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Addressing behavior and policy around meat: Associating factory farming with animal cruelty "works" better than zoonotic disease

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Abstract

Research on shifting attitudes or behaviours surrounding the use of animal products traditionally focuses on animal cruelty. How this approach may differ from exposure on the zoonotic disease transmission risk factory farms pose, is unclear. The present study sought to examine how information regarding zoonotic disease may stimulate concern for animals/ concern for human health, respectively, and thus predict lower willingness to consume meat, when compared to animal cruelty and a control condition. The extent to which such information could shift support for changing conditions on factory farms was also examined. In a preregistered experiment ($N =$ 454), participants were exposed to an informative paragraph on either a) zoonotic disease transmission risk from factory farming, b) animal cruelty on factory farms, or c) a control paragraph. Those in the animal cruelty condition were significantly more likely to indicate lower meat consumption willingness and higher support for changing conditions on factory farms, when compared to the two other conditions. Concern for animal health and welfare mediated the relationship between the combined experimental conditions and both dependent variables, when compared to the control condition. Upon examining the moderating role of human supremacy beliefs, a conditional effect was found with higher human supremacy beliefs predicting higher meat consumption willingness and lower support for changing conditions on factory farms, across all conditions. This study offers evidence for the intervention potential of informative excerpts. These findings also emphasize animal cruelty as a more effective way to mobilize support for behaviours and policies aimed at reducing animal product consumption.

Keywords: factory farming, meat consumption, animal cruelty, zoonotic disease, COVID-19

Introduction

The human use of other animals for food is problematic for multiple reasons. For example, animals on factory farms are kept in unhygienic conditions (Fiber-Ostrow & Lovell, 2016) where they often cannot move, stand, or breathe fresh air (Appleby et al., 2004). Additionally, livestock production generates nearly a fifth of the world's greenhouse gases, along with major contributions to soil, air, and water pollution globally (Alvarado et al., 2021; Anastasiadis, 2004; Gerber et al., Food and Agriculture Organization of the United Nations, 2013; Godfray et al., 2018; Steinfeld et al., 2006). Further, diseases borne on factory farms pose public health risks (Bueno-Marí et al. 2015; Karesh et al., 2012), meat can be damaging to the humans who consume it (Wolk, 2017; Zhong et al., 2020), and humans who work in slaughterhouses often experience physical and psychological harm (Blanchette, 2019; Mitloehner & Calvo, 2008), with harm spilling over to the general community in the form of increased crime (Fitzgerald, 2009). It is no surprise then, that calls have been made for human diets to transition toward plant-based options (e.g., Humane Society International, 2022; Intergovernmental Panel on Climate Change, 2019).

Attempts to shift attitudes and behaviours about the use of animals for food traditionally focus on drawing attention to animal cruelty on factory farms (Freeman, 2010; Mathur et al., 2021). Although these have been effective in reducing the purchase or consumption of meat (Mathur et al., 2021), multiple approaches are likely necessary to engage a broader range of people, and research on the effectiveness of other approaches is needed. One such approach, especially amid the COVID-19 pandemic, is drawing attention to the conditions on factory farms being harmful to humans. Zoonotic diseases – such as COVID-19 – are those transmitted from animals to

70   humans via human exposure to animals or animal products. These will often emerge on factory

71   farms before spreading to humans (Karesh et al., 2012). Drawing attention to zoonotic disease

72   transmission risk or to animal cruelty on factory farms has the potential to impact willingness to

73   consume animal products and to support changing policies related to factory farming. It is

74   currently unclear however, whether this approach is effective (e.g., Dhont et al., 2021).

75

76   **Exploring Ways to Shift Attitudes**

77   Many meat-eaters are motivated to continue meat consumption and may actively avoid or

78   disregard information that makes them feel uncomfortable with their consumption habits (Dhont

79   et al., 2021; Leach et al., 2022; Piazza, 2020; Rothgerber & Rosenfeld, 2021). However, when

80   information about the harm on factory farms is unavoidable and explicit, some people may

81   change their attitudes. That is, some may be less willing to eat meat or more willing to support

82   changing conditions on factory farms in light of such information. Of course, there are different

83   aspects of factory farming to focus on in interventions. We sought to examine and compare the

84   outcomes of explicitly presenting information on two different aspects of factory farming: animal

85   cruelty and zoonotic disease risk.

86

87   *Animal Cruelty*

88   Support for animal rights and opposition to animal cruelty are common reasons for adopting and

89   maintaining a plant-based diet (Kerschke-Risch, 2015; Rosenfeld & Burrow, 2017). Gaining

90   awareness of animal cruelty has a longstanding history as an effective way to shift attitudes.

91   A systematic review (Mathur et al., 2021) suggested that animal welfare interventions appear

92   effective in short-term studies where outcomes involved self-report or intended future behaviour

93   and lower consumption was indicated. Tonsor and Olynk (2011) found that long-term demand

94   for pork and poultry was hindered by increases in animal welfare issues addressed by the media.

95   Experimental work also showed that targeting moral disengagement through displaying

96   distressing animal agriculture scenes, followed by discussions on the feelings the video elicited

97   can lead to more negative evaluations of meat and greater willingness to reduce meat

98   consumption (Buttlar et al., 2021).

99

100   When evaluating support for policy change, Harris et al. (2022) found that providing information

101   about animal welfare reforms did not increase opposition to animal farming, whereas providing

102   information about the cruelty of current practice increased opposition. Given this work, we

103   expected that presenting information about animal cruelty on factory farms would lead to lower

104   willingness to eat meat and greater support for changing conditions on factory farms. We were

105   curious, however, how this might compare to presenting information of zoonotic disease risk on

106   factory farms, at a time when concern about zoonotic disease (COVID-19) was high.

107

108   *Zoonotic Disease*

109   Health concerns are an additional leading motive for adopting/maintaining a meat-free diet (Fox

110   & Ward, 2008; Hopwood et al., 2021). This typically reflects concerns with optimizing one's

111   personal health and fitness. Although it has yet to be examined, concerns about avoiding

112   zoonotic disease may tie into this. With no clear consensus on whether animal or health

113   motivations are more effective in shifting attitudes toward animal consumption (De Backer &

114   Hudders, 2014; de Boer et al., 2017; de Oliveira Padilha et al., 2022), we opted to compare the

115   effects of information about zoonotic disease risk on factory farms to information about animal

116   cruelty on factory farms.

117

118   The COVID-19 pandemic heightened public discourse around zoonotic disease. This could

119   influence attitudes toward consuming meat. Research conducted following Hong Kong's SARS

120   outbreak in 2003 indicated increased consumer concern with health (Lau et al., 2005). Wen et al.

121   (2019) examined poultry purchase intentions during the 2013 avian influenza: the more a person

122   believed that purchasing chicken products was a risk, the less likely they were to purchase

123   chicken. A U.S. poll gauged the public's recognition of disease risk from animal agriculture and

124   although 43.7% of participants indicated support for restrictions on animal agriculture to help

125   prevent pandemics, only 15% agreed there is a direct link between disease outbreaks and

126   livestock farming (Beggs & Anderson, 2020). When considering dietary changes, results were

127   split: 17.9% indicated they were more likely to reduce meat intake, yet 17.0% reported they were

128   less likely than before to reduce meat intake. Recent work by Dhont et al. (2021) suggests

129   zoonotic disease information may not be as effective at shifting attitudes. Participants blamed

130   infectious diseases on factory farms and global meat consumption less than wild animal trade

131   and consumption or lack of government preparedness. This was particularly evident for those

132   indicated as meat-committed persons.

133

134   Like information about animal cruelty on factory farms (Bastian & Loughnan, 2017; Loughnan

135   et al., 2014) the above evidence suggests that people may be similarly resistant to information

136   linking zoonotic disease with factory farms. Nonetheless, given that animal rights and health are

137   primary motivations to forgo meat (De Backer & Hudders, 2014; de Boer et al., 2017), we

138 expected that information regarding animal cruelty/ zoonotic disease on factory farms could

139 stimulate concern for animals/ concern for human health, respectively, and thus predict lower

140 willingness to consume meat and/or greater support for changing conditions on factory farms.

141 Past studies have suggested that informative interventions can effectively induce concern and

142 this concern can subsequently shift attitudes towards meat and factory farms (Cordts et al., 2014;

143 Mathur et al., 2021). We expected that both types of information would be effective in doing

144 this, but in light of the salience of and concern about COVID-19 at the time the research was

145 conducted, we expected that the zoonotic disease (*vs.* animal cruelty) information would be

146 particularly effective.

147

148 We also considered a potential moderator of these effects, human supremacy beliefs (HSB)- the

149 extent to which one believes that humans are superior over other animals. Research has revealed

150 that stronger endorsement of HSB is associated with higher meat consumption and stronger

151 support for animal exploitation (Dhont & Hodson, 2014), making it likely that individuals higher

152 in HSB would be particularly resistant to the effects of animal cruelty information (and possibly

153 information about the risks of factory farming in general). Interestingly, a recent study revealed

154 that among those higher in HSB who consume less meat, health and environmental (*vs.* animal-

155 related) motives for doing so were cited (Weber & Kollmayer, 2022), suggesting that the

156 zoonotic disease information could be more effective for those higher in HSB. Prior awareness

157 of the connection between factory farming and zoonotic disease/animal cruelty was also gauged

158 to see where the sample stood on awareness of these issues.

159

Hypotheses

We predicted that when comparing both experimental (zoonotic & animal cruelty) conditions to the control condition, there would be lower meat consumption willingness and greater support for changing the conditions on factory farms (Hypothesis 1). We also predicted that there would be lower meat consumption willingness and greater support for improving farm conditions in the zoonotic (*vs*. cruelty) condition (Hypothesis 2). Additionally, we predicted that the effects predicted in Hypotheses 1 and 2 would be weaker among those higher (*vs*. lower) in human supremacy beliefs (Hypothesis 3). These hypotheses were pre-registered through AsPredicted (56471) (https://aspredicted.org/NH9_G6P). For exploratory purposes, we also examined concerns for animals and concerns for humans as potential mediators of the relationship between the manipulation and meat consumption willingness.

Method

Participants

Ethics approval was received from the University of Calgary Conjoint Faculty Research Ethics Board (REB20-1621). Undergraduate students ($N = 454$, Mage = 20.00 years, $SD = 3.07$, Range: 17-47 years) at a Canadian (Alberta) University completed a 30-minute online survey for course credits. Participants were excluded from the analyses if they failed both attention checks and the manipulation check, or if they did not provide consent for their data to be used. The original sample had 469 participants; however, 10 participants failed the manipulation check and both attention checks and 5 did not reconsent to their survey data being used, reducing the sample to 454 participants. This included 234 women, 215 men, 3 nonbinary participants, and 2 transgender men. Ethnicity of the participants included Aboriginal/Indigenous/Inuit (1.1%),

183 Black (3.8%), East Asian (17.2%), European/White (39.3%), Hispanic or Latino (4.4%), Middle

184 Eastern (including Northern African, West Asian, Arabic, and others) (5.5%), Pacific Islander or

185 Native Hawaiian (0.4%), South Asian (21.6%), Southeast Asian (13.7%). In terms of diet, 89.8%

186 indicated eating both meat and fish, 0.9% self-identified as pescatarian, 5.7% self-identified as

187 vegetarian, and 1.5% self-identified as vegan.

188

189 **Procedure**

190 After providing consent, participants completed Dhont and Hodson's (2014) human supremacy

191 beliefs scale (e.g., 'There is nothing unusual at all in the fact that humans dominate other animal

192 species.'). Six items rated on a 7-point scale (1= *Strongly disagree*; 7= *Strongly Agree*) were

193 averaged, after reverse-coding three items; higher scores indicated higher human supremacy

194 beliefs (α = .84). Participants reported their age, gender, ethnicity, and dietary status. Next,

195 participants were randomly assigned to one of the three conditions. Each condition included a

196 brief paragraph that either highlighted the connections between zoonotic diseases and factory

197 farming, animal cruelty and factory farming, or a description of the activity of geocaching (i.e.,

198 control condition). In the *zoonotic disease* experimental condition, an example statement was

199 "Scientists have been warning us for many years that factory farms are one of the most alarming

200 causes of infectious diseases". In the *animal cruelty* experimental condition, an example

201 statement was "Experts have been arguing for many years that factory farms are one of the most

202 alarming causes of animal cruelty". In the *control condition*, an example statement was "In

203 essence, geocaching is a GPS-enabled treasure hunt". Participants then completed the following

204 measures in the following order (unless otherwise noted). Full paragraphs used in each condition

205   and all measures can be found in the online supplement:

206   https://osf.io/d4w73/?view_only=42adcfd626294ca5928f9f30429b0b69.

207

208   ***Concern for Human Health/Welfare and Animal Health/Welfare***

209   Participants specified the extent to which they agreed with statements reflecting concern for

210   human health/welfare and animal health/welfare (e.g., 'How much do you care about human

211   health/welfare?'). The six items created by the authors were rated on a 7-point scale (1= *Not at*

212   *all*; 7= *Very much*). All items were averaged, with higher scores indicating higher concern for

213   human heath/welfare and animal health/welfare *(α =.89)* .

214

215   ***Meat Consumption Willingness***

216   The attitudes participants held towards their current consumption of meat (e.g., 'To what extent

217   do you want to reduce your consumption of animal products from factory farms?') were

218   measured by this scale (modified from Earle et al., 2019 (α = .93)). The three items were rated on

219   a 7-point Likert scale (1= *Not at all*; 7= *Very much*). All items were averaged, with higher scores

220   indicating a higher willingness to consume meat *(α =.87)*.

221

222   ***Support for Changing Conditions on Factory Farms***

223   The extent to which participants would endorse altering conditions on factory farms (e.g.,

224   'Improving hygiene on factory farms') was measured by this scale. The five items created by the

225   authors were rated on a 7-point Likert scale (1= *Not at all*; 7= *Very much*). All items were

226   averaged, with higher scores indicating stronger support for changing the conditions on factory

227   farms *(a =.87)*.

228

Manipulation check

230 The manipulation check asked participants which topic their vignette addressed (i.e., animal

231 cruelty, zoonotic disease, or geocaching).

232

Prior Awareness of Animal Cruelty, Zoonotic Diseases, and Factory Farming

234 Participants indicated their prior awareness of the connection between animal cruelty, zoonotic

235 diseases, and factory farming (e.g., 'Before participating in this study, I was aware of the

236 connections between animal cruelty and factory farming'). The three items created by the authors

237 were rated on a 7-point Likert scale (1= *Strongly disagree*; 7= *Strongly Agree*). The items were

238 averaged with higher scores indicating higher previous awareness *(a =.71)*.

239

Attention checks

241 The first attention check was placed directly after the vignette and asked, "What is two plus

242 six?". The second was placed before the last prior awareness item and stated, "This is an

243 attention check question. Please choose disagree as your answer".

244 All measures appear in the supplemental material.

245

246   **Results**

247 **Preliminary Analysis**

248 The data were checked for outliers (more than three standard deviations from the mean). Three

249 participants were deemed outliers and as per our pre-registration decision, these scores were

250 winsorized (i.e., converted to values at three standard deviations from the mean). Table 1

251 displays descriptive statistics and correlations. Table 2 displays means and standard deviations

252 by condition.

253

254 **Primary Analysis**

255 Multiple regression analyses with the manipulation represented by orthogonal contrast codes

256 were used to examine our hypotheses. Orthogonal contrasts assign numerical weights to compare

257 conditions or groups of conditions with others (Cohen et al., 2003). Contrast 1 compared the two

258 experimental conditions (zoonotic disease and animal cruelty) to the control condition ($-2/3$, $1/3$,

259 $1/3$), and contrast 2 compared the zoonotic condition to the cruelty condition (0, $-1/2$, $1/2$).[1]

260 First, meat consumption willingness was regressed on the two experimental conditions versus the

261 control, the zoonotic condition versus the cruelty condition, and mean-centered human

262 supremacy beliefs (HSB), as well as the interaction terms between mean-centered HSB and each

263 of the two contrast variables. All five variables were entered simultaneously. This same

264 regression analysis was then repeated separately with support for changing conditions on factory

265 farms as the dependent variable.

266

267 For meat consumption willingness, the experimental conditions against the control condition was

268 a significant predictor ($\beta = -0.13$, $SE = 0.14$, $p = .001$), revealing that participants in the control

269 condition were significantly more willing to consume meat in comparison to the experimental

270 conditions combined, supporting H1. The contrast between the zoonotic and cruelty conditions

271 was also significant ($\beta = 0.10$, $SE = 0.17$, $p = .016$). Those in the zoonotic disease condition were

272 unexpectedly more willing to consume meat in comparison to the animal cruelty condition

273 (contrary to H2). HSB was also significant ($\beta = 0.46$, $SE = 0.05$, $p < .001$), such that those higher

274   in HSB had a significantly higher willingness to consume meat. No interaction terms were

275   significant (see Table 3).

276

277   For changing conditions on factory farms, the experimental conditions against the control

278   condition was a significant predictor ($\beta = 0.13$, $SE = 0.11$, $p = .002$). Participants in the

279   experimental conditions combined were significantly more likely to support changing conditions

280   on factory farms in comparison to the control condition (supporting H1). The contrast between

281   the zoonotic and cruelty conditions was also significant ($\beta = -0.12$, $SE = 0.120$, $p = .003$), such

282   that those in the animal cruelty condition were significantly more likely to support changing

283   conditions on factory farms when compared to the zoonotic disease condition (contrary to H2).

284   HSB was also significant ($\beta = -0.51$, $SE = 0.04$, $p < .001$). Those higher in HSB were

285   significantly less likely to support changing conditions on factory farms. However, no interaction

286   terms were significant (see Table 3).

287

288   Mediation analyses using Hayes Process macro model 4 in SPSS (Hayes, 2013) were performed

289   to examine the mediating role of concern for animal health and welfare, or the separate role of

290   concern for human health and welfare, in the relationship between manipulation and meat

291   consumption willingness or support for changing conditions on factory farms. There was a

292   significant effect of condition on concern for animal health and welfare when comparing the

293   control condition to the experimental conditions combined (IV on Mediator: $b = .35$, $SE\ b = .13$,

294   p =.041), but not when comparing the two experimental conditions. There was no effect of

295   condition, among either of the contrasts, when looking at concern for human health and welfare.

296

297   Concern for animal health and welfare mediated the relationship between the experimental

298   conditions against the control condition and meat consumption willingness (indirect effect: -.23,

299   95% CI [-.40, -.06]), as well as between the experimental conditions against the control condition

300   and support for changing conditions on factory farms (indirect effect: .20, 95% CI [.05, .35).

301   This suggests that compared to the control group, those in the experimental groups were less

302   likely to endorse meat consumption willingness and more likely to indicate support for changing

303   conditions on factory farms. This effect can be partially explained by the participants' concern

304   for animal health and welfare.

305

306   However, concern for animal health and welfare did not mediate the relationship between the

307   zoonotic versus cruelty conditions and meat consumption willingness or changing conditions on

308   factory farms. Human health and welfare did not act as a mediator in any of the analyses. It

309   appears that the experimental conditions resulted in heightened concern for animals, which in

310   turn, was associated with decreased meat consumption willingness and increased support for

311   changing conditions on factory farms (see Table 4).

312

313   **Discussion**

314   We examined two possible strategies for influencing meat consumption willingness and support

315   for changing factory farming conditions. Hypothesis 1 — that when comparing both

316   experimental conditions to the control condition, there would be lower meat consumption

317   willingness and greater support for improving factory farming conditions — was supported. The

318   animal cruelty condition demonstrated effectiveness in shifting attitudes however, the zoonotic

319   disease condition did not differ significantly from the control.[2] Hypothesis 2 — that when

320   comparing the zoonotic condition to the animal cruelty condition, there would be lower meat

321   consumption willingness and greater support for improving factory farming conditions — was

322   not supported. Those in the animal cruelty condition had significantly lower meat consumption

323   willingness and significantly higher support for changing conditions on factory farms. Even at a

324   time where human health fears may have been heightened given the context of the COVID-19

325   pandemic, animal cruelty (*vs.* zoonotic disease) information still has a stronger impact. This is

326   consistent with recent findings that zoonotic concerns are relatively dismissible in contexts

327   linked to meat (Dhont et al., 2021). Contrary to predictions, human supremacy beliefs did not

328   moderate either contrast.

329

330   This then raises the question, why did animal cruelty information impact outcomes significantly

331   more than information about the threat of zoonotic disease? This could potentially be due to

332   participants viewing animal cruelty as more emotionally arousing and morally relevant (Feinberg

333   et al., 2019; Herchenroeder et al., 2022). The zoonotic disease condition may not evoke the same

334   visceral feelings that reading about animal cruelty could. Pre-established associations of COVID-

335   19 origins in Wuhan, China may have also made the risk that factory farms pose resonate less

336   with participants. Participants may have dismissed the potential for factory farms to generate

337   zoonotic diseases to the same direct extent that a wet market with wild animals could (Beggs &

338   Anderson, 2020; Dhont et al., 2021). Research also suggests that the threat of zoonotic diseases

339   may resonate less within the age group we examined. A North American online survey with a

340   sample average age close to the present study (28.6 years) found that a significant number of

341   individuals believed they were at less risk of contracting the disease, when compared to the

342   general population (Beggs & Anderson, 2020). The possibilities are speculative at this point but

343   could be examined in future work.

344

345   The insignificance of the predicted interactions suggests that the experimental effects were

346   similar for both those lower and higher in HSB. These results demonstrate that the intervention

347   "works" regardless of variation in the extent to which one views humans as hierarchically above

348   other animals. Our results did show that HSB was correlated with prior awareness of zoonotic

349   disease risk and animal cruelty such that as HSB increased, awareness decreased. This suggests

350   that despite generally having lower awareness, those high in HSB still were not differentially

351   influenced by any of the manipulations. Awareness was also associated with lower meat

352   consumption willingness and greater support for changing conditions on factory farms,

353   consistent with previous work (Harguess et al., 2020).

354

355   **Implications**

356   Although we had expected that zoonotic disease information would influence outcomes more

357   strongly given the life-changing and ever-salient COVID-19 pandemic, our results fall in line

358   with previous work (Buttlar et al., 2021; Harris et al, 2022; Mathur et al., 2021), in which animal

359   cruelty was demonstrated to be a more effective connection to underscore. This further

360   establishes the intervention potential of exposure to such informative excerpts, coinciding with

361   past research (Amiot et al., 2018). Companies seeking to persuade consumers to reconsider their

362   dietary choices, such as plant-based alternatives, can use this insight for marketing strategies.

363

364   There are also broader implications for both public health and policy making. It appears to be

365   difficult for people to comprehend the danger factory farm conditions will continue to pose if

366   changes are not made. A lack of understanding of local risk, such as the threat of zoonotic

367   disease outbreaks on factory farms, will be a barrier in fostering preventative action. The human-

368   animal relations discourse surrounding the COVID-19 pandemic has largely been focused on

369   exotic animal consumption and so, efforts to educate the public on how their own behaviour can

370   minimize the risk of future outbreaks will be critical. If preventative behaviour (eating less meat,

371   supporting changing factory farming systems) is motivated more by a focus on animal cruelty

372   than zoonotic disease, then perhaps emphasizing the treatment of animals on factory farms may

373   prove to be a more effective way to mobilize public concern and to promote support for policies

374   seeking to prevent future outbreaks. Thus, although companies, policy makers, or lobbyists may

375   be tempted to employ zoonotic disease arguments in an attempt to reduce meat consumption, our

376   results demonstrate that this will not be as effective as animal cruelty information.

377

378   **Limitations and Future Directions**

379   First, our study is limited in that our manipulation involved reading informative paragraphs.

380   Although this is often how people acquire new information, participants may have struggled to

381   visualize the information (Law, 2009). Presenting the same information through videos and/or

382   virtual reality would likely be more effective, consistent with evidence that these are successful

383   advocacy tools (Faunalytics, 2017; Herchenroeder et al., 2022; Herrewijn et al., 2021). Our study

384   was also limited in our focus on self-reported attitudinal measures rather than objective

385   behavioural measures. As with all self-report data, it may be subject to bias and in particular,

386   social desirability. Our study also only reflects attitudes immediately after reading the

387   manipulation paragraph and it is unclear if long-term attitude shifts would occur. It is also worth

388   acknowledging that internal validity may have been reduced through minor phrasing differences

389   between the manipulation paragraphs (e.g., "scientists have been warning" [zoonotic disease

390   condition] *vs.* "experts have been arguing" [animal cruelty condition]).

391

392   Timing is another limitation, as participants may have felt a sense of "covid fatigue". Due to the

393   amount of time that the pandemic had already been going on for (11 months at data collection),

394   stronger initial concern may have faded, leaving some potentially more indifferent (Zerbe, 2020).

395   Given the sample of undergraduate students who were in a psychology course at the time, the

396   generalizability is also worth considering. Links have been identified between higher education

397   and a lower likelihood of consuming beef or pork (Guenther et al., 2005) and with an increased

398   likelihood of following a vegetarian diet (Hoek et al., 2004). With a mean age of 20 among our

399   sample, it is important to consider potential age-related impacts. A Canadian survey showed that

400   of those identifying as vegetarian or vegan, more than half are under the age of 35

401   (Charlebois et al., 2018). This suggests that even though the vast majority of our participants

402   did not identity as vegetarian, they are likely to know those who are or to potentially be more

403   open to the concept.

404

405   Additionally, research indicates that political orientation, specifically a desire for more

406   economic equality and greater tolerance of outgroups, is related to concern for farm-animal

407   welfare (Deemer & Lobao, 2011; see also Dhont et al., 2016, Study 3). University samples tend

408   to reflect these more liberal-leaning views, especially among social science students (Hastie,

409   2007). It is also critical to note the local culture of Alberta (the location of the university our

410   sample was drawn from). Despite the presence of the Alberta beef industry and reports indicating

411   that Alberta has the highest red meat intake across all Canadian provinces (Statistics Canada,

412   2018), our study nonetheless demonstrated the effectiveness of an animal cruelty manipulation in

413   shifting meat-eating intentions. Future research should examine how attitudes on meat

414   consumption and factory farming may shift in differing cultural contexts.

415

416   Lastly, when discussing attitudes towards lowering meat consumption, environmental

417   considerations should not be overlooked. Recent work by Herchenroeder et al (2022) suggests

418   that environmental video appeals may be the most effective for increasing intentions to change

419   future meat intake. A recent meta-review also echoed these sentiments (Grundy et al., 2022).

420   Diving further into why some motivational factors may work better on a moral or personal level

421   and who is most likely to be influenced by such factors would be a meaningful pursuit for future

422   inquiries.

423

424   **Conclusion**

425   Research continues to stress the need to shift away from intensive farming practices and animal

426   product consumption. In order to raise public concern and to catalyze action, we must understand

427   how apathy or disengagement from these issues can be targeted most effectively. The present

428   study contributes to a growing narrative suggesting zoonotic concerns do not evoke a response

429   strong enough to broadly shift attitudes surrounding animal products and factory farming. Our

430   findings instead offer support for the ability of informative paragraphs on animal cruelty to

431   establish a desire to consume less meat and to support changes on factory farms. This research

432   should inform future endeavours seeking to spark support for behaviours and policies that

433   address the profound harm of factory farming and animal product consumption.

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Notes

1. Those who self-identified as pescatarian, vegetarian, or vegan (N = 37) were retained in the analyses.

2. A multivariate analysis of variance indicated that there was no significant difference between the zoonotic condition and the control in predicting meat consumption willingness, $M = -.25$, $SE = .19$, $p = .176$ or in predicting support for changing conditions on factory farms; $M = .12$, $SE = .14$, $p = .384$.

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723 **Table 1**

724 *Descriptive Statistics & Intercorrelations Between Variables*

Measure	Mean	SD	1	2	3	4	5	6
1. Human Supremacy Beliefs	3.80	1.24	-					
2. Concern for Human Health/Welfare	6.03	0.95	-.08	-				
3. Concern for Animal Health/Welfare	5.18	1.30	-.45**	.49**	-			
4. Meat Consumption Willingness	3.80	1.64	.47**	-.18**	-.55**	-		
5. Support for Changing Conditions on Factory Farms	5.73	1.21	-.50**	.33**	.61**	-.62**	-	
6. Prior Awareness	4.55	1.35	-.14**	.22**	.25**	-.24**	.12*	-

725 *Note.* N= 454, Scale ranges 1-7, * p < .05, ** p < .01 (2-tailed).

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729 **Table 2**

730 *Means and Standard Deviations by Condition*

	Mean	SD
Zoonotic Disease Condition n = 153		
Meat Consumption Willingness	3.89	1.59
Support for Changing Conditions on Factory Farms	5.63	1.22
Concern for Animal Health and Welfare	5.15	1.30
Concern for Human Health and Welfare	6.02	.89
Animal Cruelty Condition n = 151		
Meat Consumption Willingness	3.36	1.59
Support for Changing Conditions on Factory Farms	6.04	1.10
Concern for Animal Health and Welfare	5.43	1.22
Concern for Human Health and Welfare	6.14	.92
Control Condition n = 150		
Meat Consumption Willingness	4.14	1.66
Support for Changing Conditions on Factory Farms	5.52	1.24
Concern for Animal Health and Welfare	4.95	1.32
Concern for Human Health and Welfare	5.94	1.03

731

732 **Table 3**

733 *Multiple Regressions with Orthogonal Contrasts*

Model	β(*SE*)	[CI₉₅%]	Standardized Coefficients Beta	t	*p*
Meat Consumption Willingness Coefficients					
Constant	3.80(.07)	3.67/3.94		56.55	<.001
OC1	-.46(.14)	-.74/-.18	-.13	-3.24	.001
OC2	.40(.17)	.07/.72	.10	2.41	.016
HSB	.61(.05)	.50/.72	.46	11.23	<.001
OC1xHSB	.03(.12)	-.20/.26	.01	.25	.803
OC2xHSB	-.19(.13)	-.45/.07	-.06	-1.47	.143
Support for Changing Conditions on Factory Farms Coefficients					
Constant	5.50(.05)	5.40/5.60		109.18	<.001
OC1	.34(.11)	.13/.55	.13	3.17	.002
OC2	-.37(.12)	-.61/-.13	-.12	-3.02	.003
HSB	-.52(.04)	-.60/-.44	-.51	-12.79	<.001
OC1xHSB	.01(.09)	-.17/.18	.00	.07	.947
OC2xHSB	.04(.10)	-.15/.23	.02	.40	.690

734 *Note*. Constant= control condition; OC1= experimental contrast 1 (experimental compared to

735 control); OC2= experimental contrast 2 (zoonotic compared to cruelty); HSB (Human

736 Supremacy Beliefs; OC1xHSB= Moderation of HSB on OC1; OC2xHSB= Moderation of HSB

737 on OC2.

738

739 **Table 4**

740 *Mediation Analyses*

Mediator	Dependent Variable	Contrast	IV on Mediator *a*	Mediator on DV *b*	Direct Effect c'	Indirect Effect (ab) [CI$_{95\%}$]
				b (*SE b*)		
	Meat Consumption Willingness	C1	.35*(.13)	-.67**(.05)	-.28*(.14)	-.23(.09) [-.40;-.06]
Concern for animal health and welfare		C2	.28(.15)	-.67**(.05)	-.34*(.16)	-.19(.10) [-.38;.01]
	Support for Changing Conditions on Factory Farms	C1	.35*(.13)	.58**(.04)	.18(.10)	.20(.08) [.05; .35]
		C2	.28(.15)	.58**(.04)	.31**(.12)	.16(.09) [-.00; .33]
	Meat Consumption Willingness	C1	.13(.09)	-.28**(.08)	-.48(.16)	-.04(.03) [-.10; .01]
Concern for human health and welfare		C2	.12(.11)	-.28**(.08)	-.49(.18)	-.03(.03) [-.10; .02]
	Support for Changing Conditions on Factory Farms	C1	.13(.09)	.36**(.06)	.33**(.12)	.05(.04) [-.02; .14]
		C2	.12(.11)	.36**(.06)	.43**(.14)	.04(.04) [-.03; .13]

741 *Note*. *<.05 **<.01

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