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SUBMITTED ARTICLE

Can a sustainability facts label reduce the halo surrounding organic labels?

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Abstract

Consumers often form beliefs about credence attributes unsupported by the best available evidence. In particular, prior research has revealed many consumers have overly-optimistic beliefs about the environmental and nutritional impacts of organic food. We propose and study the effects of a sustainability facts label (SFL), which displays quantitative environmental information related to global warming potential, land use, and energy use per serving size of the product. The SFL is akin to a nutrition facts label (NFL), which we also study. We surveyed a nationally representative sample of milk consumers in the United States (USA) to measure their choices and beliefs about organic vs. conventional milk under one of three different label information treatments; the NFL only, the SFL only, and both labels relative to a control without any nutrition or sustainability information. Unexpectedly, our results show that the SFL increased the likelihood of organic purchases. Facts panels altered beliefs; The participants exposed to the SFL increased their perception that organic performs better on environmental metrics, despite the fact the information contained in the label provided a nuanced picture with organic better in some dimensions and worse in others. Consistent with the information provided, consumers exposed to the NFL decreased their perception that organic had fewer calories and more protein than conventional milk. Prior beliefs about organic were found to be important determinants of choice and information acquisition.

KEYWORDS
environmental labels, halo effect, influence of beliefs, nutrition facts labels, organic

JEL CLASSIFICATION
Q10, Q13, Q18

Consumers often form beliefs about credence attributes that are unsupported by the best available evidence. These beliefs can persist precisely because the attributes are unverifiable even after consumption (Lusk, 2018). Such phenomena might be particularly likely to occur for sustainability-related claims and labels that are not tied to quantitative or verifiable outcomes. In particular, consumers often associate organic labeled foods with outcomes that are scientifically untenable, such as a heightened ability of organic food to aid weight loss relative to non-organic foods (Prada, Rodrigues, & Garrido, 2016; Schuldt & Schwarz, 2010). That is, certain labels and claims create a halo-effect, inducing consumers to believe they are better for health or the environment than they actually are even in dimensions unrelated to the targeted claims (Campbell, Khachatryan, Behe, Dennis, & Hall, 2014; Chandon, 2013; Durham, 2007; Schleenbecker & Hamm, 2013). It is traditionally thought that credence attributes can be more effectively labeled and marketed when there is standardization and third-party verification (Caswell & Mojduszka, 1996; Darby & Karni, 1973). Might a standardized "sustainability facts panel" (SFL) ameliorate the health and environmental halos that have been observed for organic food in the form of reducing selection likelihood? The purpose of this research is to answer this question.

Food labels are commonly used in the United States as a method for relaying information about food products. Examples of common food labels in the United States are the Nutrition Facts Label (NFL) and production based labels such as the USDA organic label (Costanigro, Deselnicu, & Kroll, 2015; Dumoitier, Abbo, Neuhofer, & Mcfadden, 2019; Guilabert & Wood, 2012; Van Loo, Van, Nayga, Meullenet, & Ricke, 2011; Wartella, Lichtenstein, & Boon, 2010) At present, however, there is no comparable label to provide consistent, objective information about other aspects of food production related to sustainability metrics regarding environmental impact. Absent something like a SFL, food manufacturers have utilized a host of claims and labels, including natural, cage free, non-GMO, and organic, from which consumers likely infer sustainability-related attributes. That is, consumers likely use labels, such as organic, to form beliefs about the sustainability of food products. Organic foods command a price premium, in part, because many consumers perceive them to be healthier (Aertsens, Verbeke, Mondelaers, & van Huylenbroeck, 2009; Chen, 2009; Hjelmar, 2011; Schuldt & Schwarz, 2010; Zakowska-Biemans, 2011), tastier (Aertsens et al., 2009; Hjelmar, 2011), more environmentally friendly (Chen, 2009; Hjelmar, 2011; Kim & Chung, 2011; Lockie, Lyons, Lawrence, & Mummery, 2002), and more animal-friendly (Harper & Makatouni, 2002; Hjelmar, 2011; Lockie et al., 2002). In some instances, these beliefs may lead consumers to be less inclined to exercise or stick with a specific diet plan if they perceive organic products as intrinsically healthier (Schuldt & Schwarz, 2010). Perceptions of environmental superiority may in turn bolster these preferences, thus we examine both health and environmental halo effects.

Although scientific evidence suggests that organic production may be better for the environment in some dimensions and in some instances, outcomes are highly dependent on the commodity and metric, and in some metrics and circumstances, conventional foods outperform organic (Gomiero, Paoletti, & Pimentel, 2008; Mondelaers, Aertsens, & van Huylenbroeck, 2009; Trewavas, 2001). Evidence also shows that organic food items are not substantively more nutritious than their conventional counterparts, though this perception persists among food consumers (Smith-Spangler et al., 2012). We seek to understand whether providing scientific information in the form of a food label with objective scientific data can alter the perceptions of health and environmental quality attributed to organic products. Our primary hypothesis is that providing objective scientific information in the form of standardized nutrition and sustainability labels will decrease the likelihood of purchasing organic products, given the propensity above for consumers to inflate organic's nutritional and environmental characteristics.

Although there have been many prior studies on consumer beliefs about and willingness-to-pay (WTP) for organic versus conventional food, we have yet to be aware of previous research on the effects of an objective facts label provision on choice and beliefs. Previous studies primarily focus on measuring WTP for products with organic labels accompanied by varying information treatments that provide definitions (positive or negative) of organic production or product-specific information regarding a specific attribute of the product rather than specific scientific data about environmental outcomes (Bernard & Bernard, 2010; Gifford & Bernard, 2011; McFadden & Huffman, 2017; Meas, Wuyang, Batte, Woods, & Ernst, 2015). This study also adds to the growing literature seeking to understand the relationship between consumer beliefs and food choice, particularly for organic foods (Costanigro et al., 2015; Lister, Tonsor, Brix, Schroeder, & Yang, 2017; Lusk, 2018; Lusk, Roosen, & Bieberstein, 2014; Malone & Lusk, 2017, 2018; Neuhofer & Lusk, 2021). Prior studies have identified that consumer perceptions of the environmental impacts, nutritional quality, and taste of food products are primary motivations for the purchase of products, especially for foods with a USDA organic label (Costanigro et al., 2015; Malone & Lusk, 2017; Neuhofer & Lusk, 2021). These studies primarily focused on information statements and general perceptions of organic labels and food items. We measure the impact of beliefs related to the healthiness, taste, environmental impact, and animal welfare of organic and non-organic food. As a manipulation check, we study how these beliefs change after exposure to labels.

Although this paper focuses on organic food, the underlying question is broader. It most likely applies to many other labels that do not explicitly provide scientific information but rather provide information signaling that certain standards are met. Examples include Certified Vegan, Certified Naturally Grown, and Certified Animal Welfare Approved (Certified Naturally Grown, 2015; Certified Vegan, 2017). For non-food items, the Environmental Protection Agency (EPA) runs the Energy Star certification, and Safer Choice labels (EPA, 2020). Although these labels ensure certain objective standards are met, consumers often need help to ascertain this information. Some labeling programs, such as EnergyGuide on appliances, provide quantitative scientific information to consumers, albeit in a single dimension (Newell & Siikammki, 2014).

Unlike environmental labels, which provide signals or information in a single dimension, the NFL offers information on the nutritional content and quality from multiple dimensions (FDA, 1994; Newell & Siikammki, 2014). The NFL was created in the United States in 1990, mandated for most food products in 1993, and fully implemented in 1994 (FDA, 1994), and was recently updated in 2016. The updates to the NFL include a bolder and enlarged "calories" section and updated sugars information to include "total sugars" and "added sugars" (FDA, 2016). Nutrition labels are valuable to consumers in a few different ways. First, the label enables consumers to identify and switch from "unhealthy" to "healthy" foods. Some recent studies suggest that exposure to the NFL encouraged healthier food purchases for products such as yogurt, cereal, fruit juice, snack bars, bread, and ice cream (Fang, Nayga, Snell, West, & Bazzani, 2019; Khandpur, Rimm, & Moran, 2020; Kim, Ellison, McFadden, & Prescott, 2021), while for other products such as soda, cookies, and meat, food choices did not significantly change (Graham & Roberto, 2016; Khandpur, Graham, & Roberto, 2017; Neuhofer et al., 2020) Second, nutrition labels can allow consumers to maintain a consistent level of nutrition intake while increasing their utility in other attributes like the flavor or environmental quality (Teisl, Bockstael, & Levy, 2001).

Some literature suggests that the influence of new information depends on the degree to which the new information conforms to prior beliefs (Huffman, Rousu, Shogren, & Tegene, 2007; McFadden & Lusk, 2015). Bayesian decision theory states that when individuals hold a prior belief and receive new information, they update beliefs by combining the prior belief with the new information received; the degree of updating depends on the weights attached to priors versus the new information. Traditionally, Bayesian decision theory would predict that when new information is presented that conflicts with prior beliefs, the beliefs will either remain unchanged (if the weight on prior beliefs is high) or move in the direction of the provided information. In some circumstances, however, violations of Bayesian decision theory occur due to various cognitive biases (Charness, Karni, & Levin, 2007; Charness & Levin, 2005; Kahan, Jenkins-Smith, & Braman, 2011; McFadden & Lusk, 2015; Plous, 1991; Rabin & Schrag, 1999).

People tend to be conservative in their beliefs as they over-weight their subjective prior beliefs in favor of new contradicting information (McFadden & Lusk, 2015). Confirmation bias is one of the primary cognitive biases that occur when we interact with new information with prior beliefs. Confirmation bias occurs when an individual interprets the content of the new dissenting information to conform to their prior beliefs (Bronfman et al., 2015; Kappes, Harvey, Terry Lohrenz, Montague, & Sharot, 2020; Lord, Ross, & Lepper, 1979; McFadden & Lusk, 2015; Nickerson, 1998; Plous, 1991; Talluri, Urai, Tsetsos, Usher, & Donner, 2018). Prior studies have determined that confirmation bias is prevalent for beliefs in many controversial political and scientific issues, such as capital punishment (Lord et al., 1979), the safety of nuclear technologies (Plous, 1991), genetically modified food (McFadden & Lusk, 2015), and climate change (Kahan et al., 2011; McFadden & Lusk, 2015). These studies show that confirmation bias can be so strong that it can lead individuals to either misinterpret new information or selectively read studies and related factual information to bolster prior beliefs even when the studies are either neutral or contrary with their position (Kahan et al., 2011; Lord et al., 1979; McFadden & Lusk, 2015; Plous, 1991). Kappes et al. (2020) found that respondents strengthened their prior beliefs when their partner in the experiment shared the same belief and had high confidence. Moreover, studies show that prior decisions can decrease sensitivity to new information and affect how future decisions are processed (Bronfman et al., 2015; Talluri et al., 2018).

To merge these themes of the influence of nutrition information and environmental perceptions, we explore a new label format that conveys nutritional and environmental data in something we refer to as a sustainability facts label (SFL). Currently no labels exist that combine these important scientific data in a succinct manner akin to the NFL. To measure the label's effectiveness, we conducted a survey with a nationwide sample of U.S. milk consumers who were randomly assigned to different treatments that varied the presence and type of label. Milk was selected as the product of interest due to its popularity and the abundance of studies that have analyzed the environmental impacts of milk production in the form of life cycle analyses

(Capper & Cady, 2020; Capper, Cady, & Bauman, 2009; Naranjo, Johnson, Rossow, & Kebreab, 2020; Thomassen, van Calker, Smits, Iepema, & de Boer, 2008).

1 | METHODS

1.1 | Label design

This paper explores the effects of a SFL designed to visually resemble the NFL. NFLs are mandatory labels displaying nutritional data in a concise way that enables" apples-to-apples" nutritional comparisons between products. The SFL analyzed in this paper is designed to accomplish a similar outcome insofar as allowing individuals to make "apples-to-apples" relative comparisons between products with respect to the environmental and animal welfare impacts associated with the production process.

The nutritional content between conventional and organic milk is very similar, and any observed differences between conventional and organic are mostly found in micronutrients that are not typically included in SFLs (Smith-Spangler et al., 2012). The nutritional data were collected from the FDA nutritional database, and the values for calories, total fat, cholesterol, sodium, total carbohydrates, and protein were included on the label (USDA ARS, 2021).

The SFL data were derived by reviewing previously published life-cycle analyses (LCAs).

The numbers collected and averaged were for both conventional and organic production in the United States, and European Union (EU) countries such as, the Netherlands, and Germany, from 2001–2020 (Capper et al., 2009; Capper & Cady, 2020; de Vries & de Boer, 2010; Thomassen et al., 2008). International estimates from developed nations were used for two primary reasons, one is that particularly for organic milk there is a lack of life cycle analyses conducted on US based farms. The second reason is that due certification similarities and equivalency agreements between the US and EU, the organic certifications and production methods are similar and in most cases the certifications are jointly recognized across nations trading (USDA AMS, 2016; USDA AMS, 2022). The environmental metrics chosen were global warming potential (GWP), energy use, land use, water use, and an animal welfare measurement. These metrics were chosen due to their prominence in life cycle analysis, as well as the heterogenous impacts to show strengths and weaknesses between organic and conventional production. The values are estimated from cradle to farm gate, and the units were converted to impacts per kilogram of milk. GWP values for organic and conventional production are very similar, in part because of the greater milk production per cow associated with non-organic. Energy use refers to the consumption of energy used in the production process from inputs such as electricity, and is measured in megajoules (MJ) per kilogram of milk. The review suggests that organic production uses less energy inputs than conventional alternatives. Land use is the amount of total land used in production to produce a unit of milk, including land used in production of the feed. According to the review, the amount of land used in organic production is higher than in conventional production. Water use is the amount of water inputs used in production for operations such as feed production, hydration, and waste water. The value is an aggregate sum of irrigation (blue), rainfall (green), and waste (gray) water used to produce a unit of milk. The water use between conventional and organic production is similar, though the literature on water use in dairy production is sparse.

We used the scientific units in LCAs because evidence suggests that consumers interpret standard LCA units with higher accuracy over simplified communication styles such as values converted to popular references and standardized units (Vizzoto, Testa, & Iraldo, 2021).

We know for example that with regards to energy use, consumers are more likely to think in terms of wattage rather than megajoules, however, consumers likely do not have alternative explanations to help understand LCA units (Vizzoto et al., 2021). This may in turn lead to consumers treating LCA estimates with simplistic interpretations that are dimensionless and unidirectional (less is better) (Vizzoto et al., 2021). This in turn allows for more accurate comparisons between products when using the SFL. Additionally, some research suggests that consumer WTP was higher for visual displays of environmental data than labels (Schmiess & Lusk, 2022).

The final value was an animal welfare measurement which was estimated from the COWEL ratings model. The COWEL ratings contain information on various animal welfare attributes such as, number of resting places, feed quality, bedding materials, water quality, dehorning, and air quality (Ursinus et al., 2009). These ratings were not generated from LCA metrics and instead estimated based on the USDA organic certifications for dairy (USDA, 2022) according to the framework laid out in Ursinus et al. (2009). The traditional ratings are scored from a value of 0–313, but for our ratings, we re-scaled the score to range from 0 to100. Additionally, unlike the other metrics, this is an aggregate score and not based on serving sizes like the other metrics in the SFL. Organic has a higher animal welfare score according to the COWEL model. Figure 1 shows the NFL used in the survey, Figure 2 shows the SFL used, and Figure 3 shows the combination of both labels. In the figures we show the image of the labels for the 2% fat, organic milk.

1.2 | Data collection

An online Qualtrics survey of milk consumers was conducted in March of 2021 using a nationally representative sample of the US population. The final dataset consists of 2000 respondents

FIGURE 1 Example NFL: Organic, 2% Milk.

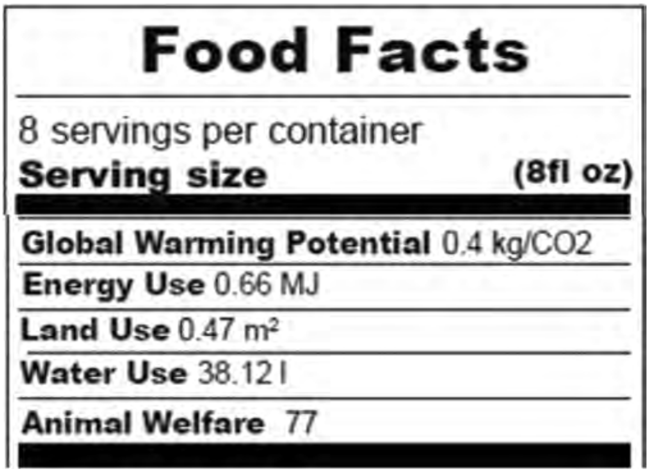

FIGURE 2 Example SFL: Organic, 2% Milk.

randomly assigned to different treatments. To qualify for the survey, participants had to state that they purchase dairy milk at least once every few months and shop for at least half the groceries in their household. The experimental flow is shown in Figure 4, and the means of the variables used in analysis are in Table 1.

1.3 | Survey design

The focal part of the survey asked respondents to make a choice between two different milk options, an organic and non-organic (conventional) gallon of milk. First, the participants made a choice with no label information (see Figure 5). This served as the control choice in which the participants were asked to make a decision between organic and conventional milk with no additional information outside of prices and the organic label. Next, the participants were randomly assigned to one of three different information treatments to make a second choice, where the milk options had one of the following labels attached (1) the NFL only, (2) the SFL only, or (3) and both the NFL and SFL (example in Figure A1). In addition to the information treatments, the participants were divided into two different price treatments that varied by price of organic milk between \$3.25 or \$5/gallon; the conventional milk price was held constant at \$3/gallon. Prices were estimated based on data from the USDA Agricultural Marketing Service (AMS) from retail prices for the two calendar years prior to the survey of 2019 and 2020. The prior 2 years were used due to potential price increases caused by the supply chain disruptions of the COVID-19 pandemic in 2020. We selected a price for organic from the lower tail and upper tail of the price distribution. Prices only varied across subjects, but were the same for each respondent for the initial and subsequently labeled choice. In summary, we utilized a partial within-subject, partial between-subject $2 \times 3 \times 2$ design: (Presence of labels: present vs. absent; within-subject) $\times$ (Label type: NFL only vs. SFL only vs. NFL + SFL; between subject) $\times$ (Organic price; \$3.25 vs. \$5; between subject). Because different subjects have different preferences for milk fat content which affects the content of the NFL label, prior to the choice questions, we asked people their preferences for milk-fat and then we showed them choices

FIGURE 3 Example of Both Labels Combined: Organic, 2% milk.

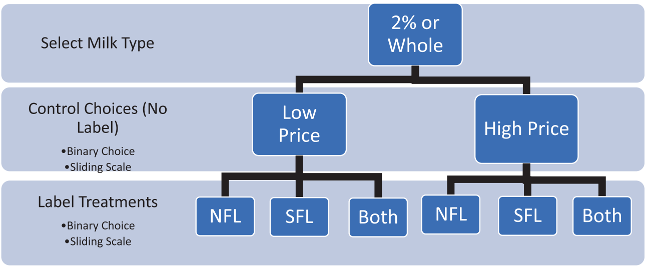

FIGURE 4 Experimental Flow.

corresponding to their preferred milkfat (either whole or 2% milk). The milkfat was always the same for organic and non-organic options for a given subject.

Because of the within-subject nature of a portion of our design, possible concerns about order effects may arise. As such, we assigned one group of subjects to a treatment in which they

TABLE 1 Overview of variables used in data analysis.

Variable name	Definition	Mean
SFL	1 if choice made in SFL treatment rather than control	0.342
NFL	1 if choice made in NFL treatment rather than control	0.341
Both labels	1 if choice made in both label treatment rather than control	0.312
Price	$3 for non-organic; $3.25 or $5 for organic depending on treatment	$1.112
Two percent versus whole	1 if respondent prefers two percent rather than whole	0.647
Taste	"Organic milk tastes better than non-organic milk" Likert value from 1–5, 1 represents "strongly disagree", 5 represents "strongly agree" (Prior to information)	2.911
Safety	"Organic milk is safer to consume than non-organic" Same format as "Taste".	3.035
Calories	"Organic milk has a lower calorie content than non-organic" Same format as "Taste"	2.824
GHG emissions	"Organic milk produces fewer greenhouse gas emissions than non-organic" Same format as "Taste"	3.038
Land and water use	"Organic milk production uses less land and water than non-organic" Same format as "Taste".	2.968
Price	"Organic milk is more expensive than non-organic" Same format as "Taste".	4.082
Protein	"Organic milk has a higher protein content than non-organic" Same format as "Taste".	2.979
Animal welfare	"Animal welfare in organic production is superior to non-organic" Same format as "Taste".	3.210
Environmental impact	"Organic milk is better for the environment than non-organic" Same format as "Taste".	3.226
Taste Difference	Value from −4 to 4	0.008
Safety Difference	Value from −4 to 4	0.015
Calories Difference	Value from −4 to 4	−0.059
GHG Emissions Difference	Value from −4 to 4	0.075
Land and Water Use Difference	Value from −4 to 4	0.082
Cost Difference	Value from −4 to 4	−0.016
Protein Difference	Value from −4 to 4	−0.067
Animal Welfare Difference	Value from −4 to 4	0.069
Environment Difference	Value from −4 to 4	0.063
Male	1 if male rather than female	0.509

(Continues)

TABLE 1 (Continued)

Variable name	Definition	Mean
Young	1 if young (under 35) rather than middle age (35–64) or senior (65+)	0.155
Middle Age	1 if middle age (35–64) rather than young (under 35) or senior (65+)	0.379
Married	1 if married rather than single, divorced or widowed	0.634
HH Size	Value from 1–5, any household larger than 5 is considered a 5	2.256
Northeast	1 if in Northeast US (NY, MA) rather than Midwest (IL, IN, WI), South (FL, GA, LA), or West (CA, WA)	0.234
Midwest	1 if in Midwest (IL, IN, WI) rather than Northeast (NY, MA), South (FL, GA, LA), or West (CA, WA)	0.235
South	1 if in South (FL, GA, LA) rather than Midwest (IL, IN, WI), Northeast (NY, MA), or West (CA, WA)	0.362
College	1 if college educated or higher rather than less	0.549
Food Stamps	1 if on SNAP (food stamp) program or not	0.150
Low Income	1 if low income (<$40,000) rather than middle income ($40,000–$99,999) or high income (> $100,000)	0.256
Middle Income	1 if middle income ($40,000–$99,999) rather than low income (<$40,000) or high income (> $100,000)	0.459
Liberal	1 if liberal rather than conservative or centrist	0.362
Conservative	1 if conservative rather than liberal or centrist	0.397
Hispanic	1 if Hispanic ethnicity than not	0.045
Non-White	1 if non-white racially (African-American, Asian, Native American etc.) than white	0.123

did not see the initial unlabeled choice and they only saw the choice that included combined SFL + NFL label.

In addition to the choices, the participants were asked to rate their strength of preference for the organic option on a 0–100 sliding scale, where 0 represented organic would certainly not be purchased, and a 100 represented organic would be purchased for certain. This question captures a continuous measure of intensity of preference beyond the binary choice.

At different points of the survey participants were asked questions regarding their beliefs of organic versus conventional milk along dimensions related to nutrition, environmental impact, and animal welfare. The same belief questions were asked both before and after the provision of the NFL or SFL labels (Figure A2). These data allow us to conduct a manipulation check to determine whether beliefs were impacted by the label information. Comparative beliefs

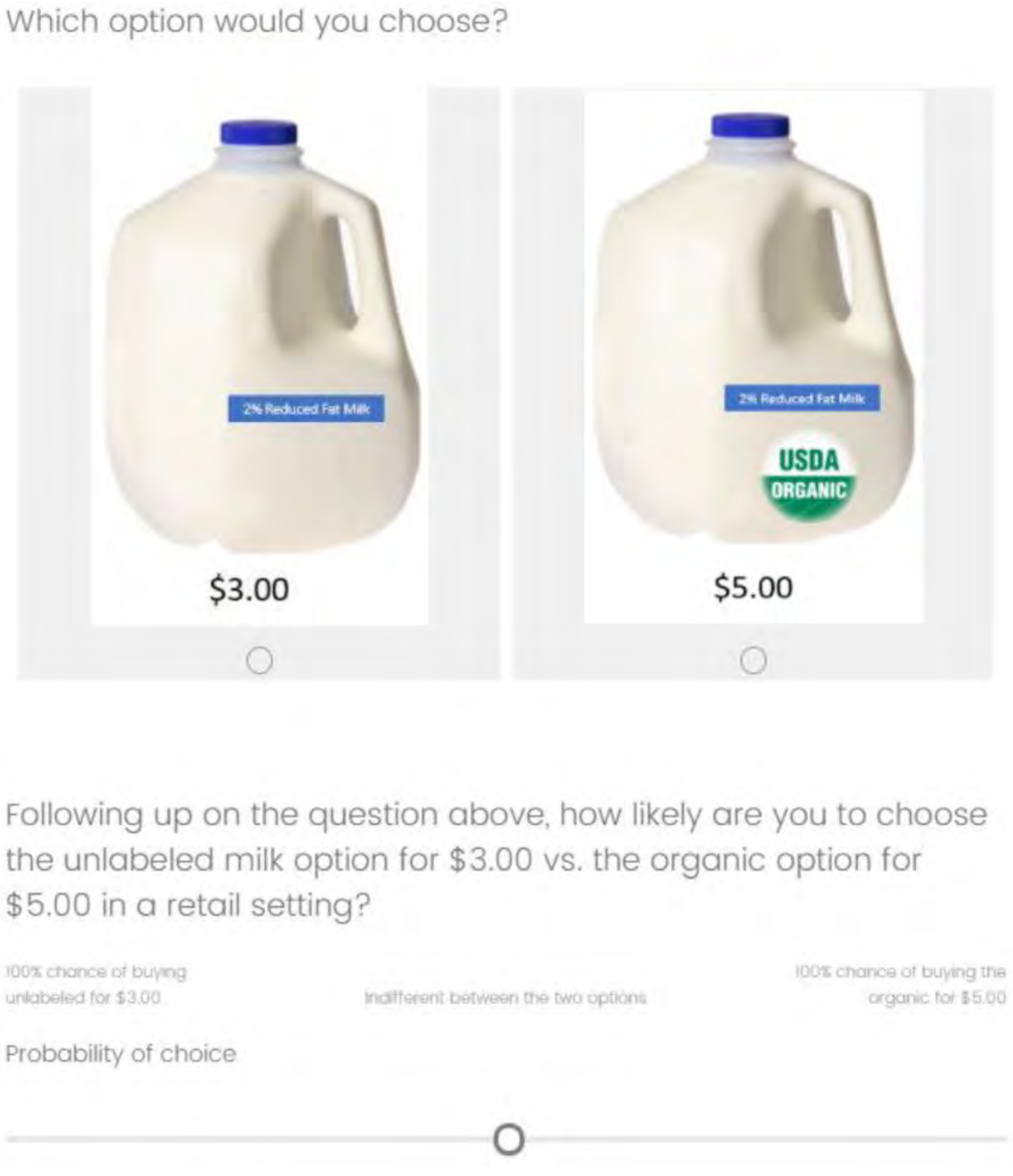

FIGURE 5 Control Choice Example with Sliding Scale.

between organic and conventional milk were measured for taste, food safety, calorie content, GHG emissions, land and water use, price, protein content, animal welfare, and environmental impact. Beliefs are measured on a 1 to 5 scale, where 5 indicates a belief that organic is much better than non-organic, and a 1 indicates a belief that non-organic is much better than organic on the underlying dimension of interest. These beliefs were then used in turn to estimate the effects of the SFL and NFL on changes to respondent beliefs, and used in models estimating changes in choice behavior patterns. A Likert scale was chosen due to its common use in the literature for simplicity of estimating beliefs (Malone & Lusk, 2017; Malone & Lusk, 2018; Neuhofer & Lusk, 2021).

1.4 | Econometric models

Random utility theory suggests an individual's utility for a choice alternative is derived from the attributes of the product (McFadden, 1974). The indirect utility participant i derives from milk option j in treatment t is denoted as:

$$V_{ijt} = \beta_{ijt} * + \alpha_{ti} * Price_{jt} + \varepsilon_{ijt}, \tag{1}$$

where β_{ijt} represents an alternative specific constant, which indicates the utility of organic or conventional milk; $Price_j$ is the price of milk options j in treatment t, α_{ti} is the marginal disutility of the price, and ε_{ijt} is a stochastic term assumed to be known to the individual but unknown to the analyst. Because each alternative specific constant is not uniquely identified, we normalize the utility of non-organic to zero, meaning β_{ijt} is the utility of organic relative to non-organic. To explore the impact of the labels on likelihood of choosing organic (and to determine whether people's preference for fat content affected the likelihood of choosing organic), we re-specify the alternative specific constant as follows: $\beta_{ijt} = \theta_{0ti} + \theta_{1ti} * NFL_j + \theta_{2ti} * SFL_j + \theta_{3ti} * Both_j + \rho_{ti} * TwoPercent_j$; θ_{0ti} indicates the preference for organic versus non-organic when no labels are present; θ_{1ti}, θ_{2ti}, and θ_{3ti} indicate how the utility of organic versus conventional changes when the NFL, SFL, or both labels are present; NFL_j, SFL_j, $Both_j$, are indicator variables for presence/absence of a label, ρ_{ti} indicates how preference for organic milk shifts when a subject's preference is for 2% versus while milk.

The utility function in (1) can be estimated using both the discrete choice data and the data from the continuous 0–100 sliding scale. A binary logistic model is estimated for the binary choice data, and an OLS model is used for the sliding scale. Because each respondent made two choices (before and after the introduction of labels), standard errors are clustered at the individual level. To account for preference heterogeneity, we also employ random effects regressions where θ_{0ti} is assumed normally distributed in the population with 1000 Halton draws.

In addition to the base specification in equation (1), we further consider the extent to which choices are affected by beliefs (and belief change) using approaches similar to that in Lusk, Schroeder, and Tonsor (2014). In particular, belief variables are added to the β_{ijt} term. We included the prior belief perceptions of taste, food safety, calories, greenhouse gas emissions, land and water use, price, protein, animal welfare, and environmental impact. This allows us to understand if stronger perceptions of these characteristics of organic relative to conventional increase the likelihood of organic selection. We also consider specifications where β_{ijt} is further expanded to include demographic variables in the appendix (Tables A1–A3).

Additionally, to aid in estimating the potential reductions in health and environmental halos, we compared the belief values both before and after exposure to the labels. A significant positive difference would indicate that exposure to the label strengthened the perception, thus indicating an increase in the perception that organic is superior to conventional, and a significant negative difference would imply that exposure to the NFL or SFL reduced the perception that organic was superior to conventional milk.

In addition to the structural random utility model, we also explore a reduced-form specifications of choice change to closely examine the impact of the prior and posterior beliefs on choice behavior. Respondents are divided into one of four categories according to their choice patterns:

(1) switched from organic to conventional; (2) switched from conventional to organic; (3) chose organic both times; or (4) chose conventional both times. We estimate a multinomial logit model (MNL) to determine how belief changes explain these choice patterns. First, we estimate the model with the prior beliefs only (i.e., the beliefs measured prior to the introduction of SFL or NFL labels) to explore how confirmation bias may affect choice patterns. Next, we re-estimate this model considering only the changes in beliefs to estimate the effects of halo affirmations or reductions on choice behavior. Our last estimation includes both the prior beliefs and changes in beliefs to capture the effects of both the prior perceptions and halo affirmations (reductions) on choice behavior.

2 | RESULTS

Summary statistics associated with propensity of choosing organic in different treatments are shown in Table 2. Respondents were more likely to choose organic in the low price treatment (39–45%) than in the high price treatment (17–22%). The percent of subjects choosing organic increased slightly after exposure to the labels. A chi-square test of independence showed that a significant number of people changed choice either from organic to conventional or conventional to organic after exposure to the label. Further regressions were conducted to examine the isolated effects of the label on choices.

The sliding scale results similarly show that the participants favored organic in the control choice in the low price treatment (47–53%) more than in the high price treatment (28–35%) (see Table 3). In the high price treatment, some significant differences were observed in preferences for organic after exposure to the label. In the high price treatment, the likelihood of selecting organic fell after exposure to the NFL; however, organic purchase likelihood increased following exposure to the SFL. We did not observe any significant differences in the mean preferences after exposure to the labels for the treatment that saw both labels or for any of the groups in the

TABLE 2 Percent of participants who selected organic in each treatment before and after exposure to label information.

Treatment/choice	N	Before labels	After labels	Difference	p-value
High price					
NFL	220	18.18%	20.45%	2.27%	0.0001
SFL	226	17.26%	21.24%	4.78%	0.0001
Both Labels	207	21.74%	26.57%	3.57%	0.0001
No Control (Both)	212		21.23%		
Low price					
NFL	232	40.95%	40.95%	0.00%	0.0001
SFL	227	44.49%	47.58%	2.78%	0.0001
Both Labels	213	39.44%	43.66%	4.47%	0.0001
No Control (Both)	229		39.74%		

Note: A chi-square test of independence is used to test the null that choice of organic is independent of presence/absence of label.

TABLE 3 Mean response of sliding scale preference intensity for organic by treatment before and after exposure to information.

Treatment/response	*N*	Before labels	After labels	Difference	*p*-value
High price					
NFL	220	31.945	29.691	−2.255	**0.021**
SFL	226	28.770	31.212	2.443	**0.020**
Both Labels	207	34.971	36.391	1.420	0.269
No Control (Both)	212		36.245		
Low price					
NFL	232	49.560	48.578	−0.983	0.339
SFL	227	52.313	50.278	−2.035	0.177
Both Labels	213	47.582	49.981	2.399	0.077
No Control (Both)	229		50.000		

Note: A within-subject, paired t-test is used to test the null that the mean response on the sliding scale is the same before and after the provision of the label.

TABLE 4 Base effects of labels on likelihood of binary organic selection.

Variable/model	Base logit	Random effects logit
Intercept (Utility of Organic vs. non-Organic)	−0.116 (0.132)	−0.392 (0.279)
Standard Deviation of Random Intercept	–	8.284 (0.459)
SFL	0.296** (0.103)	0.950** (0.252)
NFL	0.131 (0.105)	0.483 (0.263)
Both Labels	0.242* (0.108)	0.914** (0.251)
Price	−0.541** (0.069)	−1.980** (0.333)
Two Percent versus Whole	−0.407** (0.119)	−1.514** (0.146)
−2 Log Likelihood	3158.361	2291.636
AIC	3146.361	2305.600

Note: A * denotes significance at the 5% level, and ** denotes significance at the 1% level. The values in () denote standard errors, which are clustered at the individual level. In the random effects logit, the third value is the variance estimate of the random intercept term, followed by its standard error.

low price treatment. The initial summary results in Tables 2 and 3 do not provide much support the hypothesis that SFL labels reduce the likelihood of organic selection, however, it is important to further consider approaches that control for fat-content preferences and price-levels, and to explore whether labels affected beliefs.

Table 4 reports random utility estimates using choice data. Results reveal relatively low WTP for organic versus non-organic in the control treatment without labels. A simple WTP estimation is taken by dividing the ASC by the negative effect of the price difference. WTP for organic versus non-organic ranges from (−0.12/0.54) = −\$0.22 gallon to (−0.39/1.98) = −\$0.20/gallon across the two model specifications of the base logit and the random effects logit for consumers who prefer whole milk without exposure to labels. While these values are small, they are not inconsistent with previous estimates suggesting not all consumers prefer organic (Kim, Lusk, & Wade

TABLE 5 Base effects of labels on organic sliding scale preference intensity.

Variable/model	OLS	Random effects model
Intercept (Utility of Organic vs. non-Organic)	55.094** (2.223)	55.102** (1.005)
Standard deviation of random intercept		12.710** (0.100)
SFL	1.180 (1.581)	2.072 (0.902)
NFL	−0.764 (1.575)	−1.819 (0.938)
Both Labels	1.215 (1.669)	1.362 (0.884)
Price	−9.921** (1.134)	−9.914** (0.494)
Two Percent versus whole	−5.295* (2.085)	−5.295** (2.050)
R^2	0.059	

Note: A * denotes significance at the 5% level, and ** denotes significance at the 1% level. The values in parentheses denote standard errors, which are clustered at the individual level.

TABLE 6 Difference in mean belief perceptions before and after exposure to label treatments.

Variable/treatment	NFL	SFL	Both labels
Difference			
Taste	−0.002	0.009	0.019
Safety	−0.009	0.049	0.005
Calories	−0.179**	0.049	−0.045
GHG	−0.086*	0.168**	0.150**
Land/Water Use	−0.027	0.121*	0.155**
Price	−0.033	−0.004	−0.010
Protein	−0.126**	0.071*	−0.152**
Welfare	−0.027	0.119**	0.119**
Environment	−0.044	0.163**	0.071*

Note: Each row designates the average difference in the beliefs before and after exposure to the label on a 1 to 5 scale, where 1 indicates conventional is better and 5 indicates conventional is better. A paired t-test is used to measure if the difference in means is significantly different from zero. A * denotes significance at the 5% level and ** denotes significance at the 1% level.

Brorsen, 2018; Lusk, 2011). When accounting for heterogeneity via a random effects specification, we observe a standard deviation of 8.284, implying a significant stratification in the individual utility for organic milk absent any labels. Respondents who selected from 2% milk were significantly less likely to purchase organic than those purchasing whole milk. Estimates indicate preferences for organic increased after viewing the SFL, and the effect becomes stronger when accounting for individual heterogeneity with random effects. The random-effects specification also indicates the combination SFL + NFL label was associated with an increase in utility for organic versus conventional. These findings are the opposite of that hypothesized, which was that the introduction of the SFL and NFL would significantly decrease the likelihood of organic purchase.

Table 5 shows random utility estimates using the sliding scale question data as the outcome of interest. Note the estimates are in "probability space" rather than "utility space." The constant term indicates the probability of choosing organic in the control (i.e., no label) treatment for respondents who prefer whole milk. In the OLS specification, this intercept is 55.09, indicating a slight preference for organic over non-organic. The price difference that would induce the average consumer to have the same probability of buying organic versus non-organic under the generic OLS (i.e., consumers' WTP for organic) is (55.09–50)/9.92 = \$0.51/gallon, while under the random effects specification we observe a WTP of (55.10–50)/9.91 = \$0.51. In the random effects specification, we also observe a standard deviation of 34.472 similarly implying a significant stratification in preferences for organic absent the labels. Consistent with the binary choice regressions, we observe significant negative price effects and find that consumers selecting from 2% options had weaker preferences for organic than those selecting from whole milk. Results indicate provision of the NFL and SFL did not significantly affect the likelihood of choosing organic.

Given that the analyses in Tables 4 and 5 show little support for the hypothesis that provision of "objective" nutritional and sustainability data reduces health and environmental halos associated with organic, we must ask whether our results pass manipulation checks. That is, did the provision of SFL and NFL labels even change people's beliefs in the anticipated directions? We observed changes in several beliefs after exposure to the labels, with the general trend showing that respondents significantly altered their beliefs in areas explicitly shown in the label they were exposed to (Table 6; Table A4). For example, in the treatment where subjects viewed the NFL only, we observe significant decreases in the perception that organic milk has fewer calories and more protein than conventional alternatives according to a within-subject t-test, as calories and protein are visible in the NFL. Additionally, though unrelated to the NFL itself, the participants decreased their perception that organic milk production emitted fewer greenhouse gasses than conventional alternatives, suggesting evidence of a halo effect as beliefs in one dimension spill over into another. In the SFL only label treatment, there were significant increases in the perception that organic milk production is superior to conventional in the metrics of greenhouse gasses, land and water use, animal welfare, and general environmental impact, which are the focal points of the SFL information content. Interestingly, the perception that organic has more protein content than conventional alternatives significantly increased on average. This may provide further evidence of a halo effect spilling over from one dimension to another. In the treatment where subjects viewed both labels effects are similar to the SFL treatment, with increases in the perception of organic in environmental impacts and animal welfare. In the combined label treatment, we also observe similar effects to the NFL treatment in that participants decreased their perception that organic milk alternatives have more protein content than conventional alternatives.

2.1 | Effects of beliefs on choice change

Our final set of models examine the effects of the participants' prior and posterior beliefs on choice behavior using reduced form approaches (Table 7). Further reduced form estimates of the effects of the beliefs can be found in the (Tables A1–A3). For the dependent variable of the MNL model each respondent is placed into one of four choice bins based on how their behavior changed or did not change over the course of the two binary choice decisions made. The bins were divided as follows: (1) switched from organic to conventional, (2) switched from conventional to organic, (3) remained organic, and (4) remained conventional. Each of the estimates can be interpreted as the likelihood of choice pattern (1), (2), or (3) relative to choice pattern (4) in which consumers chose convention before and after information. When controlling only

TABLE 7 Reduced form multinomial logit estimates examining effects of prior and belief differences on choice patterns.

Variable/model	Prior beliefs only			Belief changes only			Beliefs + control covariates		
Bin	Organic to conventional	Conventional to organic	Remain organic	Organic to conventional	Conventional to organic	Remain organic	Organic to conventional	Conventional to organic	Remain organic
Value in each bin	35	75	369	35	75	369	35	75	369
ASC	−7.357* (1.044)	6.740 (0.788)	−5.638* (0.467)	−3.443* (0.208)	−2.577* (0.137)	−0.828 (0.064)	−6.563* (1.530)	−7.024* (1.142)	−5.153* (0.681)
Taste	0.362 (0.258)	0.391 (0.188)	0.640* (0.111)				0.960* (0.351)	0.517* (0.229)	1.008* (0.148)
Safety	0.421 (0.268)	0.260 (0.188)	0.304 (0.107)				0.267 (0.374)	0.792* (0.256)	0.544* (0.152)
Calories	−0.123 (0.28)	−0.175 (0.198)	−0.157 (0.115)				−0.183 (0.407)	−0.244 (0.258)	−0.271 (0.171)
GHG Emissions	0.106 (0.293)	−0.130 (0.214)	−0.038 (0.12)				0.116 (0.452)	−0.242 (0.311)	−0.381* (0.186)
Land and Water Use	0.394 (0.282)	0.720 (0.207)	0.195* (0.116)				0.154 (0.365)	0.858* (0.275)	0.221 (0.163)
Price	−0.283 (0.205)	0.045 (0.150)	−0.065 (0.084)				−0.177 (0.277)	−0.106 (0.204)	−0.181 (0.115)
Protein	0.273 (0.291)	0.179 (0.21)	−0.075 (0.121)				0.027 (0.372)	0.028 (0.256)	−0.183 (0.168)
Animal Welfare	−0.422 (0.293)	−0.096 (0.215)	0.211 (0.122)				−0.243 (0.405)	0.213 (0.294)	0.482* (0.174)
Environment	0.643* (0.313)	0.181 (0.222)	0.492 (0.128)				0.185 (0.406)	−0.143 (0.301)	0.562* (0.182)
Taste Difference				0.500* (0.230)	0.026 (0.181)	0.237 (0.101)	0.594* (0.298)	0.280 (0.199)	0.568* (0.141)
Safety Difference				−0.345 (0.237)	0.370* (0.171)	0.149 (0.092)	−0.103 (0.313)	0.951* (0.230)	0.658* (0.141)
Calories Difference				0.056 (0.250)	0.294 (0.164)	0.133 (0.092)	−0.201 (0.342)	0.050 (0.212)	−0.092 (0.142)
GHG Emissions Difference				−0.440* (0.197)	0.173 (0.162)	−0.089 (0.085)	−0.139 (0.313)	0.139 (0.234)	−0.175 (0.144)
Land and Water Use Difference				−0.493* (0.186)	−0.083 (0.149)	−0.054 (0.081)	−0.502* (0.243)	0.314 (0.203)	0.035 (0.123)
Cost Difference				−0.090 (0.192)	−0.200 (0.143)	−0.074 (0.076)	−0.158 (0.267)	−0.316 (0.205)	−0.109 (0.125)
Protein Difference				−0.274 (0.235)	0.009 (0.172)	0.018 (0.092)	−0.304 (0.307)	0.099 (0.214)	−0.152 (0.143)
Animal Welfare Difference				0.226 (0.219)	0.339* (0.167)	0.048 (0.090)	0.182 (0.311)	0.499* (0.236)	0.403* (0.143)
Environment Difference				−0.406 (0.233)	0.144 (0.184)	0.068 (0.101)	−0.246 (0.319)	0.113 (0.239)	0.407* (0.157)
SFL Treatment							0.338 (0.503)	0.506 (0.368)	0.066 (0.201)

(Continues)

TABLE 7 (Continued)

Variable/model	Prior beliefs only			Belief changes only			Beliefs + control covariates		
Bin	Organic to conventional	Conventional to organic	Remain organic	Organic to conventional	Conventional to organic	Remain organic	Organic to conventional	Conventional to organic	Remain organic
Both Label Treatment							0.345 (0.488)	0.798* (0.359)	−0.033 (0.202)
Price Difference							−0.882* (0.250)	−0.624* (0.165)	−0.999* (0.102)
Two percent versus Whole							−0.419 (0.411)	−0.020 (0.294)	−0.143 (0.174)
Male							0.259 (0.414)	−0.693* (0.298)	−0.081 (0.171)
Young							1.440* (0.629)	1.375* (0.437)	0.443 (0.281)
Middle Age							0.175 (0.592)	0.552 (0.371)	0.372 (0.202)
Married							−0.840 (0.491)	−0.370 (0.340)	0.014 (0.204)
HH Size							−0.081 (0.191)	−0.106 (0.139)	0.052 (0.087)
Northeast							0.339 (0.698)	−0.442 (0.449)	−0.489 (0.255)
Midwest							0.727 (0.698)	−0.146 (0.437)	−0.724* (0.263)
South							0.063 (0.670)	−0.465 (0.412)	−0.445 (0.239)
College							0.708 (0.462)	0.265 (0.313)	0.038 (0.182)
Food Stamps							0.002 (0.490)	0.260 (0.361)	−0.453 (0.257)
Low Income							0.031 (0.605)	−0.402 (0.448)	−0.461 (0.275)
Middle Income							−0.284 (0.518)	−0.456 (0.361)	−0.283 (0.202)
Liberal							0.101 (0.522)	0.509 (0.360)	0.209 (0.210)
Conservative							−0.107 (0.550)	−0.342 (0.402)	−0.245 (0.215)
Hispanic							0.470 (0.646)	−0.044 (0.537)	−0.852* (0.421)
Non-White							0.883 (0.491)	−0.255 (0.405)	0.556* (0.246)
N	1325			1325			1325		
AIC	2072.950			2381.149			1878.682		
−2 Log-Likelihood	2012.950			2321.149			1644.682		

Note: This is table of MNL estimates. Each column represents a comparison group of choice behavior in relation to the group that remained conventional. Each standard error for the coefficients is represented using parenthesis. A * represents significance at the 5% level and a ** represents significance at the 1% level.

for the prior beliefs, respondents with a higher perception of organic in regards to environmental impact were more likely to switch from organic to conventional rather than remain conventional. Additionally, respondents with a higher prior perception of taste and land and water use were more likely to remain organic rather than remain conventional.

Next, we estimated the model when only considering the changes in beliefs before and after the information treatment. Respondents who increased their perception of GHG emissions and land and water use from organic were less likely to switch from organic to conventional rather than remain organic. As the perception of safety and animal welfare of organic increase after exposure to the labels, respondents were more likely to switch choices from conventional to organic.

When adding prior beliefs, changes in beliefs, treatments, and demographic variables to the model, we observe that respondents who have a higher prior taste perception of organic were either more likely to switch from organic to conventional, remain organic, or switch from conventional to organic rather than remain conventional. Those who had a higher prior perception of organic safety were more likely to remain organic or switch from conventional to organic than remain conventional. Respondents with a higher prior perception of GHG emissions were less likely to remain organic than remain conventional, while those with a higher prior perception of land and water use were more likely to switch from conventional to organic than remain conventional. Those with a higher prior perception of animal welfare and environmental impact of organic were more likely to have selected organic both times than conventional twice. With regards to the changes in beliefs, respondents who increased their perception of taste were more likely to remain organic or switch from organic to conventional than remain conventional, while those that increased their perception of safety were more likely to have switched from conventional to organic or remain organic than remain conventional. Respondents who increased their perception of land and water use were less likely to switch from organic to conventional than remain conventional. Those that increased their perception of animal welfare were more likely to either switch from conventional to organic or remain organic rather than remain conventional, and respondents who increased their perception of environmental impact were more likely to remain organic than remain conventional. Few significant differences occurred in behavior across the label treatments, but respondents in the treatment that viewed both labels were more likely to have switched from conventional to organic than remain conventional. Those in the high price treatment were less likely to be in any choice bin other the base of remaining conventional. A few differences were observed between varying demographics as males were less likely than females to have switched from conventional to organic rather than remain conventional. Additionally, young respondents were more likely to have switched from organic to conventional or switch from conventional to organic than older respondents. The only difference in geographic region was that respondents from the Midwest (IN, OH, IL, etc.) were less likely to be in the remain organic choice bin than those from the Western United States (CA, WA, OR etc.). Finally, Hispanic respondents were less likely to be in the remain organic bin and non-white respondents were more likely to choose organic twice than remain organic.

3 | CONCLUSIONS

Our results show that the labels had inconclusive effects on choice decisions for both the binary choice and the sliding scale choice (Tables 4 and 5). The within-subject choice models show that respondents were more likely to select organic milk in the binary choice when exposed to the SFL. Controlling for random effects showed that respondents were more likely to choose organic when exposed to both labels. The most significant effects on choice from the within-subject models were from the price difference. As is expected in economic theory as the price difference between the organic and conventional options increased, we observed a lower likelihood of organic purchase. The results from the sliding scale question showed less significance overall in the labels, but, when controlling for random effects those exposed to the SFL only increased their preference for organic. We also observe a strong negative price effect and strong effects for 2% milk as these respondents had a lower value for organic on average than those selecting from whole milk.

In general, the beliefs regarding the nutrition elements move in the expected direction. Those exposed to the NFL or both labels that viewed nutrition information significantly decreased their perception that organic has lower calorie content and more grams of protein than conventional alternatives. With regards to environmental metrics we observe the opposite effect. We initially hypothesized that these perceptions would decrease as the label reflects that there are minimal differences in the overall environmental impact between conventional and organic milk. The mean differences show that the respondents on average who viewed the SFL labels increased their perception that organic milk production emitted fewer greenhouse gasses, used less land and water, and was better for the environment. With regards to animal welfare we observe an increased perception which is expected given the label design.

Some insight into the phenomena observed in this study can be gained by the between subject models that show the effects of the beliefs on choice behavior. The effects on changes in choice show some evidence of confirmation bias in certain groups, particularly those that remained organic as these respondents relied significantly more on prior beliefs than those that chose conventional twice. Significant prior beliefs included the taste, safety, and GHG emission perceptions. Additionally, the respondents that remained organic strengthen their environmental perception of organic.

Previous literature provides some insight into these results. Consistent with prior NFL studies the revised label has mixed effects on purchase intentions, with most evidence suggesting its use for products in which the healthiness of them is ambiguous like yogurts (Fang et al., 2019), and cereals (Grebitus & Davis, 2017), while other products where the healthiness or lack thereof is commonly known such as sodas (Neuhofer et al., 2020), and potato chips (Grebitus & Davis, 2017) the label did not influence purchasing decisions much. It is possible that the labels provide utility in other ways, in that by showing the consistent health metrics between them, the label is confirming that organic is not a worse alternative in healthiness, and the consumers seek utility from other product attributes (Teisl et al., 2001).

It is unclear why the environmental perceptions associated with organic milk did not decrease with the introduction of the SFL. Environmental superiority is a commonly cited reason for organic preferences (Chen, 2009; Hjelmar, 2011; Kim & Chung, 2011; Lockie et al., 2002). We designed the SFL to reflect the scientific data that suggests that organic milk is not necessarily superior to conventional alternatives in its environmental impact (de Vries & de Boer, 2010; Thomassen et al., 2008). The results from the beliefs reflected the opposite as respondents that saw the SFL strengthened their perception of environmental superiority. This confirmation bias was reinforced by results from the MNL models. The label did not show that organic milk production performed better on metrics like general environmental impact yet the perception from respondents indicated these beliefs were reinforced and even strengthened. Prior studies show that confirmation bias can lead to a misinterpretation of evidence leading individuals to conform new information to solidify a prior belief (McFadden & Lusk, 2015; Rabin & Schrag, 1999). It is also possible that the respondents have preferences for organic for different reasons than its perceived environmental benefits and the SFL allows them to select a product of similar environmental impact while seeking utility in other product attributes (Teisl et al., 2001). One example, may be that consumers placed a higher value on animal welfare in production than environmental attributes, as consumer concern for animal welfare has increased in recent years. Another potential reason for the belief discrepancies may be that the consumers did not fully understand the LCA data, and it is possible that other unit approximations should be considered for a SFL (Vizzoto et al., 2021).

These results suggest that assuming a preference for organic, nutritional, and environmental information that show direct scientific data between conventional and organic do not significantly alter preferences. It is possible that other unobserved attributes of organic milk could be contributing to the increased likelihood of purchase after SFL exposure, and the SFL allows consumers to maintain these preferences while not sacrificing environmental impact. It is also possible that the information in the label was misinterpreted by participants and they did not see the link between the beliefs and the scientific information presented in the label. Additionally, the information presented in the SFL may not be a primary focus of the participants when making selections. Future research could include an emphasis on environmental messages rather than scientific data, or different unit approximations in a similar SFL format. An example of a different unit approximation may be "carbon emissions per mile traveled by a car" rather than kilograms of CO2 equivalents. Additionally, future research could consider providing a "recommended daily value" for a sustainable diet for each of the SFL label item, similar to the % Daily Value seen in the NFL.

REFERENCES

Aertsens, Joris, Wim Verbeke, Koen Mondelaers, and Guido van Huylenbroeck. 2009. "Personal Determinants of Organic Food Consumption: A Review." *British Food Journal* 111(10): 1140–67. https://doi.org/10.1108/00070700910992961.

Bernard, John C., and Daria J. Bernard. 2010. "Comparing Parts with the Whole: Willingness to Pay for Pesticide-Free, Non-GM, and Organic Potatoes and Sweet Corn." *Journal of Agricultural and Resource Economics* 35(3): 457–75.

Bronfman, Zohar Z., Noam Brezis, Rani Moran, Konstantinos Tsetsos, Tobias Donner, and Marius Usher. 2015. "Decisions Reduce Sensitivity to Subsequent Information." *Proceedings of the Royal Society B: Biological Sciences* 282(1810): 1–10. https://doi.org/10.1098/rspb.2015.0228.

Campbell, Benjamin L., Hayk Khachatryan, Bridget K. Behe, Jennifer Dennis, and Charles Hall. 2014. "U.S. and Canadian Consumer Perception of Local and Organic Terminology." *International Food and Agribusiness Management Review* 17: 21–40.

Capper, J. L., R. A. Cady, and D. E. Bauman. 2009. "The Environmental Impact of Dairy Production: 1944 Compared with 2007." *Journal of Animal Science* 87(6): 2160–7. https://doi.org/10.2527/jas.2009-1781.

Capper, Judith L., and Roger A. Cady. 2020. "The Effects of Improved Performance in the U.S. Dairy Cattle Industry on Environmental Impacts between 2007 and 2017." *Journal of Animal Science* 98(1): 1–14. https://doi.org/10.1093/jas/skz291.

Caswell, Julie A., and Eliza M. Mojduszka. 1996. "Using Informational Labeling to Influence the Market for Quality in Food Products." *American Journal of Agricultural Economics* 78(5): 1248–53. https://doi.org/10.2307/1243501.

Chandon, Pierre. 2013. "How Package Design and Packaged-Based Marketing Claims Lead to Overeating." *Applied Economic Perspectives and Policy* 35(1): 7–31. https://doi.org/10.1093/aepp/pps028.

Charness, Gary, Edi Karni, and Dan Levin. 2007. "Individual and Group Decision Making under Risk: An Experimental Study of Bayesian Updating and Violations of First-Order Stochastic Dominance." *Journal of Risk and Uncertainty* 35(2): 129–48. https://doi.org/10.1007/s11166-007-9020-y.

Charness, Gary, and Dan Levin. 2005. “When Optimal Choices Feel Wrong: A Laboratory Study of Bayesian Updating, Complexity, and Affect.” *American Economic Review* 95(4): 1300–9. https://doi.org/10.1257/0002828054825583.

Chen, Mei Fiang. 2009. “Attitude toward Organic Foods among Taiwanese as Related to Health Consciousness, Environmental Attitudes, and the Mediating Effects of a Healthy Lifestyle.” *British Food Journal* 111(2): 165–78. https://doi.org/10.1108/00070700910931986.

Costanigro, Marco, Oana Deselnicu, and Stephan Kroll. 2015. “Food Beliefs: Elicitation, Estimation and Implications for Labeling Policy.” *Journal of Agricultural Economics* 66(1): 108–28. https://doi.org/10.1111/1477-9552.12085.

Darby, Michael R., and Edi Karni. 1973. “Free Competition and the Optimal Amount of Fraud.” *The Journal of Law and Economics* 16(1): 67–88. https://doi.org/10.1086/466756.

de Vries, M., and I. J. M. de Boer. 2010. “Comparing Environmental Impacts for Livestock Products: A Review of Life Cycle Assessments.” *Livestock Science* 128(1–3): 1–11. https://doi.org/10.1016/j.livsci.2009.11.007.

Dumoitier, Alice, Vincent Abbo, Zachary T Neuhofer, and Brandon R Mcfadden. 2019. “A Review of Nutrition Labeling and Food Choice in the United States,” 1–11. https://doi.org/10.1002/osp4.374.

Durham, Catherine A. 2007. “The Impact of Environmental and Health Motivations on the Organic Share of Produce Purchases.” *Agricultural and Resource Economics Review* 36(2): 304–20. https://doi.org/10.1017/S1068280500007115.

EPA. 2020. Recommendations of Specifications, Standards, and Ecolabels for Federal Purchasing | Sustainable Marketplace: Greener Products and Services | US EPA https://www.epa.gov/greenerproducts/recommendations-specifications-standards-and-ecolabels-federal-purchasing

Fang, D., R. M. Nayga, H. A. Snell, G. H. West, and C. Bazzani. 2019. “Evaluating USA's New Nutrition and Supplement Facts Label: Evidence from a Non-Hypothetical Choice Experiment.” *Journal of Consumer Policy* 42: 545–62. https://doi.org/10.1007/s10603-019-09426-z.

FDA. 1994. Nutrition Labeling and Education Act (NLEA) Requirments (8/94–2/95) https://www.fda.gov/ICECI/Inspections/InspectionGuides/ucm074948.htm

FDA. 2016. Changes to the Nutriton Facts Panel https://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/LabelingNutrition/ucm385663.htm?utm_source=msn

Gifford, Katie, and John C. Bernard. 2011. “The Effect of Information on Consumers' Willingness to Pay for Natural and Organic Chicken.” *International Journal of Consumer Studies* 35(3): 282–9. https://doi.org/10.1111/j.1470-6431.2010.00929.x.

Gomiero, T., M. G. Paoletti, and D. Pimentel. 2008. “Energy and Environmental Issues in Organic and Conventional Agriculture.” *Critical Reviews in Plant Sciences* 27(4): 239–54. https://doi.org/10.1080/07352680802225456.

Graham, Dan J., and Christina A. Roberto. 2016. “Evaluating the Impact of U.S. Food and Drug Administration–Proposed Nutrition Facts Label Changes on Young Adults' Visual Attention and Purchase Intentions.” *Health Education & Behavior* 43(4): 389–98. https://doi.org/10.1177/1090198116651082.

Grebitus, Carola, and George C. Davis. 2017. “Change Is Good!? Analyzing the Relationship between Attention and Nutrition Facts Panel Modifications.” *Food Policy* 73: 119–30. https://doi.org/10.1016/j.foodpol.2017.10.002.

Grown, Certified Naturally. 2015. Certified Naturally Grown https://www.cngfarming.org/faqs

Guilabert, Margarita, and John Andy Wood. 2012. “USDA Certification of Food as Organic: An Investigation of Consumer Beliefs about the Health Benefits of Organic Food.” *Journal of Food Products Marketing* 18(5): 353–68. https://doi.org/10.1080/10454446.2012.685028.

Harper, Gemma C., and Aikaterini Makatouni. 2002. “Consumer Perception of Organic Food Production and Farm Animal Welfare.” *British Food Journal* 104(3): 287–99. https://doi.org/10.1108/00070700210425723.

Hjelmar, Ulf. 2011. “Consumers' Purchase of Organic Food Products. A Matter of Convenience and Reflexive Practices.” *Appetite* 56(2): 336–44. https://doi.org/10.1016/j.appet.2010.12.019.

Huffman, Wallace E., Matthew Rousu, Jason F. Shogren, and Abebayehu Tegene. 2007. “The Effects of Prior Beliefs and Learning on Consumers' Acceptance of Genetically Modified Foods.” *Journal of Economic Behavior and Organization* 63(1): 193–206. https://doi.org/10.1016/j.jebo.2005.04.019.

Kahan, Dan M., Hank Jenkins-Smith, and Donald Braman. 2011. “Cultural Cognition of Scientific Consensus.” *Journal of Risk Research* 14(2): 147–74. https://doi.org/10.1080/13669877.2010.511246.

Kappes, Andreas, Ann H. Harvey, P. Terry Lohrenz, Read Montague, and Tali Sharot. 2020. “Confirmation Bias in the Utilization of Others' Opinion Strength.” *Nature Neuroscience* 23(1): 130–7. https://doi.org/10.1038/s41593-019-0549-2.

Khandpur, Neha, Dan J. Graham, and Christina A. Roberto. 2017. "Simplifying Mental Math: Changing how Added Sugars Are Displayed on the Nutrition Facts Label Can Improve Consumer Understanding." *Appetite* 114(July): 38–46. https://doi.org/10.1016/J.APPET.2017.03.015.

Khandpur, Neha, Eric B. Rimm, and Alyssa J. Moran. 2020. "The Influence of the New US Nutrition Facts Label on Consumer Perceptions and Understanding of Added Sugars: A Randomized Controlled Experiment." *Journal of the Academy of Nutrition and Dietetics* 120(2): 197–209. https://doi.org/10.1016/j.jand.2019.10.008.

Kim, Elizabeth Jiyoon, Brenna Ellison, Brandon McFadden, and Melissa Pflugh Prescott. 2021. "Consumers' Decisions to Access or Avoid Added Sugars Information on the Updated Nutrition Facts Label." *PLoS ONE* 16(3): 1–14. https://doi.org/10.1371/journal.pone.0249355.

Kim, Hee Yeon, and Jae Eun Chung. 2011. "Consumer Purchase Intention for Organic Personal Care Products." *Journal of Consumer Marketing* 28(1): 40–7. https://doi.org/10.1108/07363761111101930.

Kim, Seon Woong, Jayson L. Lusk, and B. Wade Brorsen. 2018. "'Look at me, I'm Buying Organic': The Effects of Social Pressure on Organic Food Purchases." *Journal of Agricultural and Resource Economics* 43(3): 364–87.

Lister, Garrett, Glynn T. Tonsor, Marcus Brix, Ted C. Schroeder, and Chen Yang. 2017. "Food Values Applied to Livestock Products." *Journal of Food Products Marketing* 23(3): 326–41. https://doi.org/10.1080/10454446.2014.1000436.

Lockie, Stewart, Kristen Lyons, Geoffrey Lawrence, and Kerry Mummery. 2002. "Eating 'Green': Motivations behind Organic Food Consumption in Australia." *Sociologia Ruralis* 42(1): 23–40. https://doi.org/10.1111/1467-9523.00200.

Loo, Ellen J., Vincenzina Caputo Van, Rodolfo M. Nayga, Jean Francois Meullenet, and Steven C. Ricke. 2011. "Consumers' Willingness to Pay for Organic Chicken Breast: Evidence from Choice Experiment." *Food Quality and Preference* 22(7): 603–13. https://doi.org/10.1016/j.foodqual.2011.02.003.

Lord, Charles G., Lee Ross, and Mark R. Lepper. 1979. "Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence." *Journal of Personality and Social Psychology* 37(11): 2098–109. https://doi.org/10.1037/0022-3514.37.11.2098.

Lusk, Jayson L. 2011. "External Validity of the Food Values Scale." *Food Quality and Preference* 22(5): 452–62. https://doi.org/10.1016/j.foodqual.2011.02.009.

Lusk, Jayson L. 2018. "Consumer Preferences for and Beliefs about Slow Growth Chicken." *Poultry Science* 97: 4159–66. https://doi.org/10.3382/ps/pey301.

Lusk, Jayson L., Jutta Roosen, and Andrea Bieberstein. 2014. "Consumer Acceptance of New Food Technologies: Causes and Roots of Controversies." *Annual Review of Resource Economics* 6(1): 381–405. https://doi.org/10.1146/annurev-resource-100913-012735.

Lusk, Jayson L., Ted C. Schroeder, and Glynn T. Tonsor. 2014. "Distinguishing Beliefs from Preferences in Food Choice." *European Review of Agricultural Economics* 41(4): 627–55. https://doi.org/10.1093/erae/jbt035.

Malone, Trey, and Jayson L. Lusk. 2017. "Taste Trumps Health and Safety: Incorporating Consumer Perceptions into a Discrete Choice Experiment for Meat." *Journal of Agricultural and Applied Economics* 49(1): 139–57. https://doi.org/10.1017/aae.2016.33.

Malone, Trey, and Jayson L. Lusk. 2018. "An Instrumental Variable Approach to Distinguishing Perceptions from Preferences for Beer Brands." *Managerial and Decision Economics* 39(4): 403–17. https://doi.org/10.1002/mde.2913.

McFadden, Brandon R., and Jayson L. Lusk. 2015. "Cognitive Biases in the Assimilation of Scientific Information on Global Warming and Genetically Modified Food." *Food Policy* 54: 35–43. https://doi.org/10.1016/j.foodpol.2015.04.010.

McFadden, Jonathan R., and Wallace E. Huffman. 2017. "Willingness-to-Pay for Natural, Organic, and Conventional Foods: The Effects of Information and Meaningful Labels." *Food Policy* 68: 214–32. https://doi.org/10.1016/j.foodpol.2017.02.007.

Meas, Thong, Hu Wuyang, Marvin T. Batte, Timothy A. Woods, and Stan Ernst. 2015. "Substitutes or Complements? Consumer Preference for Localand Organic Food Attributes." *American Journal of Agricultural Economics* 97(4): 1044–71. https://doi.org/10.1093/ajae/aau108.

Mondelaers, Koen, Joris Aertsens, and Guido van Huylenbroeck. 2009. "A Meta-Analysis of the Differences in Environmental Impacts between Organic and Conventional Farming." *British Food Journal* 111(10): 1098–119. https://doi.org/10.1108/00070700910992925.

Naranjo, A., A. Johnson, H. Rossow, and E. Kebreab. 2020. "Greenhouse Gas, Water, and Land Footprint per Unit of Production of the California Dairy Industry over 50 Years." *Journal of Dairy Science* 103(4): 3760–73. https://doi.org/10.3168/jds.2019-16576.

Neuhofer, Zachary, Brandon R. McFadden, Alicia Rihn, Xuan Wei, Hayk Khachatryan, and Lisa House. 2020. "Can the Updated Nutrition Facts Label Decrease Sugar-Sweetened Beverage Consumption?" *Economics and Human Biology* 37: 100867. https://doi.org/10.1016/j.ehb.2020.100867.

Neuhofer, Zachary T., and Jayson L. Lusk. 2021. "Decomposing the Value of Food Labels on Chicken." *Journal of Agricultural and Applied Economics* 53(2): 229–45. https://doi.org/10.1017/aae.2021.2.

Newell, Richard G., and Juha Siikammki. 2014. "Nudging Energy Efficiency Behavior: Role of Information Labels." *SSRN Electronic Journal* 1(4): 555–598. https://doi.org/10.2139/ssrn.2467676.

Nickerson, Raymond S. 1998. "Confirmation Bias: A Ubiquitous Phenomenon in Many Guises." *Review of General Psychology* 2(2): 175–220. https://doi.org/10.1037/1089-2680.2.2.175.

Plous, S. 1991. "Biases in the Assimilation of Technological Breakdowns: Do Accidents Make us Safer?" *Journal of Applied Social Psychology* 21(13): 1058–82. https://doi.org/10.1111/j.1559-1816.1991.tb00459.x.

Prada, Marília, David Rodrigues, and Margarida V. Garrido. 2016. "Deliberate Choices or Strong Motives: Exploring the Mechanisms Underlying the Bias of Organic Claims on Leniency Judgments." *Appetite* 103: 8–16. https://doi.org/10.1016/j.appet.2016.03.012.

Rabin, Matthew, and Joel L. Schrag. 1999. "First Impressions Matter: A Model of Confirmatory Bias." *Quarterly Journal of Economics* 114(1): 37–82. https://doi.org/10.1162/003355399555945.

Schleenbecker, Rosa, and Ulrich Hamm. 2013. "Consumers' Perception of Organic Product Characteristics. A Review." *Appetite* 71: 420–9. https://doi.org/10.1016/j.appet.2013.08.020.

Schmiess, Jacob S., and Jayson L. Lusk. 2022. "Trade-off between Animal Welfare and Environmental Impacts of Beef Production: An Analysis of Presentation Effects on Consumer Choice." *Journal of Agricultural and Resource Economics* 47(2): 278–99. https://doi.org/10.22004/ag.econ.310530.

Schuldt, Jonathon P., and Norbert Schwarz. 2010. "The 'Organic' Path to Obesity? Organic Claims Influence Calorie Judgments and Exercise Recommendations." *Judgment and Decision making* 5(3): 144–50.

Smith-Spangler, Crystal, Margaret L. Brandeau, Grace E. Hunter, J. Clay Bavinger, Maren Pearson, Paul J. Eschbach, Vandana Sundaram, et al. 2012. "Are Organic Foods Safer or Healthier than Conventional Alternatives?: A Systematic Review." *Annals of Internal Medicine* 157(5): 348–66. https://doi.org/10.7326/0003-4819-157-5-201209040-00007.

Talluri, Bharath Chandra, Anne E. Urai, Konstantinos Tsetsos, Marius Usher, and Tobias H. Donner. 2018. "Confirmation Bias through Selective Overweighting of Choice-Consistent Evidence." *Current Biology* 28(19): 3128–3135.e8. https://doi.org/10.1016/j.cub.2018.07.052.

Teisl, Mario F., Nancy E. Bockstael, and Alan Levy. 2001. "Measuring the Welfare Effects of Nutrition Information." *American Journal of Agricultural Economics* 83(1): 133–49. https://doi.org/10.1111/0002-9092.00142.

Thomassen, M. A., K. J. van Calker, M. C. J. Smits, G. L. Iepema, and I. J. M. de Boer. 2008. "Life Cycle Assessment of Conventional and Organic Milk Production in The Netherlands." *Agricultural Systems* 96(1–3): 95–107. https://doi.org/10.1016/j.agsy.2007.06.001.

Trewavas, A. 2001. "Urban Myths of Organic Farming." *Nature* 410(6827): 409–10. https://doi.org/10.1038/35068639.

Ursinus, W. W., F. Schepers, R. M. De Mol, M. B. M. Bracke, J. H. M. Metz, and P. W. G. Groot Koerkamp. 2009. "COWEL: A Decision Support System to Assess Welfare of Husbandry Systems for Dairy Cattle." *Animal Welfare* 18(4): 545–52.

USDA. 2022. "Guidelines for Organic Certification of Dairy Livestock." https://www.ams.usda.gov/sites/default/files/media/Dairy.Guidelines.pdf

USDA AMS. 2016. "Importing Organic Products in to the US. Organic Products Factsheet.pdf." https://www.ams.usda.gov/sites/default/files/media/Importing

USDA AMS. 2022. "AMS Dairy Program – EU Dairy and Composite Product Certification Programs" https://www.ams.usda.gov/services/imports-exports/dairy-exports/eu-dairy-exports

USDA ARS. 2021. "FoodData Central" https://fdc.nal.usda.gov/

Vegan, Certified. 2017. Vegan Action https://vegan.org/

Vizzoto, Felipe, Francesco Testa, and Fabio Iraldo. 2021. "Towards a Sustainability Facts Panel? Life Cycle Assessment Data Outperforms Simplified Communication Styles in Terms of Consumer Comprehension." *Journal of Cleaner Production* 323: 129124. https://doi.org/10.1016/j.jclepro.2021.129124.

Wartella, Ellen A., Alice H. Lichtenstein, and Caitlin S. Boon. 2010. "Examination of Front-of-Package Nutrition Rating Systems and Symbols: Phase I Report." http://www.iom.edu/Reports/2010/Examination-of-Front-of-Package-Nutrition-Rating-Systems-and-Symbols-Phase-1-Report.aspx%5Cnhttp://www.nap.edu/catalog.php?record_id=12957%5Cnhttp://www.iom.edu/Reports/2010/Examination-of-Front-of-Package-Nutrition-Rating-.

Zakowska-Biemans, Sylwia. 2011. "Polish Consumer Food Choices and Beliefs about Organic Food." *British Food Journal* 113(1): 122–37. https://doi.org/10.1108/00070701111097385.

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APPENDIX A

TABLE A1 Binary choice model estimates accounting for prior beliefs and demographic controls.

Variable	Beliefs only	Beliefs + covariates
ASC	4.909* (0.423)	3.937* (0.571)
Taste	−0.544* (0.103)	−0.653* (0.113)
Safety	−0.294* (0.101)	−0.290* (0.109)
Calories	0.138 (0.108)	0.201 (0.119)
GHG Emissions	−0.005 (0.112)	0.035 (0.121)
Land and Water Use	−0.100 (0.109)	−0.076 (0.118)
Price	0.095 (0.079)	0.086 (0.085)
Protein	0.074 (0.113)	−0.005 (0.12)
Animal Welfare	−0.163 (0.115)	−0.170 (0.122)
Environment	−0.475* (0.12)	−0.445* (0.129)
SFL Treatment		−0.091 (0.177)
Both Label Treatment		0.033 (0.179)
Price Difference		0.840 (0.089)
Two percent versus Whole		0.172 (0.155)
Male		0.012* (0.153)
Young		−0.383* (0.243)
Middle Age		−0.353* (0.182)
Married		−0.033 (0.184)
HH Size		−0.036 (0.078)
Northeast		0.392 (0.228)
Midwest		0.587 (0.234)
South		0.336 (0.214)
College		−0.033 (0.163)
Food Stamps		0.365* (0.223)
Low Income		0.337 (0.247)
Middle Income		0.132 (0.181)
Liberal		−0.107* (0.189)
Conservative		0.188 (0.194)
Hispanic		0.627 (0.351)
Non-White		−0.755 (0.219)
AIC	1359.803	1254.043
Log-Likelihood	1339.803	1194.043

Note: A * denotes significance at the 5% level and a ** denotes significance at the or 1% level. The standard errors for the coefficients are denoted in ().

TABLE A2 Sliding scale preference intensity model estimates accounting for prior beliefs and demographic controls.

Variable	Beliefs only	Beliefs + covariates
ASC	−16.964* (4.491)	−4.575 (6.136)
Taste	8.654* (1.355)	8.708* (1.302)
Safety	5.615* (1.362)	5.416* (1.303)
Calories	−2.387 (1.451)	−3.92* (1.397)
GHG Emissions	−0.29 (1.524)	−0.388 (1.456)
Land and Water Use	2.932* (1.482)	2.06 (1.417)
Price	−2.563* (0.901)	−2.071* (0.868)
Protein	0.826 (1.495)	1.253 (1.428)
Animal Welfare	0.976 (1.474)	0.594 (1.409)
Environment	6.039* (1.556)	4.501* (1.485)
SFL Treatment		0.254 (2.038)
Both Label Treatment		−0.856 (2.083)
Price Difference		−9.892* (0.969)
Two percent versus Whole		0.487 (1.837)
Male		3.132 (1.789)
Young		11.594* (2.962)
Middle Age		7.858* (2.079)
Married		0.918 (2.154)
HH Size		0.679 (0.967)
Northeast		−2.385 (2.702)
Midwest		−2.679 (2.719)
South		−2.718 (2.529)
College		1.992 (1.897)
Food Stamps		3.087 (2.665)
Low Income		−3.787 (2.852)
Middle Income		−3.474 (2.119)
Liberal		6.404* (2.254)
Conservative		1.196 (2.228)
Hispanic		−0.714 (4.226)
Non-White		8.068* (2.772)
R^2	0.279	0.368

Note: A * denotes significance at the 5% level and a ** denotes significance at the or 1% level. The standard errors for the coefficients are denoted in ().

TABLE A3 Sliding scale preference intensity model estimates accounting for prior beliefs, changes in beliefs, and demographic controls.

Variable/model	Prior beliefs only	Belief changes only	Beliefs + control covariates
ASC	1.388 (2.071)	−0.107 (0.500)	−3.282 (3.689)
Taste	−0.116 (0.625)		−1.174 (0.887)
Safety	0.360 (0.628)		1.331 (0.943)
Calories	0.413 (0.669)		−0.627 (1.057)
GHG Emissions	−0.583 (0.703)		−0.649 (1.162)
Land and Water Use	0.520 (0.683)		1.631 (1.022)
Price	0.146 (0.416)		0.363 (0.582)
Protein	−0.675 (0.689)		1.118 (1.042)
Animal Welfare	−0.676 (0.680)		−0.051 (1.028)
Environment	0.254 (0.718)		−1.030 (1.109)
Taste Difference		−0.704 (0.761)	−1.072 (0.881)
Safety Difference		2.593* (0.708)	3.264* (0.868)
Calories Difference		−0.329 (0.702)	−0.805 (0.896)
GHG Emissions Difference		1.627* (0.651)	0.972 (0.891)
Land and Water Use Difference		0.939 (0.624)	1.495 (0.766)
Cost Difference		0.333 (0.585)	0.471 (0.667)
Protein Difference		1.096 (0.710)	2.033* (0.880)
Animal Welfare Difference		0.184 (0.692)	0.249 (0.866)
Environment Difference		0.790 (0.769)	0.011 (0.970)
SFL Treatment			0.796 (1.219)
Both Label Treatment			3.109* (1.232)
Price Difference			0.301 (0.571)
Two percent versus Whole			0.090 (1.079)
Male			−2.671* (1.052)
Young			−2.375 (1.756)
Middle Age			−0.185 (1.224)
Married			−1.729 (1.266)
HH Size			0.719 (0.568)
Northeast			−1.327 (1.586)
Midwest			−0.183 (1.600)
South			−0.854 (1.484)
College			0.342 (1.111)
Food Stamps			0.313 (1.571)
Low Income			0.185 (1.673)
Middle Income			0.440 (1.241)
Liberal			1.600 (1.327)

TABLE A3 (Continued)

Variable/model	Prior beliefs only	Belief changes only	Beliefs + control covariates
Conservative			−0.281 (1.306)
Hispanic			2.084 (2.478)
Non-White			−4.465* (1.633)
R^2	0.003	0.029	0.057

Note: This table shows the results from generalized linear models, where each column designates a model. The standard error of each coefficient is listed in (). A * denotes significance at the 5% level and ** denotes significance at the 1% level.

TABLE A4 Mean belief values before and after information exposure by treatment.

	NFL		SFL		Both labels	
Variable/treatment	Before	After	Before	After	Before	After
Taste	2.920	2.918	2.845	2.854	2.971	2.990
Safety	3.040	3.031	3.002	3.051	3.064	3.069
Calories	2.841	2.662	2.790	2.839	2.843	2.798
GHG	3.069	2.983	2.991	3.159	3.055	3.205
Land/Water Use	2.985	2.958	2.945	3.066	2.974	3.129
Price	4.095	4.062	4.020	4.015	4.133	4.124
Protein	2.958	2.832	2.890	2.960	3.098	2.945
Welfare	3.201	3.175	3.199	3.318	3.231	3.350
Environment	3.212	3.168	3.192	3.355	3.279	3.350

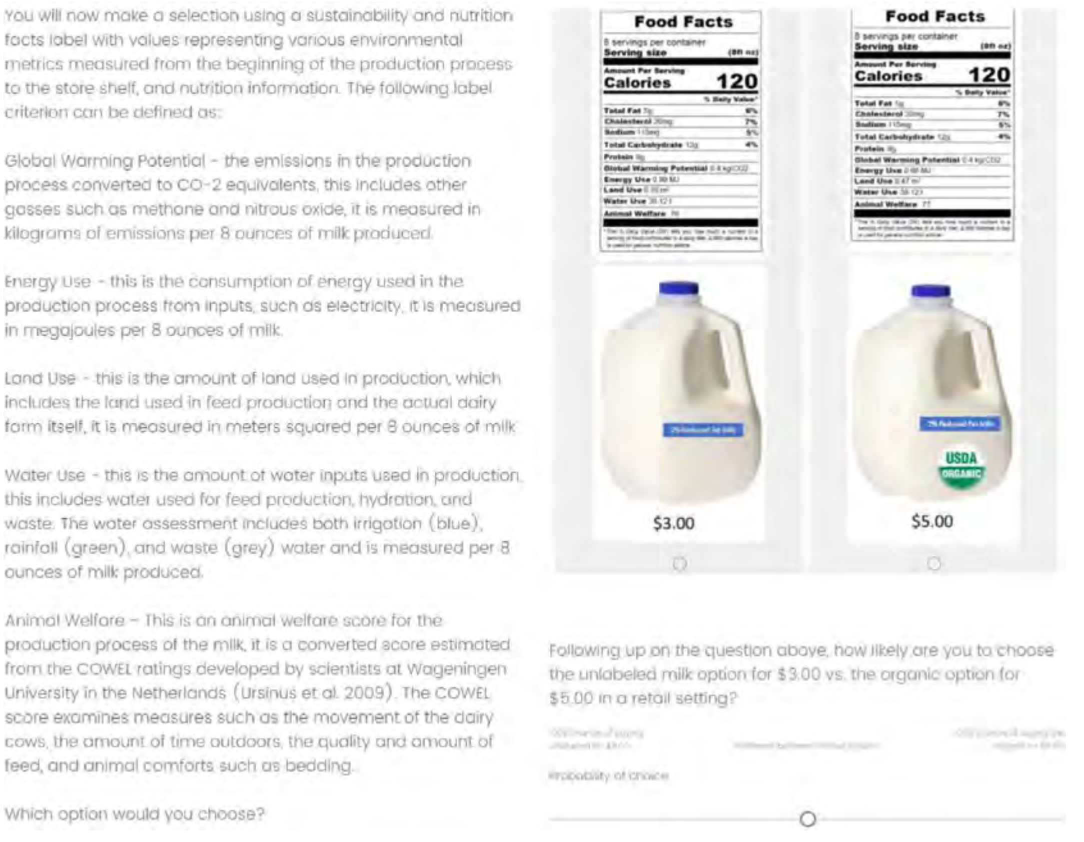

FIGURE A1 Treatment choice example: 2% milk, full label.

FIGURE A2 Belief question format.