Consumers' Evaluation of Animal Welfare Labels on Poultry Products

Animal production in recent decades has experienced two competing developments: the widespread adoption of confinement production facilities on one hand and increased public concern for farm animal welfare on the other (Prickett et al., 2010). The basic types of animal welfare violations include abuse or neglect of animals (Grandin, 2014). However, sophisticated views of animal welfare require producers to raise animals under conditions that not only promote good biological functioning and minimize suffering, but also allow animals to exhibit natural behaviors and maintain contentment (Fraser, 2003). The U.S. established its first provisions for animal welfare in 1966 with the passing of the Animal Welfare Act (USDA-NAL, 2018a). Today, most livestock industries, including the poultry industry, have implemented animal care guidelines to assure the appropriate treatment of animals for food production (USDA-NAL, 2018b).

The U.S. poultry industry is the world's largest producer and second largest exporter of poultry meat and a major egg producer (USDA-NASS, 2018). In 2017, 374.3 million laying hens were held in the U.S., and roughly 8.8 billion dozen eggs were produced (USDA-NASS, 2018). Concern for farm animal welfare specifically targets producers' use of cages, chickens' limited access to outdoor spaces, and their inability to display the most normal behaviors (Tonsor & Olynk, 2011). To avoid inhumane treatment of chickens, the U.S. Department of Agriculture (USDA) and a number of third-party organizations have developed standards and guidelines for the rearing, handling, transporting and slaughtering of laying hens. The American Humane (AH) created the first welfare certification program in the U.S. to help ensure the humane treatment of farm animals (American Humane, 2018). The Humane Farm Animal Care, which is an international nonprofit certification organization, created the Certified Humane ® Raised and Handled ® program that promotes the ethical treatment of animals from birth through slaughter. Farm animals, including chickens, are required to have a quality diet without antibiotics or growth hormones (HFAC, 2018). In addition, more than 85% of egg producers in the U.S. participate in the United Egg Producers Certified program (UEPC), which focuses primarily on animal husbandry, including indoor housing, balanced diet, disease prevention, no added hormones, and full-day access to clean water (UEPC, 2018).

Despite the existence of these programs, consumers have shown heightened interests and concerns for the humane practices of the poultry industry. According to a 2018 survey conducted by the National Chicken Council, approximately three-quarters of respondents indicated that they are concerned about how chickens are raised for meat (National Chicken Council, 2018b). Consumers consider food production animals' wellbeing and treatment for both moral and pragmatic reasons (Lusk & Norwood, 2011). On the one hand, previous research identified significant relationships between consumers' concern for farm animal welfare and their religiosity, ethical beliefs, morals, and concerns for the environment (Laryea, 2017). On the other hand, more and more consumers start to associate humane treatment of farm animals with enhanced food safety and increased food quality (Norwood & Lusk, 2013).

With the goal to educate consumers and to inform their purchasing decisions, the USDA, as well as the aforementioned organizations (i.e., AHA, UFAC, UEPC), started using labels on eggs and other poultry products to signify the humane treatment of hens. In addition to the mandatory labeling, the USDA regulates voluntary label claims by providing definitions to terms related to poultry animal welfare: "natural," "all-vegetable diet," "organic," "cage free," and "free range or free roaming." Under the USDA regulations, a "natural" product has not artificial

ingredients, coloring ingredients, or chemical preservatives (USDA-FSIS, 2018). However, no definitions exists as to what a natural environment consists. Similarly, the term "all-vegetable diet" refers to poultry feed that does not contain meat or poultry by-products (National Chicken Council, 2018a). The terms "cage free" or "free range/roaming" suggest that chickens have access to the outdoors for at least some part of the day (USDA-FSIS, 2018). Chicken or egg products labeled as "organic," which mean that they are from a source of flock fed an organic diet specified by USDA, must also be free range or cage free (USDA-FSIS, 2018). However, free-range and cage-free products are not necessarily organic. In addition, packages of eggs and other poultry products often bear terms such as "farm fresh," "happy hens" and "pasture raised"; however, no legal definitions or codified standards exist for these subjective descriptions.

Animal welfare labels and claims found on food packages often serve as the most direct and sometimes the only way to communicate with the consumer regarding the raising and treatment of farm animals. As consumers' interest in the ethical treatment of farm animals increases, it is critical for food manufacturers and marketers to understand the implications of animal welfare labels on consumers' perceptions of food products and purchasing decisions. In addition, as government regulators use food labels and claims to differentiate products and to inform consumers about their options, we must consider the acceptance of food labels to ensure the policies, standards, and guidelines for such labels are balancing the market and not confusing consumers.

However, to the best of our knowledge, no study ever examined the U.S. consumers' preferences of animal welfare labels and the impact of currently used labels on their willingness to purchase. Using poultry products (i.e. cartoned shell eggs) as a case study, we conducted an experiment to examine how the commonly used food labels related to animal welfare shape Americans' perception of food products and purchasing tendencies. We discussed the implications for regulators, marketers, and agricultural communicators.

Theoretical Framework

Food labels, which broadly include any words, particulars, trademarks, brand names, pictorial matter or symbols, are the primary devices that consumers use to guide their purchasing decisions of food products. As demand for sustainable food products has significantly grown, food manufactures, regulatory agencies, and third-party organizations have increasingly used textual, pictorial, graphic or symbolic representation to suggest the sustainable characteristics of food products (Van Loo, Caputo, Nayga, & Verbeke, 2014). These so-called "sustainable labels" can function as branding devices that not only signal the attributes of food products at the point-of-sale, but also carry social meaning for consumers (Loken, Ahluwalia, & Houston, 2010). For instance, the use of such terms as "humane," "organic," "cage free," and "certified," makes possible a repetition of information and helps consumers form opinions toward a strategic end (Moor, 2007). For consumers who are particularly concerned about animal welfare, such labels may resonate with their ethical and moral beliefs and lead to behavioral changes (Moor, 2007).

Conceptualizing the animal welfare labels as branding devices that carry social meaning for consumers, this study used the Heuristic Processing Theory (Chaiken, 1980) to explain how these labels might shape consumers' perceived (ethical) treatment of hens and purchasing tendencies toward egg products. The Heuristic Processing Theory assumes that individuals have a natural tendency of minimizing the cognitive efforts and time spent on processing new information or forming decisions on unfamiliar matters (Chaiken, 1980). The heuristic processing is an efficient cognitive process that does not require a systematic and thorough evaluation of all aspects related to a given decision, which allows people to form or change

opinions without extended informational input (Petty & Cacioppo, 1986). When individuals engage in the heuristic processing mode, they only consider a few informational cues, such as the source and length of the message, to form a judgement (Todorov, Chaiken, & Henderson, 2002). The heuristic processing has been widely observed when it comes to food purchasing decisions and behaviors. As Verbeke (2005, p.352) stated, "…food-related decisions and risk perceptions are often based on heuristics or follow peripheral routes of information processing."

According to the American Farm Bureau Federation (2018), a mere two percent of the American population is directly involved in agricultural production. Most members of the non-agriculture population are not knowledgeable about the procedures and practice standards of food or fiber production; neither have they known substantially about the complexities involved in sustaining a viable agriculture system (Doerfert, 2011). When making purchasing decisions on a food product, consumers only spend seconds scanning its packaging (Ares et al., 2013). During this brief scan, consumers usually select a few salient aspects and features to analyze and process, such as the image or visual, the brand logo or name, the ingredient list, and nutrition information (Ares et al., 2013). Other informational components, including the product's origin, the manufacture, and shelf life data, only receive limited interest. Previous research revealed that consumers prefer to see an identifying symbol when it comes to labeling for genetically modified foods (Meyers & Miller, 2007).

By using visually appealing design and meaningful terms, food labels can attract consumers' immediate attention and function as heuristic cues to guide their purchasing decisions (Ares et al., 2013; Schuldt, 2013; Talati et al., 2017; Verbeke & Ward, 2006). In particular, the sustainable labels, which provide concise information about a product's overall social, ethical, environmental characters, can enable concerned consumers to infer the quality of a product and the integrity of food production process (Verbeke & Ward, 2006). For instance, Jeong and Lundy (2016) reported that consumers perceive organic and antibiotic products (e.g., bananas, milk) more favorably than genetically modified foods (e.g., potato chips) simply based on the type of foods and food labels. In a similar vein, when being asked about their attitudes toward the Front-of-Pack Labels (FoPLs) that summarizes a product's nutritional content, consumers preferred labels that were easy to understand and could help them understand the product's overall healthiness (Talati et al., 2017). Presence of FoPLs also increased the premium that consumers are willing to pay for the product (Talati et al., 2017).

For most consumers, it is improbable to track the sources of their food products and to understand whether the producers have complied with appropriate animal welfare standards. Presumably, consumers should take labels indicating meaningful animal welfare standards into account when purchasing food products, especially when such standards meet their ethical expectations. However, with a plethora of animal welfare labels currently available in the U.S. grocery stores, it is extremely difficult for consumers to acknowledge the organization or agency that issues each label, let alone the specific standards and guidelines used for certification. Consumers will not be able to use the labels as informative devices if there has not been a prior research of each of these labels to understand its meaning. As a result, consumers may simply rely on a superficial assessment of a variety of extrinsic cues, such as the colors, imagery, and design to judge the credibility of an animal welfare label (Verbeke & Ward, 2006). As a result, better-designed labels will receive evaluation that is more positive and exert a stronger impact on consumers' purchasing decisions.

In addition, consumers may perceive labels with more concise and stronger terms to be more credible than wordy, vague labels. In a study with European consumers, Van Loo et al.

(2014) showed that participants are willing to pay the highest price premium for chicken breast with "free range" labels, followed by identical products with an EU animal welfare label and organic labels. Almost 90% of the participants prefer the free-range label to other sustainable labels, including the Belgian and EU organic logos and animal welfare labels (Van Loo et al., 2014). The findings suggested that while consumers hold the animal welfare issue in high regard when making purchasing decisions on poultry products, their knowledge of specific labels might be limited; hence, consumers might rely on a superficial interpretation of the terms to assess the meaning of the label. When the used terms reflected consumers' deeply held concerns or values, they might be willing to pay a higher premium for the labeled product.

What's more, source attribution and one's trust in the source play a critical role in shaping consumers' evaluation of sustainable labels. When being exposed to eco-labels (i.e., labels indicating environmental friendly features and attributes) issued by the government and corporate, consumers who rarely purchased the product tended to perceive the government-sourced label to be more trustworthy than the corporate-sourced one (Atkinson & Rosenthal, 2014). However, the overall trustworthiness did not translate into positive attitudes toward the eco-label, as consumers favored the corporate-sourced label over government-sourced one, in spite of viewing the corporate as less credible than the government (Atkinson & Rosenthal, 2014). In sum, previous research revealed a rather complex picture regarding how the design features of food labels may influence individuals' perceived credibility and overall impression of it. While appealing visual designs and powerful terms may attract consumers' attention at the first sight, consumers take other heuristic cues, such as the label source, to judge the meaning and usability of the label.

Purpose & Objectives

Considering these findings, we used cartoned shell eggs as a case to examine the effects of animal welfare labels on American consumers' perceptions of food products and purchasing tendencies. We chose shell egg products primarily because of their popularity as a grocery item and people's heightened concerns regarding the (ethical) treatment of laying hens. With 256 adult participants recruited from the Amazon Mechanical Turk (MTurk) workers panel, we conducted a controlled experiment investigating people's knowledge of five animal welfare labels commonly appearing in the U.S. grocery stores, as well as how those labels may shape consumers' perception of hen treatment and purchasing tendencies toward egg products. Three research questions (RQ) guided the implementation of this study, including:

RQ1: How does the level of consumer knowledge vary for different animal welfare labels on shell eggs?

RQ2: How do animal welfare labels shape egg consumers' perception of ethical treatment of hens on farms?

RQ3: How do animal welfare labels shape consumers' willingness to pay a higher price for shell eggs?

Noticeably, while our primary focus was to examine the main effects of animal welfare labels on consumers' perceptions and purchasing tendencies, we did identify a number of individual-level factors that may correlate with the dependent variables and thus exert potentially confounding effects. For example, people who are generally more concerned about farm animal welfare or ethical treatment of hens on the farm may form different perceptions regarding hen treatments than those who are not concerned (María, 2016). In a similar vein, people who are knowledgeable regarding the poultry industry may develop a different perception regarding how hens are typically treated than those with limited knowledge (Thompson et al., 2011). Therefore,

we measured consumers' general concern for animal welfare and ethical treatment of hens on the farm, and preexisting knowledge of the egg production industry during the study. An inclusion of such variables would help factor out the potential confounding effects introduced by uneven distribution of samples. In addition, as consumers' demographic background and egg purchasing habits may influence their estimated price range and purchasing tendencies (Fearne & Lavelle, 1996), we included those variables as covariates in the analytical models as well.

Methods

Design and Participants

To examine the effects of animal welfare labels on consumers' perceptions and knowledge, we implemented an online experiment using the Amazon Mechanical Turk. A questionnaire was developed using Qualtrics and then disseminated to 256 participations recruited via the Amazon MTurk workers panel. Amazon MTurk is an online crowdsourcing platform that allows for recruiting subjects to perform tasks such as survey participation. Previous literature indicated that MTurk respondents "do not appear to differ fundamentally from population-based respondents in unmeasurable ways." (Levay, Freese, & Druckman, 2016, p.1). Out of 249 valid responses, 67% were from males and approximately half of the participants indicated that their highest level of education was a bachelor's degree. Upon completion, each participant received $2 as compensation.

During the experiment, participants first answered a series of questions regarding their general concern of animal welfare issue and the treatment of hens on the farm. In addition, they reported their overall knowledge of different areas related to food and egg production. The questions were based on established measures and were reviewed and modified by a group of experts. We then assigned participants randomly to one of six treatment groups where they viewed a stand-alone label commonly used for labeling shell egg products (see Table 1).

Two labels were USDA affiliated labels, which were USDA Grade A and USDA Organic. The USDA Grade A label was included only as a control condition to gauge the baseline of participants' knowledge level of displayed labels, perceived treatment of hens, and willingness to pay for eggs. Another two labels included the term "humane," which were American Humane Certified® and Certified Humane ® Raised and Handled ®. These two labels were backed up with certification guidelines developed by AHA and HFAC respectively. The fifth label was the United Egg Producers Certified label, created by the UEPC. The last one was a "Cage Free" label created by the researchers to reflect typical cage free claims shown on egg packages.

Table 1
Animal Welfare Labels Used as Stimuli for Treatment Groups

					
Certified Humane® Raised and Handled® Label	American Humane Certified Label	United Egg Producers Certified Label	Cage Free Label	USDA Organic Label	USDA Grade A Label (Control Group)
N = 41	*N* = 42	*N* = 42	*N* = 40	*N* = 42	*N* = 42

Note: *N* stands for sample size for each treatment group.

After viewing the stimuli, participants indicated their familiarity with each label as well as their perception of and purchasing tendencies toward the labeled egg products. We also asked additional dispositional questions, including the frequency of egg purchasing, demographics, and political ideology post treatment.

Dependent Variables

Label knowledge. After viewing the shown label, participants were asked to indicate if they had seen it before. Across all treatment groups, 49.4% (*n* = 123) of participants indicated that they had seen the given label before. In addition, we asked the participants who indicated being aware of the shown label to report their knowledge of it. Label knowledge was measured with the question "how much do you know about the label" on a four-point scale (0 = "not at all," 3 = "to a great extent"). The mean value for this variable ranged from 0.29 to 1.59 for all six groups, suggesting that a majority of participants knew nothing or very little about the given labels.

Perception of ethical treatment of hens on farms. Perception of ethical treatment of hens was measured by asking participants whether they "think this label indicates how well laying hens are treated on the farm." Potential responses included "yes," "no," and "not sure." Answers to this question ranged from 31% to 70.7% answering "yes" across all treatment groups. We dichotomized the variable for further statistical analysis.

Willingness to pay for labeled shell eggs. Additionally, participants indicated how much they would be willing to pay for shell eggs labeled with the displayed label. We chose the price range based upon shell eggs in the U.S. grocery stores with similar labels. Four price options were provided for participants to choose from—$2.67, $2.82, $3.97, and $4.68.

Control Variables

General concern for animal welfare. To ensure that the participants accurately interpreted the questions, we offered a definition of animal welfare derived from the American Veterinary Medical Association (AVMA). The definition is "An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behavior, and if it is not suffering from unpleasant states such as pain, fear, and distress" (AVMA, 2018). Participants then indicated their agreement with seven statements

related to farm animal welfare on a five-point scale (1 = "strongly disagree," 3 = "neither agree or disagree," 5 = "strongly agree"). Example statements included "The government should take an active role in promoting farm animal welfare," "Farmers should always treat their farm animals in an ethical manner," and "I am emotionally connected to the wellbeing of animals that produce the food products that I purchase." We took an average of the items to form an index to measure people's concern for the farm animal welfare (Cronbach's alpha=.89, *M*=3.80, *SD*=.84)

General concern for the ethical treatment of hens on farms. To determine participants' general concern for the ethical treatment of hens on farms, we adopted seven items from the Farm Animal Welfare Councils' (FAWC) Five Freedoms list (FAWC, 2009), which standardizes all environmental and raising factors contributing to farm animal welfare. On a five-point scale (1 = "not important at all," 3 = "neither important nor unimportant," 5="very important"), participants were asked to indicate their level of perceived importance of how hens should be treated on the farm. For example, participants indicated how important it is to allow hens to receive fresh and clean food, treatment for industry and disease, comfortable shelter, and to exhibit natural behaviors. We also asked one question asking how important it was to raise hens in ways to keep food costs low (reversely coded). The mean value of the seven items was used to measure this variable (Cronbach's alpha=.87, *M*=4.11, *SD*=.69).

Knowledge of the egg production industry. Additionally, participants reported how informed they were regarding a number of food-related topics, including food production in general, egg production, technology in food production on a five-point scale (1="not informed at all," 5="extremely informed"). The mean value of the three items was used to measure people's knowledge level (Cronbach's alpha=.89, *M*=3.09, *SD*=1.07).

Egg purchasing frequency. To help participants form an appropriate response, we offered a definition of shell eggs: "Eggs in a shell that have not been processed into powdered eggs, liquefied eggs, or any other egg-based product." Participants reported the frequency of purchasing shell eggs using a nominal scale ranging from never to more than once every week. A significant portion of participants purchased eggs once every week (38.2%) or more than once per week (31.3%).

Demographics and political ideology. To factor out the potential confounding effects of demographical factors, we asked participants to report their gender (67.5% males), educational level (10.8% high school graduate, 20.5% some college, 47.4% bachelor's degree), and household income (median was $30,000-$39,999). A majority of participants were Democrats (49.4%) and 46.2% described their political views as somewhat or very liberal. Another 33% described themselves as somewhat or very conservative.

Data Analysis

To examine the roles of animal welfare labels in shaping participants' perception of and purchasing tendencies toward egg products, we ran a series of Analysis of Covariance (ANCOVA) and binary/ordinal logistic regressions to determine the main effects of treatment groups on three dependent variables, including label knowledge, perception of hen treatment, and purchasing willingness. For the series of ANCOVA analysis, the covariates included general concern for animal welfare, general concern for the ethical treatment of hens, knowledge of the egg production industry, egg-purchasing frequency, as well as the demographical factors and political ideology. These variables also served as control variables for the regressions, which allowed us to separate the main effects of animal welfare labels from other potential confounding effects introduced by the attitudinal and dispositional factors.

Results

Label Knowledge

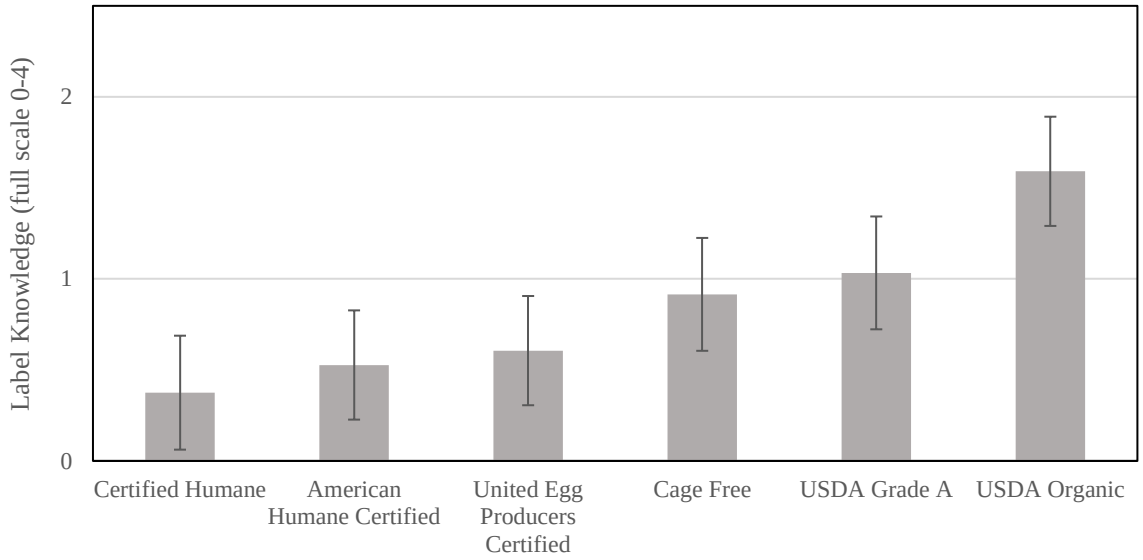
RQ 1 asked if consumers possess significantly different levels of knowledge regarding the shown labels. Results showed that the main effect of treatment is significant (F=8.29, $p < .001$), suggesting that participants' self-reported knowledge varied for the shown labels. Pairwise comparisons showed that participants knew significantly more about the USDA Organic label than the Certified Humane ® Raised and Handled ®, American Humane Certified®, and United Egg Producers Certified labels. The mean differences between other pairs, however, were not significant (see Table 2 and Figure 1). In addition, ANCOVA results showed that people who were generally more concerned about the ethical treatment of hens indicated being less informed about the animal welfare labels (B = -.306, $p = .026$), which reflected their potentially suspicious attitudes toward the meaning of those labels. Not surprisingly, general knowledge about the egg production industry was positively related to self-reported label knowledge (B = .376, $p < .001$).

Table 2.
ANCOVA Results for the Self-Reported Knowledge of the Displayed Labels

Predictor	Sum of Squares	*df*	*F*	*p*	Partial Eta Square
Treatment group	39.89	5	8.29	.00***	.15
General concern for animal welfare	1.96	1	2.04	.16	.01
General concern for hen treatment	4.82	1	5.00	.03*	.02
Knowledge of Egg Production	25.62	1	26.61	.00***	.10
Egg purchasing frequency	0.10	1	.10	.75	.00
Gender	0.47	1	.49	.49	.00
Education	0.07	1	.07	.79	.00
Political ideology	0.25	1	.26	.61	.00

Note: ***$p < .001$, **$p < .01$, *$p < .05$.

Figure 1.
Group Mean Values of Participants' Self-Reported Knowledge of the Displayed Labels



Perceptions of Hen Treatment

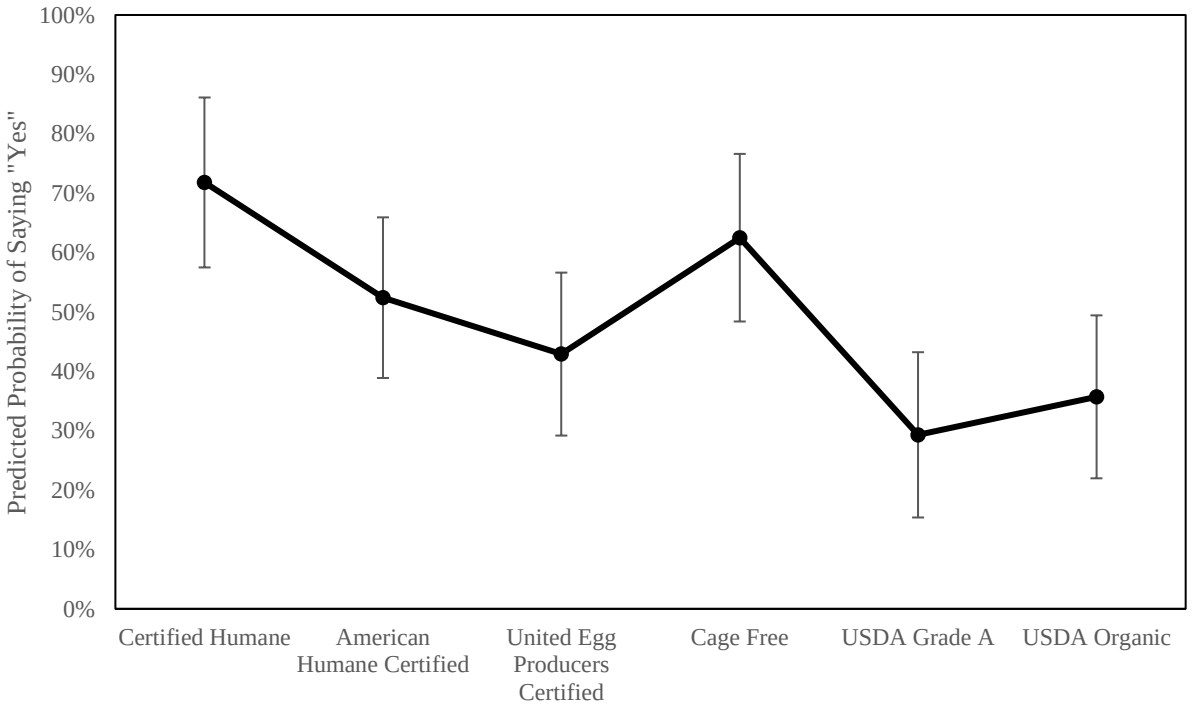
RQ 2 asked if the animal welfare labels shape consumers' perception of hen treatment on the farm. Binary logistic regression results showed that people exposed to the Certified Humane ® Raised and Handled ® (B = 2.11, $p < .001$) and Cage Free (B =1.59, $p = .003$) labels were more likely to agree that the labels indicate the proper treatment of hens on the farm than people exposed to the USDA Organic label (see Table 3 and Figure 2). In addition, people who were more concerned about farm animal welfare were more likely to consider the shown labels as indicators of ethical treatment (B = .55, $p = .041$). In contrast, people who were more concerned about hen treatment were less likely to agree that the shown labels indicated how well the hens are treated on the farm (B = -.62, $p = .047$). Not surprisingly, people who reported being knowledgeable about egg production (B = .34, $p = .045$) and purchased egg frequently (B = .60, $p < .001$) tended to perceive the labels as good indicators.

Table 3.
Logistic Regression Results for Perceptions of Hen Treatment As Indicated By the Displayed Labels

Predictor	B	*S.E.*	*df*	*p*
Certified Humane	2.11	.55	1	.000***
American Humane Certified	.92	.50	1	.07
United Egg Producers Certified	.39	.50	1	.43
Cage Free	1.59	.53	1	.003**
USDA Grade A	-.18	.53	1	.73
General concern for animal welfare	.55	.27	1	.04*
General concern for hen treatment	-.62	.31	1	.047*
Knowledge of Egg Production	.34	.17	1	.045*
Egg purchasing frequency	.60	.17	1	.000***
Gender	.08	.34	1	.81
Education	.01	.09	1	.93
Political ideology	.14	.12	1	.23

Note: ***$p < .001$, **$p < .01$, *$p < .05$

Figure 2.
Participants' Perceptions of Hen Treatment As Indicated By the Displayed Labels

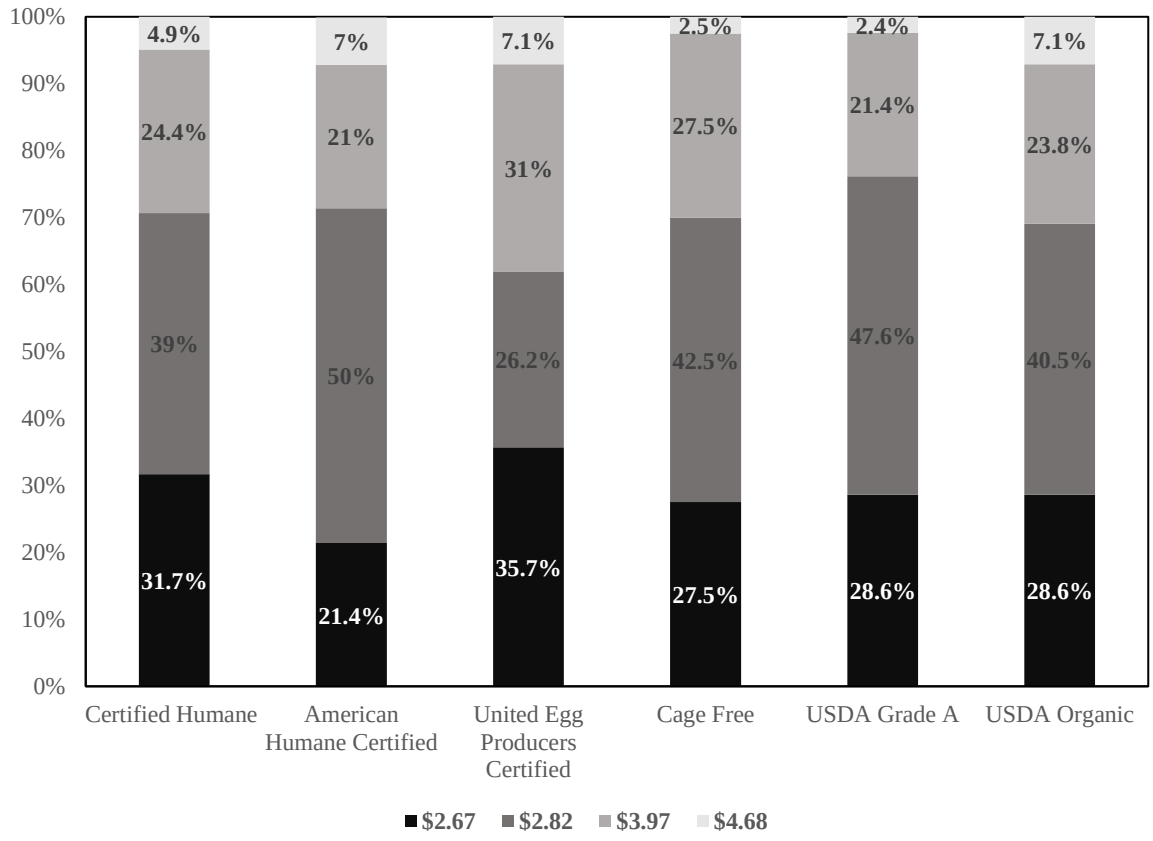


Willingness to Pay for Shell Eggs

RQ3 asked if the presence of animal welfare labels would motivate consumers to purchase the labeled eggs at a higher price. Ordinary logistic regression results showed that the group assignment does not significantly correlate with the price categories that participants chose. Figure 3 showed that most participants favored the second lowest price–$2.82–across all treatment groups. In other words, regardless of what labels they received, participants chose a price that only reflected their acceptable price rates for egg products in general. In terms of covariates, people who were generally more concerned about farm animal welfare were willing to pay a higher price for eggs with the animal welfare labels (B = .48, p = .037).

Figure 3.

Participants' Willingness to Pay a Lower or Higher Price for Labeled Egg Products.



Discussion

In the past decade, public interest in animal welfare issues has significantly heightened due to concerns about the wellbeing of farm animals and the integrity of the food production system. More and more consumers care about the means by which their food is produced and how the welfare of farm animals may influence the food quality and safety. Partially driven by the public's increased concern, regulatory agencies, food manufactures, and industry organizations have developed a variety of mandatory and voluntary labeling schemes enforcing humane treatment of farm animals. However, a plethora of labels with various designs and terminologies

may confuse and mislead consumers, many of whom not only know limited about agriculture and food production, but also lack motivation to educate themselves on the label schemes. This study identified five commonly used animal welfare labels on poultry products and conducted an experiment to examine how consumers' self-reported knowledge vary for the labels and whether the presence of each label motivates consumers to pay a higher premium for labeled products.

Before discussing the findings in more details, we would point out a few methodological limitations of this study. The targeted population for this study is the average American food consumers who may encounter the examined labels when shopping groceries on a regular basis. Compared to convenience samples of local grocery shoppers, Amazon MTurk allowed us to collect data from demographically and geographically diverse populations, and therefore secure the generalizability of the findings (Buhrmester, Kwang, & Gosling, 2011). However, it should be noted that Amazon MTurkers mostly reside in urban areas and are typically more educated than the average American (Huff & Tingley, 2015). Hence, the findings may not reflect the preferences and perceptions of rural and undereducated population. Further research may replicate the study with a larger and more representative sample of consumers.

Second, the stimuli consisted of six stand-alone labels that consumers might have seen on poultry products. To examine consumers' knowledge and interpretation of the "cage-free" claim commonly shown on egg cartons, we created a red-colored label that was visually comparable to other labels. While the artificial design allowed us to minimize the potential confounding effects introduced by display format, the unfamiliar looking of the label may decrease consumers' trust in it. Future researchers should develop different labels indicating "cage-free" and examine how the design components (e.g., color, symbol, graphic etc.) may influence the label effectiveness. In addition, while many participants indicated seeing the given label before, they might not necessarily associate the label with poultry or egg products. One strategy to enhance the design is to attach the label to a bogus product to create more of a genuine feeling. However, other empirical questions may arise as the impact of food labels will potentially interact with that of many other components on the food package.

Despite these limitations, this study has important theoretical implications, as well as policy and practical relevance, as it evaluates the effects of popular animal welfare labels on consumers' perception of food products and purchasing tendencies. Previous research has pursued two distinct theoretical routes regarding consumers' cognitive processing of food labels. One line of research conceptualizes food labels as heuristic cues that can aid in consumers' purchasing decisions (Verbeke, 2005). In other words, consumers would rely on salient and visually appealing labels to infer the healthiness, quality, and safety of food products, regardless of how much they know about the label's meaning. In contrast, another line of research argues that food labels would only work effectively when consumers actually understand what the labels mean and are motivated by their sufficient knowledge to make purchasing decisions (Grunert, Hieke, & Wills, 2014).

Our results, however, are supportive of the former observation, as participants have perceived the labels they are least knowledgeable of as the strongest indicators of hen welfare. In particular, compared to the third-party labels, consumers feel most informed about the USDA Organic label but do not consider it implying sufficient information on the humane treatment of hens on the farm. In contrast, while most participants indicate having very limited knowledge about the voluntary labels, including the Certified Humane and Cage Free labels, they believe that these labels are credible indicators of humane treatment of animals. Considering the different cognitive pathways through which consumers may process food labels, it is worth

future research efforts to investigate how the psychological traits of consumers (e.g., product involvement, motivation, understanding etc.) may interact with their tendencies of using food labels.

The results show that consumers are highly concerned about farm animal welfare and the ethical treatment of hens in particular. However, a majority of consumers lacks confidence in their knowledge about animal welfare issues and related standards on food labeling. While the American Humane Certified and United Egg Producers Certified labels are backed up with robust standards on ethical treatment of hens and other farm animals, consumers are unlikely to view them as credible. Instead, they assign more credibility to alternative labels that contain more simplistic and stronger terms, such as "certified humane" and "cage free." Although consumers' conservative attitudes might be due to their limited familiarity with the certifying organizations, it is clear that low knowledge does not prevent consumers from using the labels as heuristic cues to judge how hens are treated. In fact, the Certified Humane label is the one that receives the lowest level of awareness, but most people believe that it is a reliable indicator of humane treatment.

In addition, people who are knowledgeable about food and egg production tend to know well about animal welfare labels and consider the popular labels as good indicators. However, concerning consumers, including those who are concerned about farm animal welfare and hen treatment, demonstrate a lower level of self-reported knowledge and confidence in the labels. It is understandable that without much self-education and frequent access to credible information, concerning consumers can be more suspicious about the labels and other packaging claims that appear to be convincing. This finding implies the necessity of enhancing public education on animal welfare issues via mediated communications and public campaigns.

Noticeably, the selected animal welfare labels do not lead consumers to pay a higher premium for the egg products; most participants choose the financially reasonable options that reflect the typical price range of a dozen eggs. While previous research has shown the positive effects of sustainable labels on consumers' willingness to purchase meat or other food products, our results do not replicate this finding. It has been highlighted the potential use of animal welfare labels as a marketing tool; however, empirical questions remain as the effectiveness of such tools in encouraging purchasing behavior. Consumers desire values and meanings from brands (Tan & Ming, 2003). Agricultural product marketing should take advantage of this by developing new branding strategies that integrate public education on farm animal welfare.

This study suggested that consumers are minimally knowledgeable about the labels found on shell eggs. The unsuccessful nature of third-party organizations' consumer education program comes as no benefit to the egg sector of the poultry industry. Agricultural practitioners should make strong efforts to communicate sound fact-based information regarding production and rearing practices to activist groups and the public. Agriculture cannot ignore the critical role of consumer perceptions in deriving policies or practices pertaining to farm animal welfare. (Croney, 2011). Creation and refinement of animal welfare labels should be based on empirical evidence drawn from solid research.

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