frontiers | Frontiers in Sustainable Food Systems

TYPE Original Research
PUBLISHED 28 September 2022
DOI 10.3389/fsufs.2022.997590

OPEN ACCESS

EDITED BY
Christopher John Bryant,
University of Bath, United Kingdom

REVIEWED BY
Giulio Gabrieli,
Italian Institute of Technology, Italy
Andreas Bschaden,
University of Hohenheim, Germany

*CORRESPONDENCE
Heidi Zamzow
h.zamzow@lse.ac.uk

SPECIALTY SECTION
This article was submitted to Nutrition and Sustainable Diets, a section of the journal Frontiers in Sustainable Food Systems

RECEIVED 19 July 2022
ACCEPTED 23 August 2022
PUBLISHED 28 September 2022

CITATION
Zamzow H and Basso F (2022) *'Say Cheese!'*: Humane halos from environmental practices in dairy production.
Front. Sustain. Food Syst. 6:997590.
doi: 10.3389/fsufs.2022.997590

'Say Cheese!': Humane halos from environmental practices in dairy production

Heidi Zamzow* and Frédéric Basso

Department of Psychological and Behavioural Science, London School of Economics and Political Science, London, United Kingdom

Awareness of the negative impacts of our food choices on planetary, human and animal health is growing. Research shows an increasing number of consumers consider ethical consequences when purchasing food. A new market sector has emerged which caters to the demands of these value-driven consumers. However, attempts to change the market through ethical purchases may be thwarted by advertising strategies which exploit the 'halo effect', a cognitive bias which manifests when first impressions of one attribute influence subsequent evaluations of unknown attributes. This research investigates how two ethical domains, environmentalism and animal welfare, interact to influence consumer choice. In an online experiment, we recruited 267 participants and randomly assigned them to read either a pro-environmental, anti-environmental, or ethically neutral vignette about a cheese company. After being asked to rate the dairy on how well it treats its cows—an issue on which no information had been provided—participants indicated how frequently they would recommend the cheese compared to other brands. Results confirm that information about the company's environmental practices influenced perceptions of its animal welfare practices: a 'humane halo' effect. Further, humane ratings predicted product consumption recommendations, indicating the humane halo acted as a mediator. Exploratory analyses suggest the strength of this mediated relationship depends on participants' environmental protection values, particularly if they received negative information. Our findings establish the existence of a cross-domain halo in food ethics and shed light on ways to increase the effectiveness of policies designed to shift consumers to more sustainable diets.

KEYWORDS

ethical consumption, animal products, dairy reduction, halo effect, animal welfare, environmental values, negativity bias

Introduction

Among animal products, cheese is the third largest emitter of greenhouse gases, after lamb and beef (Poore and Nemecek, 2018). In addition, dairy production is a major contributor to other environmental problems such as poor air quality (Domingo et al., 2021), water pollution (Joy et al., 2022), and excessive and inefficient use of natural resources (Shepon et al., 2018; Clark et al., 2019; Hayek et al., 2020). Animal agriculture is often discussed without differentiating between product types (e.g., Wellesley et al., 2015), making dairy's contribution to climate change and other environmental

impacts less salient in both the scientific and public spheres. As a result, researchers and policymakers concerned with sustainability have focused on meat consumption in their educational and behavioural interventions (see review in Kwasny et al., 2022). Whilst many industrialised countries may be reaching 'peak meat' (Carrington, 2021), both demand for cheese and emissions from dairy continue to rise (Sharma, 2020; USDA, 2021). More research is needed to understand perceptions of dairy production in order to identify opportunities for reducing consumption.

In the UK, food choices are primarily based on taste, cost, and convenience (Wellesley et al., 2015). Beyond self-interested drivers, however, there is evidence showing consumers can also be motivated by more altruistic concerns (Lusk and Briggeman, 2009), including human rights, the environment, and animal welfare (Hain, 2017). These 'ethical consumers' use their purchasing power to further ethical goals, considering both upstream (e.g., resource extraction and production methods) and downstream (e.g., pollution) consequences of their food choices.

Recent literature suggests that environmental concerns may be contributing to the observed decline in demand for meat (Sanchez-Sabate and Sabaté, 2019), and some studies indicate animal welfare also may be playing a role (Bertrandias et al., 2021; Mathur et al., 2021). Consumer research has consistently shown that the majority of people in Western cultures care about how food animals are treated (Bayvel and Cross, 2010; Ingenbleek et al., 2012; Estévez-Moreno et al., 2022), and many consumers are willing to pay more for humanely-sourced food (Lagerkvist and Hess, 2011; Spain et al., 2018; Thibault et al., 2022). This concern has created a new market sector which caters to the demands of these ethical consumers, such as 'cage-free' eggs and 'pasture-raised' beef.

However, questions remain as to whether such marketing practices effectively serve the intentions and expectations of value-driven consumers. Bray et al. (2011) conducted focus groups in the UK to better understand impediments to ethical consumption. Although lack of awareness about the ethical consequences of consumption choices was a significant barrier, the primary issue which kept consumers from translating their ethical preferences into purchasing behaviours was the quantity, variety, and ambiguous nature of value-based labels and advertisements which left consumers feeling confused and overwhelmed. Similarly, a recent survey of 1,000 US consumers found that 89% selected animal-sourced foods believing the labels signified better treatment of animals, yet some labels (e.g., 'humane,' 'farm-raised') lacked uniform standards, and others referred to production practices unrelated to animal welfare (Thibault et al., 2022). For example, the survey showed almost 70% of respondents purchased 'natural' dairy products because they associated the label with more humane practices, yet this appellation has no bearing on treatment of dairy cows (Dominick et al., 2018). Likewise, UK consumers motivated by animal welfare concerns may purchase organic foods because they conflate the term 'organic' with being 'animal-friendly' (Harper and Makatouni, 2002). Food manufacturers have a vested interest in highlighting only those product attributes which they believe will appeal to their customers. The obscurity and ambivalence which are often inherent in ethically-based food choices create an ideal scenario for the *halo effect* when marketing claims are salient in one ethical attribute yet silent on another.

The halo effect

The halo effect is a type of cognitive bias where known characteristics of a person or product influence expectations about unknown qualities. The term was first coined by Edward Thorndike (1920) who observed that, when asking someone to evaluate a colleague in one attribute, the rater's initial evaluation cast a 'halo' which predicted subsequent evaluations of other attributes. In daily life, choices are often based on information that is, at best, limited and ambiguous. The halo effect can facilitate more rapid and efficient decision-making by engaging heuristic processing mechanisms which selectively identify and interpret information to fit patterns. Because these inferences are not backed by evidence, the halo effect reinforces and propagates cognitive bias, creating a path dependency which can play a significant role in shaping not only perceptions but behaviours.

In recent years, ethical consumers have become a significant share of the market, with some surveys indicating upwards of 80% of respondents prioritise sustainability and brands which align with their social values (Kohan, 2021). Because consumers' beliefs about a company can have a strong influence on their purchasing behaviour, many firms are responding with marketing campaigns which signal corporate social responsibility (CSR) to enhance their image with stakeholders and promote brand loyalty (Jin and Lee, 2019). Such branding strategies often benefit from halo effects. For instance, Sheehan and Lee (2014) found that a 'cruelty-free' claim caused consumers to perceive a product as being safer and more socially responsible than other brands, and that this perception was intensified by values related to animal welfare.

Research shows that halo effects can occur within, as well as between, ethical domains. As an example of a within-domain effect, one study showed that when French university students read a brief description of a large European manufacturer of printers, those who went on to learn the company had a print cartridge recycling programme were more likely to believe the manufacturer also used eco-friendly production practices, compared to participants who did not read about the programme (Smith et al., 2010, Study 1). Smith et al. (2010, Study 2) also demonstrated a cross-domain halo effect: when participants learned a fast-food restaurant chain engaged in environmental initiatives (e.g., renewable energy and waste

reduction), they rated it higher on community-related CSR activities (e.g., blood donation and feeding the homeless) compared to those students who read only the generic description of the company. The same authors later ran a similar experiment online using US participants (Smith et al., 2018). Again testing the cross-domain halo effect, Smith et al. (2018, Study 1) showed that a fast-food company described as being at the forefront of environmentally friendly business practices (e.g., using solar panels and composting) was judged by participants to be more likely to ensure employee, customer and community well being, compared to a similar restaurant chain with more moderate pro-environmental initiatives (e.g., recycling and reducing water use). This effect held even when measuring participants' inferences about specific CSR initiatives, such as providing leadership opportunities for women employees (Smith et al., 2018, Study 2). The same study also demonstrated a within-domain environmental halo; for instance, the progressive company was perceived to be more likely than its more modest competitor to recycle cooking oil, even though this action was not listed among its pro-environmental activities.

Research on halo effects from ethical claims in the context of food has yielded mixed results. Most studies have looked at 'health' halos from environmental claims, such as organic (Schuldt and Schwarz, 2010; Lee et al., 2013; Richetin et al., 2022) or 'eco-friendly' (Sörqvist et al., 2015). For example, a sample of shoppers at a mall in the US perceived cookies, potato chips and yoghurt labelled 'organic' to be more nutritious and lower in calories compared to the same products when labelled 'regular' (Lee et al., 2013). Sörqvist et al. (2015) had Swedish students taste samples of fruit (grapes or raisins) described as either 'conventional' or 'eco-friendly' and then estimate which was healthier, higher in calories, or contained fewer vitamins and minerals. Despite the fact that the samples came from the same package (all conventionally produced), participants who tasted raisins rated the eco-labelled product more favourably on all three measures. Calorie estimates for the two samples did not differ for those who tasted grapes, however, even though the 'eco-friendly' version was perceived to be healthier and higher in vitamin and mineral content. Another study using German university students showed no difference in health perceptions of a spicy snack when it was promoted as 'sustainable' *versus* when no environmental information was provided (Bschaden et al., 2022).

The variation in sample pool, food product and research design makes it difficult to ascertain the source of the observed inconsistencies. Findings are also mixed with respect to how environmental ethics might influence consumer decisions in similar contexts. Some studies (Schuldt and Schwarz, 2010; Schuldt et al., 2012; Sörqvist et al., 2015) indicate effects are more pronounced in people with strong environmental values, whilst Lee et al. (2013) found just the opposite, i.e., a diminished halo effect in participants who scored higher on their pro-environmental index. Other studies (Bschaden et al., 2022) found no significant influence of environmental ethics on the halo effect.

In another ethical domain, Schuldt et al. (2012, Study 2) found that consumers perceived a chocolate bar's caloric content differently depending on how fairly the workers involved in its production were treated, and that this 'health halo' was moderated by participants' social ethics. However, we are aware of no studies which have explored whether ethical claims in one aspect of food production can lead to inferences about other ethical aspects of food production. Given that consumers may consider both the environment and animal welfare in their food purchases, in the present research we ask: *Can an environmental ethics claim cast a 'humane' halo?*

The bulk of food marketing research has logically focused on positive halos which can be used to help sell a company's products by creating a favourable impression in the minds of consumers. However, Schuldt et al. (2012, Study 2) also found evidence of an even stronger negative halo effect[1], in that consumers perceived calories to be higher if they felt the workers were being treated poorly and, in turn, were less likely to recommend the product. This finding is somewhat intriguing, given that it rarely appears in the food psychology literature. However, many studies have been done on positive-negative asymmetry, or 'negativity bias,' which could help shed light on their results. Baumeister et al. (2001) argue that, as a survival mechanism to avoid danger, 'we are psychologically designed to respond to bad more strongly than good' (p. 325). In a comprehensive review of the negativity bias phenomenon, the authors conclude that bad events produce more emotion and have stronger effects on adjustment than good events. Other researchers have found that consumers may be more confident in their evaluations when they are based on negative rather than positive information (Alves et al., 2019).

Negativity dominance, a related aspect of negativity bias (Rozin and Royzman, 2001), may also play a role. Put simply, all else being equal, when good and bad are combined, bad usually wins. People are more prone to notice—and act upon—negative information because it is counter-normative (Baumeister et al., 2001). When a negative behaviour is related to ethical issues (as opposed to, for instance, competence), the effect can be even stronger (Rozin and Royzman, 2001). The reasoning behind this assertion is that entities which violate the norm are resisting social pressure and risking social retribution, therefore their behaviour may be more revealing of their character in general; 'good' behaviour, on the other hand, is expected and hence may not be as demanding of either attention or action (Baumeister et al., 2001).

Aside from Schuldt and colleagues, there are few studies which explore the effect of negative halos resulting from a food company's ethical practices. Further, despite the growth

1 In other literature, a negative halo may be termed a 'reverse halo' or 'horn' effect.

in 'green' marketing (Babkin et al., 2021), we are aware of no studies which have looked at the influence of a food producer's environmental ethics on perceptions of its animal welfare practices. Our study builds upon the work of Schuldt et al. (2012, Study 2) by testing the halo effect in a cross-domain food ethics context and exploring the role of negative halos in perceptions of a dairy company. We formally hypothesise that:

- ***H1***: Participants will recommend eating a cheese more frequently when the cheese company producing it is described as engaging in pro-environmental practices.
- ***H2***: Participants will judge a dairy as *(a)* treating its cows better when they believe it engages in pro-environmental practices and *(b)* treating its cows worse when they believe it engages in anti-environmental practices.
- ***H3***: The relationship between a cheese company's environmental practices and consumption frequency recommendations of the cheese it produces will be mediated by participants' judgments of how the company treats its dairy cows.

Using a moderated mediation analysis, we also explore whether this relationship is influenced by the strength of participants' environmental protection values.

Materials and methods

This study was preregistered with the Wharton Credibility Lab, University of Pennsylvania (#23873). Please refer to the Supplementary material for survey design and analyses details not included in the text.

Research design

This replication is conceptual in that it applies the psychological phenomenon of the halo effect in a new context. Both the current work and Schuldt et al. (2012, Study 2) employ a between-subjects design using one independent variable and three conditions to investigate (1) whether claims regarding the ethics of how a food was produced could result in unwarranted inferences (a halo effect); (2) whether those inferences in turn would predict consumption recommendations; and (3) whether effects would be more pronounced among individuals who hold strong values about ethical consumption. To preserve the integrity of the replication, we attempted to match the survey design and stimuli as described in Schuldt et al. (2012, Study 2) in terms of the nature of the vignette and framing of the conditions (ethical *versus* unethical) as well as the outcome variable (consumption recommendation). However, whereas Schuldt and colleagues tested the effect of fair trade practices on health inferences in the context of social equity values, we test the effect of environmental practices on animal welfare inferences in the context of environmental protection values.

Data collection

Through Prolific Academic's crowdsourcing website, we recruited 292 UK participants to complete a brief survey on food consumption in exchange for £0.50. Of those, 25 were excluded for the following reasons: failed attention check (8), did not answer with care and diligence (2) or had dietary restrictions (15), leaving 267 participants ranging in age from 18 to 74 ($M_{age} = 37.40$, $SD_{age} = 12.02$; 196 female, 71 male). An *a priori* power analysis in G*Power 3.1 (Faul et al., 2007) indicated this was a sufficient sample size for a 95% probability of detecting a medium size effect ($d = 0.5$) given a conventional level of significance ($\alpha = 0.05$).

We took further precautions in designing and implementing the experiment to help ensure optimal quality. To ensure participants engaged sufficiently with the stimuli before answering questions, we set a 20-s timer on the treatment condition page, as pilot studies suggested this was the minimum time necessary to carefully read the vignette. We blocked access to mobile phone users because we observed during pilot studies that the Qualtrics survey was not always properly and consistently displayed on mobile devices. We also included questions to check attention (*'Please respond with "Strongly Agree" for this item'*), care and diligence, and comprehension as further quality control measures (e.g., excluding non-human participants or 'bots'). Finally, at the end of the survey we included a comment box for participants to provide feedback.

Procedure

After reading the instructions and giving informed consent, participants were randomly assigned by computer algorithm to one of three brief descriptions of a cheese made by a fictitious company called 'Delly's.' In all the conditions, they were presented with the same image of cheese and standard information about the product:

'Delly's has been making cheese for over 50 years. The company prides itself on quality control, with each batch of cheese thoroughly tested for texture and flavour. Delly's routinely wins awards from the National Cheese Society and other groups, and in 2012, the company received a gold medal in the World Championship Cheese Contest.'

Participants in the pro-environmental condition ($n = 90$) went on to read an additional paragraph which detailed the company's favourable environmental practices (e.g., effective waste management and support of environmental regulations). In the anti-environmental condition, participants ($n = 91$) instead read an additional paragraph with the wording

adjusted to reflect unfavourable practices (e.g., ineffective waste management and opposition of regulation). The control group ($n = 86$) received the standard description only.

Measures

After being presented with the vignettes, participants were then asked to respond to the following items.

Humane rating. To determine whether the environmental ethics frame would invite unwarranted inferences about animal welfare practices, participants were asked *'Compared to other cheese producers, how well do you think Delly's treats its dairy cows?'* (1 = *Far worse,* 4 = *About the same,* 7 = *Far better*).

Consumption recommendations. To determine whether the environmental ethics frame could influence downstream consumption decisions, participants were asked, '*Compared to other brands of cheese, how often do you think that Delly's cheese should be eaten?'* (1 = *Far less often,* 4 = *About the same amount,* 7 = *Far more often*).

Environmental protection values. Because our research question related to the potential role of ethical consumerism on food behaviour, we chose the six-item GREEN scale (Haws et al., 2014) to explore whether participants' responses to information about environmental aspects of cheese production could be a function of their values. The scale was designed specifically to capture 'the tendency to express the value of environmental protection through one's purchases and consumption behaviours' (Haws et al., 2014, p. 337), for example: *'My purchase habits are affected by my concern for our environment'* (1 = *Strongly disagree*, 4 = *Neither agree nor disagree*, 7 = *Strongly agree*).

Demographics. The survey concluded with questions regarding personal details. In addition to age, gender, level of education and political standing, we asked participants to describe their dietary identity (omnivore, vegetarian, etc.; Piazza and Loughnan, 2016) and disclose any dietary restrictions so that we could eliminate any respondents who limited or excluded dairy products.

Data analyses

We analysed the data with IBM SPSS Version 25 software and used an alpha level of 0.05 for all statistical tests. As the data set failed Levene's test for equal variance, we used a Welch's analysis of variance (ANOVA) with the Games-Howell pairwise multiple comparison test for *post hoc* analyses. Confidence intervals (*CI*) which do not contain zero indicate significant effects. For effect sizes of the experimental manipulation, Cohen's *d* with the Welch correction was calculated in Microsoft Excel Version 16.54 (Gaetano, 2019). All mediation and moderation analyses were performed with the PROCESS Version 3.3 macro for SPSS which uses an ordinary least squares regression with percentile bootstrap confidence intervals (Hayes, 2018).

We conducted the analyses in three steps. First, we tested the main effect (*H1*) and halo effect (*H2*) of the manipulation on the outcome variable of interest using a between-subjects one-way ANOVA with *post hoc* tests as described above. Second, we used PROCESS Model 4 to test for the mediation (*H3*). Third, we conducted exploratory analyses using PROCESS Model 1 and Model 8 to determine if the observed effects were influenced by environmental protection values.

Results

Sample characteristics

Descriptive statistics from SPSS were used to characterise participants' demographics. Approximately two-thirds of the participants reported eating mostly meat and vegetables, with the other third restricting or eliminating meat from their diets. The sample pool was diverse educationally (18% with secondary education, 21% with some college, 40% college graduates and 21% postgraduate) as well as politically, albeit with a tendency to lean liberal (46%) *versus* moderate (22%) or conservative (21%). Eleven percent of respondents expressed no political affiliation. A one-way ANOVA confirmed demographic characteristics did not differ between treatment conditions.

Main analyses

Main effect (H1). Analyses revealed a significant effect of the environmental framing on consumption recommendations across the three conditions [$F_{(2, 264)} = 128.94$, $p < 0.001$]. As predicted, participants who were told the company engaged in pro-environmental practices were more likely to recommend the cheese than participants who received no ethical information about the company [$M_{PRO} = 5.04$, $SD_{PRO} = 1.07$; $M_{CONTROL} = 4.64$, $SD_{CONTROL} = 0.97$; $M_{DIFF} = 0.41$, *95% CI*$_{DIFF}$ (0.04, 0.77), $p = 0.025$, $d = 0.40$]. In addition, we observed that the effect of the framing was even more pronounced for participants who were told the company engaged in harmful environmental practices [$M_{ANTI} = 2.37$, $SD_{ANTI} = 1.50$; $M_{DIFF} = -2.27$, *95% CI*$_{DIFF}$ (-2.71, -1.82), $p < 0.001$, $d = -1.79$].

Halo effect (H2). Consistent with our expectations, there were significant differences in participants' humane ratings between groups who received positive, negative or no information about Delly's environmental practices [$F_{(2, 264)} = 159.23$, $p < 0.001$]. Relative to the control condition, participants rated the dairy company as treating its cows better when it took measures to protect the environment [$M_{PRO} = 5.67$, $SD_{PRO} = 0.92$; $M_{CONTROL} = 4.88$, $SD_{CONTROL} = 0.95$; $M_{DIFF} =$

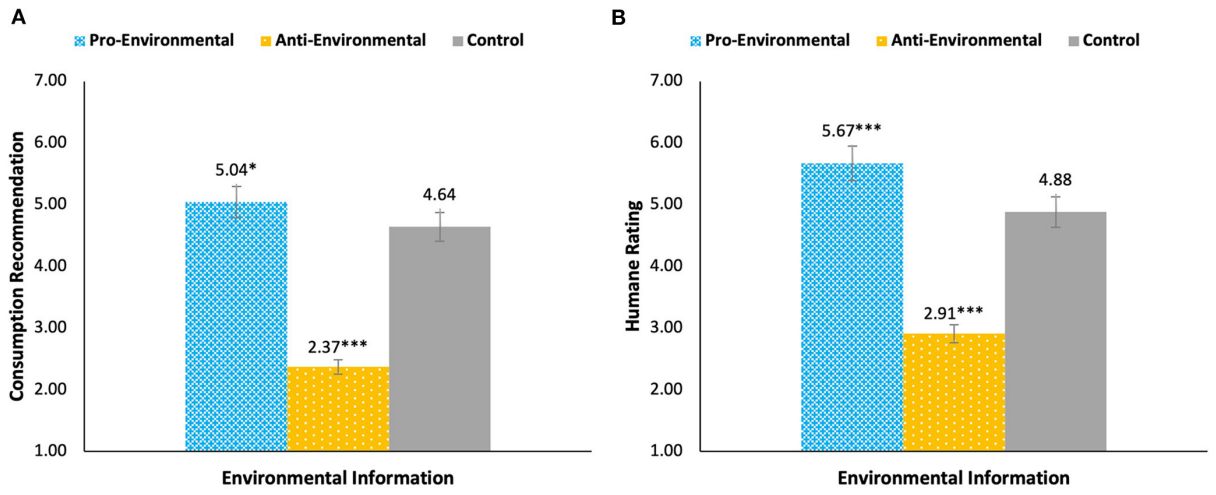

FIGURE 1
Mean scores for **(A)** cheese consumption recommendations and **(B)** judgment of dairy cow treatment, across the three conditions. Error bars correspond to 95% confidence intervals. Asterisks indicate significant differences *versus* the control condition, *$p < 0.05$ and ***$p < 0.001$.

0.78, *95% CI*$_{DIFF}$ (0.45, 1.12), $p < 0.001$, $d = 0.84$]. Again, a larger effect was observed in the anti-environmental condition, where participants judged the dairy cows to be treated far worse [$M_{ANTI} = 2.91$, $SD_{ANTI} = 1.29$; $M_{DIFF} = -1.97$, *95% CI*$_{DIFF}$ (-2.37, -1.57), $p < 0.001$, $d = -1.73$].

Results for testing our first and second hypotheses are depicted in Figures 1A,B, respectively. Taken together, the data suggest that, in considering how a cheese is produced, consumers will infer that a dairy treats its cows in a similar way it treats the environment; that is, the ethical claim regarding the environment projects a 'humane halo.' Further, negative information appears to have far more impact on judgments than does positive information.

Mediation (H3). Having established significant main effects on both the outcome variable and the proposed mediator, we proceeded to test our mediation hypothesis using PROCESS Model 4. We used indicator coding for the multi-categorical independent variable (Hayes and Preacher, 2014). Because we were interested in testing the effect of the treatment compared with the control, we coded the conditions as follows: 0 = Control, 1 = Pro-environmental, and 2 = Anti-environmental (PROCESS identifies 0 as the default reference group). We set humane ratings as the mediator in our model and consumption recommendations as the outcome variable. We report the unstandardized coefficients as generated by PROCESS for direct comparison with results from bootstrapping analyses (Hayes et al., 2017).

Results demonstrate that the information on environmental practices indirectly influenced consumption recommendations through its effect on perceptions of animal welfare. Bootstrap analysis with 5,000 resamples indicated that the indirect effect of pro-environmental information on consumption recommendations through humane ratings was slightly positive and significant [$b = 0.48$, $SE = 0.11$, *95% CI* (0.28, 0.71)]. Whilst the direct effect of the environmental ethics claim had been significant without the mediator [$b = 0.41$, $SE = 0.18$, $p = 0.027$, *95% CI* (0.047, 0.763)], it was no longer significant once the mediator was included in the model [$b = -0.07$, $SE = 0.16$, $p = 0.656$, *95% CI* (-0.386, 0.244)], indicating a full mediation[2]. Likewise, the indirect effect of anti-environmental information was strongly negative and significant [$b = -1.20$, $SE = 0.16$, *95% CI* (-1.51, -0.90)]. Here the direct effect on consumption recommendations was substantially weakened though remained significant [from $b = -2.27$, $SE = 0.18$, $p < 0.001$, *95% CI* (-2.623, -1.909) to $b = -1.07$, $SE = 0.19$, $p < 0.001$, *95% CI* (-1.444, -0.690)]. The model was significant [$F_{(3, 263)} = 157.01$, $p < 0.001$] and accounted for 49% of the variance in consumption recommendations ($R^2 = 0.49$); see Figure 2.

2 There is disagreement in the research community regarding what constitutes a 'true' test of mediation. Without entering into the debate, we report here results which meet Baron and Kenny (1986) causal steps criteria for mediation. Whilst our findings are consistent with their definition of 'full' mediation (in the pro-environmental treatment) and 'partial' mediation (for the anti-environmental treatment), we acknowledge the criticism that—in real life situations—the relationship between an independent and dependent variable is unlikely to be fully mediated. We also include significance tests for component paths (Yzerbyt et al., 2018) as well as the bootstrapping confidence intervals (Preacher and Hayes, 2004) generated by Model 4 to confirm the mediation.

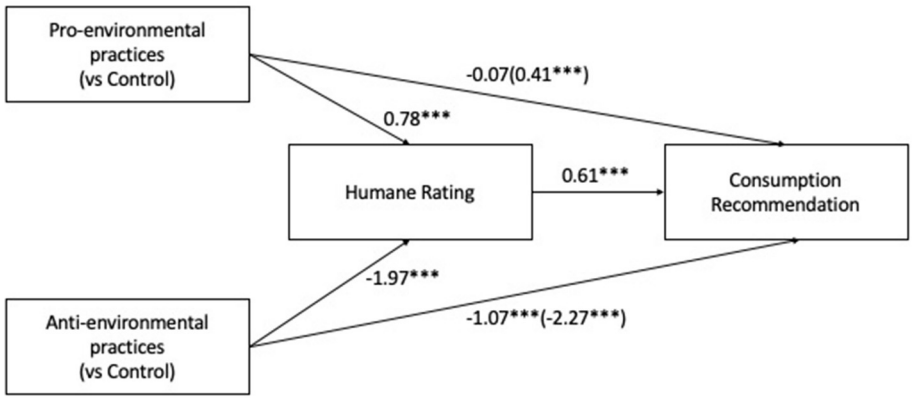

FIGURE 2
Model testing whether judgments about a dairy's treatment of its cows mediate the effect of environmental ethics information on consumption recommendations. The model accounted for 49% of the variance in consumption recommendations ($R^2 = 0.49$). Numbers in parentheses indicate direct effects without inclusion of the mediator in the model. Asterisks indicate significant differences *versus* the control condition, ***$p < 0.001$.

Moderated mediation analysis

For all our exploratory analyses, we used the same indicator coding as described in our mediation analysis and again report the unstandardised regression coefficients. The model parameters were as in Model 4, with the addition of environmental protection values as the moderator, mean-centred for ease of interpretation. Responses for the six items on the GREEN scale were highly correlated (Cronbach's $\alpha = 0.91$) and thus were averaged. A one-way between-subjects ANOVA showed no effect of the experimental manipulation on the scale, confirming its reliability as a moderator. Linear regression indicated GREEN scale scores alone did not predict either humane ratings ($p = 0.411$) or consumption recommendations ($p = 0.173$).

Moderated mediation occurs when the indirect effect of the independent variable on the outcome variable through the mediator changes across different levels of the moderator. Because our research focuses on the halo effect, we investigated a first stage moderated mediation (Edwards and Lambert, 2007), where the indirect effect is moderated through the influence of environmental protection values on the relationship between environmental information and perceptions of animal welfare. To better understand the nature of the conditional (moderated) indirect effect, we first conducted simple moderation analyses of both the main effect and the halo effect using PROCESS Model 1. Isolating the effect of environmental protection values on the relationship between environmental ethics information and consumption recommendations, without including humane ratings in the model, we found a significant interaction between framing and GREEN scale scores in the anti-environmental condition [$b = -0.50$, $SE = 0.21$, $p = 0.018$, *95% CI* (-0.912, -0.087)] but not in the pro-environmental treatment [$b = 0.284$, $SE = 0.20$, $p = 0.165$, *95% CI* (-0.118, 0.685)]. We then examined whether the halo effect varies as a function of how strongly people feel about environmentally ethical consumption by again using Model 1, this time with humane ratings as the outcome variable. As with consumption recommendations, the data suggest that the positive halo is not moderated by participants' environmental protection values [$b = 0.103$, $SE = 0.19$, $p = 0.577$, *95% CI* (-0.261, 0.467)] but the negative halo is [$b = -0.40$, $SE = 0.19$, $p = 0.035$, *95% CI* (-0.778, -0.029)].

By grouping GREEN scale scores as low (defined as one standard deviation below the mean), average, and high (one standard deviation above the mean), we can visualise the interactions using simple slopes (Figure 3). Consumption recommendations by participants who read the negative environmental framing fall rapidly moving up the scale but only gradually increase for participants in the positive framing (Figure 3A). The effect of anti-environmental information on product endorsement is sizeable and significant at all three levels of GREEN scale scores. Therefore, exploratory analysis suggests that consumers' environmental protection values could be an important factor influencing product recommendations when the dairy is shown to be environmentally irresponsible, but they are not likely to have a significant effect if the environmental information about the company is positive or ambiguous.

A similar pattern is seen for the effect of environmental protection values on perceptions of animal welfare (Figure 3B). The gap between humane ratings in the pro-environmental *versus* control conditions does not change significantly with increasing environmental values. However, the gap between the control and the anti-environmental condition gets wider moving along the scale. The perception that irresponsible environmental practices signify irresponsible animal treatment intensifies as the strength of participants' commitment to environmentally ethical consumption increases.

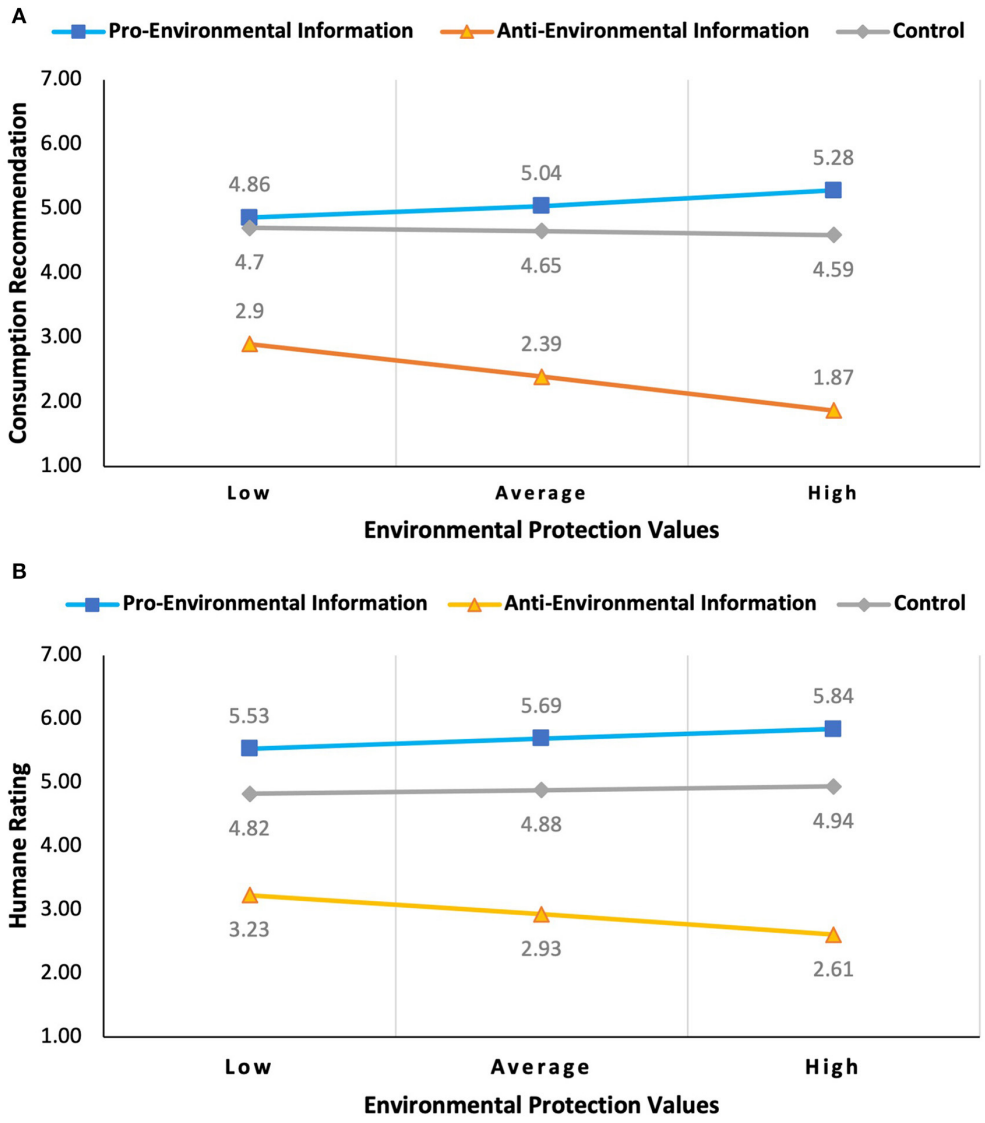

FIGURE 3
Simple slopes analysis showing the effect of participants' environmental protection values on **(A)** endorsement of the dairy's cheese (in terms of how frequently they would recommend it be eaten) and **(B)** how well they perceived the dairy's treatment of its cows, compared to other brands. Low and High values correspond to one standard deviation below and one standard deviation above the mean, respectively.

Having established evidence that the interaction between environmental information and environmental protection values significantly impacts both humane ratings and consumption recommendations, we tested moderation of the full mediation model using PROCESS Model 8, conceptually represented in Figure 4. The macro uses an index of moderated mediation with bootstrap confidence intervals to draw statistical inference. As opposed to the piecemeal approach described above, the index quantifies the relationship between the moderator and indirect effects (Hayes, 2018).

Treatment condition, GREEN scale scores, their interaction terms, and humane ratings were all included as predictors in the model. For the anti-environmental condition, the index of moderated mediation was significant [$index = -0.229$, $SE = 0.107$, $95\%\ CI\ (-0.454, -0.030)$]. Both direct and indirect effects were negative and significant at low, average and high levels of the moderator, with confidence intervals that did not contain 0. The index confidence interval did include 0 in the pro-environmental condition [$95\%\ CI\ (-0.127, 0.253)$]. The model was significant [$F_{(6, 260)} = 83.54$, $p < 0.001$] and accounted for 66% of the variance in consumption recommendations ($R^2 = 0.66$). Results strongly suggest that the mediation of the effect of negative information regarding a dairy's environmental practices on consumption recommendations of

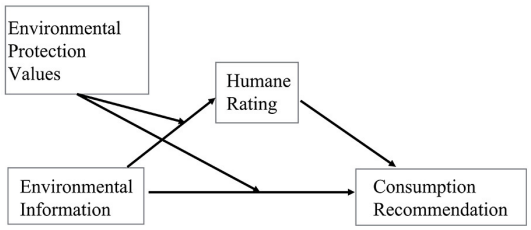

FIGURE 4
Conceptual model of the moderated mediation analysis used to explore the influence of the moderator (environmental protection values) on the relationship between the independent variable (environmental information) and the mediator (humane rating) as well as on the relationship between the independent variable and the outcome variable (consumption recommendation). Adapted from Hayes (2018).

its cheese through animal welfare perceptions is moderated by participants' environmental protection values.

Discussion

Conceptual replication is critical to advancing and improving theoretical development, as well as maintaining scientific integrity (Stroebe and Strack, 2014; Camerer et al., 2018; Baucal et al., 2020). In a well-powered, preregistered study using UK participants, we find evidence that an ethical claim in one domain can lead to unwarranted inferences in another ethical domain, confirming this halo effect as a robust phenomenon and extending the literature on its application in the context of food consumption. Schuldt et al. (2012) found that consumer judgments could be influenced by social ethics claims in chocolate production which provoke a 'health halo.' In like fashion, we demonstrated that consumers can be influenced by environmental practices in dairy production which cast a 'humane halo.' In so doing, we show that altruistic/ethical halo effects could be drivers of food consumption, in addition to self-interested ones. Of particular relevance to reducing consumption of animal products, we also found evidence to support the authors' finding of a pronounced negative halo from unethical food production which was conditional upon the strength of perceivers' values. Taken together, these results provide the first empirical evidence that ethics-related attributes can bias perceptions of animal welfare in dairy production as well as endorsement of the dairy product itself.

We find it interesting that the relationship between pro-environmental framing and consumption recommendations appears to be due to the indirect effect through perceptions of dairy cow treatment. This implies that, *when prompted* to consider the dairy cows—and when subsequently judging them to be treated well—consumers may indeed be more likely to recommend a cheese compared to other brands. Dairy advertisements frequently employ visual rhetoric of cows in nature, raising the possibility that the 'humane halo' may play a part in marketing strategy (Borkfelt et al., 2015; Shortall, 2019). It is worth noting that a dairy company's pro-environmental practices alone were not enough to cause participants to recommend its cheese over other brands about which they had no information. In contrast, both direct effects of unethical information and indirect effects through the negative halo were substantial and significant, with a roughly equivalent influence on consumption recommendations.

Our mediation analysis reveals that the path dependency of evaluations is not linear and depends on the valence of the information. Participants receiving information about ethical practices 'adjust down,' in that their humane ratings are higher than their consumption ratings (from $M_{HR} = 5.67$ to $M_{CR} = 5.04$). Conversely, participants receiving information about unethical practices 'adjust up'—that is, their negative evaluations become even stronger. As low as humane ratings were ($M_{HR} = 2.91$), average consumption ratings were even lower ($M_{CR} = 2.37$), reflecting participants' dissatisfaction with the dairy's treatment of the environment as well as their perceived treatment of the cows. As a result, the effect of positive *versus* negative information on consumption recommendations is highly asymmetrical (Figure 5).

The literature on negativity bias (Baumeister et al., 2001; Rozin and Royzman, 2001; Alves et al., 2019) lends itself well to interpretation of our results. Good behaviour is expected and therefore not likely to be rewarded; 'bad actors,' on the other hand, warrant punishment (Harth et al., 2013). Consistent with the theory of negativity dominance (Rozin and Royzman, 2001), a negative halo is likely to emerge if good information is immediately followed by bad (Kahneman, 2011). The positive tone of the control[3] (e.g., 'award-winning') may have set up a contrast which accentuated the counter-normativity of the anti-environmental behaviour, leading to stronger effects (Baumeister et al., 2001). By claiming a high-quality product, rather than 'buffering' against any subsequent negative publicity (Dawar and Pillutla, 2000; Cho and Kim,

3 A one-sample *t*-test indicated that humane ratings and consumption frequency recommendations for participants in the control group were significantly higher than 4 ($p < 0.001$), the mid-point of the response scale. The standard description read by participants in all groups was not entirely 'neutral' in the sense that it made reference to the quality of the cheese and the fact that the dairy had won awards. This language was crafted to closely reflect the wording in the original study, which also reported control means which were above the mid-point. Additionally, we felt this type of description was typical of what consumers confront in the marketplace, where companies often advertise their products as high quality and award-winning. The objective of the research is not to compare treatment results to a theoretical 'true' neutral condition which does not accurately reflect real-world conditions but rather to determine how participants deviate from the control as a result of the manipulation.

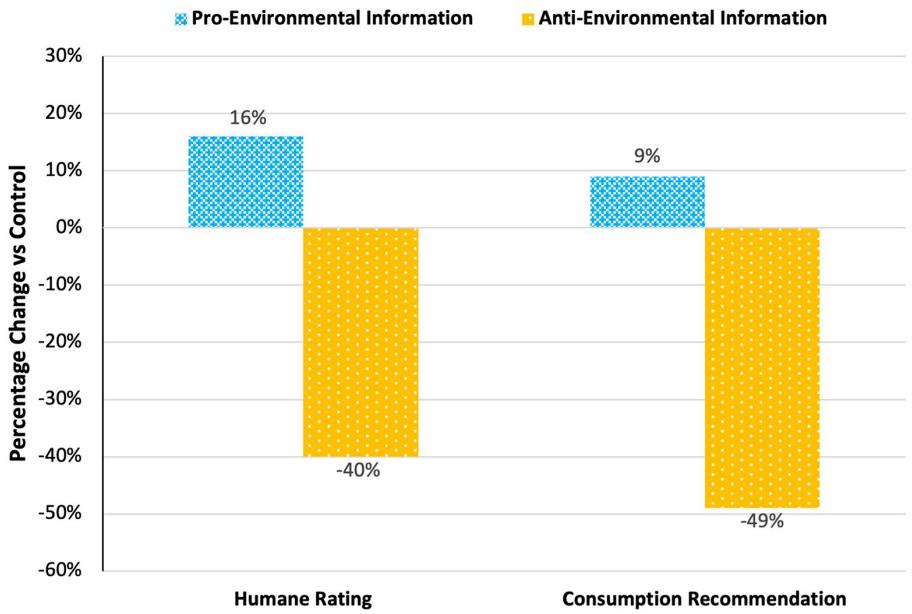

FIGURE 5
Asymmetrical effect of positive (pro-environmental production practices) *versus* negative (anti-environmental production practices) information on participants' perception of dairy cow treatment (humane rating) and their subsequent cheese consumption recommendation. The treatment effect of positive information (*versus* a neutral control) is significantly smaller than the effect of negative information. In addition, when moving from the humane rating to the consumption decision, the effect of positive information is attenuated whereas the effect of negative information increases.

2012), dairy promotions could possibly backfire if unethical issues are exposed.

Results of our moderation analyses support the conclusion of Schuldt et al. (2012) that ethical consumers process information more heuristically and are thus more susceptible to the halo effect and more vulnerable to marketing strategies which exploit it. However, in addition to the interaction, we also found significant main halo effects whereas the original study did not. Overall, our treatment effect sizes for both positive and negative halos, as well as consumption recommendations, were considerably larger and were statistically significant regardless of the strength of environmental values. This finding may be due in part to the sample being larger and/or drawn from a different population, however the nature of the halo itself may also have played a role. Concern for animal welfare can provoke strong emotions (Herzog and Golden, 2009), and research has shown this concern extends to farm animals, including dairy cows (Wolf et al., 2016; Busch et al., 2017). Whilst we did not directly measure emotional responses, they are known to have a powerful influence on attitude formation and subsequent decision-making (Slovic et al., 2007) and thus could help explain the strength of our effects.

Limitations and future directions

These findings should be interpreted with caution, as this experiment represents only one study of a UK sample. We recognise there can be vast cultural differences concerning animal welfare in food production (e.g., Fitzpatrick, 2009; Mazhary, 2021). Even within the UK there may be geographical differences, as perceptions of animals and the environment may differ between urban and rural populations (Vanhonacker et al., 2010). In addition to more studies using diverse populations, we recommend further research into ethical halos which combine different stimuli and measures. Our results are strongly indicative of a mediation *via* perceptions of animal welfare, however we did not attempt to measure the individual motivations behind whether participants recommended the cheese or not. Individuals will vary significantly in the degree to which self-interest *versus* more altruistic tendencies influence choice (Lusk and Briggeman, 2009). As discussed, consumers consistently express a desire for humane treatment of animals in food production. At the same time, some research has shown that consumers associate better taste with better treatment of the animal from whom the food was sourced

(Anderson and Barrett, 2016; Bray and Ankeny, 2017) as well as with sustainable production (Sörqvist et al., 2015). Our stimuli make specific reference to 'manure management' which may engender disgust, an emotion which has been implicated as a mediator of meat consumption (Ruby and Heine, 2012). In addition, both environmental and animal welfare practices in cheese production may be linked to perceptions of food safety (Harper and Makatouni, 2002; Demartini et al., 2018). Future studies could help parse out the relative contributions of these factors, for instance through a serial mediation model including taste as well as animal welfare.

The relationship between consumers' animal welfare values and their perception of dairy production should be further explored to generate additional insight into the psychological mechanisms underpinning our observations. A follow-up study could switch the stimuli and the mediator, such that information is provided regarding animal welfare, and participants are subsequently asked to evaluate environmental practices. Direct and indirect effects could again be compared, and animal welfare rather than environmental protection values could be explored as a moderator. There is also a gap in the literature regarding how consumers perceive the consumption of an animal 'product' (e.g., milk or eggs) as opposed to the animal itself (e.g., beef cattle or chicken), despite the fact that all animals used in food production are ultimately slaughtered. We focused on cheese in this study primarily because of its environmental consequences, but a conceptual replication using eggs rather than dairy products could improve our understanding of consumer psychology and ethical consumption as it relates to animal-based foods.

Our results are consistent with Schuldt et al. (2012, Study 2) who suggested that the observed halo effect on participants' product endorsement could impact downstream consumption. However, we also acknowledge that behaviour does not necessarily follow from intention. Participants may say they would or would not recommend a cheese but fail to do so in practice (Vigors, 2018). Eating behaviours are complex and contextual. Food choices are often strongly influenced by norms and other sociocultural factors which can be difficult to measure, and we do not attempt to do so here. Rather, we provide additional insight into drivers of dairy consumption by identifying a potential underlying mechanism which could be leveraged in behavioural interventions to change dietary practices.

Finally, whilst environmental and animal welfare ethics may contribute to consumer recommendations of one brand of dairy products over another, this does not in any way predict that these factors would deter consumers from eating less dairy overall, let alone eliminating it entirely. Self-interest is likely to dominate food behaviours, even amongst consumers who consider the ethical consequences of their diets (Lusk and Briggeman, 2009; Wellesley et al., 2015). Individual behaviours will change when norms change, but this will need the support of policy and regulation (Godfray et al., 2018). Complementary interventions will be required, to include incorporating externalised costs, incentivising innovation, and supporting businesses in bringing more sustainable and humane alternatives to market so that they are affordable and accessible. In addition, consumers need education not only on climate impacts but also how to easily and enjoyably incorporate non-dairy products into their diets. All of these strategies can be augmented by continuing to study food behaviours in order to understand the most effective means of shifting consumers to more sustainable lifestyles.

Implications

The halo effect can shape perceptions of not only people and objects, but producers of goods we consume every day. The danger is that it could be used to manipulate people into buying certain foods because they perceive production methods to be congruent with their values or standards. Our research shows that people can generalise from one kind of ethics claim to another ethical domain which may be a determining factor in dairy product choice. In light of the findings that negative information can have a strong influence on perceptions and possibly downstream consumption behaviours, the following considerations may be useful for policymakers and advocacy groups interested in reducing dairy consumption in the population:

Bring dairy to the climate change table. Concern for the environment, and climate change in particular, is at an all-time high in the UK (Steentjes, 2021). Encouragingly, this concern has translated into a significant reduction in meat consumption which is expected to continue (Stewart et al., 2021). Yet awareness of the connection between dairy and environmental impacts appears to be lagging. Our study shows that consumers are likely to develop negative attitudes towards a cheese when they learn its production has harmed the environment. In addition to raising awareness about water and air pollution associated with the industry, making the connection between climate change and dairy more salient could help motivate consumers to reduce their consumption.

Dismantle the humane halo. Our results suggest that if a dairy is environmentally responsible, it is not enough to get people to recommend its cheese over another brand. However, if consumers are primed into thinking about how the animals are treated and the halo effect leads them to associate environmental practices with humane practices, they may endorse the product. Yet in reality, regulations pertaining to treatment of animals in food production tend to be limited or inconsistent, and there may be little enforcement of voluntary humane certification (Borkfelt et al., 2015; Ballentine, 2016). Dairy production in Europe and the UK is increasingly moving away from pasturing cows to continuous indoor housing (March et al., 2014; Shortall, 2019), despite consumer preference for

more 'traditional' grazing systems which are perceived as better for animal welfare (Taverner, 2015). Practices such as dehorning calves without anaesthesia (Robbins et al., 2015) and immediate separation of calf from cow after birth (Busch et al., 2017) are also unpopular with consumers and incompatible with perceptions that dairy products are 'natural.' Efforts to reduce dairy consumption overall could focus on dismantling the humane halo by emphasising the downsides of animal welfare and dispelling some of the bucolic myths surrounding present-day dairy production.

Conclusion

As a conceptual replication of a study on the halo effect of a social ethics claim in food production (Schuldt et al., 2012, Study 2), this research investigated other ethical factors which could influence the consumption of dairy products in both direct and indirect ways. In producing evidence of a 'humane halo' emanating from information about a dairy's environmental practices, we introduce a novel application of the halo effect, showing that an ethical claim in the environmental domain can cause participants to infer an ethical attribute in the animal welfare domain. Further, our results demonstrate that inferences about dairy animal welfare can have a greater effect on cheese consumption recommendations than environmental information, suggesting new avenues for research regarding altruistic *versus* self-interested motivations for food behaviours. We hope these findings will provide a deeper understanding of the drivers of dairy consumption for policymakers as well as scientists as they chart a course to a more sustainable future.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the Department of Psychological and Behavioural Science Ethics Committee of the London School of Economics and Political Science (LSE). The participants provided their written informed consent to participate in this study.

Author contributions

HZ: conceptualisation, methodology, formal analysis, investigation, writing—original draft, writing—review and editing, and visualisation. FB: conceptualisation, methodology, validation, resources, writing—review and editing, supervision, project administration, and funding acquisition. Both authors contributed to the paper and approved it for publication.

Funding

This research was funded by the London School of Economics and Political Science (LSE). We thank the LSE Open Access Publication Fund for generously supporting this research by covering the open access publication fees.

Acknowledgments

The authors thank Feiyang Wang and Dario Krpan for their help with methodology, and the editor and reviewers for their insightful comments and recommendations.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fsufs.2022.997590/full#supplementary-material

References

Alves, H., Koch, A., and Unkelbach, C. (2019). The differential similarity of positive and negative information – an affect-induced processing outcome? *Cogn. Emot.* 33, 1224–1238. doi: 10.1080/02699931.2018.1549022

Anderson, E. C., and Barrett, L. F. (2016). Affective beliefs influence the experience of eating meat. *PLoS ONE* 11:e0160424. doi: 10.1371/journal.pone.0160424

Babkin, A., Malevskaia-Malevich, E., Kvasha, N., and Eliseev, E. (2021). The relationship between socially responsible investment and the market value of an enterprise. *E3S Web Conf.* 291:01002. doi: 10.1051/e3sconf/202129101002

Ballentine, L. (2016). What does "Humane Certified" really mean? 'Humane' or 'ethical' certification has a market value and as such may be driven by what consumers say they want rather than what is best for animals. *Ont. Farmer,* A.15. Retrieved from: https://www.proquest.com/magazines/what-does-humane-certified-really-mean-ethical/docview/2194547555/se-2 (accessed July 17, 2022).

Baron, R. M., and Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J. Pers. Soc. Psychol.* 51, 1173–1182. doi: 10.1037/0022-3514.51.6.1173

Baucal, A., Gillespie, A., Krstić, K., and Zittoun, T. (2020). Reproducibility in psychology: theoretical distinction of different types of replications. *Integr. Psych. Behav.* 54, 152–157. doi: 10.1007/s12124-019-09499-y

Baumeister, R. F., Bratslavsky, E., Finkenauer, C., and Vohs, K. D. (2001). Bad is stronger than good. *Rev. Gen. Psychol.* 5, 323–370. doi: 10.1037/1089-2680.5.4.323

Bayvel, A. C. D., and Cross, N. (2010). Animal welfare: a complex domestic and international public-policy issue–who are the key players? *J. Vet. Med. Educ.* 37, 3–12. doi: 10.3138/jvme.37.1.3

Bertrandias, L., Cazes-Valette, G., and Gurviez, P. (2021). How concern for animal welfare impacts meat consumption. *Décis. Market*. 103, 229–250. Retrieved from: https://www.cairn-int.info/journal-decisions-marketing-2021-3-page-229.htm

Borkfelt, S., Kondrup, S., Röcklinsberg, H., Bjørkdahl, K., and Gjerris, M. (2015). Closer to nature? A critical discussion of the marketing of "ethical" animal products. *J. Agric. Environ. Ethics* 28, 1053–1073. doi: 10.1007/s10806-015-9577-4

Bray, H. J., and Ankeny, R. A. (2017). Happy chickens lay tastier eggs: motivations for buying free-range eggs in Australia. *Anthrozoös* 30, 213–226. doi: 10.1080/08927936.2017.1310986

Bray, J., Johns, N., and Kilburn, D. (2011). An exploratory study into the factors impeding ethical consumption. *J. Bus. Ethics* 98, 597–608. doi: 10.1007/s10551-010-0640-9

Bschaden, A., Schulz, J., and Stroebele-Benschop, N. (2022). The sustainability halo effect: does the provision of sustainability information of a snack affect sensory and health perception, and willingness to pay? *Future Foods* 5:100143. doi: 10.1016/j.fufo.2022.100143

Busch, G., Weary, D. M., Spiller, A., and von Keyserlingk, M. A. G. (2017). American and German attitudes towards cow-calf separation on dairy farms. *PLoS ONE* 12:e0174013. doi: 10.1371/journal.pone.0174013

Camerer, C. F., Dreber, A., Holzmeister, F., Ho, T.-H., Huber, J., Johannesson, M., et al. (2018). Evaluating the replicability of social science experiments in nature and science between 2010 and 2015. *Nat. Hum. Behav.* 2, 637–644. doi: 10.1038/s41562-018-0399-z

Carrington, D. (2021). *Europe and US Could Reach 'Peak Meat' in 2025 – Report. The Guardian*. Available online at: http://www.theguardian.com/environment/2021/mar/23/europe-and-us-could-reach-peak-meat-in-2025-report (accessed June 28, 2021).

Cho, S., and Kim, Y.-C. (2012). Corporate social responsibility (CSR) as a halo effect in issue management: public response to negative news about pro-social local private companies. *Asian J. Commun.* 22, 372–385. doi: 10.1080/01292986.2012.681666

Clark, M. A., Springmann, M., Hill, J., and Tilman, D. (2019). Multiple health and environmental impacts of foods. *Proc. Natl. Acad. Sci. U.S.A.* 116, 23357–23362. doi: 10.1073/pnas.1906908116

Dawar, N., and Pillutla, M. M. (2000). Impact of product-harm crises on brand equity: the moderating role of consumer expectations. *J. Mark. Res.* 37, 215–226. doi: 10.1509/jmkr.37.2.215.18729

Demartini, E., Ricci, E. C., Mattavelli, S., Stranieri, S., Gaviglio, A., Banterle, A., et al. (2018). Exploring consumer biased evaluations: halos effects of local food and of related attributes. *Int. J. Food Syst. Dyn.* 9, 375–389. doi: 10.18461/ijfsd.v9i4.947

Domingo, N. G. G., Balasubramanian, S., Thakrar, S. K., Clark, M. A., Adams, P. J., Marshall, J. D., et al. (2021). Air quality–related health damages of food. *PNAS* 118:e2013637118. doi: 10.1073/pnas.2013637118

Dominick, S. R., Fullerton, C., Widmar, N. J. O., and Wang, H. (2018). Consumer associations with the "all natural" food label. *J. Food Prod. Mar.* 24, 249–262. doi: 10.1080/10454446.2017.1285262

Edwards, J. R., and Lambert, L. S. (2007). Methods for integrating moderation and mediation: a general analytical framework using moderated path analysis. *Psychol. Methods* 12, 1–22. doi: 10.1037/1082-989X.12.1.1

Estévez-Moreno, L. X., Miranda-de la Lama, G. C., and Miguel-Pacheco, G. G. (2022). Consumer attitudes towards farm animal welfare in Argentina, Chile, Colombia, Ecuador, Peru and Bolivia: a segmentation-based study. *Meat Sci.* 187:108747. doi: 10.1016/j.meatsci.2022.108747

Faul, F., Erdfelder, E., Lang, A.-G., and Buchner, A. (2007). G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav. Res. Methods* 39, 175–191. doi: 10.3758/BF03193146

Fitzpatrick, M. (2009). "Seoul food." *The Guardian*. Available online at: https://www.theguardian.com/lifeandstyle/wordofmouth/2009/oct/23/korea-dog-meat-food-livestock (accessed July 1, 2022).

Gaetano, J. (2019). *Welch's t-test for comparing two independent groups: An Excel calculator (1.0.1). [Microsoft Excel workbook]*. doi: 10.13140/RG.2.2.14550.91209/2. Retrieved from: https://www.researchgate.net/publication/332217175_Welch's_t-test_for_comparing_two_independent_groups_An_Excel_calculator_101

Godfray, H. C. J., Aveyard, P., Garnett, T., Hall, J. W., Key, T. J., Lorimer, J., et al. (2018). Meat consumption, health, and the environment. *Science* 361:eaam5324. doi: 10.1126/science.aam5324

Hain, M. (2017). How good products make you feel: the underlying emotions of ethical consumerism. *Maastricht University Journal of Sustainability Studies 3*. Available online at: https://openjournals.maastrichtuniversity.nl/SustainabilityStudies'/article/view/509 (accessed July 5, 2022).

Harper, G. C., and Makatouni, A. (2002). Consumer perception of organic food production and farm animal welfare. *Br. Food J.* 104, 287–299. doi: 10.1108/00070700210425723

Harth, N. S., Leach, C. W., and Kessler, T. (2013). Guilt, anger, and pride about in-group environmental behaviour: different emotions predict distinct intentions. *J. Environ. Psychol.* 34, 18–26. doi: 10.1016/j.jenvp.2012.12.005

Haws, K. L., Winterich, K. P., and Naylor, R. W. (2014). Seeing the world through GREEN-tinted glasses: green consumption values and responses to environmentally friendly products. *J. Consum. Psychol.* 24, 336–354. doi: 10.1016/j.jcps.2013.11.002

Hayek, M. N., Harwatt, H., Ripple, W. J., and Mueller, N. D. (2020). The carbon opportunity cost of animal-sourced food production on land. *Nat. Sustain.* 4, 21–24. doi: 10.1038/s41893-020-00603-4

Hayes, A. F. (2018). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*, *2nd Edn*. New York, NY: Guilford Press.

Hayes, A. F., Montoya, A. K., and Rockwood, N. J. (2017). The analysis of mechanisms and their contingencies: PROCESS *versus* structural equation modeling. *Australas. Mark. J.* 25, 76–81. doi: 10.1016/j.ausmj.2017.02.001

Hayes, A. F., and Preacher, K. J. (2014). Statistical mediation analysis with a multicategorical independent variable. *Br. J. Math. Stat. Psychol.* 67, 451–470. doi: 10.1111/bmsp.12028

Herzog, H. A., and Golden, L. L. (2009). Moral emotions and social activism: the case of animal rights. *J. Soc. Issues* 65, 485–498. doi: 10.1111/j.1540-4560.2009.01610.x

Ingenbleek, P. T. M., Immink, V. M., Spoolder, H. A. M., Bokma, M. H., and Keeling, L. J. (2012). EU animal welfare policy: developing a comprehensive policy framework. *Food Policy* 37, 690–699. doi: 10.1016/j.foodpol.2012.07.001

Jin, C.-H., and Lee, J.-Y. (2019). The halo effect of CSR activity: types of CSR activity and negative information effects. *Sustainability* 11:2067. doi: 10.3390/su11072067

Joy, M. K., Rankin, D. A., Wöhler, L., Boyce, P., Canning, A., Foote, K. J., et al. (2022). The grey water footprint of milk due to nitrate leaching from dairy farms in Canterbury, New Zealand. *Australas. J. Environ. Manage.* 29, 177–199. doi: 10.1080/14486563.2022.2068685

Kahneman, D. (2011). *Thinking, Fast and Slow*. London: Allen Lane.

Kohan, S. E. (2021). Customers seek purpose driven companies creating a rise in b corps. *Forbes*. Available online at: https://www.forbes.com/sites/shelleykohan/2021/03/28/customers-seek-purpose-driven-companies-creating-a-rise-in-b-corps/ (accessed July 18, 2022).

Kwasny, T., Dobernig, K., and Riefler, P. (2022). Towards reduced meat consumption: a systematic literature review of intervention effectiveness, 2001–2019. *Appetite* 168:105739. doi: 10.1016/j.appet.2021.105739

Lagerkvist, C. J., and Hess, S. (2011). A meta-analysis of consumer willingness to pay for farm animal welfare. *Eur. Rev. Agric. Econ.* 38, 55–78. doi: 10.1093/erae/jbq043

Lee, W. J., Shimizu, M., Kniffin, K. M., and Wansink, B. (2013). You taste what you see: do organic labels bias taste perceptions? *Food Qual. Prefer.* 29, 33–39. doi: 10.1016/j.foodqual.2013.01.010

Lusk, J. L., and Briggeman, B. C. (2009). Food Values. *Am. J. Agric. Econ.* 91, 184–196. doi: 10.1111/j.1467-8276.2008.01175.x

March, M. D., Haskell, M. J., Chagunda, M. G. G., Langford, F. M., and Roberts, D. J. (2014). Current trends in British dairy management regimens. *J. Dairy Sci.* 97, 7985–7994. doi: 10.3168/jds.2014-8265

Mathur, M. B., Peacock, J., Reichling, D. B., Nadler, J., Bain, P. A., Gardner, C. D., et al. (2021). Interventions to reduce meat consumption by appealing to animal welfare: meta-analysis and evidence-based recommendations. *Appetite* 164:105277. doi: 10.1016/j.appet.2021.105277

Mazhary, H. (2021). Distancing animal death: geographies of killing and making killable. *Geogr. Compass* 15:e12582. doi: 10.1111/gec3.12582

Piazza, J., and Loughnan, S. (2016). When meat gets personal, animals' minds matter less: motivated use of intelligence information in judgments of moral standing. *Soc. Psychol. Personal. Sci.* 7, 867–874. doi: 10.1177/1948550616660159

Poore, J., and Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science* 360, 987–992. doi: 10.1126/science.aaq0216

Preacher, K. J., and Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behav. Res. Methods Instrum. Comp.* 36, 717–731. doi: 10.3758/BF03206553

Richetin, J., Caputo, V., Demartini, E., Conner, M., and Perugini, M. (2022). Organic food labels bias food healthiness perceptions: estimating healthiness equivalence using a discrete choice experiment. *Appetite* 172:105970. doi: 10.1016/j.appet.2022.105970

Robbins, J., Weary, D., Schuppli, C., and von Keyserlingk, M. (2015). Stakeholder views on treating pain due to dehorning dairy calves. *Anim. Welf.* 24, 399–406. doi: 10.7120/09627286.24.4.399

Rozin, P., and Royzman, E. B. (2001). Negativity bias, negativity dominance, and contagion. *Pers. Soc. Psychol. Rev.* 5, 296–320. doi: 10.1207/S15327957PSPR0504_2

Ruby, M. B., and Heine, S. J. (2012). Too close to home. Factors predicting meat avoidance. *Appetite* 59, 47–52. doi: 10.1016/j.appet.2012.03.020

Sanchez-Sabate, R., and Sabaté, J. (2019). Consumer attitudes towards environmental concerns of meat consumption: a systematic review. *IJERPH* 16:1220. doi: 10.3390/ijerph16071220

Schuldt, J. P., Muller, D., and Schwarz, N. (2012). The "Fair Trade" effect: health halos from social ethics claims. *Soc. Psychol. Personal. Sci.* 3, 581–589. doi: 10.1177/1948550611431643

Schuldt, J. P., and Schwarz, N. (2010). The "organic" path to obesity? Organic claims influence calorie judgments and exercise recommendations. *Judgm. Decis. Mak.* 5, 144–150.

Sharma, S. (2020). *Milking the Planet. Institute for Agriculture and Trade Policy.* Available online at: https://www.iatp.org/milking-planet (accessed July 9, 2020).

Sheehan and Lee (2014). What's cruel about cruelty free: an exploration of consumers, moral heuristics, and public policy. *J. Anim. Ethics* 4, 1–15. doi: 10.5406/janimalethics.4.2.0001

Shepon, A., Eshel, G., Noor, E., and Milo, R. (2018). The opportunity cost of animal based diets exceeds all food losses. *Proc. Natl. Acad. Sci. U.S.A.* 115, 3804–3809. doi: 10.1073/pnas.1713820115

Shortall, O. (2019). Cows eat grass, don't they? Contrasting sociotechnical imaginaries of the role of grazing in the UK and Irish dairy sectors. *J. Rural Stud.* 72, 45–57. doi: 10.1016/j.jrurstud.2019.10.004

Slovic, P., Finucane, M. L., Peters, E., and MacGregor, D. G. (2007). The affect heuristic. *Eur. J. Oper. Res.* 177, 1333–1352. doi: 10.1016/j.ejor.2005.04.006

Smith, N. C., Read, D., and Lopez, S. (2018). CSR Halo: The gift that keeps on giving? (INSEAD Working Paper No. 2018/07/ATL/Social Innovation Centre). Available online at: https://ssrn.com/abstract=3135132

Smith, N. C., Read, D., and López-Rodríguez, S. (2010). *Consumer perceptions of corporate social responsibility: The CSR halo effect (INSEAD Working Paper No. 2010/16/INSEAD Social Innovation Centre)*. Available online at: https://ssrn.com/abstract=1577000

Sörqvist, P., Haga, A., Langeborg, L., Holmgren, M., Wallinder, M., Nöstl, A., et al. (2015). The green halo: Mechanisms and limits of the eco-label effect. *Food Qual. Prefer.* 43, 1–9. doi: 10.1016/j.foodqual.2015.02.001

Spain, C. V., Freund, D., Mohan-Gibbons, H., Meadow, R. G., and Beacham, L. (2018). Are they buying it? United States consumers' changing attitudes toward more humanely raised meat, eggs, and dairy. *Animals* 8, 128. doi: 10.3390/ani8080128

Steentjes, K. (2021). *UK Public Concern Over Climate Crisis 'At All-Time High' as Crucial COP26 Summit Begins.* Cardiff University. Available online at: https://www.cardiff.ac.uk/news/view/2581272-uk-public-concern-over-climate-crisis-at-all-time-high-as-crucial-cop26-summit-begins (accessed July 17, 2022).

Stewart, C., Piernas, C., Cook, B., and Jebb, S. A. (2021). Trends in UK meat consumption: analysis of data from years 1–11 (2008–09 to 2018–19) of the National Diet and Nutrition Survey rolling programme. *Lancet Planet. Health* 5, e699–e708. doi: 10.1016/S2542-5196(21)00228-X

Stroebe, W., and Strack, F. (2014). The alleged crisis and the illusion of exact replication. *Perspect. Psychol. Sci.* 9, 59–71. doi: 10.1177/1745691613514450

Taverner, C. (2015). *British Public want Dairy Cows Grazing, Poll Shows. Farmers Weekly*. Available online at: https://www.fwi.co.uk/business/british-public-want-dairy-cows-grazing-poll-shows (accessed July 17, 2022).

Thibault, M., Pailler, S., and Freund, D. (2022). Why are they buying it?: United States consumers' intentions when purchasing meat, eggs, and dairy with welfare-related labels. *Food Ethics* 7:12. doi: 10.1007/s41055-022-00105-3

Thorndike, E. L. (1920). A constant error in psychological ratings. *J. Appl. Psychol.* 4, 25–29. doi: 10.1037/h0071663

USDA (2021). *Cheese Now Accounts for Largest Share of Dairy Cup-Equivalents in U.S. Diets*. US Department of Agriculture, Economic Research Service. Available online at: http://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=58308 (accessed July 17, 2022).

Vanhonacker, F., Van Poucke, E., Tuyttens, F., and Verbeke, W. (2010). Citizens' views on farm animal welfare and related information provision: exploratory insights from Flanders, Belgium. *J. Agric. Environ. Ethics* 23, 551–569. doi: 10.1007/s10806-010-9235-9

Vigors, B. (2018). Reducing the consumer attitude–behaviour gap in animal welfare: the potential role of 'Nudges.' *Animals* 8:232. doi: 10.3390/ani8120232

Wellesley, L., Happer, C., and Froggatt, A. (2015). *Changing Climate, Changing Diets: Pathways to Lower Meat Consumption*. London: The Royal Institute of International Affairs, Chatham House.

Wolf, C. A., Tonsor, G. T., McKendree, M. G. S., Thomson, D. U., and Swanson, J. C. (2016). Public and farmer perceptions of dairy cattle welfare in the United States. *J. Dairy Sci.* 99, 5892–5903. doi: 10.3168/jds.2015-10619

Yzerbyt, V., Muller, D., Batailler, C., and Judd, C. M. (2018). New recommendations for testing indirect effects in mediational models: the need to report and test component paths. *J. Pers. Soc. Psychol. Attitudes Soc. Cogn.* 115, 929–943. doi: 10.1037/pspa0000132