unlike CO₂ which is the type of GHG mainly produced by IVM (Lynch and Pierrehumbert, 2019).

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49 animal welfare concerns (Chriki and Hocquette, 2020). However, in addition to current technical
50 challenges and high production costs, some researchers are claiming that consumers' acceptance is
51 the most relevant barrier to market development for IVM (Sharma, Thind, and Kaur, 2015). A few
52 studies have investigated consumers' acceptance of IVM and find that a majority of consumers would
53 at least be willing to try IVM, while a substantial number would consume it regularly or as a
54 replacement for conventional meat, suggesting the existence of potential markets in North America,
55 Europe, and Asia for IVM (for an extensive review on consumers' acceptance of IVM, see Bryant
56 and Barnett, 2018, 2020).

57

58 One of the most critical issues related to IVM consumers' acceptance is its nomenclature (Friedrich
59 2016; Ong, Choudhury, and Naing, 2020) which affects marketing and communication strategies as
60 well as labeling policies for IVM and hence could be a major factor in its success (Watson, 2020).
61 Furthermore, before IVM goes to market, regulators will likely first have to decide how to term IVM
62 products (Johnson, Maynard, and Kirshenbaum, 2018), with substantial implications for both IVM
63 and conventional meat producers. For example, several farm groups and the conventional meat-
64 processing interests have affirmed their allegiance to traditional meat by loudly voicing their
65 opposition to IVM and demanding that it not be called "meat" at all.⁶ In addition, the lack of
66 regulations and standardization of IVM have generated several ambiguities in terms of its
67 nomenclature (Ong, Choudhury, and Naing, 2020).

68

69 To our knowledge, few studies have investigated consumers' preferences regarding IVM and whether
70 these are influenced by the terminology used to identify IVM products. Bryant and Barnett (2019)
71 found that the term "clean meat" led to higher acceptance than "lab-grown meat," while the terms
72 "cultured meat", and "animal-free meat" scored in the middle (Bryant and Barnett, 2020). Two other
73 non-refereed consumer studies on how nomenclature affects consumers' acceptance of IVM have
74 also been carried out. The Good Food Institute found that the terms "slaughter-free," "craft," "clean,"
75 and "cultured" held some appeal. The terms "slaughter-free" and "cell-based" performed best in terms
76 of descriptiveness and differentiation, while the terms "slaughter-free" and "craft" performed best in
77 regard to the likelihood of trying and purchasing IVM (Szejda, 2018). In addition, the Animal Charity

⁶This issue is now one of the U.S. National Cattlemen's Beef Association's top policy priorities, with the purported goal of protecting people from what they called misleading labels (USCA, 2018).

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78 Evaluators found that the term “clean” led to significantly greater consumer acceptance than
79 “cultured” (Greig, 2017). None of these studies, however, has examined consumers’ valuation of
80 IVM products using different terminology.

81

82 Our study fills this gap by using a choice experiment (CE) to investigate consumers’ willingness to
83 pay (WTP) for hypothetical IVM fresh skinless boneless chicken breast products, hereafter called
84 “chicken products”. Specifically, we performed an online experiment with consumers in the United
85 States using different treatments to test how sensitive consumers’ preferences and marginal WTP
86 (mWTP) for the chicken product attributes are to different terms associated with IVM (i.e.,
87 “cultured,” “lab-grown,” and “artificial”). Although other terms are also widely used (e.g., clean
88 meat, synthetic meat, etc.), we decided to test terms that are conceptually different from each other
89 and that have been used by several published studies, advocacy groups, and the media. We chose
90 fresh skinless boneless chicken breast products for three main reasons: (i) chicken breast is one of the
91 most consumed meats in United States (National Chicken Council, 2018b), (ii) the United States
92 chicken industry is the largest in the world (National Chicken Council, 2018a), and (iii) several large
93 companies and startup businesses (e.g., Tyson Foods, Eat Just Inc.) are investing in IVM chicken
94 (Tyson Foods, 2018; Lucas, 2019).

95

96 **1. MATERIALS AND METHODS**

97 **1.1 CE Design**

98 In the CE, four attributes were used in all treatments to describe the different types of chicken
99 products, as follows: “production method,” “Carbon Trust label,” “antibiotics use,” and “price”
100 (Table 1). First, we included “production method” because we wished to test consumers’ mWTP for
101 different chicken production methods. Thus, two levels of production method were specified
102 “conventional”, and “IVM”. We randomly assigned respondents to three treatments to test the effect
103 of different IVM terms. Thus, IVM was termed “cultured” for treatment 1 (“Cultured”); “lab-grown”
104 for treatment 2 (“Lab Grown”); and “Artificial” for treatment 3, (“Artificial”). Specifically, the term
105 “cultured” may evoke associations to science, which are not rated negatively (Bryant and Barnett,
106 2019). Moreover, it has been widely used in the IVM community, including by the NGO New Harvest
107 as well as by a number of studies (e.g., Bryant and Barnett, 2019; The Golden Food Institute, 2019),
108 and it seems to be preferred by IVM companies (Ong, Choudhury, and Naing, 2020). “Lab-grown

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109 meat” is a term often used by the media, perhaps because it intuitively describes the concept in lay
110 terms, and is, perhaps, more sensational compared to other terms (Bryant and Barnett, 2019; Smith,
111 2014). In addition, the “lab-grown meat” term may serve as shorthand to distinguish IVM from meat
112 harvested from slaughtered animals (Watson, 2020), and it seems to be preferred by traditional meat
113 producers (Ong, Choudhury, and Naing, 2020). “Artificial” is a lesser-used term typically deployed
114 by opponents of the IVM technology (Watson, 2020), and used in the media (Dahlgreen, 2013; Heid,
115 2016).

116
117 Second, we included information about the environmental impact of meat production because it is
118 currently one of the top key concerns of the conventional meat production method (Godfray et al.,
119 2018). Specifically, we used the “Carbon Trust label,” referring to the environmental impact of food
120 production, transportation and use of the food products in terms of CO2 emissions, against no label.
121 Third, we included the information about “antibiotics use” given the fact that antibiotics might be
122 used during chicken production (Chriki and Hocquette, 2020). This information is a top concern when
123 consumers are purchasing meat (Boyer, Neth, and Nunlist., 2017). Therefore, “antibiotics use” was
124 specified by the phrase “No antibiotics ever”, or no information about this was reported. Lastly, four
125 price levels were specified based partly on the current market prices for chicken products in retail
126 stores in the United States (\$2.50/lb, \$5.50/lb, \$8.50/lb, and \$11.50/lb).⁷

127

128 **Table 1**

129

130 The selected attributes and their levels were then used to generate an orthogonal, fractional factorial
131 design that resulted in the creation of 24 choice sets,⁸ which were then divided into two blocks of 12
132 choice tasks each to prevent respondents’ fatigue. We used the Ngene 1.2 software to generate our
133 choice design. Specifically, we used a sequential orthogonal design approach. In the sequential
134 method, an orthogonal design is first generated for the first alternative, and then the allocation of

⁷The prices for fresh skinless boneless chicken breast products were based on prices recorded in different U.S. stores, including grocery stores, farmers’ markets, specialty stores, organic stores, and supermarkets.

⁸The suitability of the adoption in this study of an orthogonal design approach with no prior information is given by the use of treatments differing in terms of the naming frame, that is, the production method. As we expected, the use of different naming frames might have affected consumers’ evaluation of the products’ attributes. As such, the use of an experimental design based on prior information might have more efficiently worked in the case of one treatment (i.e., the treatment where the same naming frame was specified) but not for all them (Bliemer and Collins, 2016).

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135 attributes and attribute levels is derived based on the first alternative (Choicemetrics, 2018). This type
136 of design is implemented for unlabeled designs like ours, where the utility function of each alternative
137 has the same attributes and attribute levels⁹. Each choice task was composed of two product
138 alternatives (options A and B) and an “opt-out” option (option C) (see example in Appendix A, on-
139 line). The choice tasks within each block, and the products within each choice task (options A and B)
140 were randomly ordered.

141

142 The CE was introduced to the respondents with an explanation, and description of the attributes and
143 levels. Before the choice tasks, respondents were asked to read a cheap talk (CT) script in an attempt
144 to mitigate the possible hypothetical bias that typically affects WTP estimates in stated preference
145 studies (Cummings and Taylor, 1999) (see Appendix B, on-line, for the CT script). Upon completion
146 of the 12 choice tasks, the respondents were then asked to fill out a questionnaire to collect several
147 consumers’ attitudes. A pre-test involving 50 consumers was performed to test the survey. The
148 complete questionnaire is available in Appendix C, on-line.

149

150 **1.2 Experimental Treatments and Research Hypotheses**

151 To test our research hypotheses, we implemented a between-subjects design based on the use of three
152 CE treatments. Hence, each respondent was randomly assigned to only one of the CE treatments. The
153 three treatments differed only in terms of the name given to the IVM. Specifically, in treatment 1,
154 termed “Cultured”, 210 consumers were exposed to chicken products with the IVM product being
155 termed “*cultured*.” In treatment 2, termed “Lab Grown”, 208 respondents were exposed to chicken
156 products with the IVM product being termed “*lab-grown*.” In treatment 3, termed “Artificial”, 207
157 respondents were exposed to chicken products with the IVM product being termed “*artificial*.” To
158 avoid providing information that could potentially bias consumers’ responses, we provided the same
159 definition of IVM across all the treatments (see Appendix D, on-line).

160

161 With these CE treatments, we were able to test a series of hypotheses aimed at testing whether the
162 term used for the IVM affected consumers’ mWTP for the IVM technology. To determine the effect

⁹ In the generation of the orthogonal design, interaction terms between the production method and the remaining non-price attributes were included. However, in this study we focused on the treatment effect on the attributes’ main effect; hence we did not take into account the interaction terms in our model estimation.

163 of terms on individuals' mWTP, the estimates from the three treatments were compared. Accordingly,
164 we conducted the following three tests:

165 First, we tested Treatment 1 (Cultured) vs. Treatment 2 (Lab Grown) to investigate whether the two
166 naming frames affected consumers' WTP for "cultured" vs. "lab-grown" meat. Thus, we tested the
167 following hypothesis:

168
$$H_{01}: (mWTP^{LABGROWN} - mWTP^{CULTURED}) = 0$$

169
$$H_{11}: (mWTP^{LABGROWN} - mWTP^{CULTURED}) \neq 0$$

170

171 Second, we tested Treatment 1 (Cultured) vs. Treatment 3 (Artificial) to investigate whether
172 consumers are willing to pay different price premiums for "cultured" vs. "artificial" meat. Thus, we
173 tested the following hypothesis:

174
$$H_{02}: (mWTP^{ARTIFICIAL} - mWTP^{CULTURED}) = 0$$

175
$$H_{12}: (mWTP^{ARTIFICIAL} - mWTP^{CULTURED}) \neq 0$$

176

177 Third, we tested Treatment 2 (Lab Grown) vs. Treatment 3 (Artificial) to investigate whether
178 consumers' evaluations for "lab-grown" vs. "artificial" meat differ. Thus, we tested the following
179 hypothesis:

180
$$H_{03}: (mWTP^{ARTIFICIAL} - mWTP^{LABGROWN}) = 0$$

181
$$H_{13}: (mWTP^{ARTIFICIAL} - mWTP^{LABGROWN}) \neq 0$$

182

183 Moreover, the existing literature shows that attitudinal factors may shape consumers' perceptions of
184 IVM. For this reason, we also tested hypotheses related to the effect of attitudinal variables on
185 respondents' mWTP formation for the different IVM chicken products. We particularly focused on 6
186 major factors.

- 187 (i) The effect of having heard or not heard about IVM (HEARING). Following past studies,
188 our hypothesis is that consumers who have heard about IVM have a higher mWTP for
189 IVM products in the case of "Cultured" but a lower mWTP in the case of "Lab Grown",
190 and "Artificial". This is because studies have shown that "cultured" may evoke positive
191 associations to science (Bryant and Barnett, 2019), while "lab-grown" (Bryant and
192 Barnett, 2019) and "artificial" may sound more sensational and may be negatively
193 associated with human manipulation of nature (Bryant and Barnett, 2019; Watson, 2020).

- 194 (ii) The effect of pro-animal welfare attitude (AAS). Our hypothesis is that consumers who
195 have a higher pro-animal welfare attitude have a higher mWTP for IVM since by using
196 IVM technology no animal is slaughtered, and previous consumer research found that
197 animal welfare is one of the most important perceived benefits of IVM (Bryant and
198 Barnett, 2018). We do not expect differences among the IVM terms for this effect.
- 199 (iii) The effect of the degree of neophobia toward new food technologies (FTNS). Previous
200 research has shown that a high degree of neophobia toward new food technologies may
201 reduce consumers' acceptance of foods produced using new technologies (Asioli et al.,
202 2019). However, prior consumer studies on IVM show ambiguous results (Dupont and
203 Fiebelkorn, 2020; Gómez-Luciano et al., 2019). Thus, given the previous literature, we
204 are unsure of what to expect.
- 205 (iv) The effect of pro-environmental attitude (NEP). Authors have reported that environmental
206 benefits are one of the major perceived benefits of IVM (Bryant and Barnett, 2018), while
207 others have found that consumers perceive that IVM can be harmful to the environment
208 (Gómez-Luciano et al., 2019; Specht, Rumble, and Rhoades, 2020). Thus, given the
209 previous literature, we are unsure of what expect. We do not expect differences among the
210 IVM terms for this effect.
- 211 (v) The effect of religious orientation (RELIGION). Prior research has shown that religion
212 could affect consumers' acceptance of IVM. Indeed, Marcu et al. (2014) found that
213 consumers characterize IVM as "playing God," while other authors found that, in
214 principle, religious people were open to IVM if it comes from animal species allowed in
215 their religion (Bryant, 2020). Thus, given the previous literature, we are unsure of what to
216 expect.
- 217 (vi) The effect of political preferences (POLITICS). Previous research has found that left-
218 wing/liberal consumers tend to accept IVM more than right-wing/conservative people
219 (Bryant and Barnett, 2018). Thus, we hypothesize that left-wing/liberal consumers have a
220 higher mWTP for IVM. We do not expect differences among the IVM terms for this effect.
221
- 222 Specifically, we aim first at testing within each treatment whether attitudinal factors shape mWTP
223 formation for IVM. Second, we test the above hypotheses related to naming effects across different
224 attitudinal subsamples in order to investigate how the naming of the IVM impacts the evaluations of

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225 individuals with different attitudinal characteristics.

226

227 **1.3 Data**

228 The data¹⁰ used in this study are drawn from an online survey involving 625 consumers in the United
229 States using the online platform Qualtrics LLC (Provo, USA), carried out in fall of 2017. Consumers
230 were randomly recruited by Qualtrics using sampling quotas in terms of age, gender, and income
231 based on official statistics (United States Census Bureau, 2015). Only consumers who were at least
232 18 years old were included in the study.

233

234 Given the randomization to treatments, we checked if we had achieved balance for the observable
235 characteristics across the treatments. The results are presented in Table A2, on-line and show that the
236 hypotheses of equality of means between socio-demographic characteristics across treatments failed
237 to be rejected at the 0.05 level.

238

239 **Table 2**

240

241 After the choice tasks described above, we included questions to test our hypotheses concerning
242 attitudinal factors, as described in section 2.2.

243

244 **2. ECONOMETRIC ANALYSIS**

245 To test the research hypotheses, we estimated the effect of the treatments on mWTP formation using
246 discrete choice models, which are typically used to analyze choice data (Hensher, Rose, and Green,
247 2015). Specifically, discrete choice models are based on modeling “utility” that is to say, the net
248 benefit a subject obtains from selecting a specific product in a choice situation as a function of the
249 attributes that are embedded to the product under consideration (Hensher, Rose, and Green, 2015).
250 There are different specifications of discrete choice models, from multinomial logit (MNL), which
251 assumes homogeneity in individuals’ tastes, to the mixed logit model (MIXLM), which accounts for
252 preference heterogeneity.

253

¹⁰ We obtained informed consent from all the participants in the study. Our study was approved by an institutional review board (IRB).

254 In addition, in discrete choice models, it is necessary to specify the utility function, which could be
255 in either preference space or WTP space (Train, 2009). In preference space models, mWTP values
256 are derived by dividing the coefficients of the non-price attributes by the negative of the price
257 coefficient, while in WTP space models, the attributes' coefficients enter the utility function directly
258 as mWTP. Studies have shown several advantages of WTP space models over preference space
259 models, including accounting for interpersonal scale variations (Scarpa and Willis, 2010), greater
260 stability in the WTP estimates (Balcombe, Chalak, and Fraser, 2009), and more reasonable WTP
261 distribution (Train and Weeks, 2005). Hence, we opted for the MILXLM, with the specification of
262 the utility function in the WTP space. Consistent with the Lancaster Theory (Lancaster, 1966),
263 discrete choice models assume that the total utility consumers derive from a product can be segregated
264 into the marginal utilities given by the attributes of a product. As such, the specification of the utility
265 (U) function in our study can be defined as follows:

$$266$$
$$267 \quad U_{njt} = \alpha_n(ASC - PRICE_{njt} + \theta_{n1}PRODUCT_{njt} + \theta_{n2}CARBON_{njt} + \theta_{n3}ANTIBIOTICS_{njt}) + \epsilon_{njt}, \quad (1)$$
$$268$$

269 where n refers to the individual, j denotes each of the three options available in the choice set, t is the
270 number of choice occasions, and α_n is the price scale parameter that is assumed be random and to
271 follow a log-normal distribution. The ASC is the alternative constant indicating the selection of the
272 opt-out option. The price ($PRICE_{njt}$) attribute is represented by four experimentally defined price
273 levels (i.e., \$2.50/lb, \$5.50/lb, \$8.50/lb, and \$11.50/lb). $PRODUCT_{njt}$ is a dummy variable
274 representing the production method, taking the value of 0 if the production method is “Conventional”
275 and 1 if it is “cultured” for $CULTURED_{njt}$, “lab-grown” for $LABGROWN_{njt}$, and “artificial” for
276 $ARTIFICIAL_{njt}$. $CARBON_{njt}$ is a dummy variable representing the “Carbon Trust label,” taking the
277 value of 0 if no label is reported and 1 if the Carbon Trust label is reported. $ANTIBIOTICS_{njt}$ is a
278 dummy variable for information about antibiotics use, taking the value of 0 if no information is
279 reported and 1 if the phrase “No antibiotics ever” is reported. θ_{n1} , θ_{n2} , and θ_{n3} are the coefficients of
280 the estimated mWTP values for the production method, the Carbon Trust label, and the “No
281 antibiotics ever” claim, respectively. Finally, ϵ_{njt} is an unobserved random term that is distributed
282 following an extreme value type I (Gumbel) distribution, independent and identically distributed
283 (i.i.d.) over alternatives.

284

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285 The parameters corresponding to the three non-price attributes were modeled as random parameters
286 assumed to follow a normal distribution, while the opt-out parameter was modeled as a fixed
287 parameter.

288

289 The differences in the mWTP among the three treatments involved in our hypotheses (i.e., H₀₁, H₀₂,
290 and H₀₃) can be tested by conducting pairwise tests using data from the two respective treatments
291 involved in the particular hypothesis. Then, following Bazzani et al. (2017) and De-Magistris, Gracia,
292 and Nayga (2013), we created interactions between the non-price attributes and the treatment (*dtreat*)
293 parameters, which were modeled as a fixed parameters. Precisely, the interaction effects were
294 specified as dummy variables to differentiate one treatment over another (*dtreat*). Accordingly, the
295 model can be specified as follows:

296

$$297 \quad U_{njt} = \alpha(ASC - PRICE_{njt} + \theta_{n1}PRODUCT_{njt} + \theta_{n2}CARBON_{njt} + \theta_{n3}ANTIBIOTICS_{njt} + \delta_1$$
$$298 \quad (PRODUCT_{nj} * dtreat) + \delta_2 (CARBON_{nj} * dtreat) + \delta_3 (ANTIBIOTICS_{nj} * dtreat) + \epsilon_{njt}, \quad (2)$$

299

300 where *dtreat* is coded as 1 for the first treatment in the analyzed hypothesis (i.e., “Lab Grown” for
301 H₀₁, “Artificial” for H₀₂, and “Artificial” for H₀₃), and 0 otherwise. The significance of the estimated
302 δ coefficients and their signs indicate the effect of the treatment on the mWTP for the attribute of
303 interest.

304

305 Finally, to test our hypotheses concerning consumer attitudinal factors, we conducted subsample
306 analyses based on the factors described in section 2.2 above. Again, the estimated mWTP for the
307 different subsamples as well as the differences in mWTP for the different subsamples among the three
308 treatments can be tested using the same models, (1) and (2), used for the pooled samples.

309

310 All the models were estimated using STATA 16.1 software (Stata-Corp LP, College Station, USA).

311

312 **3. RESULTS**

313 **3.1 WTP Estimates: Pooled Samples**

314 The results from the estimation of the mixed logit models using equation (1) in the WTP space for
315 the three treatments are shown in Table 3. Specifically, we report the estimates (mWTP) of the

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316 production method, Carbon Trust label, antibiotics use, price, and opt-out parameters.

317

318 In all three treatments, the mean estimate for the opt-out option is negative and significant, suggesting
319 that consumers tend to prefer one of the two product alternatives as opposed to the “opt-out” option.

320 On average, consumers prefer chicken products produced through the conventional production

321 method, branded with the “Carbon Trust label,” and labeled with the claim “No antibiotics ever.”

322 Specifically, if we look at the mWTP magnitudes for the individual attributes, we notice that the
323 production method has the highest magnitude, suggesting that it is the attribute that mostly influences

324 consumers’ mWTP. The second most important attribute that affects the mWTP is antibiotics use. On

325 average, consumers prefer chicken products with the label claiming “No antibiotics ever”, with

326 relatively similar mWTP across the treatments. The Carbon Trust label is the least valued attribute,

327 with relatively similar mWTP across the treatments. The estimated price coefficients indicate that the

328 "cultured" description is less rejected than the "lab-grown" or "artificial" with consumers are willing

329 to pay a higher price (or less lower price) for IVM on average when it is termed "cultured" rather than

330 "lab-grown" or "artificial".

331

332 **Table 3**

333

334 Next, we test the hypothesis that the different terms associated with IVM significantly affect mWTP

335 estimates using the model specified in equation (2). Specifically, we estimated three separated models

336 to test: 1) our first null hypothesis ($H_{01}: mWTP^{LABGROWN} - mWTP^{CULTURED} = 0$) using pooled data

337 from the Lab-grown and Cultured treatments; 2) our second null hypothesis ($H_{02}: mWTP^{ARTIFICIAL} -$

338 $mWTP^{CULTURED} = 0$) using pooled data from the Artificial and Cultured treatments; 3) our third null

339 hypothesis ($H_{03}: mWTP^{ARTIFICIAL} - mWTP^{LABGROWN} = 0$), using pooled data from Artificial and Lab-

340 grown treatment. Table 4 reports the estimates of the main effects and the interaction between the

341 production method, the Carbon Trust label, antibiotics use, and the interaction parameters accounting

342 for treatment effect (*dtreat*). From column 1, we observe that our first null hypothesis ($H_{01}:$

343 $mWTP^{LABGROWN} - mWTP^{CULTURED} = 0$) is rejected, since the interaction effect between the production

344 attribute and the treatment variable is statistically significant. Specifically, consumers’ mWTP is

345 significantly lower when the production method for IVM chicken products is termed “lab-grown”

346 rather than “cultured” (-\$4.82/lb). The statistically significant parameter of the “Lab Grown”

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347 treatment interaction indicates that our second null hypothesis ($H_{02}: mWTP^{ARTIFICIAL} -$
348 $mWTP^{CULTURED} = 0$) is also rejected. Specifically, the negative sign of the treatment parameter
349 indicates that consumers' mWTP is significantly lower when IVM chicken products are termed
350 "artificial" rather than "cultured" (-\$4.03/lb). Finally, we reject our third null hypothesis ($H_{03}:$
351 $mWTP^{ARTIFICIAL} - mWTP^{LABGROWN} = 0$) since the treatment parameter is statistically significant.
352 Specifically, consumers' mWTP is significantly higher when the production method for IVM chicken
353 products is termed "artificial" rather than "lab-grown" (+\$2.19/lb).

354

355 **Table 4**

356

357 **3.2 WTP Estimates: Subsample Analysis**

358 The results from the estimation of the MIXLM models using equation (1) in the WTP space for the
359 subsample analysis of the three treatments are shown in Table 5 (see also Table F1, on-line, for the
360 model fit statistics). We performed the analysis in three steps. First, for each treatment, we identified
361 subsamples based on the attitudinal factors described above (section 2.2). ~~In Table 6, we describe the~~
362 ~~subsamples we have identified with the respective acronyms~~ (see Table E2 in Appendix E, on-line,
363 for details on how the subsamples were created). ~~within each treatment, for each identified subsample,~~
364 ~~we estimated the MIXLM in the WTP space, which is specified in equation (1).~~ For each subsample,
365 we extracted the conditional individual mWTP (i.e., $mWTP_i$) to check for significant differences
366 across the subsamples within each treatment by using the non-parametric Mann Whiney U test (Mann
367 and Whitney, 1947). Specifically, Table 5 reports the estimates of the production method¹¹ and the
368 corresponding standard errors. The reported *p-values* are the results of the Mann Whiney U tests,
369 which explain the statistical differences in terms of mWTP for the IVM attribute across the attitudinal
370 subsamples.

371

372 **Table 5**

373

374 ~~**Table 6**~~

¹¹ In Table 5, we included only the production method estimates because it is the only attribute that differs across the treatments and that we are interested to test. In addition, adding all the other estimates would have created an information overload. However, the complete results are available upon request.

375

376 Some interesting findings can be identified. First, we observe that consumers who have heard and
377 who have not heard (H/NH) of the IVM term prior to the study have different mWTP depending on
378 the IVM term. Specifically, in Treatment 1 “Cultured”, consumers who have heard (H) the term
379 “cultured” have a higher mWTP than those who have not heard (NH) the term (+\$4.09/lb).
380 Interestingly, there are no significant differences in mWTP between the two subsamples in
381 Treatments 2 “Lab Grown”, and 3 “Artificial”. Second, for the subsamples identified by pro-animal
382 welfare attitude (AAS), we find that in Treatment 3 “Artificial”, consumers who have a higher pro-
383 animal welfare attitude (HAAS) have a lower mWTP (-\$4.73/lb) than those who have a lower pro-
384 animal welfare attitude (LAAS). We find no significant differences, however, in mWTP for the IVM
385 product across the two subsamples in Treatments 2 “Lab Grown”, and 3 “Artificial”. Third, as for the
386 subsamples related to the degree of neophobia toward the adoption of new food technologies (FTNS),
387 the results indicate that consumers who have a lower degree of food technology neophobia (LFTNS)
388 have a higher mWTP for cultured (+\$5.11/lb), lab-grown (+\$10.63/lb), and artificial (+\$6.11/lb) meat
389 than consumers who have a higher degree of food technology neophobia (HFTNS). Fourth, the results
390 suggest that there is no heterogeneity in results in all three treatments across those who have a higher
391 vs. a lower pro-environmental attitude (HNEP v. LNEP). Fifth, as for religiosity (REL/NREL), we
392 find that consumers who are not religious in “Cultured” and “Lab Grown” have a higher mWTP for
393 cultured (+\$1.12/lb) and lab-grown (+\$2.03/lb) meat, respectively, than those who are religious. In
394 addition, we find significant differences in terms of mWTP across the two subsamples in Treatment
395 3 “Artificial” but at the 0.10 level of significance. Finally, as for political preferences, the results
396 suggest that moderate consumers tend to have a higher mWTP for artificial meat than conservatives
397 (+\$1.46/lb) and liberals (+\$3.52/lb) and that conservatives have a higher mWTP for artificial meat
398 than liberals (+\$2.06/lb).

399

400 Finally, for each subsample, we tested the hypothesis that the different terms associated with IVM
401 significantly affect the mWTP estimates using equation (2). Specifically, Table 7 (see also Table F2
402 in the on-line appendix F for the model fit statistics) reports the estimates of the production method
403 parameters, the standard errors, and the corresponding significance (i.e., at 1%, 5%, 10% level *p*-
404 *value*) of the *t* tests for the dummy variables. The findings reveal that in all the subsamples, the term
405 “cultured” is less rejected than the terms “lab-grown”, and “artificial.” In addition, in some

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406 subsamples, such as hearing (H), religious (REL), and moderate (MOD), the term “artificial” is less
407 rejected than the term “lab-grown” at the 5% level *p-value*.

408

409 **Table 7**

410

411 **4. DISCUSSION**

412 Our goal was to investigate the sensitivity of United States consumers’ evaluations of In Vitro Meat
413 (IVM) chicken products to different descriptive names (cultured, lab-grown, or artificial). We found
414 some interesting results. First, consumers value IVM chicken products less than conventional
415 chicken, confirming the results of Van Loo et al. (2020) for beef. Second, the name given to IVM can
416 significantly affect consumers’ mWTP values. Overall, the term “cultured” gets the least negative
417 mWTP valuation compared to the terms “artificial” and “lab-grown.” This finding is corroborated by
418 Bryant and Barnett (2019), who found that the term “lab-grown” meat was evaluated more negatively
419 than the term “cultured.” We speculate that the terms “lab-grown”, and “artificial” have stronger
420 negative connotations than the term “cultured” because consumers might perceive the former terms
421 as less natural than ‘cultured’ due to perceptions related to human manipulation and intervention.
422 Third, we found that consumers who have heard of the name “cultured” meat prior to the study are
423 willing to pay more for IVM than those who have not heard the term, while we found no significant
424 differences in mWTP for the terms “lab-grown” and “artificial” in this respect. This finding
425 corroborates our conjecture, based on the study of Bryant and Barnett (2019), that the term “cultured”
426 may evoke associations to science, which are not rated negatively. Fourth, we observe ambiguous
427 findings about pro-animal welfare attitudes. Indeed, consumers who have a higher pro-animal welfare
428 attitude have a lower mWTP than those who have a lower pro-animal welfare attitude only in the case
429 of IVM termed as “artificial.” Fifth, in all the treatments, we found that consumers who have a high
430 degree of neophobia toward the adoption of new food technologies have a lower mWTP for IVM
431 than those who have lower food technology neophobia, which contrasts with Gómez-Luciano et al.
432 (2019) for IVM. Sixth, in all treatments, we found that consumers’ pro-environmental attitude does
433 not affect consumers’ mWTP for IVM, which contradicts previous consumer research pointing out
434 that environmental benefits are one of the major perceived benefits of IVM (Bryant and Barnett,
435 2018; Weinrich et al., 2020), although other studies indicate that consumers negatively perceive IVM
436 since it can be harmful to the environment (Gómez-Luciano et al., 2019; Specht, Rumble, and

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437 Rhoades, 2020). Seventh, we found that in all three treatments, consumers who are not religious have
438 a higher mWTP for IVM. This finding could be explained by the fact that some consumers
439 characterize IVM as “playing God” (Marcu et al., 2014). Eighth, as for political preferences, we found
440 ambiguous results. Indeed, political moderates tend to have a higher mWTP for artificial meat than
441 conservatives and liberals, and in turn, conservatives have a higher mWTP for artificial meat than
442 liberals. This finding is in contrast with previous research showing that liberal consumers tend to
443 accept IVM more than conservative consumers (Bryant and Barnett, 2018; Wilks et al., 2019).
444 Finally, we found that, consistent with the pooled samples, the term “cultured” is less rejected than
445 the terms “lab-grown” and “artificial” in all the subsamples, while only in some subsamples (i.e.,
446 hearing, religion, and moderate), the term “artificial” is less rejected than the term “lab-grown.”

447

448 **5. CONCLUSIONS**

449 Our results give some insights into the growing controversy over whether IVM products should be
450 labeled differently in the market. While plant-based foods that look like meat can now be bought in
451 supermarkets, it could be just a matter of time before retailers stock their shelves with IVM, as
452 illustrated by the recent approval in Singapore for the commercialization of IVM chicken (Noyes,
453 2020). This obviously worries many conventional meat producers. Verbeke et al. (2015) found that
454 consumers want regulations that would require IVM to be clearly labeled as such, while Van Loo et
455 al. (2020) found that the majority of consumers prefer that the use of the label “beef” should be
456 prohibited for IVM. If consumers value IVM significantly differently than conventional meat, this
457 indicates a need for labeling regulations to help consumers make more informed purchase decisions
458 by allowing them to identify IVM specifically. Thus, it is of crucial importance to have an established
459 regulatory framework controlled by authorities to ensure effective and standardized IVM labeling
460 that consumers can trust and use to make more informed choices (Ong, Choudhury, and Naing, 2020).
461 Our results generally imply that consumers’ valuation of IVM is quite different (i.e., lower) from that
462 of conventional meat, at least in the context of our choice experiment. This suggests that consumers
463 will likely demand the right to know whether or not the product they are buying is produced in-vitro.
464 In other words, consumers will likely demand that IVM be labeled differently from conventional
465 meat. At the same time, however, our results indicate that the term that consumers find on the package
466 of IVM on the supermarket shelves could have a strong effect on consumers’ acceptance or rejection

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467 of IVM. However, we should note that our sample size for our choice experiment is relatively small
468 for an online study performed in a large country, such as the United States.

469

470 In terms of the future of the IVM market, the significantly lower valuations given by consumers to
471 IVM compared to conventional meat could pose a non-trivial challenge for IVM producers given the
472 higher production costs currently associated with IVM (Post, 2012). Our results suggest that different
473 names for IVM could affect consumers' rejection of this food technology, and that consumers who
474 are less neophobic toward new food technologies and are not religious could be the initial consumer
475 segments to target for IVM.

476

477 While this study represents a first investigation of how consumers value IVM descriptions in terms
478 of their marginal willingness to pay, more research is needed to definitively answer questions about
479 the market potential of IVM. Moreover, given lobbying efforts from the meat industry to persuade
480 the government to enact policies that would disallow the naming of IVM as “meat,” future studies
481 should investigate how such policies would influence consumers' valuation of IVM products. Finally,
482 it would also be interesting to test the robustness of our results for other types of meat (i.e., beef, pork,
483 lamb) and in other countries given the expected increase in meat demand in many parts of the world.

484

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490

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TABLES

661 **Table 1 – Attributes and levels.**

ATTRIBUTES	LEVELS
Production method	“Conventional” “IVM” (i.e., “cultured,” “lab-grown,” and “artificial”)
Carbon Trust label	No label reported Carbon Trust label
Antibiotics use	No information reported “No antibiotics ever”
Price	\$2.50/lb \$5.50/lb \$8.50/lb \$11.50/lb

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664 **Table A2 – Socio-demographic characteristics of the sample.**

VARIABLE	CULTURED (N=210)	LAB GROWN (N=208)	ARTIFICIAL (N=207)	TOTAL (N=625)
Gender				
Male	53%	53%	54%	53%
Female	47%	47%	46%	47%
<i>Pearson chi2(2) = 0.03</i> <i>Pr = 0.99</i>				
Age				
18-35	33%	35%	34%	34%
36-53	30%	29%	28%	29%
54-71	32%	31%	31%	31%
>71	5%	6%	7%	6%
<i>Chi-squared = 0.05 with 2 d.f.</i> <i>Probability = 0.98</i>				
Household size (n° member)				
1	45 (21%)	48 (23%)	36 (17%)	129 (21%)
2	74 (35%)	60 (29%)	69 (33%)	203 (32%)
3	38 (18%)	44 (21%)	53 (26%)	135 (22%)
4	32 (15%)	34 (16%)	25 (12%)	91 (14%)
5	15 (7%)	13 (6%)	16 (8%)	44 (7%)
6	5 (2%)	7 (3%)	4 (2%)	16 (3%)
7	0 (0%)	1 (0%)	1 (0%)	2 (0%)
8	1 (0%)	1 (0%)	1 (0%)	3 (0%)
10			1 (0%)	1 (0%)
22			1 (0%)	1 (0%)
<i>Chi-squared with ties = 0.93 with 2 d.f.</i> <i>probability = 0.63</i>				
Education				
Elementary/some high school	2%	1%	1%	1%
High school diploma	21%	21%	22%	21%
Some college	17%	22%	17%	19%
Technical school diploma	3%	3%	4%	3%
Associate's degree	10%	11%	9%	10%
Bachelor's degree	31%	28%	29%	29%
Master's degree	10%	10%	13%	11%
Doctorate	5%	3%	4%	4%
Other	0%	0%	0%	0%
<i>Chi-squared = 0.89 with 2 d.f.</i> <i>Probability = 0.64</i>				
Income				
Less than \$10,000	5%	5%	5%	5%
\$10,000-\$19,999	7%	6%	9%	7%
\$20,000-\$29,999	7%	8%	6%	7%
\$30,000-\$39,999	12%	15%	11%	13%
\$40,000-\$49,999	10%	7%	9%	8%
\$50,000-\$59,999	9%	9%	10%	9%

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\$60,000-\$69,999	10%	11%	8%	10%
\$70,000-\$79,999	6%	7%	9%	7%
\$80,000-\$89,999	5%	2%	2%	3%
\$90,000-\$99,999	3%	5%	4%	4%
\$100,000-\$149,999	15%	14%	15%	15%
More than \$150,000	11%	10%	13%	11%
<i>Chi-squared = 0.44 with 2 d.f.</i> <i>Probability = 0.80</i>				
Race				
White	82%	81%	80%	81%
Hispanic	6%	5%	5%	5%
Native American	0%	1%	0%	1%
African American	5%	6%	9%	7%
Asian/pacific islander	4%	7%	3%	5%
Other	1%	1%	2%	2%
<i>Pearson chi2(10) = 7.94</i> <i>Pr = 0.64</i>				
Presence of child under 18 y				
Child	34%	40%	38%	37%
No child	66%	60%	62%	63%
<i>Pearson chi2(2) = 1.70</i> <i>Pr = 0.43</i>				
Area of growing up				
Rural area	20%	20%	25%	21%
Urbanized cluster	47%	42%	36%	42%
Urban area	34%	38%	39%	37%
<i>Pearson chi2(4) = 5.27</i> <i>Pr = 0.26</i>				
Area of living				
Rural area	19%	19%	18%	18%
Urbanized cluster	50%	39%	42%	43%
Urban area	32%	42%	41%	38%
<i>Pearson chi2(4) = 6.38</i> <i>Pr = 0.17</i>				
Employment				
Student	4%	4%	5%	4%
Independent worker	7%	5%	11%	8%
Private sector worker	33%	29%	31%	31%
Public sector worker	13%	18%	15%	15%
Retired	24%	20%	23%	23%
Unemployed seeking work	9%	6%	5%	6%
Not in paid employ not seeking work	4%	11%	6%	7%
Other	5%	8%	5%	6%
<i>Pearson chi2(14) = 21.36</i> <i>Pr = 0.09</i>				

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668 **Table 3 – Estimated mWTP from the MLXLM models for the three treatments: Cultured, Lab**
 669 **Grown, and Artificial.**

VARIABLES	Cultured (N=210)		Lab Grown (N=208)		Artificial (N=207)	
	mWTP (\$/lb) (SE)	SD	mWTP (\$/lb) (SE)	SD	mWTP (\$/lb) (SE)	SD
Production method	-2.60*** (0.41)	5.72*** (0.45)	-8.69*** (0.80)	8.67*** (0.70)	-7.49*** (0.61)	6.94*** (0.52)
Carbon Trust label	1.19*** (0.26)	3.36*** (0.27)	1.05*** (0.35)	4.24*** (0.40)	0.52* (0.32)	4.27*** (0.41)
Antibiotics use	2.19*** (0.34)	3.35*** (0.24)	2.52*** (0.51)	4.47*** (0.48)	1.57*** (0.38)	3.73*** (0.34)
Price	-0.75*** (0.08)	0.81*** (0.08)	-1.14*** (0.08)	0.92*** (0.08)	-0.85*** (0.08)	0.78*** (0.08)
Opt-out	-7.08*** (0.28)	/	-7.67*** (0.37)	/	-6.71*** (0.29)	/
Model fit statistics						
N. obs.	7,560		7,488		7,452	
Wald chi2	1385.13		776.93		928.09	
Prob > chi2	0.00		0.00		0.00	
logL	-1933.67		-2001.94		-1883.65	
df	9		9		9	
AIC	3885.34		4021.88		3785.30	
BIC	3947.72		4084.17		3847.54	

670 Note. mWTP: marginal willingness to pay.
 671 Note. SE: standard error.
 672 Note. SD: standard deviation.
 673 Note: ***, **, * significance, respectively, at 1%, 5%, 10% levels.
 674 Note. N. obs.: number of observations.
 675 Note. Wald chi2: Wald test.
 676 Note. logL: log likelihood function.
 677 Note. df: degree of freedom.
 678 Note. AIC: Akaike's information criterion.
 679 Note. BIC: Bayesian information criterion.
 680

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681 **Table 4 – WTP hypothesis tests.**

VARIABLES	COEFFICIENT	H ₀₁ : (WTP ^{LABGROWN} – WTP ^{CULTURED}) = 0	H ₀₂ : (WTP ^{ARTIFICIAL} – WTP ^{CULTURED}) = 0	H ₀₃ : (WTP ^{ARTIFICIAL} – WTP ^{LABGROWN}) = 0
Opt-out	mWTP (SE)	-7.14*** (0.23)	-6.85*** (0.20)	-6.65*** (0.27)
Production method	mWTP (SE)	-2.57*** (0.42)	-2.22*** (0.34)	-9.19*** (0.60)
	SD (SE)	6.74*** (0.42)	6.14*** (0.39)	7.30*** (0.44)
Carbon Trust label	mWTP (SE)	1.08*** (0.31)	1.53*** (0.33)	1.50*** (0.35)
	SD (SE)	3.98*** (0.28)	3.73*** (0.26)	4.05*** (0.27)
Antibiotics use	mWTP (SE)	2.19*** (0.34)	2.76*** (0.34)	2.34*** (0.33)
	SD (SE)	4.09*** (0.28)	3.60*** (0.21)	4.12*** (0.28)
Price	mWTP (SE)	-0.89*** (0.06)	-0.80*** (0.05)	-1.01*** (0.06)
	SD (SE)	0.93*** (0.06)	0.81*** (0.05)	0.92*** (0.07)
Interactions with treatments				
Production method × dtreatment	mWTP (SE)	-4.82*** (0.85)	-4.03*** (0.64)	2.19*** (0.65)
Carbon trust label × dtreatment	mWTP (SE)	-0.21 (0.44)	-1.13** (0.45)	0.31 (0.37)
Antibiotics use × dtreatment	mWTP (SE)	0.03 (0.45)	-1.46*** (0.44)	-0.51 (0.55)
Model fit statistics				
N. obs.		15,048	15,012	14,940
Wald chi2		2672.44	2335.29	1599.61
Prob > chi2		0.00	0.00	0.00
logL		-3950.52	-3824.08	-3905.23
df		12	12	12
AIC		7925.03	7672.17	7834.46
BIC		8016.46	7763.56	7925.80

682 Note. mWTP: marginal willingness to pay.
683 Note. SE: standard error.
684 Note. SD: standard deviation.
685 Note: ***, **, * significance, respectively, at 1%, 5%, 10% levels.
686 Note. N. obs.: number of observations.
687 Note. Wald chi2: Wald test.
688 Note. logL: log likelihood function.
689 Note. df: degree of freedom.
690 Note. AIC: Akaike's information criterion.
691 Note. BIC: Bayesian information criterion.
692

693 **Table 5 – Estimated mWTP from MLXLM models for IVM from the subsample analyses.**

ATTRIBUTE	Cultured (N=210) mWTP(\$/lb) (SE)			Lab Grown (N=208) mWTP(\$/lb) (SE) H vs. NH			Artificial (N=207) mWTP(\$/lb) (SE)											
	H (N=65)	NH (N=145)	p-value ¹	H (N=84)	NH (N=124)	p-value ¹	H (N=101)	NH (N=106)	p-value ¹									
Production method	0.28 (0.40)	-3.81*** (0.27)	0.00	-8.92*** (1.28)	-8.18*** (0.76)	0.20	-8.10*** (0.85)	-6.01*** (0.59)	0.81									
	LAAS vs. HAAS																	
	LAAS (N=106)	HAAS (N=104)	p-value¹	LAAS (N=90)	HAAS (N=118)	p-value¹	LAAS (N=108)	HAAS (N=99)	p-value¹									
Production method	-2.80*** (0.35)	-2.32*** (0.55)	0.39	-9.25*** (1.21)	-8.25*** (0.60)	0.89	-6.03*** (0.58)	-10.76*** (1.21)	0.00									
	LFTNS vs. HFTNS																	
	LFTNS (N=114)	HFTNS (N=96)	p-value¹	LFTNS (N=86)	HFTNS (N=122)	p-value¹	LFTNS (N=82)	HFTNS (N=125)	p-value¹									
Production method	-0.50 (0.31)	-5.61*** (0.47)	0.00	-4.26*** (0.65)	-14.89*** (1.47)	0.00	-3.30*** (0.45)	-9.41*** (1.39)	0.00									
	LNEP vs. HNEP																	
	LNEP (N=100)	HNEP (N=110)	p-value¹	LNEP (N=112)	HNEP (N=96)	p-value¹	LNEP (N=101)	HNEP (N=106)	p-value¹									
Production method	-1.18** (0.44)	-3.82 (0.39)	0.06	-9.25*** (1.31)	-8.24*** (0.96)	0.75	-6.80*** (1.12)	-6.88*** (0.95)	0.29									
	NREL vs. REL																	
	NREL (N=67)	REL (N=143)	p-value¹	NREL (N=72)	REL (N=136)	p-value¹	NREL (N=78)	REL (N=129)	p-value¹									
Production method	-1.68*** (0.26)	-2.80*** (0.41)	0.02	-8.08*** (1.15)	-10.11*** (1.04)	0.02	-7.45*** (0.69)	-7.90*** (0.73)	0.08									
	LIB vs. MOD vs. CON																	
	LIB (N=59)	MOD (N=63)	CON (N=73)	p-value¹ LIB vs. MOD	p-value¹ LIB vs. CON	p-value¹ MOD vs. CON	LIB (N=58)	MOD (N=67)	CON (N=65)	p-value¹ LIB vs. MOD	p-value¹ LIB vs. CON	p-value¹ MOD vs. CON						
Production method	-4.21*** (0.47)	-2.12*** (0.64)	-2.25*** (0.51)	0.74	0.90	0.97	-8.23*** (0.93)	-8.06*** (1.36)	-9.90*** (1.41)	0.93	0.13	0.07	-8.29*** (1.36)	-4.77*** (0.38)	-6.23*** (0.83)	0.01	0.04	0.00

694 Note. H: includes consumers who have heard the terms “cultured,” “lab-grown,” and “artificial” meat, respectively, for Cultured, Lab Grown, and Artificial, prior to the study.
 695 Note. NH: includes consumers who have not heard the terms “cultured,” “lab-grown,” and “artificial” meat, respectively, for Cultured, Lab Grown, and Artificial, prior to the study.
 696 Note. LAAS includes consumers who have a low pro-animal welfare attitude.
 697 Note. HAAS includes consumers who have a high pro-animal welfare attitude.
 698 Note. LFTNS includes consumers who have low fears toward food products produced with novel food technologies.
 699 Note. HFTNS includes consumers who have high fears toward food products produced with novel food technologies.
 700 Note. LNEP includes consumers who have a low pro-ecological worldview.
 701 Note. HNEP includes consumers who have a high pro-ecological worldview.
 702 Note. REL includes consumers who follow religion.
 703 Note. NREL includes consumers who do not follow religion.
 704 Note. LIB includes consumers who are extremely or slightly liberal.
 705 Note. MOD includes consumers who are moderate.
 706 Note. CON includes consumers who are extremely or slightly conservative.

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707 *Note*¹: *p-values* were measured using the Kruskal-Wallis test.
708 *Note.* mWTP: marginal willingness to pay.
709 *Note.* SE: standard error.
710 *Note.* For the sake of brevity, we did not report the standard deviations.

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711 **Table 6 – Subsample identification and acronyms.**

VARIABLE	SUBSAMPLE	ACRONYM
Having heard or not heard about IVM (HEARING)	Heard about IVM	H
	Not heard about IVM	NH
PRO-ANIMAL WELFARE ATTITUDE (AAS)	Consumers who have low pro-animal welfare attitude	LAAS
	Consumers who have high pro-animal welfare attitude	HAAS
FOOD TECHNOLOGY NEOPHOBIA (FTNS)	Consumers who have low fears toward food products produced with novel food technologies	LFTNS
	Consumers who have high fears toward food products produced with novel food technologies	HFTNS
PRO-ENVIRONMENTAL ATTITUDE (NEP)	Consumers who have a low pro-ecological world view	LNEP
	Consumers who have a high pro-ecological world view	HNEP
RELIGION	Consumers who follow religion	REL
	Consumers who do not follow religion	NREL
POLITICS	Consumers who are extremely or slightly liberal	LIB
	Consumers who are moderate	MOD
	Consumers who are extremely or slightly conservative	CON

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714 **Table 7 – mWTP Hypothesis tests from MLXLM models for the subsamples analysis.**

ATTRIBUTE	Cultured vs. Lab Grown		Cultured vs. Artificial		Lab Grown vs. Artificial		Cultured vs. Lab Grown		Cultured vs. Artificial		Lab Grown vs. Artificial	
	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)
	NH (N=375)						H (N=250)					
Production method	-4.72*** (0.97)	-3.95*** (0.56)	-3.95 (0.96)	-3.95 (0.96)	-7.65*** (0.89)	-6.14*** (0.97)	-6.14*** (0.97)	-6.14*** (0.97)	-6.14*** (0.97)	-6.14*** (0.97)	2.07** (0.74)	2.07** (0.74)
	LAAS (N=304)						HAAS (N=321)					
Production method	-3.26*** (0.48)	-3.13*** (0.66)	-0.27 (0.76)	-0.27 (0.76)	-5.98*** (0.79)	-6.15*** (1.14)	-6.15*** (1.14)	-6.15*** (1.14)	-6.15*** (1.14)	-6.15*** (1.14)	1.12 (1.22)	1.12 (1.22)
	LFTNS (N=282)						HFTNS (N=343)					
Production method	-2.43*** (0.68)	-4.04*** (0.64)	-0.24 (0.54)	-0.24 (0.54)	-7.77*** (1.25)	-3.26*** (0.76)	-3.26*** (0.76)	-3.26*** (0.76)	-3.26*** (0.76)	-3.26*** (0.76)	-1.55* (0.82)	-1.55* (0.82)
	LNEP (N=313)						HNEP (N=312)					
Production method	-5.01*** (0.65)	-5.30*** (0.95)	0.65 (1.50)	0.65 (1.50)	-5.38*** (0.63)	-5.85*** (0.57)	-5.85*** (0.57)	-5.85*** (0.57)	-5.85*** (0.57)	-5.85*** (0.57)	1.23* (0.65)	1.23* (0.65)
	NREL (N=217)						REL (N=408)					
Production method	-3.25*** (0.56)	-3.40*** (0.48)	-0.57 (1.22)	-0.57 (1.22)	-4.71*** (0.84)	-4.50*** (0.66)	-4.50*** (0.66)	-4.50*** (0.66)	-4.50*** (0.66)	-4.50*** (0.66)	3.68*** (0.73)	3.68*** (0.73)
	Cultured vs. Lab Grown	Cultured vs. Artificial	LabGrown vs. Artificial	Cultured vs. Lab Grown	Cultured vs. Artificial	LabGrown vs. Artificial	Cultured vs. Lab Grown	Cultured vs. Artificial	Cultured vs. Lab Grown	Cultured vs. Artificial	LabGrown vs. Artificial	LabGrown vs. Artificial
	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)	mWTP (\$/lb) (SE)
	LIB (N=175)			MOD (N=197)			CON (N=206)					
Production method	-2.77*** (0.63)	-4.73*** (0.54)	-1.45 (1.04)	-6.32*** (1.07)	-3.53*** (1.01)	1.50** (0.53)	-4.90*** (0.95)	-4.90*** (0.95)	-4.90*** (0.95)	-4.90*** (0.95)	-4.90*** (0.91)	-0.65 (1.13)

715 Note. H: includes consumers who have heard the terms “cultured,” “lab-grown,” and “artificial” meat, respectively, for
716 Cultured, Lab Grown, and Artificial, prior to the study.

717 Note. NH: includes consumers who have not heard the terms “cultured,” “lab-grown,” and “artificial” meat, respectively,
718 for Cultured, Lab Grown, and Artificial, prior to the study.

719 Note. LAAS includes consumers who have a low pro-animal welfare attitude.

720 Note. HAAS includes consumers who have a high pro-animal welfare attitude.

721 Note. LFTNS includes consumers who have low fears toward food products produced with novel food technologies.

722 Note. HFTNS includes consumers who have high fears toward food products produced with novel food technologies.

723 Note. LNEP includes consumers who have a low pro-ecological worldview.

724 Note. HNEP includes consumers who have a high pro-ecological worldview.

725 Note. REL includes consumers who follow religion.

726 Note. NREL includes consumers who do not follow religion.

727 Note. LIB includes consumers who are extremely or slightly liberal.

728 Note. MOD includes consumers who are moderate.

729 Note. CON includes consumers who are extremely or slightly conservative.

730 Note: ***, **, * significance respectively at 1%, 5%, 10% level.

731 Note. mWTP: marginal willingness to pay.

732 Note. SE: standard error.

733 Note. For the sake of brevity, we did not report the standard deviations.

734

735

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736

Are Consumers Willing to Pay for In-vitro Meat?

737

An Investigation of Naming Effects

738

Daniele Asioli, Claudia Bazzani and Rodolfo M. Nayga, Jr

739

On-Line Appendices.

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742

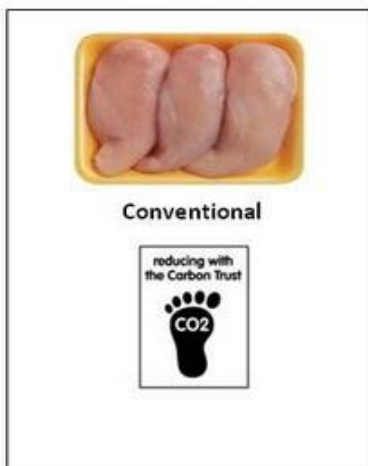
743

Appendix A

744

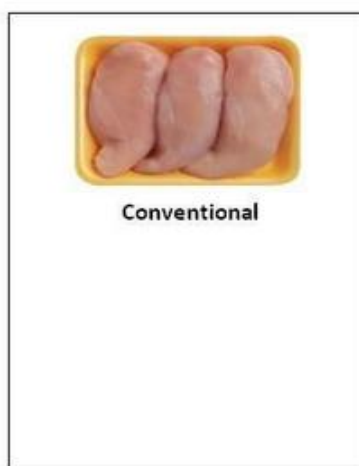
An example of a choice set.

Imagine you are in a store and you would like to purchase a package of fresh skinless boneless chicken breast product. Would you choose Option A, Option B or Option C?



\$5.5/lb

Option A



\$5.5/lb

Option B



Option C



745

746

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Appendix B

Cheap Talk (CT) script.

NOW, PLEASE TAKE TIME TO CAREFULLY READ THE FOLLOWING INSTRUCTIONS BEFORE PROCEEDING.

Imagine you are in your usual store and considering the purchase of fresh boneless skinless chicken breast. In the following, you will see 12 choice questions. Each choice question includes a description of two different fresh boneless skinless chicken breast products. All features of the products in each choice question are identical except that they vary in terms of the type of production method used, carbon trust, antibiotics use, and price. In each choice question, please indicate the fresh boneless skinless chicken breast product that you would choose to purchase. Alternatively, you may choose NOT TO PURCHASE either product. Please carefully examine each option before you make a decision, and select the decision that you would make based on your own preferences. Previous similar studies show that people often respond in one way on a survey, but act differently in real life. In studies where people do not actually have to pay money for a product when indicating a particular preference, people state a higher willingness to pay than what one actually is willing to pay for the good in the store. A possible reason for this is that people do not really consider how large the impact of this extra cost actually is on the available family budget. It is easy to be generous when you do not really have to pay for it. In the store, people might think in a different way: the amount of money spent on this good cannot be spent on other things. We ask you to respond to each of the following choice questions just exactly as you would if you were in a real store and had to pay for your choice.

Please keep this in mind when answering the following choice questions.

IMPORTANT

Choose one of the product options on each page. Or you may choose "I would not buy either option A or option B":

Assume that the options on each page are the only ones available.

Do not compare options on different pages.

You might see a few options that may seem counter-intuitive (e.g. a lower price, but a higher quality in your personal opinion). Be assured that this is not an error but part of the design of the survey.

Simply choose the option in each choice question that you prefer the most, based on its characteristics.

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Appendix C

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Questionnaire

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Consumers' preferences for chicken products

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This study is being conducted by researchers from the XXX and XXX. The purpose is to investigate consumers' preferences for chicken products. You are being asked to participate in a research project by taking an online survey. The online survey should not take more than 15 minutes of your time. You can be assured that your answers will be kept confidential to the extent allowed by law and University policy and will only be released as summaries. Your name will not be collected as part of your survey response and thus can never be associated with the data. Your responses will not be individually identified or publicized. Your answers are strictly voluntary. You are free to withdraw from the survey at any time if you want. You must be 18 or older to participate in the survey. The submitted data will be used for statistical purposes only and statistical results will be reported in research papers, conferences, technical reports and academic journals. In the future, the statistical data may be used for subsequent research in the area of consumers' preferences, as a basis for comparison to future results and as an example in teaching. There are no anticipated risks to participating in this study. Benefits include a broader understanding of consumers' preferences of chicken that can contribute to the formation of public policy. If you have questions at any time about the study or the procedures, (or you experience adverse effects as a result of participating in this study) you may contact the researcher XXX at XXX, or XXX at XXX. If you have questions about your rights as a participant, you may contact the XXX IRB Compliance Officer, at XXX. Completing the survey (questionnaire) and clicking the button to continue will be considered your consent to participate. Thank you very much for your participation!

Q1 - We care about the quality of our survey data and hope to receive the most accurate measures of your opinions, so it is important to us that you thoughtfully provide your best answer to each question in the survey.

Do you commit to providing your thoughtful and honest answers to the questions in this survey?

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- 807 • I will provide my best answers
- 808 • I will not provide my best answers
- 809 • I can't promise either way

810

811 **Q2.1** - How old are you?_____

812

813 **Q2.2** -What is your gender?

- 814 • Female
- 815 • Male

816

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817 **Q2.3** - Please indicate your approximate annual household income before taxes:

- 818 • Less than \$10,000
- 819 • \$10,000 - \$19,999
- 820 • \$20,000 - \$29,999
- 821 • \$30,000 - \$39,999
- 822 • \$40,000 - \$49,999
- 823 • \$50,000 - \$59,999
- 824 • \$60,000 - \$69,999
- 825 • \$70,000 - \$79,999
- 826 • \$80,000 - \$89,999
- 827 • \$90,000 - \$99,999
- 828 • \$100,000 - \$149,999
- 829 • More than \$150,000

830

831 On the following screens you will see a series of fresh skinless boneless chicken breast products. All
832 the products adhere to US food safety regulations and have the same characteristics except for the
833 type of production method, carbon trust, antibiotics use and price. Now, we will explain the different
834 characteristics in details:

835 1. *Production method*: refers to the method of producing the chicken. The products that you will see
836 have been produced using either of these two methods:

- 837 • *Conventional*: the product is produced by growing the chicken in poultry farms. At maturity,
838 the chickens are then transported to food processors that slaughter, process, and then package
839 them into fresh boneless skinless chicken breast products.
- 840 • (Treatment 1): *Cultured*: the product is produced by taking a number of cells from a live
841 chicken. These cells are then transported to a food industry lab where the cells will proliferate

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842 in a nutrient-rich medium until a fresh boneless skinless chicken breast product is formed and
843 then it will be packaged. No chicken is slaughtered.

844 • (Treatment 2): *Lab-grown*: the product is produced by taking a number of cells from a live
845 chicken. These cells are then transported to a food industry lab where the cells will proliferate
846 in a nutrient-rich medium until a fresh boneless skinless chicken breast product is formed and
847 then it will be packaged. No chicken is slaughtered.

848 • (Treatment 3): *Artificial*: the product is produced by taking a number of cells from a live
849 chicken. These cells are then transported to a food industry lab where the cells will proliferate
850 in a nutrient-rich medium until a fresh boneless skinless chicken breast product is formed and
851 then it will be packaged. No chicken is slaughtered.

852 2. *Carbon Trust Label*: refers to the environmental impact of food production, transportation and use
853 of the food products in terms of CO₂ emissions. On the product, you will find information
854 presented in two ways:

855 • *With Carbon Trust Label*: the Carbon Trust Label indicates that the product is produced with a
856 commitment to reduce the carbon emissions. A food product's carbon footprint is the total sum
857 of the greenhouse gas emissions (CO₂) produced throughout the product's life-cycle, including
858 production, distribution and use.

859 • *No label is reported.*

860 3. *Antibiotics*: use refers to the fact that antibiotics might be used during the chicken breast
861 production. On the product you will find information presented in two ways:

862 • With information saying "*No antibiotics ever*" meaning that no antibiotics were ever used in
863 any process of the chicken breast production.

864 • *No information is reported.*

865 4. *Price*: refers to the price in U.S. dollars per pound (\$/lb) of the fresh boneless skinless chicken
866 breast product. There will be four price levels.

867

868 NOW, PLEASE TAKE TIME TO CAREFULLY READ THE FOLLOWING INSTRUCTIONS

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869 BEFORE PROCEEDING. Imagine you are in your usual store and considering the purchase of fresh
870 boneless skinless chicken breast. In the following, you will see 12 choice questions. Each choice
871 question includes a description of two different fresh boneless skinless chicken breast products. All
872 features of the products in each choice question are identical except that they vary in terms of the type
873 of production method used, carbon trust, antibiotics use, and price. In each choice question, please
874 indicate the fresh boneless skinless chicken breast product that you would choose to purchase.
875 Alternatively, you may choose NOT TO PURCHASE either product. Please carefully examine each
876 option before you make a decision, and select the decision that you would make based on your own
877 preferences. Previous similar studies show that people often respond in one way on a survey, but act
878 differently in real life. In studies where people do not actually have to pay money for a product when
879 indicating a particular preference, people state a higher willingness to pay than what one actually is
880 willing to pay for the good in the store. A possible reason for this is that people do not really consider
881 how large the impact of this extra cost actually is on the available family budget. It is easy to be
882 generous when you do not really have to pay for it. In the store, people might think in a different way:
883 the amount of money spent on this good cannot be spent on other things. We ask you to respond to
884 each of the following choice questions just exactly as you would if you were in a real store and had
885 to pay for your choice. Please keep this in mind when answering the following choice questions.

886

887 **IMPORTANT**

888 Choose one of the product options on each page. Or you may choose "I would not buy either option
889 A or option B":

- 890 • Assume that the options on each page are the only ones available.
- 891 • Do not compare options on different pages.

892 You might see a few options that may seem counter-intuitive (e.g. a lower price, but a higher quality
893 in your personal opinion). Be assured that this is not an error but part of the design of the survey.
894 Simply choose the option in each choice question that you prefer the most, based on its characteristics.

895

896 **Treatment 1**

897

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898 **Block 1**

899

900 **Q3 - Choice set 1**

901 Imagine you are in a store and you would like to purchase a package of fresh skinless boneless
902 chicken breast product. Would you choose Option A, Option B or Option C?

- 903 • Option A
- 904 • Option B
- 905 • Option C

906 Example (NOTE: for simplicity we report only one example of choice set):



907

908

909 **Q15.1** - Now, we will ask you a few questions about the attributes that you have considered when
910 you made your choices. While responding to the choice questions, did you ignore (i.e. not consider)
911 any of the attribute/label information (i.e. production method, carbon trust label, antibiotic use,
912 price) reported on the products ?

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913 • Yes

914 • No

915

916 **Q15.2** - Which of the following attributes did you ignore (i.e. not consider)? Please, check all that
917 apply.

918 • Production process

919 • Carbon Trust Label

920 • Antibiotic use

921 • Price

922

923 This is the last part of the survey. We would like to ask you for some background information about
924 yourself, as it is a critical part of our analysis. This is an anonymous survey and your name is not
925 linked to the responses. In addition, all of this information will be treated as confidential. Results of
926 the survey will only be used in aggregate form and only for research purposes.

927

928 **Q16.1** - Are you responsible for food shopping in your household?

929 • Always

930 • Sometimes

931 • Never

932

933 **Q16.2** - Which of the following most closely resembles the diet that you regularly adopt?

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- 934 • Full time meat eater (eating red meat, fish and chicken).
- 935 • Flexitarian (reducing meat intake, but eating meat now and then).
- 936 • Pollotarian (eating no red meat, but eat fish, chicken and other poultry).
- 937 • Pescotarian (eating no red meat or chicken, but eat fish and shellfish).
- 938 • Macrobiotic consumer (eating unprocessed, organic, and locally grown foods, with a great
939 overlap with foods consumed in a vegetarian diet, yet also including certain kinds of meat).
- 940 • Lacto-ovo vegetarian (eating no meat or fish, but eating eggs and dairy produce).
- 941 • Lacto-vegetarian (eating no meat, fish or eggs, but eating dairy produce).
- 942 • Ovo-vegetarian (eating no meat, fish or dairy produce, but eating eggs).
- 943 • Vegan (eating no meat and using no products of animal origin).

944

945 **Q17.1** - Do you buy meat products?

- 946 • Yes
- 947 • No

948

949 **Q17.2** - Which kinds of meat products do you buy at the store? Please, check all the apply.

- 950 • Beef
- 951 • Pork
- 952 • Chicken/poultry
- 953 • Lamb
- 954 • Others, please specify: _____

955

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956 **Q17.3** - Please indicate your purchase frequency of chicken/poultry products:

- 957 • Less than once a month
- 958 • Once a month
- 959 • 2-3 times a month
- 960 • Once a week
- 961 • Several times a week
- 962 • Everyday

963

964 **Q17.4** - Where do you usually buy chicken/poultry products? Please check all that apply.

- 965 • Supermarket
- 966 • Farmers' market
- 967 • Corner/convenience shop
- 968 • Online grocery store
- 969 • Butcher
- 970 • Others, please specify: _____

971

972 **Q17.5** – How important are the following criteria when buying chicken/poultry products at a

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973 supermarket?

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	1- Not at all important	2	3	4	5	6	7- Extremely important
Appearance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fat content	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shelf life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Price	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Country of origin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brand name	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Production method (i.e. organic, free range)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information on antibiotic use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Information on environmental impact	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information on hormones and/or steroids use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information on artificial ingredients and/or artificial additives and/or artificial preservatives use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health claims	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Package size	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Type of packaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Color	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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974

975 **Treatment 1**

976

977 **Q18.1** - Have you ever heard of the term "cultured" meat before?

978 • Yes

979 • No

980

981 **Q18.2** - From 1 (Very low knowledge) to 7 (Very high knowledge), how much do you know about
982 "cultured" meat prior to participating in this survey?

983 • 1 - Very low knowledge

984 • 2

985 • 3

986 • 4

987 • 5

988 • 6

989 • 7 - Very high knowledge

990

991 **Q18.3** - From 1 (I will definitely not buy) to 7 (I will definitely buy), how much you feel like

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992 buying "cultured" meat in the future?

993 • 1 - I will definitely not buy

994 • 2

995 • 3

996 • 4

997 • 5

998 • 6

999 • 7 - I will definitely buy

1000

1001 **Treatment 2**

1002

1003 **Q18.1** - Have you ever heard of the term "lab-grown" meat before?

1004 • Yes

1005 • No

1006

1007 **Q18.2** - From 1 (Very low knowledge) to 7 (Very high knowledge), how much do you know about

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1008 “lab-grown” meat prior to participating in this survey?

1009 • 1 - Very low knowledge

1010 • 2

1011 • 3

1012 • 4

1013 • 5

1014 • 6

1015 • 7 - Very high knowledge

1016

1017 **Q18.3** - From 1 (I will definitely not buy) to 7 (I will definitely buy), how much you feel like
1018 buying "lab-grown" meat in the future?

1019 • 1 - I will definitely not buy

1020 • 2

1021 • 3

1022 • 4

1023 • 5

1024 • 6

1025 • 7 - I will definitely buy

1026

1027 **Treatment 3**

1028

1029 **Q18.1** - Have you ever heard of the term "artificial" meat before?

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1030 • Yes

1031 • No

1032

1033 **Q18.2** - From 1 (Very low knowledge) to 7 (Very high knowledge), how much do you know about
1034 "artificial" meat prior to participating in this survey?

1035 • 1 - Very low knowledge

1036 • 2

1037 • 3

1038 • 4

1039 • 5

1040 • 6

1041 • 7 - Very high knowledge

1042

1043 **Q18.3** - From 1 (I will definitely not buy) to 7 (I will definitely buy), how much you feel like
1044 buying "artificial" meat in the future?

1045 • 1 - I will definitely not buy

1046 • 2

1047 • 3

1048 • 4

1049 • 5

1050 • 6

1051 • 7 - I will definitely buy

1052

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1053 **Treatment 1**

1054

1055 **Q19** - From 1 (Not important at all) to 7 (Very important), what do you think about the use of the
1056 label “No antibiotics ever” in cultured chicken products? How important is this information to you
1057 when choosing a poultry or meat product?

1058 • 1 - Not important at all

1059 • 2

1060 • 3

1061 • 4

1062 • 5

1063 • 6

1064 7 - Very important

1065

1066 **Treatment 2**

1067

1068 **Q19** - From 1 (Not important at all) to 7 (Very important), what do you think about the use of the
1069 label “No antibiotics ever” in lab-grown chicken products? How important is this information to you
1070 when choosing a poultry or meat product?

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1071 • 1 - Not important at all

1072 • 2

1073 • 3

1074 • 4

1075 • 5

1076 • 6

1077 • 7 - Very important

1078

1079 **Treatment 3**

1080

1081 **Q19** - From 1 (Not important at all) to 7 (Very important), what do you think about the use of the
1082 label “No antibiotics ever” in artificial chicken products? How important is this information to you
1083 when choosing a poultry or meat product?

1084 • 1 - Not important at all

1085 • 2

1086 • 3

1087 • 4

1088 • 5

1089 • 6

1090 • 7 - Very important

1091

1092

1093 **Q20** - The following statements deal with attitudes related to new food technologies. Please give us

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1094 your opinion on the following statements:

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	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
New food technologies are something I am uncertain about.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
New foods are not healthier than traditional foods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The benefits of new food technologies are often grossly overstated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are plenty of tasty foods around so we do not need to use new food technologies to produce more.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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New food technologies decreases the natural quality of food.

New food technologies are unlikely to have long term negative health effects.

New food technologies gives people more control over their food choices.

New products produced using new food technologies can help people have a balanced diet.

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<p>New food technologies may have long term negative environmental effects.</p>	○	○	○	○	○	○	○
<p>It can be risky to switch to new food technologies too quickly.</p>	○	○	○	○	○	○	○
<p>Society should not depend heavily on technologies to solve its food problems.</p>	○	○	○	○	○	○	○
<p>There is no sense trying out high-tech food products because the ones I eat are already good enough.</p>	○	○	○	○	○	○	○

Please cite as: Asioli, D., Bazzani, C. & Nayga, R.M. Jr (2021) Are consumers willing to pay for in-vitro meat? An investigation of naming effects. Journal of Agricultural Economics, 00, 1–20. Available from: <https://doi.org/10.1111/1477-9552.12467>

The media usually provides a balanced and unbiased view of new food technologies.

1095

1096 **Q21** - The following statements deal with attitudes related to animal protection. Please give us your
1097 opinion on the following statements:

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	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
It is morally wrong to hunt wild animals just for sport.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not think that there is anything wrong with using animals in medical research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think it is perfectly acceptable for cattle and hogs to be raised for human consumption.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please cite as: Asioli, D., Bazzani, C. & Nayga, R.M. Jr (2021) Are consumers willing to pay for in-vitro meat? An investigation of naming effects. Journal of Agricultural Economics, 00, 1–20. Available from: <https://doi.org/10.1111/1477-9552.12467>

The slaughter of whales and dolphins should be immediately stopped even if it means some people will be put out of work.

I sometimes get upset when I see wild animals in cages at zoos.

1098 **Q22** - The following statements deal with your environmental attitudes. Please state rate each

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1099 statement using this scale:

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	Strongly agree	Mildly agree	Unsure	Mildly disagree	Strongly disagree
We are approaching the limit of the number of people the Earth can support.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans have the right to modify the natural environment to suit their needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When humans interfere with nature it often produces disastrous consequences.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Human ingenuity will insure that we do not make the Earth unlivable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Humans are seriously abusing the environment.

The Earth has plenty of natural resources if we just learn how to develop them.

Plants and animals have as much right as humans to exist.

The balance of nature is strong enough to cope with the impacts of modern industrial nations.

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Despite our special abilities, humans are still subject to the laws of nature.

○ ○ ○ ○ ○

The so-called “ecological crisis” facing humankind has been greatly exaggerated.

○ ○ ○ ○ ○

The Earth is like a spaceship with very limited room and resources.

○ ○ ○ ○ ○

Humans were meant to rule over the rest of nature.

○ ○ ○ ○ ○

The balance of nature is very delicate and easily upset.

○ ○ ○ ○ ○

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Humans will eventually learn enough about how nature works to be able to control it.

If things continue on their present course, we will soon experience a major ecological catastrophe.

1100

1101 **Q23** - When it comes to politics, do you usually think of yourself as...

- 1102 • Extremely liberal
- 1103 • Slightly liberal
- 1104 • Moderate or middle of the road
- 1105 • Slightly conservative
- 1106 • Extremely conservative
- 1107 • I do not know

1108

1109 **Q24.1**- Do you follow any religion?

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1110 • Yes

1111 • No

1112

1113 **Q24.2** - How important is religion in your life?

1114 • Not at all important

1115 • Slightly important

1116 • Moderately important

1117 • Very important

1118 • Extremely important

1119

1120 **Q24.3** - Are you regularly attending a place of worship or religious service?

1121 • Never

1122 • Sometimes

1123 • About half the time

1124 • Most of the time

1125 • Always

1126

1127 **Q25.1** - What is your educational background? Please, mark the box next to the highest level of
1128 education you have completed.

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- 1129 • Elementary/Some High School
- 1130 • High School Diploma
- 1131 • Some college
- 1132 • Technical School Diploma
- 1133 • Associate's Degree
- 1134 • Bachelor's Degree
- 1135 • Master's Degree
- 1136 • Doctorate
- 1137 • Other, please specify: _____

1138

1139 **Q25.2** - What is your race?

- 1140 • White
- 1141 • Hispanic
- 1142 • Native American
- 1143 • African American
- 1144 • Asian/Pacific Islander
- 1145 • Other, please specify: _____

1146

1147 **Q25.3** - How many individuals live in your household where you currently reside, including

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1148 yourself?____

1149

1150 **Q25.4** - Are children under the age of 18 present in the household?

1151 • Yes

1152 • No

1153

1154 **Q25.5** - Did you grow up in a rural area (less than 2,500 people) or in an urbanized cluster (between
1155 2,500 and 50,000 people) or in an urbanized area (more than 50,000 people)?

1156 • Rural (less than 2,500 people)

1157 • Urbanized cluster (between 2,500 - 50,000 people)

1158 • Urban area (more than 50,000 people)

1159

1160 **Q25.6** - Do you live today in a rural area (less than 2,500 people) or in an urbanized cluster (between
1161 2,500 and 50,000 people) or in an urbanized area (more than 50,000 people)?

1162 • Rural (less than 2,500 people)

1163 • Urbanized cluster (between 2,500 - 50,000 people)

1164 • Urban area (more than 50,000 people)

1165

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1166 **Q25.7** - What is your employment situation?

- 1167 • Student
- 1168 • Independent worker (e.g. consultant)
- 1169 • Private-sector worker
- 1170 • Public-sector worker
- 1171 • Retired
- 1172 • Unemployed (seeking work)
- 1173 • Not in paid employment (not seeking work, e.g. houseman, housewife)
- 1174 • Other, please specify: _____

1175

1176 **Q26** - Thank you! If you have any comments regarding this survey, please enter them in the box.

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1188

Appendix D

1189

1190

Definition of IVM.

1191

“in cultured/lab-grown/artificial the product is produced by taking a number of cells from a live chicken. These cells are then transported to a food industry lab where the cells will proliferate in a nutrient-rich medium until a fresh boneless skinless chicken breast product is formed and then it will be packaged. No chicken is slaughtered”. Adapted from Edelman et al. (2005), Post (2012), Roberts et al., (2015), and Yuan, (2018).

1196

1197

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1198

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1207

Appendix E

1208

1209

Table E1 - Consumer attitudes: descriptive statistics.

ATTITUDES	CULTURED (N=210)	LAB GROWN (N=208)	ARTIFICIAL (N=207)	POOLED (N=625)
Hearing				
Frequency				
No	145 (69.05%)	124 (40.38%)	106 (51.21%)	375 (60.00%)
Yes	65 (30.95%)	84 (59.62%)	101 (48.79%)	250 (40.00%)
Pro-animal attitude (AAS)				
Mean	3.32	3.35	3.26	3.31
Standard deviation	0.66	0.69	0.70	0.68
Median	3.20	3.40	3.20	3.40
Min	1.60	1.00	1.60	1.00
Max	5.00	5.00	4.80	5.00
Degree of neophobia towards new food technology (FTNS)				
Mean	4.33	4.55	4.55	4.48
Standard deviation	0.86	0.74	0.83	0.81
Median	4.23	4.54	4.46	4.38
Min	2.00	2.77	2.07	2.00
Max	6.67	6.62	7.00	7.00
Pro-environmental attitude (NEP)				
Mean	3.47	3.36	3.45	3.43
Standard deviation	0.60	0.56	0.61	0.59
Median	3.33	3.20	3.33	3.27
Min	1.87	1.80	1.93	1.8
Max	5.00	4.93	5.00	5.00
Religion				
Frequency				
No	67 (31.90%)	72 (34.62%)	78 (37.68%)	217 (34.72%)
Yes	143 (68.10%)	136 (65.38%)	129 (62.32%)	408 (65.28%)
Politics				
Liberal (LIB)	59 (28.10%)	58 (27.88%)	58 (28.02%)	175 (28.00%)
Moderate (MOD)	63 (30.00%)	67 (32.21%)	67 (32.37%)	197 (31.52%)
Conservative (CON)	73 (34.76%)	68 (32.69%)	65 (31.40%)	206 (32.96%)

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I do not know	15 (7.14%)	15 (7.21%)	17 (8.21%)	47 (7.52%)
---------------	------------	------------	------------	------------

1210

1211

1212 **Table E2 - Description of the consumers’ attitudes used for the sub-samples analysis: variable**
 1213 **used, question asked and subsample description.**

VARIABLE	QUESTION	SUBSAMPLE
HEARING	<p>CULTURED: <i>“Have you ever heard of the term ‘cultured’ meat before?”</i></p> <p>LAB GROWN: <i>“Have you ever heard of the term ‘lab-grow’ meat before?”</i></p> <p>ARTIFICIAL: <i>“Have you ever heard of the term ‘artificial’ meat before?”</i></p>	<p>H</p> <p>(H includes consumers who have heard the names “cultured”, “lab-grown” and “artificial” meat respectively for “cultured”, “lab-grown” and “artificial”, prior to the study).</p> <p>NH</p> <p>(NH includes consumers who have not heard the names “cultured”, “lab-grown” and “artificial” meat respectively for “cultured”, “lab-grown” and “artificial”, prior to the study).</p>
PRO-ANIMAL WELFARE ATTITUDE (AAS)	<p>Animal Attitude Scale (AAS) (Herzog, Grayson, and McCord 2015) is composed by 5-items (5–point Likert scale “agree”-“disagree”): (i) <i>It is morally wrong to hunt wild animals just for sport.</i> (ii) <i>I do not think that there is anything wrong with using animals in medical research.</i> (iii) <i>I think it is perfectly acceptable for cattle and hogs to be raised for human consumption.</i> (iv) <i>The slaughter of whales and dolphins should be immediately stopped even if it means some people will be put out of work.</i> (v) <i>I sometimes get upset when I see wild animals in cages at zoos.</i></p>	<p>LAAS</p> <p>(LAAS includes consumers who have low pro-animal welfare attitude). We included consumers who had AAS lower or equal to the median (3.40).</p> <p>HAAS</p> <p>(HAAS includes consumers who have high pro-animal welfare attitude). We included consumers who had AAS higher to the median (3.40).</p>
FOOD TECHNOLOGY NEOPHOBIA	<p>Food Technology Neophobia Scale (FTNS) (Cox and Evans 2008) is composed by 13-items (7–point Likert scale “agree”-“disagree”): (i) <i>New food</i></p>	<p>LFTNS</p> <p>(LFTNS includes consumers who have low fears towards food products</p>

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<p>(FTNS)</p>	<p><i>technologies are something I am uncertain about.</i> (ii) <i>New foods are not healthier than traditional foods.</i> (iii) <i>The benefits of new food technologies are often grossly overstated.</i> (iv) <i>There are plenty of tasty foods around so we do not need to use new food technologies to produce more.</i> (v) <i>New food technologies decreases the natural quality of food.</i> (vi) <i>New food technologies are unlikely to have long term negative health effects.</i> (vii) <i>New food technologies gives people more control over their food choices.</i> (viii) <i>New products produced using new food technologies can help people have a balanced diet.</i> (ix) <i>New food technologies may have long term negative environmental effects.</i> (x) <i>It can be risky to switch to new food technologies too quickly.</i> (xi) <i>Society should not depend heavily on technologies to solve its food problems.</i> (xii) <i>There is no sense trying out high-tech food products because the ones I eat are already good enough.</i> (xiii) <i>The media usually provides a balanced and unbiased view of new food technologies.</i></p>	<p>produced with novel food technologies). We included consumers who had FTNS lower or equal to the median (4.38).</p> <p style="text-align: center;">HFTNS</p> <p>(HFTNS includes consumers who have high fears towards food products produced with novel food technologies). We included consumers who had FTNS higher to the median (4.38).</p>
<p>PRO-ENVIRONMENTAL ATTITUDE (NEP)</p>	<p>New Environmental Paradigm (NEP) (Dunlap et al. 2000) is composed by 15-items (5–point Likert scale “agree”-“disagree”): (i) <i>We are approaching the limit of the number of people the Earth can support.</i> (ii) <i>Humans have the right to modify the natural environment to suit their needs.</i> (iii) <i>When humans interfere with nature it often produces disastrous consequences.</i> (iv) <i>Human ingenuity will insure that we do not make the Earth unlivable.</i> (v) <i>Humans are seriously abusing the environment.</i> (vi) <i>The Earth has plenty of natural resources if we just learn how to develop them.</i> (vii) <i>Plants and animals have as much right as humans to exist.</i> (viii) <i>The balance of nature is strong enough to cope with the impacts of modern industrial nations.</i></p>	<p style="text-align: center;">LNEP</p> <p>(LNEP includes consumers who have a low pro-ecological world view). We included consumers who had NEP lower or equal to the median (3.27).</p> <p style="text-align: center;">HNEP</p> <p>(HNEP includes consumers who have a high pro-ecological world view). We included consumers who had NEP higher to the median (3.27).</p>

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	(ix) <i>Despite our special abilities, humans are still subject to the laws of nature.</i> (x) <i>The so-called “ecological crisis” facing humankind has been greatly exaggerated.</i> (xi) <i>The Earth is like a spaceship with very limited room and resources.</i> (xii) <i>Humans were meant to rule over the rest of nature</i> (xiii) <i>The balance of nature is very delicate and easily upset.</i> (xiv) <i>Humans will eventually learn enough about how nature works to be able to control it.</i> (xv) <i>If things continue on their present course, we will soon experience a major ecological catastrophe.</i>	
RELIGION	“Do you follow any religion?”	REL (REL includes consumers who follow religion). NREL (NREL includes consumers who do not follow religion).
POLITICS	<p>“When it comes to politics, do you usually think of yourself as...”</p> <ul style="list-style-type: none"> • <i>Extremely liberal</i> • <i>Slightly liberal</i> • <i>Moderate or middle of the road</i> • <i>Slightly conservative</i> • <i>Extremely conservative</i> • <i>I do not know</i> 	LIB (LIB includes consumers who are extremely and slightly liberal). MOD (MOD includes consumers who are moderate). CON (CON includes consumers who are extremely and slightly conservative).

1214

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APPENDIX F

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1227 **Table F1 - Estimated mWTP from MLXLM models for IVM from the subsample analyses:**
1228 **model fit statistics.**

Statistics	CULTURED (N=210)		LAB GROWN (N=208)		ARTIFICIAL (N=207)	
	H vs. NH					
	H (N=65)	NH (N=145)	H (N=84)	NH (N=124)	H (N=101)	NH (N=106)
N.obs.	2,340	5,220	3,024	4,464	3,636	3,816
Wald chi2	653.87	4123.00	609.51	2734.05	774.59	2147.26
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00
logL	-622.94	-1279.34	-849.51	-1114.57	-986.36	-864.35
df	9	9	9	9	9	9
AIC	1263.88	2576.68	1717.01	2247.13	1990.73	1746.71
BIC	1315.71	2635.72	1771.14	2304.77	2046.52	1802.93
Statistics	LAAS vs. HAAS					
	LAAS (N=106)	HAAS (N=104)	LAAS (N=90)	HAAS (N=118)	LAAS (N=108)	HAAS (N=99)
	N.obs.	3,816	3,744	3,240	4,248	3,888
Wald chi2	967.52	639.98	462.39	2093.57	1682.71	579.36
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00
logL	-921.29	-995.27	-843.39	-1140.91	-989.85	-878.86
df	9	9	9	9	9	9
AIC	1860.59	2008.54	1704.79	2299.81	1997.71	1775.72
BIC	1916.81	2064.60	1759.54	2357.00	2054.10	1881.33
Statistics	LFTNS vs. HFTNS					
	LFTNS (N=114)	HFTNS (N=96)	LFTNS (N=86)	HFTNS (N=122)	LFTNS (N=82)	HFTNS (N=125)
	N.obs.	4,104	3,456	3,096	4,392	2,952
Wald chi2	1232.88	3499.30	929.76	456.90	591.14	777.74
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00
logL	-1007.54	-904.41	-828.44	-1142.10	-773.08	-1082.80
df	9	9	9	9	9	9
AIC	2033.08	1826.81	1674.88	2302.19	1564.16	2183.61
BIC	2089.96	1882.14	1729.22	2359.68	1618.07	2241.31
Statistics	LNEP vs. HNEP					
	LNEP (N=100)	HNEP (N=110)	LNEP (N=112)	HNEP (N=96)	LNEP (N=101)	HNEP (N=106)
	N.obs.	3,600	3,960	4,032	3,456	3,636
Wald chi2	1155.34	1955.73	218.65	1075.56	390.53	819.58
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00
logL	-956.06	-938.04	-1148.48	-833.12	-998.29	-855.92
df	9	9	9	9	9	9
AIC	1930.13	1894.08	2314.97	1684.25	2014.59	1729.85
BIC	1985.82	1950.64	2371.68	1739.58	2070.37	1786.07
Statistics	NREL vs. REL					
	NREL (N=67)	REL (N=143)	NREL (N=72)	REL (N=136)	NREL (N=78)	REL (N=129)
	N.obs.	2,412	5,148	2,592	4,896	2,808

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Wald chi2	3924.73	1003.13	504.49	849.81	536.57	820.34			
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00			
logL	-626.48	-1292.88	-673.42	-1327.02	-703.82	-1162.17			
df	9	9	9	9	9	9			
AIC	1270.96	2603.76	1364.85	2672.05	1425.64	2342.33			
BIC	1323.06	2662.68	1417.59	2730.51	1479.10	2400.32			
Statistics	LIB vs. MOD vs. CON								
	CULTURED (N=210)			LABGROWN (N=208)			ARTIFICIAL (N=207)		
	LIB (N=59)	MOD (N=63)	CON (N=73)	LIB (N=58)	MOD (N=67)	CON (N=68)	LIB (N=58)	MOD (N=67)	CON (N=65)
N.obs.	2,124	2,268	2,628	2,088	2,412	2,448	2,088	2,412	2,340
Wald chi2	1906.60	529.74	718.68	1547.29	264.64	777.30	551.29	1465.43	681.60
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
logL	-526.71	-570.98	-646.07	-579.91	-612.55	-632.20	-551.02	-616.02	-537.64
Df	9	9	9	9	9	9	9	9	9
AIC	1071.41	1159.96	1310.14	1177.82	1243.10	1282.39	1120.03	1250.05	1093.27
BIC	1122.36	1211.50	1363.00	1228.61	1295.19	1334.62	1170.83	1302.14	1145.09

Note. H: includes consumers who have heard the terms “cultured,” “lab-grown,” and “artificial” meat, respectively, for Cultured, Lab-grown, and Artificial, prior to the study.

Note. NH: includes consumers who have not heard the terms “cultured,” “lab-grown,” and “artificial” meat, respectively, for Cultured, Lab-grown, and Artificial, prior to the study.

Note. LAAS includes consumers who have a low pro-animal welfare attitude.

Note. HAAS includes consumers who have a high pro-animal welfare attitude.

Note. LFTNS includes consumers who have low fears toward food products produced with novel food technologies.

Note. HFTNS includes consumers who have high fears toward food products produced with novel food technologies.

Note. LNEP includes consumers who have a low pro-ecological worldview.

Note. HNEP includes consumers who have a high pro-ecological worldview.

Note. REL includes consumers who follow religion.

Note. NREL includes consumers who do not follow religion.

Note. LIB includes consumers who are extremely or slightly liberal.

Note. MOD includes consumers who are moderate.

Note. CON includes consumers who are extremely or slightly conservative.

Note. N. obs: number of observations.

Note. Wald chi2: Wald test.

Note. logL: log likelihood function.

Note. df: degree of freedom.

Note. AIC: Akaike's information criterion.

Note. BIC: Bayesian information criterion.

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1251 **Table F2 – mWTP Hypothesis tests from MLXLM models for the subsamples analysis: model**
 1252 **fit statistics.**

Statistics	CULTURED vs. LAB GROWN		CULTURED vs. ARTIFICIAL		LAB GROWN vs. ARTIFICIAL		CULTURED vs. LAB GROWN		CULTURED vs. ARTIFICIAL		LAB GROWN vs. ARTIFICIAL	
	NH						H					
N. obs.	9,684	9,036	8,280	5,365	5,976	6,660						
Wald chi2	1762.49	2367.41	4758.45	2299.06	1120.77	1459.55						
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00						
logL	-2412.90	-2156.67	-1996.54	-1483.32	-1607.48	-1843.41						
df	12	12	12	12	12	12						
AIC	4849.80	4337.34	4017.07	2990.63	3238.96	3710.81						
BIC	4935.94	4422.65	4101.33	3069.68	3319.30	3792.46						
Statistics	LAAS						HAAS					
N. obs.	7,056	7,704	7,128	7,992	7,308	7,812						
Wald chi2	3315.05	2214.60	1503.67	947.30	1208.50	1047.58						
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00						
logL	-1782.32	-1923.44	-1850.16	-2143.35	-1877.22	-2029.00						
df	12	12	12	12	12	12						
AIC	3588.65	3870.88	3724.33	4310.70	3778.44	4082.00						
BIC	3670.99	3954.28	3806.79	4394.53	3861.20	4165.56						
Statistics	LFTNS						HFTNS					
N. obs.	7,200	7,056	6,048	7,848	7,956	8,892						
Wald chi2	1005.18	1584.75	1659.82	1191.29	1417.48	1152.98						
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00						
logL	-1848.53	-1791.28	-1605.45	-2057.43	-1997.31	-2239.52						
df	12	12	12	12	12	12						
AIC	3721.06	3606.56	3234.91	4138.85	4018.61	4503.03						
BIC	3803.64	3688.90	3315.40	4222.47	4102.40	4588.15						
Statistics	LNEP						HNEP					
N. obs.	7,632	7,236	7,668	7,416	7,776	7,272						
Wald chi2	2183.93	1559.63	1039.47	1185.99	2315.06	1282.25						
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00						
logL	-2109.67	-1967.61	-2158.52	-1788.74	-1802.66	-1696.73						
df	12	12	12	12	12	12						
AIC	4243.35	3959.21	4341.05	3601.48	3629.32	3417.47						
BIC	4326.63	4041.85	4424.39	3684.42	3712.83	3500.17						
Statistics	NREL						REL					
N. obs.	5,004	5,220	5,400	10,044	9,792	9,540						
Wald chi2	1378.51	1740.27	891.64	1483.90	2125.49	1189.22						
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00						
logL	-1298.40	-1337.04	-1386.91	-2639.86	-2461.50	-2490.88						
df	12	12	12	12	12	12						
AIC	2620.80	2698.08	2797.83	5303.73	4947.01	5005.76						
BIC	2699.02	2776.81	2876.96	5390.30	5033.28	5091.72						
Statistics	CULTURED vs. LAB GROWN	CULTURED vs. ARTIFICIAL	LAB GROWN vs. ARTIFICIAL	CULTURED vs. LABGROWN	CULTURED vs. ARTIFICIAL	LAB GROWN vs. ARTIFICIAL	CULTURED vs. LABGROWN	CULTURED vs. ARTIFICIAL	LAB GROWN vs. ARTIFICIAL			
	LIB			MOD			CON					
N. obs.	4,212	4,212	4,176	4,680	4,680	4,824	5,076	4,968	4,788			
Wald chi2	1685.00	1729.29	949.80	755.10	744.38	1898.59	1561.08	1461.77	853.09			
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
logL	-1122.27	-1067.78	-1137.96	-1188.87	-1206.33	-1231.74	-1289.47	-1190.65	-1174.59			
df	12	12	12	12	12	12	12	12	12			
AIC	2268.55	2159.56	2299.92	2401.74	2436.66	2487.47	2602.93	2405.30	2373.19			
BIC	2344.69	2235.71	2375.97	2479.16	2514.07	2565.25	2681.32	2483.43	2450.87			

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1254 Cultured, Lab-grown and Artificial, prior to the study.
1255 *Note.* NH: includes consumers who have not heard the terms “cultured,” “lab-grown,” and “artificial” meat, respectively,
1256 for Cultured, Lab-grown and Artificial, prior to the study.
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1261 *Note.* LNEP includes consumers who have a low pro-ecological worldview.
1262 *Note.* HNEP includes consumers who have a high pro-ecological worldview.
1263 *Note.* REL includes consumers who follow religion.
1264 *Note.* NREL includes consumers who do not follow religion.
1265 *Note.* LIB includes consumers who are extremely or slightly liberal.
1266 *Note.* MOD includes consumers who are moderate.
1267 *Note.* CON includes consumers who are extremely or slightly conservative.
1268 *Note.* N. obs: number of observations.
1269 *Note.* Wald chi2: Wald test.
1270 *Note.* logL: log likelihood function.
1271 *Note.* df: degree of freedom.
1272 *Note.* AIC: Akaike's information criterion.
1273 *Note.* BIC: Bayesian information criterion.
1274