



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*

**Information Choice vs. Exposure: An Experiment Examining the Impact of Honey Fraud Information on Consumer Valuation.**

**Christopher R. Gustafson, Agricultural Economics Department, University of Nebraska-Lincoln, [cgustafson6@unl.edu](mailto:cgustafson6@unl.edu) and Antoine Champetier, Independent Researcher, [antoinechampetier@gmail.com](mailto:antoinechampetier@gmail.com)**

***Selected Paper prepared for presentation at the 2024 Agricultural & Applied Economics Association Annual Meeting, New Orleans, LA; July 28-30, 2024***

*Copyright 2024 by Christopher R. Gustafson and Antoine Champetier. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.*

## Abstract

We conducted a novel experimental study of the implications of information exposure (vs. real-world conditions in which people select information to view) in consumer valuation experiments. We study honey fraud information choice and honey valuation in an information-rich setting. Typical studies on the impact of information on consumer valuation direct participants to read researcher-provided information, but evidence from studies of decisions in laboratory versus field settings suggest this approach overestimates the real-world impact of information when people must choose between many sources of information. We study the implications of information-rich settings in a controlled economic valuation experiment. Using a novel experiment design, we address three aims. First, we estimate the difference in valuation of honey when individuals are exposed to information vs. when they can choose to access information. Next, we examine triggers of information search when individuals can choose to access information. Finally, we study the effects of exposure to information on subsequent information gathering. The proposed research offers multiple contributions, including—most significantly—a methodological approach to more accurately predict the effect of information on behavior in real-world markets, which provides critical data to researchers and policymakers. It additionally contributes to our understanding of individuals' attention to information, identifying triggers of information search, and providing estimates of the impact of information about honey fraud on consumers' valuation of honey, which is an important determinant of pollination services, such as the number of hives maintained in commercial pollinator operations.

JEL Codes: C9, C91, D12, Q18

Keywords: Experimental auction, honey, information, methodology

## 1. Introduction

The impact of information on consumer decision-making has been a focus of food and agricultural economics research for decades (Hayes et al. 1995; Lange et al. 2002; Lusk et al. 2004; Combris, Lange and Issanchou 2006; Banerji et al. 2016; Gustafson, Lybbert and Sumner 2016a; McFadden and Huffman 2017; Demartini et al. 2018; Yang and Hobbs 2020; McFadden et al. 2021; Ortega, Lin and Ward 2022; Zossou et al. 2022). Many studies have documented significant impacts of information on consumer choice for issues important to the agriculture and food system, including novel food technologies like GMOs or CRISPR (Noussair, Robin and Ruffieux 2002; Colson and Huffman 2011), nutrition or health information (Streletskaya et al. 2016; Temple, Ziegler and Epstein 2016; Hobin et al. 2017; Gustafson and Zeballos 2018; Gustafson and Zeballos 2020; Stiletto et al. 2024), and production practices, e.g., organic (Vecchio, Van Loo and Annunziata 2016; Lombardi, Berni and Rocchi 2017; Fuller, Grebitus and Schmitz 2022). Most of these studies rely on data generated in experiments since secondary data—such as supermarket scanner data—do not document the type or amount of relevant information to which consumers are exposed (Rieger, Kuhlgatz and Anders 2016), with the exception of package-based information (e.g. Zhu, Lopez and Liu (2019)). However, even in the case of prominently placed information—such as menu-based calorie labeling or package-based nutrition or health claim information, there is strong evidence that many people do not notice or attend to this information, preventing the information from impacting their decisions (Cantor et al. 2015; Machín et al. 2023).

While experimental methods can guarantee exposure to information, recent findings suggest that such highly controlled studies of the impact of information on behavior may not effectively predict real-world outcomes. For instance, a recent study found the effect of front-of-pack nutrition information on food choices was nearly 20 times larger in laboratory experiments than in the supermarket (Dubois et al. 2021). Similar differences have been found between laboratory and field research on restaurant calorie labeling (Streletskaya et al. 2016; Gustafson and Zeballos 2018). A potential driver of these discrepancies is attention and, specifically, the allocation of attention in information-rich environments.

Attention is increasingly recognized as a scarce resource that interacts with the number of choices an individual faces in a way that changes the choice process: individuals limit attention to attributes as choices increase (Meißner, Oppewal and Huber 2020). In fact, visual attention in these environments follows systematic patterns, leading to attentional biases (Reutskaja et al. 2011; Chen et al. 2021). While these studies have focused on attention to items, as well as attributes of those items, in complex choice environments, consumers must make countless decisions about accessing and attending to information in non-experimental settings.

The standard approach to studying the impact of information on consumer behavior is to directly expose people to information and examine the effect on product valuation or choice. This practice bypasses the issue of attention allocation by directing subjects to process the information of interest for the experimenter. In non-experimental settings, myriad sources of information compete for individuals' attention, which lead some not to access information (consciously or not) that would have been explicitly presented to them in an experiment.

A recent literature has arisen that seeks to understand individuals' decisions to access information in certain circumstances. This literature investigates people strategically avoiding certain types of information, typically to avoid negative emotions (Miles et al. 2008; Melnyk and Shepperd 2012; Emanuel et al. 2015; Meerza et al. 2021; Gustafson, Brooks, et al. 2023) or to facilitate indulgent or otherwise preferred decisions (Thunström et al. 2014; Onwezen and van der Weele 2016; Thunström et al. 2016; Edenbrandt, Lagerkvist and Nordström 2021; Nordström et al. 2023).

However, in many situations, decisions to access or seek out information search may be driven by other motivations, including curiosity, to reinforce preferred beliefs, or utility/disutility associated with the information (Loewenstein 2006; Berns et al. 2006; Gottlieb et al. 2020; Wojtowicz and Loewenstein 2020; Golman et al. 2021). Further, exposure to information may in some cases be a starting point for information gathering rather than the key event. For instance, a study on non-

medically necessary adherence to a gluten-free diet found that the information source that most predicted the subject following a gluten-free diet was the subjects' own research (Arslain, Gustafson, Baishya, et al. 2021). It was even more predictive of behavior than a recommendation to follow a gluten-free diet from a medical professional (Arslain, Gustafson, Baishya, et al. 2021). Thus, while exposing all participants to information documents its impact across participants, it may not reflect what would occur in non-experimental environments in important ways.

In this paper, we report the results of an experiment on the impact of information exposure relative to information choice on valuation and subsequent information selection outcomes in the context of information about honey adulteration designed to explore the impact of information exposure versus information choice in the context of a honey valuation experiment. We hypothesize that participants who are exposed to information about honey fraud will significantly decrease their willingness to pay (WTP) for honeys of unspecified origin or that were imported (vs. US produced honeys) after exposure to information relative to a baseline (no-information) valuation round. We additionally hypothesize that the valuation of honeys will decrease significantly between the baseline and second valuation rounds for participants in information exposure relative to information choice conditions. We also examine how attention to information evolves among participants in the information choice condition across valuation rounds. We hypothesize that "environmental" factors, such as placement of information on screen, will influence the probability of participants accessing information about bee/honey-related topics. Finally, we assess participants' selection of information about honey fraud after exposure to information (versus when given the choice to examine information). We hypothesize that participants who are exposed to honey fraud information will engage in more information search about bee-related topics and will refine their valuation of bottles of honey more than participants who are not exposed to information.

## 2. Literature Review

Over the past decade, the topic of economically motivated adulteration of food products with less costly substances, or *food fraud* (Lotta and Bogue 2015)—has yielded significant research attention to both food production and consumer issues. Food fraud has long been a problem impacting both human health and the economic viability of high-value food products (Shears 2010; Spink and Moyer 2011). Recent literature suggests a surge in food fraud incidents over the past few decades (Lotta and Bogue 2015; Marvin et al. 2022), with additional evidence of an increase during the COVID-19 pandemic (Frera et al. 2021). The most active research area has focused on the production side, with research developing and testing diagnostic methods to identify adulterated products or documenting attributes of unadulterated product samples to aid in testing for adulteration (Cercaci, Rodriguez-Estrada and Lercker 2003; Everstine, Spink and Kennedy 2013; Tosun 2013; Moyer, DeVries and Spink 2017; Vetrova, Kalashnikova and Melkov 2017; Wu et al. 2017; Di Rosa et al. 2018; Shiddiq et al. 2019; Casadei et al. 2021; Chowdhury et al. 2021).

The literature on consumer response to food fraud incidents is smaller. Despite advancements in detection techniques, resulting in nearly as many instances of food fraud being detected and reported on in the media in two years (2011-12) as had been in the previous 30 years (Johnson 2014), identifying the impact of food fraud information on consumer behavior in non-experimental settings is complicated by multiple factors. Perhaps the most significant complication is accounting for exposure to information about food fraud incidents in consumer response. The use of secondary data makes it difficult to attribute changes in behavior to exposure to information, resulting in reliance on primary data collection through experiments and surveys.

Despite increased media coverage, consumer awareness and understanding of food fraud appears to be limited (Charlebois et al. 2017; Meerza and Gustafson 2019; Meerza and Gustafson 2020; Théolier et al. 2021). However, there is additional evidence of heterogeneity in awareness by country.

Individuals living in countries that have experienced high-profile food fraud incidents state less confidence in their food systems and employ various strategies to mitigate food fraud risks (Barnett et al. 2016; Kendall et al. 2019; Menozzi et al. 2015; Soon and Liu 2020). Research on consumer response to food fraud information or incidents covers multiple products that have been subject to food fraud, including meat products (Agnoli et al. 2016; Barbarossa et al. 2016; Barnett et al. 2016), olive oil (Chousou, Tsakiridou and Mattas 2018; Meerza and Gustafson 2020), fish (McCallum et al. 2021), and honey (Jones Ritten et al. 2019; Wu et al. 2015; Gustafson and Champetier 2023; Gustafson, Champetier, et al. 2023).

In each study examining consumer valuation in the context of food fraud, participants were exposed to information. Each study found significant impacts of food fraud information on product valuation (Wu et al. 2015; Meerza and Gustafson 2020; McCallum et al. 2021; Gustafson, Champetier, et al. 2023). This leaves the implications of exogenously exposing individuals to information unexamined, particularly with respect to decisions about accessing and retaining information under non-experimental conditions. However, a few papers communicate intriguing findings for these unexamined points. Meerza and Gustafson (2019) looked at the relationship between awareness of food fraud and subsequent valuation behavior in an experimental auction. This study used a multi-round valuation format. Participants bid in a baseline (i.e., pre-information) round and then answered a short survey about awareness of food fraud. Next, they read a text about problems with mislabeling and adulteration in the Italian extra virgin olive oil (EVOO) industry and subsequently submitted bids again. People who knew about food fraud (before the experiment) submitted lower bids for Italian EVOO in the baseline, pre-information round and decreased their bids less in the bidding round after information was provided (Meerza and Gustafson 2019).

While not a case of food fraud, a fully traceable food safety outbreak—salmonella in eggs—that occurred in Northern California led to a significant decrease in egg purchases in Southern California as



well, despite no presence of contaminated eggs in Southern California (Toledo and Villas-Boas 2019). A separate study, making use of the same salmonella outbreak, used pre- and post-recall egg valuation experiments to estimate the response of consumers in the Mid-Atlantic region of the United States (Li et al. 2017). The analysis yielded no significant average effects of the outbreak on consumer valuation; however, there were significant decreases in valuation in a specific subset of participants—consumers who had previously been affected by a food safety event, suggesting that information “in the field” is likely to interact with previous experiences, knowledge, or other individual-specific characteristics to determine the ultimate impact of information on behavior (Meerza and Gustafson 2019).

### 3. Experiment and Analyses

The experimental design and analysis plan was pre-registered through the Open Science Foundation’s online registry (<https://doi.org/10.17605/OSF.IO/EWXR2>). The experiment was approved by the University of Nebraska-Lincoln’s Institutional Review Board (20220221628EX). We designed an experiment comparing information exposure versus information choice around honey because it is a prime target for food fraud (García 2018; García and Schwarzinger 2021; Johnson 2014). The introduction of adulterated honey into the market poses significant economic challenges for honey producers by driving down market prices for honey and reducing demand for unadulterated honey. The price of honey is a crucial economic factor for beekeeping operations that directly influences the number of colonies maintained (Lee, Sumner and Champetier 2019), and thus also affects the provision of pollination services by honeybees (Ferrier 2021; García and Schwarzinger 2021). Estimates suggest that up to 10% of honey traded internationally is fraudulent, with a higher incidence—30% or more—in countries like China and India, which are known sources of adulterated honey (Bowman 1999; Koshy 2020; Lee 2013). A survey of U.S. honey packers found that 71% had discovered adulterated honey in their supplies (Fairchild, Nichols and Capps 2003). These packers accounted for approximately 50% of

U.S. honey sales at the time of the study. Half of the tested honey was intended for retail—that is honey sold in bottles—rather than for use in manufactured food products (Fairchild et al. 2003). Concerns about pollinator health and impacts on food production have also been widely publicized, making honey and bees a topic of broad interest (Lee et al. 2019; Plutino et al. 2022).

We recruited 150 adults from the Lincoln, Nebraska area to participate in the research. We placed recruitment materials in local establishments—e.g., supermarkets, coffee shops, restaurants—and online. The recruitment materials invited adults ( $\geq 19$  years old) who regularly purchased and consumed honey to participate in a research study on honey preferences. The recruitment materials included a link to register for a research session, which lasted from 30 to 45 minutes. We compensated participants \$30 for their time spent in the experiment and the inconvenience of coming to campus, finding parking, etc. Research sessions were held in university computer labs. Subjects participated in the experiment and completed surveys at a desktop computer in the lab. Adequate spacing was maintained between participants to prevent observation of others' decisions. We programmed the experiment and a subsequent survey in Qualtrics ([www.qualtrics.com](http://www.qualtrics.com)), which is a widely used web-based survey platform. The research instructions were provided in writing on the screen; additionally, the researcher leading the session read the instructions aloud.

### 3.a. Experiment Design

The experiment was designed around a valuation methodology that used the Becker-DeGroot-Marschak Mechanism to elicit willingness to pay (WTP) values from participants (Becker, DeGroot and Marschak 1964). The experiment featured both within and between subject elements (see Table 1). Participants bid on four bottles of honey in multiple rounds (within-subject) and were randomized to one of two conditions (between-subject): an information exposure condition or an information choice condition. Before beginning the experiment, participants completed an informed consent process, had the

valuation process explained to them, and were informed that the research assistants implementing the sessions were not involved or informed of the specific design elements of the experiment (including hypotheses), blinding them to the specific aims of the research.

Table 1: Experiment Design

Step	A. Information Exposure (n=75)	B. Information Choice (n=75)
1	Value four bottles of honey.	Value four bottles of honey.
2	Exposed to information about honey fraud	Choose information to read from multiple sources including the text that condition A participants are exposed to; honey related texts at bottom of the list of texts.
3	Value four bottles of honey.	Value four bottles of honey.
4	Choose information to read from multiple sources; honey texts in the middle of the list of texts.	Choose information to read from multiple sources; honey texts in the middle of the list of texts.
5	Value four bottles of honey.	Value four bottles of honey.
6	Choose information to read from multiple sources; honey texts at top of the list of texts.	Choose information to read from multiple sources; honey texts at top of the list of texts.
7	Value four bottles of honey.	Value four bottles of honey.
8	Beekeeping/pollination knowledge & socio-demographic survey	Beekeeping/pollination knowledge & socio-demographic survey

In both conditions, participants bid on four bottles of honey first in a baseline round, before having access to any information (step 1 in Table 1). After the baseline round, participants in the information exposure condition were exposed to a short text about honey fraud, which was an edited version of an article that had been published in an international popular press magazine (step 2A). In the information choice condition, participants could select one of 36 texts to read (step 2B). All texts were of a similar length (approximately 400 to 700 words) and covered the following general topics: business, food, entertainment, health, sports, history, science, and general interest. Instructions preceding the

information choice stated that participants should choose a text to read while other participants were completing another element of the research. After reading the honey fraud text (in the information exposure condition) or the selected text (in the information choice condition), all participants proceeded to a second round of bidding (step 3).

The remaining steps of the experiment were identical in both conditions. Following the second round of bidding, participants in both conditions were asked to choose another text to read and, after completing reading the text, bid on the bottles of honey a third time. These two elements—selecting a text followed by a round of bidding—were repeated once more, resulting in participants reading three texts and bidding on the bottles of honey in four rounds.

There are a few details about the design of the information selection task that are important to note. First, nine of the 36 texts—25%—that participants could choose to read touched on honey or bees (which we will henceforth refer to as honey-relevant texts). The topics of these articles ranged from honey fraud (including the target article in the information exposure condition), health benefits of honey, the relationship of bees to food production via pollination, and honey as or in food. The position of the honey-relevant texts changed from round to round, but in each round, the “forward” button that confirmed the participant’s choice and allowed them to proceed to read the article was at the bottom of the page, adjacent to the end of the list of articles. Thus, while one of our hypotheses states that we expect that the placement of the honey-relevant texts will influence the likelihood that a participant selects one of those texts, participants could not save time by selecting the top article and immediately moving on because they had to scroll to the bottom of the page in every case. As shown in Table 1, the honey-relevant texts in the first text selection task (Table 1, Step 2B) were at the end of the list of articles (in positions 28-36). In Table 1, Step 4, the honey-relevant texts were in the middle (positions 15-23). In Table 1, Step 6, the honey-relevant texts were at the top (positions 1-9).

In every valuation round, participants submitted bids for each of four bottles of honey. The bottles were procured from a local supermarket and featured a mix of store and non-store brands. To avoid having inter-individual differences in store-brand familiarity influence the results, the honey bottles' labels and brand names were not provided to participants during the experiment—an approach that has been taken in previous research using real products (Gustafson, Lybbert and Sumner 2016b). Instead, key attributes of the honeys were reported. The four bottles were listed as: 1) Imported Honey; 2) Organic Honey; 3) Honey produced in the US; 4) Pure Local Honey (produced near Lincoln). The prices of the bottles of honey ranged from \$3.99 to \$7.49 for an 8-oz. bottle of honey.

After the final round of bidding, participants completed a survey that included standard socio-demographic questions, as well as questions about honey and pollinators. At the end of the experiment, each participant had one round of bidding and one bottle of honey selected at random. The participant's bid for that bottle of honey in that round was compared to a randomly drawn experiment price. If the participant's bid for the bottle of honey was higher than the randomly drawn price, they paid the randomly drawn price and went home with the bottle of honey. If their bid was lower than or equal to the randomly drawn price, they did not purchase the honey.

### 3.b. Analyses

Our analyses are designed to address the four primary hypotheses we described in the introduction. We report all analyses as a basic model and then report a second model that incorporates demographic characteristics as a robustness check.

*Hypothesis 1:* We hypothesize that participants who are exposed to information (condition A: information exposure condition) about honey fraud will significantly decrease their willingness to pay (WTP) for honeys from unspecified locations or that were imported (vs. US produced honeys) after exposure to information relative to a baseline (no-information) valuation round. To test this hypothesis,

we regress the willingness to pay (WTP), or bid, of participants in the information exposure condition for each honey on the origin variable for the honey and a dummy variable capturing the round:

$$WTP_{ijt} = \beta_0 + \sum_j \beta_j H_{jt} \times \gamma R_t + \varepsilon_{ijt} \quad (1).$$

The WTP of participant *i* for honey *j* in round *t* is regressed on an intercept term, a vector of honey attributes, *H*, a variable, *R*, capturing the round (=1 if exposed to honey fraud information, 0 otherwise), and an error term. The round variable is interacted with the honey attribute variables to estimate differential impacts of information on attributes.

*Hypothesis 2:* We hypothesize that the valuation of honeys will decrease significantly between the baseline and second valuation rounds for participants in information exposure relative to information choice condition. The estimating equation takes essentially the same form as equation (1) but adds WTP data from participants in the information choice condition.

*Hypothesis 3:* We hypothesize that “environmental” factors, such as placement of information on screen, will influence the probability of participants accessing information about bee/honey-related topics. We will examine how attention to information and valuation evolve among participants in the information choice condition during information selection (steps 2B, 4B, and 6B). We use logistic regression to analyze the impact of information placement on the likelihood that the participant selects a honey-related text.

*Hypothesis 4:* We hypothesize that participants who are exposed to honey fraud information (condition A) will engage in more information search about honey-related topics (using data from rounds 2-4 for conditions A & B). We will assess participants’ search efforts for information about honey fraud after exposure to information by conducting a logistic regression analysis of the selection of honey-related texts, with the choice of text in information selection rounds (steps 4 and 6) regressed on information exposure condition.

#### 4. Results

We first report demographic characteristics in Table 2. There were slightly more females in the sample—57%—than males. The average age was approximately 29 years, with just over 16 years of education (corresponding to a bachelor’s degree). Household income was just under \$40,000 a year.

Table 2: Demographic characteristics of participants in experiment

	Pooled %/Mean
Female (%)	56.7
Age (years)	29.1
Education (years)	16.5
Income (\$1000s)	37.5

Notes: Data from survey. N=150, except for income: 15 participants selected “prefer not to respond” to the income question.

Next, we report mean WTP data from the baseline round of valuation for the pooled sample, as well as presenting mean WTP by condition. Note that participants in the two conditions had not experienced any differences in the research process at this point, so this is just to examine differences in baseline valuation. In the baseline valuation round, participants’ WTP for the imported honey was \$4.24 per bottle. Valuation of the US-produced honey was only a few cents higher, at \$4.28 per bottle. The organic honey was valued just under one dollar more than the imported honey, at \$5.15, despite not having a reported origin. Finally, the highest valued honey was the bottle of local honey, at \$5.41.

Condition-specific WTP for each bottle was very similar across the two conditions.

Table 3: WTP for bottles of honey in the baseline overall and by condition, pre-information round

	Pooled	Information Exposure	Information Choice
Imported	4.24	4.19	4.29
Organic, no origin	5.15	5.21	5.08
US	4.28	4.30	4.25
Local	5.41	5.50	5.31

Notes: Data from experiment. N=150

#### 4.1. The impact of exposure to honey fraud information on WTP

The first hypothesis we examine represents standard practices in estimating consumer response to information. In this analysis, we focus on data from the participants in the information exposure condition and examine how their valuation changes once they were exposed to information about concerns surrounding honey fraud in imported honey. We report two versions of the analysis in Table 4. The first includes only the attribute and informational variables, whereas the second adds demographic controls. All attribute estimates are relative to the omitted *Imported* honey attribute.

Table 4: The impact of information about honey fraud on WTP for honey attributes

	I. Coef. (SE)	II. Coef. (SE)
Intercept	4.19*** (0.27)	7.01*** (0.80)
Organic, no origin	1.03** (0.38)	1.03** (0.36)
US	0.11 (0.38)	0.11 (0.36)
Local	1.31*** (0.38)	1.31*** (0.36)
Honey Fraud Info	-0.92* (0.38)	-0.92* (0.36)
Organic*Honey Fraud Info	0.49 (0.54)	0.49 (0.52)
US*Honey Fraud Info	1.06* (0.54)	1.06* (0.52)
Local*Honey Fraud Info	1.10* (0.54)	1.10* (0.52)
Female		-0.88*** (0.19)
Age		-0.39*** (0.08)
Education		0.49*** (0.11)
Income		0.08 (0.06)
Adj.R2	0.079	0.149

Notes: N=79. Data from participants in the information exposure condition in valuation rounds 1 and 2 and survey. \*\*\*= p-value<0.001; \*\*=p-value<0.01; \*=p-value<0.05.



The estimated coefficients on the un-interacted honey attributes replicate the premiums derived from baseline mean WTP values reported in Table 3. The Honey Fraud Info variable coefficient estimate shows that participants decreased their valuation of the imported honey by just under one dollar (\$0.92). The interaction term was not significant for the organic honey, but the interactions between information and the US and Local honeys were both significant at  $P < 0.05$ . The addition of demographic variables did not change the estimated attribute valuation or response to honey fraud information. Gender, age, and education were all statistically significant.

#### 4.2. The implications of information exposure versus information choice on attribute valuation

Next, we examine our second hypothesis. We hypothesized that exposing participants to information would estimate larger responses to the information being available to consumers than when participants had a choice about the information they wanted to view. We constructed the information decision to provide participants in the information choice condition with a reason to select the target information: they knew that they were bidding real money on bottles of honey that had varying attributes, making information about honey highly relevant. In the information choice environment, the text that participants in the information exposure condition were exposed to was titled, "The Scourge of Honey Fraud," providing a clear signal of the article's content. Additionally, this text was always the first text about honey that participants encountered (assuming they scanned down from the top of the page).

We again report two versions of the regressions, with and without demographic variables (Table 5). The only additional variable from the model reported in Table 4 is that we add a "Round" variable to capture changes in valuation that might have occurred from the first round to the second round of bidding.

Table 5: The impact of information about honey fraud on WTP for honey attributes

	I. Coef. (SE)	II. Coef. (SE)
Intercept	4.20*** (0.17)	3.84*** (0.47)
Organic, no origin	0.85*** (0.22)	0.85*** (0.22)
US	0.15 (0.22)	0.15 (0.22)
Local	1.28*** (0.22)	1.28*** (0.22)
Honey Fraud Info	-0.70* (0.33)	-0.77* (0.33)
Round 2	-0.22 (0.17)	-0.19 (0.17)
Organic*Honey Fraud Info	0.66 (0.43)	0.66 (0.43)
US*Honey Fraud Info	1.02* (0.43)	1.02* (0.43)
Local*Honey Fraud Info	1.13** (0.43)	1.13** (0.43)
Female		-0.15 (0.13)
Age		-0.06 (0.04)
Education		0.29*** (0.07)
Income		-0.02 (0.04)
Adj.R2	0.064	0.077

Notes: N=150. Data from valuation rounds 1 and 2, and the survey. \*\*\*= p-value<0.001; \*\*=p-value<0.01; \*=p-value<0.05.

The results are quite similar to those reported in Table 4. Exposure to honey fraud information is estimated to significantly change the relative WTP for honeys with different attributes, with WTP for imported honey falling, and the relative WTP for local or US-produced honey increasing. In this regression, Education is the only significant demographic variable. Each additional year of education increases WTP for honey by approximately \$0.30. Additional (unreported) analyses focusing solely on changes in WTP of participants in the information choice condition between the baseline and post-information round confirm that exposing participants to information generates a different response

than allowing people to select information. These analyses show that people who selected a honey-related text (63% of information choice participants)—or even the target honey fraud text (10% of information choice participants)—did not significantly alter their bids between the baseline and first post-information round of bidding.

#### 4.3. Do environmental factors influence the probability of selecting the honey fraud text?

We next explore elements that promote the selection of the honey fraud text. Specifically, we examine the placement of honey-related texts on the page. As a reminder, the honey-related texts were at the bottom of the list of texts to choose from in the first information choice round, in the middle in the second round, and at the top in the third round. Although participants had to go to the bottom of the page to move forward in the experiment in all information choice rounds, we hypothesized that placement of honey-related texts towards the top of the page would increase the likelihood that the target honey fraud text would be selected.

Table 6 reports the results of this analysis. We used data from the three information choices made by participants in the information choice condition. The primary independent variable is the round. In a second model, we include demographic characteristics as control variables. We additionally include two analyses of the selection of any honey text as a comparison.

Table 6: The impact of honey-text placement on selection of the target honey fraud text

	Honey Fraud Text		Any Honey Text	
	I. Coef. (SE)	II. Coef. (SE)	I. Coef. (SE)	II. Coef. (SE)
Intercept	-2.21*** (0.20)	-0.51 (0.63)	-0.03 (0.12)	0.80 (0.47)
Round 2	0.52* (0.26)	0.52* (0.26)	-0.91*** (0.18)	-0.96*** (0.18)
Round 3	1.06*** (0.24)	1.07*** (0.24)	-0.40* (0.17)	-0.43* (0.18)
Female		-0.30		0.51***

		(0.19)		(0.15)
Age		-0.09		-0.26 <sup>***</sup>
		(0.06)		(0.05)
Education		-0.06		0.13
		(0.10)		(0.08)
Income		-0.09		0.15 <sup>***</sup>
		(0.06)		(0.04)
AIC	746.4	742.3	1118.3	1078.3

Notes: N=71. Data from participants in the information choice condition in information choices 1-3, and survey.  
<sup>\*\*\*</sup>= p-value<0.001; <sup>\*</sup>=p-value<0.05.

The results clearly demonstrate that the placement of the text has a significant effect on selection of the honey fraud text. However, for any honey text, we observe a different pattern. Here, the selection of a honey text decreases after the first round, suggesting that many people sought out a text having to do with honey, but did not select one related to fraud. Recall that the honey fraud text was the first honey-related text listed, so many of these individuals bypassed the honey fraud text to select an alternative honey text. The implications are that even in a situation in which a target text, which provides information that could aid differentiation among honeys, is available, a small percentage of participants choose to view. In fact, many more chose to read an adjacent text than the honey fraud text.

#### 4.4. The impact of information exposure on subsequent information choice

Finally, we examine the effect of exposing participants to information on subsequent information choice. We hypothesized that participants exposed to information would be more likely to seek out honey or food fraud-related information. We examine information choices in the second and third information choice tasks, rounds in which participants in both conditions made choices about texts to read. We report the results of the analysis in Table 7.

Table 7: The impact of information exposure subsequent selection of honey or food fraud text

	I.	II.
	Coef.	Coef.
	(SE)	(SE)

Intercept	-0.25*	1.04*
	(0.12)	(0.41)
Information Exposure	0.03	-0.08
	(0.16)	(0.17)
Round 3	1.06***	1.08***
	(0.18)	(0.18)
Information Exposure*Round 3	0.13	0.12
	(0.24)	(0.25)
Female		0.24
		(0.12)
Age		-0.06
		(0.04)
Education		0.25***
		(0.07)
Income		0.04
		(0.03)
AIC	1556.5	1545.7

Notes: N=150. Data from participants in information choices 2 and 3, and survey. \*\*\*= p-value<0.001; \*=p-value<0.05.

Contrary to our hypothesis, we do not find any effect of information exposure on subsequent selection of honey or food fraud texts. Placement of the texts at the top of the page (captured by the Round 3 variable) is the sole significant experimental variable. Education is also significant, with additional years of education increasing the likelihood that individuals select a honey or fraud text. An unreported analysis of selection of honey-related texts (excluding fraud-related texts) shows a marginally significant increase in the likelihood among participants in the information exposure condition. However, overall, this analysis does not provide evidence that information exposure might lead to a “snowball” effect by making them more attentive to information related to the text they were exposed to.

## 5. Discussion and Conclusions

In this paper, we examine multiple implications of the standard practice of requiring participants to read an informational text in consumer experiments to estimate impacts on consumer valuation of product attributes. We designed an experiment comparing the impact of information exposure on honey valuation to a condition in which participants were able to select the information they wanted to access.

Participants in both conditions knew that they were submitting bids on bottles of honey that they might be required to purchase, so accessing information that could effectively help them refine their valuation would provide value to them.

Overall, we find evidence that requiring participants to read information predicts greater changes in valuation of product attributes than when participants are given access to information, but we do not find evidence suggesting that information exposure leads to significant changes in subsequent information selection. While previous research on fad diet uptake found that a person's own research was the information source that most strongly predicted following the diet (Arslain, Gustafson, Baishya, et al. 2021), suggesting that exposure to a previous information source had spurred some people to seek out additional information, we do not find evidence of that here.

This research is related to a literature examining the implications of a tendency to use simple choice environments to test the impact of information, food labels, or nutrition facts panels on choices. In the context of food and health, large-scale policies meant to promote healthier choices, such as nutrition facts panels and calorie labeling, have had little widespread impact (Variyam 2008; Sinclair, Cooper and Mansfield 2014; Cantu-Jungles et al. 2017), despite evidence from experiments that consumers respond to this information (Streletskaia et al. 2016; Gustafson and Zeballos 2020). In one recent, dramatic example, a product-based label that had been tested in experiments was implemented in real-world retail environments. While researchers found a significant effect of the label on retail purchases, the estimated effect size was approximately 1/20<sup>th</sup> of the effects that had been predicted in the experiments (Dubois et al. 2021).

Field studies suggest that incomplete consideration of products and information may be an important factor in limiting the impact of information (Elbel et al. 2009; Cantor et al. 2015; Machín et al. 2020; Machín et al. 2023). Creating simple, experimental choice environments ensures that participants view the information, products, or attributes of interest to the research, but it may decrease the

external validity of the research findings by removing consumers' ability to interact with the choice environment. The importance of consumer self-selection into market segments has been demonstrated for wine attribute valuation (Gustafson et al. 2016b), differences in nutrient levels in foods selected (Arslain, Gustafson and Rose 2021), linking weight status to healthiness of foods considered (Gustafson, Arslain and Rose 2021), and impacts of different fiscal or informational policies on food choices (Gustafson 2023).

In the context of exercise and healthy food choice, simple reminders have been found to be an effective way to promote healthier behaviors (Calzolari and Nardotto 2017; Gustafson, Kent and Prate 2018; Arslain, Gustafson and Rose 2020; Habla and Muller 2021). In fact, simple, one-sentence messages were found to outperform longer, educational messages in motivating choice of foods with higher amounts of dietary fiber (Gitungwa, Gustafson and Rose 2024). These reminder messages change multiple choice process behaviors, including search for nutrition information. Information about issues like honey fraud is important for people to know about. Future research can examine whether a short reminder message about the importance of a topic can more effectively lead people to seek out information that is vital to the economic viability of the honey industry.

## References

- Agnoli, L., R. Capitello, M. De Salvo, A. Longo, and M. Boeri. 2016. "Food fraud and consumers' choices in the wake of the horsemeat scandal." *The British food journal and hygienic review* 118(8):1898–1913.
- Arslain, K., C.R. Gustafson, P. Baishya, and D.J. Rose. 2021. "Determinants of gluten-free diet adoption among individuals without celiac disease or non-celiac gluten sensitivity." *Appetite* 156:104958.
- Arslain, K., C.R. Gustafson, and D.J. Rose. 2020. "Point-of-Decision Prompts Increase Dietary Fiber Content of Consumers' Food Choices in an Online Grocery Shopping Simulation." *Nutrients* 12(11). Available at: <http://dx.doi.org/10.3390/nu12113487>.
- Arslain, K., C.R. Gustafson, and D.J. Rose. 2021. "The effect of health prompts on product consideration, attention to information, and choice in large, online product assortments: The case of fiber." *Food quality and preference* 94:104329.
- Banerji, A., E. Birol, B. Karandikar, and J. Rampal. 2016. "Information, branding, certification, and consumer willingness to pay for high-iron pearl millet: Evidence from experimental auctions in Maharashtra, India." *Food policy* 62:133–141.
- Barbarossa, C., P. De Pelsmacker, I. Moons, and A. Marcati. 2016. "The influence of country-of-origin stereotypes on consumer responses to food safety scandals: The case of the horsemeat adulteration." *Food quality and preference* 53:71–83.
- Barnett, J., F. Begen, S. Howes, A. Regan, A. McConnon, A. Marcu, S. Rowntree, and W. Verbeke. 2016. "Consumers' confidence, reflections and response strategies following the horsemeat incident." *Food control* 59:721–730.
- Becker, G.M., M.H. DeGroot, and J. Marschak. 1964. "Measuring utility by a single-response sequential method." *Behavioral science* 9(3):226–232.
- Berns, G.S., J. Chappelow, M. Cekic, C.F. Zink, G. Pagnoni, and M.E. Martin-Skurski. 2006. "Neurobiological substrates of dread." *Science* 312(5774):754–758.
- Bowman, J. 1999. "Tests suggest honey watered down." *South China Morning Post (Hong Kong)* 5. Available at: <https://www.scmp.com/article/296925/tests-suggest-honey-watered-down> [Accessed March 20, 2023].
- Calzolari, G., and M. Nardotto. 2017. "Effective Reminders." *Management science* 63(9):2915–2932.
- Cantor, J., A. Torres, C. Abrams, and B. Elbel. 2015. "Five Years Later: Awareness Of New York City's Calorie Labels Declined, With No Changes In Calories Purchased." *Health Affairs* 34(11):1893–1900.
- Cantu-Jungles, T.M., L.A. McCormack, J.E. Slaven, M. Slebodnik, and H.A. Eicher-Miller. 2017. "A Meta-Analysis to Determine the Impact of Restaurant Menu Labeling on Calories and Nutrients (Ordered or Consumed) in U.S. Adults." *Nutrients* 9(10). Available at: <http://dx.doi.org/10.3390/nu9101088>.
- Casadei, E., E. Valli, F. Panni, J. Donarski, J. Farrús Gubern, P. Lucci, L. Conte, F. Lacoste, A. Maquet, P. Brereton, A. Bendini, and T. Gallina Toschi. 2021. "Emerging trends in olive oil fraud and possible countermeasures." *Food control* 124:107902.
- Cercaci, L., M.T. Rodriguez-Estrada, and G. Lercker. 2003. "Solid-phase extraction–thin-layer chromatography–gas chromatography method for the detection of hazelnut oil in olive oils by determination of esterified sterols." *Journal of chromatography. A* 985(1):211–220.
- Charlebois, S., M. Juhasz, L. Foti, and S. Chamberlain. 2017. "Food Fraud and Risk Perception: Awareness in Canada and Projected Trust on Risk-Mitigating Agents." *Journal of International Food & Agribusiness Marketing* 29(3):260–277.



- Chen, M., R.R. Burke, S.K. Hui, and A. Leykin. 2021. "Understanding Lateral and Vertical Biases in Consumer Attention: An In-Store Ambulatory Eye-Tracking Study." *JMR, Journal of marketing research*:0022243721998375.
- Chousou, C., E. Tsakiridou, and K. Mattas. 2018. "Valuing Consumer Perceptions of Olive Oil Authenticity." *Journal of International Food & Agribusiness Marketing* 30(1):1–16.
- Chowdhury, S.A., J.F. Carter, S.R. Anuj, D. Cozzolino, N.L. Hungerford, and M.T. Fletcher. 2021. "The Validity of Protein in Australian Honey as an Internal Standard for C4 Sugar Adulteration." *Food analytical methods* 14(4):823–833.
- Colson, G., and W.E. Huffman. 2011. "Consumers' Willingness to Pay for Genetically Modified Foods with Product-Enhancing Nutritional Attributes." *American journal of agricultural economics* 93(2):358–363.
- Combris, P., C. Lange, and S. Issanchou. 2006. "Assessing the Effect of Information on the Reservation Price for Champagne: What are Consumers Actually Paying for?" *Journal of Wine Economics* 1(01):75–88.
- Demartini, E., E. De Marchi, A. Cavaliere, S. Mattavelli, A. Gaviglio, A. Banterle, J. Richetin, and M. Perugini. 2018. "Changing attitudes towards healthy food via self-association or nutritional information: What works best?" *Appetite*. Available at: <http://dx.doi.org/10.1016/j.appet.2018.08.001>.
- Di Rosa, A.R., F. Leone, C. Scattareggia, and V. Chiofalo. 2018. "Botanical origin identification of Sicilian honeys based on artificial senses and multi-sensor data fusion." *European food research and technology = Zeitschrift für Lebensmittel-Untersuchung und -Forschung. A* 244(1):117–125.
- Dubois, P., P. Albuquerque, O. Allais, C. Bonnet, P. Bertail, P. Combris, S. Lahlou, N. Rigal, B. Ruffieux, and P. Chandon. 2021. "Effects of front-of-pack labels on the nutritional quality of supermarket food purchases: evidence from a large-scale randomized controlled trial." *Journal of the Academy of Marketing Science* 49(1):119–138.
- Edenbrandt, A.K., C.J. Lagerkvist, and J. Nordström. 2021. "Interested, indifferent or active information avoiders of carbon labels: Cognitive dissonance and ascription of responsibility as motivating factors." *Food policy*:102036.
- Elbel, B., R. Kersh, V.L. Brescoll, and L.B. Dixon. 2009. "Calorie Labeling And Food Choices: A First Look At The Effects On Low-Income People In New York City: Calorie information on menus appears to increase awareness of calorie content, but not necessarily the number of calories people purchase." *Health affairs* 28(Suppl1):w1110–w1121.
- Emanuel, A.S., M.T. Kiviniemi, J.L. Howell, J.L. Hay, E.A. Waters, H. Orom, and J.A. Shepperd. 2015. "Avoiding cancer risk information." *Social science & medicine* 147:113–120.
- Everstine, K., J. Spink, and S. Kennedy. 2013. "Economically motivated adulteration (EMA) of food: common characteristics of EMA incidents." *Journal of food protection* 76(4):723–735.
- Fairchild, G.F., J.P. Nichols, and O. Capps Jr. 2003. "Observations on economic adulteration of high-value food products: The honey case." *Journal of Food Distribution Research*. Available at: <https://ageconsearch.umn.edu/record/27319/>.
- Ferrier, P.M. 2021. "Detecting origin fraud with trade data: the case of U.S. honey imports." *The Australian journal of agricultural and resource economics* 65(1):222–245.
- Frera, M., S. Elahi, M. Woolfe, S. Crew, Spink, and John. 2021. "Has COVID-19 caused a significant increase in observed food fraud incidents?" *Food Science & Technology*. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8013864/>.
- Fuller, K., C. Grebitus, and T.G. Schmitz. 2022. "The effects of values and information on the willingness to pay for sustainability credence attributes for coffee." *Agricultural economics* 53(5):775–791.
- García, N.L. 2018. "The Current Situation on the International Honey Market." *Bee World* 95(3):89–94.

- García, N.L., and S. Schwarzinger. 2021. "Chapter 15 - Honey fraud." In R. S. Hellberg, K. Everstine, and S. A. Sklare, eds. *Food Fraud*. Academic Press, pp. 309–334.
- Gitungwa, H., C.R. Gustafson, and D.J. Rose. 2024. "Comparing the impact of simple and educational point-of-decision messages on nutritional choice outcomes." *Appetite*:107301.
- Golman, R., G. Loewenstein, A. Molnar, and S. Saccardo. 2021. "The Demand for, and Avoidance of, Information." *Management science*. Available at: <https://doi.org/10.1287/mnsc.2021.4244>.
- Gottlieb, J., M. Cohanpour, Y. Li, N. Singletary, and E. Zabeh. 2020. "Curiosity, information demand and attentional priority." *Current Opinion in Behavioral Sciences* 35:83–91.
- Gustafson, C., and A. Champetier. 2023. "Could Information About Honey Fraud Increase Consumers' Valuation of Domestic Honey in the Face of Rising Honey Imports in the U.S. and EU?" Available at: <https://digitalcommons.unl.edu/yiitpr/8/> [Accessed August 24, 2023].
- Gustafson, C.R. 2023. "Evaluating the relative impact of multiple healthy food choice interventions on choice process variables and choices." *Appetite* 187:106596.
- Gustafson, C.R., K. Arslain, and D.J. Rose. 2021. "High BMI Predicts Attention to Less Healthy Product Sets: Can a Prompt Lead to Consideration of Healthier Sets of Products?" *Nutrients* 13(8). Available at: <http://dx.doi.org/10.3390/nu13082620>.
- Gustafson, C.R., K.R. Brooks, S.I.A. Meerza, and A. Yiannaka. 2023. "Emotional responses to COVID-19 stressors increase information avoidance about an important unrelated health threat." *PloS one* 18(9):e0286712.
- Gustafson, C.R., A. Champetier, O. Tuyizere, and H. Gitungwa. 2023. "The impact of honey fraud information on the valuation of honey origin: Evidence from an incentivized economic experiment." *Food Control* 155:110070.
- Gustafson, C.R., R. Kent, and M.R. Prate Jr. 2018. "Retail-based healthy food point-of-decision prompts (PDPs) increase healthy food choices in a rural, low-income, minority community." *PloS one* 13(12):e0207792.
- Gustafson, C.R., T.J. Lybbert, and D.A. Sumner. 2016a. "Consumer knowledge affects valuation of product attributes: Experimental results for wine." *Journal of Behavioral and Experimental Economics* 65:85–94.
- Gustafson, C.R., T.J. Lybbert, and D.A. Sumner. 2016b. "Consumer sorting and hedonic valuation of wine attributes: exploiting data from a field experiment." *Agricultural economics* 47(1):91–103.
- Gustafson, C.R., and E. Zeballos. 2018. "The effect of ingredient-specific calorie information on calories ordered." *Preventive medicine reports* 12:186–190.
- Gustafson, C.R., and E. Zeballos. 2020. "The effect of presenting relative calorie information on calories ordered." *Appetite* 153:104727.
- Habla, W., and P. Muller. 2021. "Experimental evidence of limited attention at the gym." *Experimental Economics*. Available at: <https://doi.org/10.1007/s10683-020-09693-5>.
- Hayes, D.J., J.F. Shogren, S.Y. Shin, and J.B. Kliebenstein. 1995. "Valuing food safety in experimental auction markets." *American journal of agricultural economics* 77(1):40–53.
- Hobin, E., B. Bollinger, J. Sacco, E. Liebman, L. Vanderlee, F. Zuo, L. Rosella, M. L'abbe, H. Manson, and D. Hammond. 2017. "Consumers' response to an on-shelf nutrition labelling system in supermarkets: Evidence to inform policy and practice." *The Milbank quarterly* 95(3):494–534.
- Johnson, R. 2014. "Food Fraud and 'Economically Motivated Adulteration' of Food and Food Ingredients." CRS Report No. R43358, Congressional Research Service. Available at: <https://fas.org/sgp/crs/misc/R43358.pdf>.
- Jones Ritten, C., L. Thunström, M. Ehmke, J. Beiermann, and D. McLeod. 2019. "International honey laundering and consumer willingness to pay a premium for local honey: an experimental study." *The Australian journal of agricultural and resource economics* 63(4):726–741.

- Kendall, H., S. Kuznesof, M. Dean, M.-Y. Chan, B. Clark, R. Home, H. Stolz, Q. Zhong, C. Liu, P. Brereton, and L. Frewer. 2019. "Chinese consumer's attitudes, perceptions and behavioural responses towards food fraud." *Food control* 95:339–351.
- Koshy, J. 2020. "10 out of 13 honey brands fail 'purity test', finds CSE investigation." *The Hindu*. Available at: <https://www.thehindu.com/news/national/10-out-of-13-honey-brands-fail-purity-test-finds-cse-investigation/article33230094.ece> [Accessed March 20, 2023].
- Lange, C., C. Martin, C. Chabanet, P. Combris, and S. Issanchou. 2002. "Impact of the information provided to consumers on their willingness to pay for Champagne: comparison with hedonic scores." *Food quality and preference* 13(7–8):597–608.
- Lee, D. 2013. "There's something funny going on with honey, says Consumer Council." *South China Morning Post*. Available at: <https://www.scmp.com/news/hong-kong/article/1283519/consumer-watchdog-says-some-honey-brands-contain-rogue-sugar> [Accessed March 20, 2023].
- Lee, H., D.A. Sumner, and A. Champetier. 2019. "Pollination markets and the coupled futures of almonds and honey bees: Simulating impacts of shifts in demands and costs." *American journal of agricultural economics* 101(1):230–249.
- Li, T., J.C. Bernard, Z.A. Johnston, K.D. Messer, and H.M. Kaiser. 2017. "Consumer preferences before and after a food safety scare: An experimental analysis of the 2010 egg recall." *Food policy* 66:25–34.
- Loewenstein, G. 2006. "The Pleasures and Pains of Information." *Science* 312(5774):704–706.
- Lombardi, G.V., R. Berni, and B. Rocchi. 2017. "Environmental friendly food. Choice experiment to assess consumer's attitude toward 'climate neutral' milk: the role of communication." *Journal of cleaner production* 142:257–262.
- Lotta, F., and J. Bogue. 2015. "Defining food fraud in the modern supply chain." *Eur. Food & Feed L. Rev.* 10:114.
- Lusk, J.L., L.O. House, C. Valli, S.R. Jaeger, M. Moore, J.L. Morrow, and W.B. Traill. 2004. "Effect of information about benefits of biotechnology on consumer acceptance of genetically modified food: evidence from experimental auctions in the United States, England, and France." *European Review of Agricultural Economics* 31(2):179–204.
- Machín, L., F. Alcaire, L. Antúnez, A. Giménez, M.R. Curutchet, and G. Ares. 2023. "Use of nutritional warning labels at the point of purchase: An exploratory study using self-reported measures and eye-tracking." *Appetite* 188:106634.
- Machín, L., M.R. Curutchet, V. Gugliucci, A. Vitola, T. Otterbring, M. de Alcantara, and G. Ares. 2020. "The habitual nature of food purchases at the supermarket: Implications for policy making." *Appetite* 155:104844.
- Marvin, H.J.P., W. Hoenderdaal, A.K. Gavai, W. Mu, L.M. van den Bulk, N. Liu, G. Frasso, N. Ozen, C. Elliott, L. Manning, and Y. Bouzembrak. 2022. "Global media as an early warning tool for food fraud; an assessment of MedISys-FF." *Food control* 137:108961.
- McCallum, C.S., S. Cerroni, D. Derbyshire, W.G. Hutchinson, and R.M. Nayga Jr. 2021. "Consumers' responses to food fraud risks: an economic experiment." *European Review of Agricultural Economics*. Available at: <https://academic.oup.com/erae/advance-article-abstract/doi/10.1093/erae/jbab029/6316523>.
- McFadden, B.R., B.N. Anderton, K.A. Davidson, and J.C. Bernard. 2021. "The effect of scientific information and narrative on preferences for possible gene-edited solutions for citrus greening." *Applied economic perspectives and policy* (aepp.13154). Available at: <https://onlinelibrary.wiley.com/doi/10.1002/aepp.13154>.
- McFadden, J.R., and W.E. Huffman. 2017. "Consumer valuation of information about food safety achieved using biotechnology: Evidence from new potato products." *Food policy* 69:82–96.

- Meerza, S.I.A., K.R. Brooks, C.R. Gustafson, and A. Yiannaka. 2021. "Information avoidance behavior: Does ignorance keep us uninformed about antimicrobial resistance?" *Food policy*:102067.
- Meerza, S.I.A., and C.R. Gustafson. 2020. "Consumers' Response to Food Fraud: Evidence from Experimental Auctions." *Journal of Agricultural and Resource Economics* 45(2):219–231.
- Meerza, S.I.A., and C.R. Gustafson. 2019. "Does prior knowledge of food fraud affect consumer behavior? Evidence from an incentivized economic experiment." *PloS one* 14(12):e0225113.
- Meißner, M., H. Oppewal, and J. Huber. 2020. "Surprising adaptivity to set size changes in multi-attribute repeated choice tasks." *Journal of business research* 111:163–175.
- Melnyk, D., and J.A. Shepperd. 2012. "Avoiding risk information about breast cancer." *Annals of behavioral medicine: a publication of the Society of Behavioral Medicine* 44(2):216–224.
- Menozi, D., R. Halawany-Darson, C. Mora, and G. Giraud. 2015. "Motives towards traceable food choice: A comparison between French and Italian consumers." *Food control* 49:40–48.
- Miles, A., S. Voorwinden, S. Chapman, and J. Wardle. 2008. "Psychologic predictors of cancer information avoidance among older adults: the role of cancer fear and fatalism." *Cancer epidemiology, biomarkers & prevention: a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology* 17(8):1872–1879.
- Moyer, D.C., J.W. DeVries, and J. Spink. 2017. "The economics of a food fraud incident – Case studies and examples including Melamine in Wheat Gluten." *Food control* 71:358–364.
- Nordström, J., L. Thunström, K. Van 't Veld, J.F. Shogren, and M. Ehmke. 2023. "Strategic ignorance of health risk: its causes and policy consequences." *Behavioural Public Policy* 7(1):83–114.
- Noussair, C., S. Robin, and B. Ruffieux. 2002/3. "Do consumers not care about biotech foods or do they just not read the labels?" *Economics letters* 75(1):47–53.
- Onwezen, M.C., and C.N. van der Weele. 2016. "When indifference is ambivalence: Strategic ignorance about meat consumption." *Food quality and preference* 52:96–105.
- Ortega, D.L., W. Lin, and P.S. Ward. 2022. "Consumer acceptance of gene-edited food products in China." *Food quality and preference* 95:104374.
- Plutino, M., E. Bianchetto, A. Durazzo, M. Lucarini, L. Lucini, and I. Negri. 2022. "Rethinking the connections between ecosystem services, pollinators, pollution, and health: Focus on air pollution and its impacts." *International journal of environmental research and public health* 19(5):2997.
- Reutskaja, E., R. Nagel, C.F. Camerer, and A. Rangel. 2011. "Search Dynamics in Consumer Choice under Time Pressure: An Eye- Tracking Study." *The American economic review* 101(2):900–926.
- Rieger, J., C. Kuhlitz, and S. Anders. 2016. "Food scandals, media attention and habit persistence among desensitised meat consumers." *Food policy* 64:82–92.
- Shears, P. 2010. "Food fraud – a current issue but an old problem." *British Food Journal* 112(2):198–213.
- Shiddiq, M., Zulkarnain, V. Asyana, and H. Aliyah. 2019. "Identification of Pure and Adulterated Honey Using Two Spectroscopic Methods." *Journal of physics. Conference series* 1351(1):012022.
- Sinclair, S.E., M. Cooper, and E.D. Mansfield. 2014. "The influence of menu labeling on calories selected or consumed: a systematic review and meta-analysis." *Journal of the Academy of Nutrition and Dietetics* 114(9):1375-1388.e15.
- Soon, J.M., and X. Liu. 2020. "Chinese consumers' risk mitigating strategies against food fraud." *Food control* 115:107298.
- Spink, J., and D.C. Moyer. 2011. "Defining the public health threat of food fraud." *Journal of food science* 76(9):R157-63.
- Stiletto, A., R. Vecchio, L. Cembalo, and S. Trestini. 2024. "The impact of Nutri-Score on consumers' preferences for Geographical Indications. Evidence from a non-hypothetical experiment." *Appetite*:107400.

- Streletskaia, N.A., W. Amatyakul, P. Rusmevichientong, H.M. Kaiser, and J. Liaukonyte. 2016. "Menu-Labeling Formats and Their Impact on Dietary Quality." *Agribusiness* 32(2):175–188.
- Temple, J.L., A.M. Ziegler, and L.H. Epstein. 2016. "Influence of Price and Labeling on Energy Drink Purchasing in an Experimental Convenience Store." *Journal of nutrition education and behavior* 48(1):54-59.e1.
- Théolier, J., V. Barrere, S. Charlebois, and S. Benrejeb Godefroy. 2021. "Risk analysis approach applied to consumers' behaviour toward fraud in food products." *Trends in Food Science & Technology* 107:480–490.
- Thunström, L., J. Nordström, J.F. Shogren, M. Ehmke, and K.V. Veld. 2016. "Strategic self-ignorance." *Journal of risk and uncertainty* 52(2):117–136.
- Thunström, L., K. van 't Veld, J.F. Shogren, and J. Nordström. 2014. "On strategic ignorance of environmental harm and social norms." *Revue d'économie politique* 124(2):195–214.
- Toledo, C., and S.B. Villas-Boas. 2019. "Safe or not? Consumer responses to recalls with traceability." *Applied Economic Perspectives and Policy* 41(3):519–541.
- Tosun, M. 2013. "Detection of adulteration in honey samples added various sugar syrups with 13C/12C isotope ratio analysis method." *Food chemistry* 138(2–3):1629–1632.
- Variyam, J.N. 2008. "Do nutrition labels improve dietary outcomes?" *Health Economics* 17(6):695–708.
- Vecchio, R., E.J. Van Loo, and A. Annunziata. 2016. "Consumers' willingness to pay for conventional, organic and functional yogurt: evidence from experimental auctions." *International journal of consumer studies* 40(3):368–378.
- Vetrova, O.V., D.A. Kalashnikova, and V.N. Melkov. 2017. "Detection of honey adulterations with sugar syrups by stable isotope mass spectrometry." *Journal of Analytical Chemistry*. Available at: [https://idp.springer.com/authorize/casa?redirect\\_uri=https://link.springer.com/article/10.1134/S1061934817070152&casa\\_token=jNefZ9JqaREAAAAA:JbauGrucEmRSIU-X4zjGNdH67nOxF-hH9Cy2McmTFfyDckb0jH0umghJbzIB0WxgpCPpoXcOkPiy8dH4w](https://idp.springer.com/authorize/casa?redirect_uri=https://link.springer.com/article/10.1134/S1061934817070152&casa_token=jNefZ9JqaREAAAAA:JbauGrucEmRSIU-X4zjGNdH67nOxF-hH9Cy2McmTFfyDckb0jH0umghJbzIB0WxgpCPpoXcOkPiy8dH4w).
- Wojtowicz, Z., and G. Loewenstein. 2020. "Curiosity and the economics of attention." *Current Opinion in Behavioral Sciences* 35:135–140.
- Wu, L., B. Du, Y. Vander Heyden, L. Chen, L. Zhao, M. Wang, and X. Xue. 2017. "Recent advancements in detecting sugar-based adulterants in honey – A challenge." *Trends in analytical chemistry: TRAC* 86:25–38.
- Wu, S., J.R. Fooks, K.D. Messer, and D. Delaney. 2015. "Consumer demand for local honey." *Applied economics* 47(41):4377–4394.
- Yang, Y., and J.E. Hobbs. 2020. "The power of stories: Narratives and information framing effects in science communication." *American journal of agricultural economics* 102(4):1271–1296.
- Zhu, C., R.A. Lopez, and X. Liu. 2019. "Consumer responses to front-of-package labeling in the presence of information spillovers." *Food policy* 86:101723.
- Zossou, E., R. Fiamohe, S.D. Vodouhe, and M. Demont. 2022. "Experimental auctions with exogenous and endogenous information treatment: Willingness to pay for improved parboiled rice in Benin." *Journal of agricultural economics* 73(3):806–825.