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Effects of Food Label Education on Consumers' Sensory Perception and Awareness in Chicken Meat

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Effects of Food Label Education on Consumers' Sensory Perception and Awareness in Chicken Meat

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science in Food Science

by

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Bachelor of Technology in Food Engineering and Technology, 2013

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ABSTRACT

Recently, sustainability and process-related label claims have gained immense popularity especially for meat products like chicken. Apart from providing consumers with required product information, these labels have an impact on consumer perception and purchase behavior. The objective of this study was to determine whether providing label information affects consumers' awareness and attitude toward the claims found on chicken products. Additionally, it was analyzed if enhanced label understanding affects consumers' sensory, quality perceptions and purchase intent. A total of 110 participants were randomly distributed into 1 of 3 types of education sessions: (1) reading a flyer (passive learning), (2) attending lecture by a professor (passive learning with authoritative effect), and (3) group discussion (active learning). Each participant filled out an awareness survey about 10 label claims commonly shown on chicken products. Participants' objective label understanding, as well as subjective understanding significantly increased following the educational sessions, regardless of type of education. However, passive learning demonstrated greater potential to induce positive label attitude among participants as opposed to active learning, which actually had a negative impact. Top scorers from this study were chosen as the High Label-Understanding (HLU) group to further compare sensory perception and purchase behavior regarding chicken meat products with respect to their non-educated counterparts, i.e., the control (CNTL) group. High label-understanding was instrumental in participants associating higher quality perception and liking toward labeled samples compared to non-labeled ones. Additionally, this effect varied as a function of type of label claims. It was found that the trust participants vested in the label claims strongly impacted their quality and acceptability ratings. Finally, HLU group looked out for label claims on the chicken products while making purchase decision more than CNTL group. High label-understanding led to an increase in liking and trust toward chicken products with sustainability and process-related label claims. In conclusion, label education positively affects participants' label understanding and attitude toward label claims, in turn affecting their sensory acceptability and purchase intent. Thus, poultry processors can tap this information to increase acceptability and sales of their respective products.

Keywords: *Sustainability, Label claim, Education, Awareness, Sensory perception, Purchase intent, Visual attention*

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CHAPTER 1
GENERAL INTRODUCTION

Consumer liking of food products is highly essential to determine the product's market success. Factors contributing to these aspects of consumer behavior can be classified as "search qualities" and "experience qualities" of the product affecting consumers' "expected liking" and "actual liking", respectively. While "search qualities" refer to qualities that can be ascertained to a product prior to purchase (e.g., price), "experience qualities" refer to qualities of product determined only after using the product (e.g., sensory experience) (Nelson, 1970). In addition, another class of quality determinant according to researchers is "credence", which is the "credibility on part of the seller towards the buyer". Credence cues mainly include information about health, origin, production method, brand and ethics (Fernqvist & Ekelund, 2014). Primary purpose of credence is to provide consumers with accurate product information so that they can make better informed food choices (Darby & Karni, 1973; Grunert, 1997).

"Do all consumers have same level of label understanding?" The answer is probably "no". Not all consumers have the same level of label understanding. It differs by their interests, demographic profiles, and health concerns (Davies, Titterington, & Cochrane, 1995; Cannosamy, Pugo-Gunsam, & Jeewon, 2014). Moreover, prior research suggests that consumers tend to overestimate their own label understanding, i.e., they think they understand label information well, but in reality they do not. Sharf et al. (2012) evaluated food label awareness among 120 young adults and observed that 43.9 % of the consumers thought they had sound knowledge of food labels, but only 27.2% consumers could provide the right answer when questioned about the significance of label claims. Additionally, it was found that nutritional table section on the label was best understood but the health claim section was least understood. It was brought to attention by Grunert (2002) that consumers process label information differently, depending upon their knowledge. Lack of label knowledge can easily lead to misunderstanding or misinterpretations about the claims. Ensuring sound label understanding is therefore important for consumers to interpret product information correctly.

Most of the prior research regarding consumer awareness of labels has been focused on nutritional labeling. A study by Solheim (1992) showed that consumers' liking for reduced-fat sausages differed with fat content information provided. Specifically, liking for the reduced-fat sausage was higher when the consumers were told that it contained normal fat content (20%), than when they were told it had reduced fat content (12%). Higher fat-content information automatically led consumers to think that it

would be more tasteful than the low-fat sausage. In addition to nutritional label, there are other relatively new aspects of product label, for instance, sustainability and process-related label claims, which are also important and need to be focused upon. With growing concerns about sustainability, claims providing environmental sustainability information are increasingly gaining importance. According to the basic definition of sustainability, it is '*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*' (World Commission on Environment and Development, 1991). Environmental concerns and safety factors motivate consumers to have a positive attitude towards sustainable food product (Vermeir & Verbeke, 2006). Prior research shows that sustainability and process-related claims have potential to affect consumers' quality perception of food products mainly due to high expectations associated with these products. A study by Sörqvist, Hedblom, Holmgren, Haga, and Langeborg (2013) found that "eco-friendly" labels have a positive effect on consumer liking. In this study products labeled as "eco-friendly" were found to taste better than those labeled as "not ecofriendly". Notably, both products were the same and differed only in the information being provided. Thus, credence cues providing sustainability related information have potential to enhance liking of food products. However, do they also affect consumers' purchase behavior? Currently, even though high expectations, environmental concerns and safety considerations increase consumers' liking towards sustainable food products, their purchase decisions are restricted by factors such as price (Grunert, Hieke, & Wills, 2014). Additionally, since awareness about these label claims is limited, consumers are not able to truly understand label significance for it to have an impact on their purchase decisions. General confusion among consumers regarding different sustainability and process-related label claims (e.g. "organic" versus "free range", "organic" versus "natural") have been reported in prior studies where consumers tend to underestimate label significance (Harper & Makatouni, 2002; Gifford & Bernard, 2011). As mentioned earlier, this label information can be misunderstood or misinterpreted due to lack of knowledge. Hence, measures have to be taken to increase consumers' awareness about sustainability and process-related label claims for higher acceptance and liking of sustainable food products possibly translating into positive purchase decisions.

One approach to increase consumers' current label knowledge is to provide them label education. This approach has been adopted by poultry manufacturers in past to spread label awareness among

consumers. In one such endeavor, a leading poultry company conducted awareness campaign in 2009 to educate consumers about “plumped” or “salt-water injected” chicken and health issues associated with it. They chose to conduct the education campaign via online and media sources like television. Their findings suggest that 63.1% of consumers were unaware of this practice. Interestingly, 85.4% of the consumers vowed that they would pay more attention to labels and avoid purchasing saltwater-injected chicken in the future (Berkhout, 2009). In this way, label education provides a pathway for consumer to have better understanding of label claims and make more informed food choices.

Various factors need to be taken into consideration when providing label information to consumers. Most importantly, consumers’ response to information is highly vulnerable with respect to its source. For example, media plays a primary role in molding consumer awareness as they variedly change consumers’ outlook towards food products. There has been a persistent fear of residues and food additive for a long time. Consumers are more negative towards the use of growth hormones and antibiotics in meat and poultry due to fear of residues. Media has emphasized on this issue to such a large extent that even in countries that do not allow use of growth hormones or antibiotics, consumers are still scared about finding these residues in their food (Bánáti, 2011). So what kind of information sources might be useful to increase consumers’ label awareness? Liu, Pieniak, and Verbeke (2014) studied the consumer knowledge regarding seven food-related hazards: additives, residues, counterfeit, inferior, genetically modified, deteriorated and nutritionally imbalanced food. It was found that television, internet and personal communication were popular sources of information. However, medical doctors and research institutes were considered the most trusted sources of information according to the consumers.

Another aspect to be taken into consideration is how should the information be provided to the consumers. Various methods like flyer (Lusk et al., 2004), presentations (Gifford & Bernard, 2011), and focus group discussions (Haugaard, Hansen, Jensen, & Grunert, 2014) have been used in the past for this purpose. However, to the best of our knowledge, very few studies in the past have looked into the differences in these methods as educational interventions for increasing label understanding of consumers. Consolidating the above information, the main objectives of this study were set to evaluate consumer awareness and knowledge about sustainability and process-related label claims found on chicken products and determine the effect of varying approaches of label education on their

understanding and attitude towards these claims. Additionally, this study looked into the impacts of label education on consumers' quality perception, sensory acceptability and purchase behavior toward chicken products. Since label awareness studies are highly product specific, chicken breast meat was selected as the target group for this study owing to its high demand and increasing safety concerns (Consumers Report, 2014).

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CHAPTER 2
REVIEW OF LITERATURE

1. Poultry product label

1.1. Definition/Concept

The Poultry Products Inspection Act (PPIA, 2011), as a part United States Department of Agriculture (USDA) lays down certain basic definitions to ensure appropriate labeling of poultry products. To begin with, “poultry” is defined as *“any domesticated bird, whether live or dead”*. Additionally, “label” is *“a display of written, printed, or graphic matter upon any article or the immediate container (not including packaged liners) of any article, but the term “labeling” means “all labels and other written, printed, or graphic matter (1) upon any article or any of its containers or wrappers, or (2) accompanying such article”* (PPIA, 2011). USDA public health agency named Food Safety and Inspection Services (FSIS), takes responsibility for the commercial supply of poultry while ensuring correct labeling and packaging. If a poultry product does not meet the required standards its label claims tends to have, or if the claims are proven false, the product considered “misbranded” (Post et al., 2007). It is, in fact, the duty of the FSIS to develop labeling guidelines and policies for the food manufacturers maintaining uniformity and ensuring that the consumers are not victimized to misbranding. An extensive process takes place to verify the authenticity of the label before it is finalized for a product.

Certain components of the label (such as inspection legend, ingredients statement, handling statement, product name, signature line, safe handling instructions, net weight, and nutrition facts) are mandatorily present on product labels. There are some label claims that need to be sent to the FSIS before official approval. These primarily include the statement claims like, ‘certified humane’, ‘organic’, ‘vegetarian fed’, ‘no hormones administered’, ‘natural’, to name a few (Post et al., 2007).

1.2. Type of label

Currently, under the PPIA (2011), the USDA-FSIS inspects all raw poultry processed and sold inside the country as well as the ones imported. Even though USDA provides specific definitions of most of the label claims found on poultry products, there are a few claims which do not have a particular definition yet. For example, the FSIS has not yet officially defined the term “organic” and hence the claim “Certified organic by” is used only when followed by the certifying authority name. USDA’s Agricultural Marketing Service (AMC) along with National Organic Program (NOP) initiatives is working on finding a

clear definite statement to describe “organic” and its expectation from different food products including poultry. However, USDA has its own definitions based on certain standards for labels claims like “natural”, “vegetarian fed” and “USDA process verified” to ensure good quality and safety of products. Information on different type of label claims commonly found on chicken products is summarized in Table 1.

There are certain claims that need to be certified by a third-party association as USDA approval itself is not enough. The Animal Welfare Institute (AWI) categorizes different food labels associated with environmental sustainability generally found on poultry products on the basis of their third-party certification (AWI, 2012):

- *Certified Labels*

According to AWI, *‘these label claims are defined by a formal set of publicly available animal care standards. Compliance with the standards is verified by a third-party audit’*. With respect to poultry product, these labels mainly involve ‘Animal Welfare Approved’, ‘Certified Humane’, ‘American Humane Certified’, ‘Certified Organic’, ‘Food Alliance Certified’ and ‘Global Animal Partnership.’ Additionally, certified labels are accompanied by their respective logos.

- *Unverified labels*

According to AWI, *‘these claims have no legal definition and standards are vague and/or weak. Compliance with USDA’s definition is not verified on farm by the government or any independent third party.’* With respect to poultry product, these labels mainly involve ‘Free-Range’, ‘Humanly – Raised’, and ‘Raised Without Antibiotics.

Table 1: Labels related to safety and sustainability assurance found on chicken products

| Type of label | Third Party Verification Required | Definition/Specific Requirements | Reference |
|-------------------------|-----------------------------------|---|--|
| Animal Welfare Approved | Yes | USDA-approved third-party certification label supporting and promoting compliance of highest welfare standards to raise animals/birds outdoors, on pasture or range. Administered by the non-profit Animal Welfare Institute, aimed at ensuring natural behavior, social interaction, physical comfort and psychological sanity of the birds. Physical audits are carried out to ensure that the farmers are conscientious attitude towards the animals/birds in their care. Beak cutting of poultry is prohibited. Standards include the treatment of breeding animals, during transport and at slaughter. | Animal Welfare Institute (2012, 2014). |
| Certified Humane | Yes | Third-party welfare certification program administered by the non-profit Humane Farm Animal Care. It includes standards for ensuring wholesome and nutritious feed without antibiotics or hormones, prohibition of housing in cages, maintaining enough space requirements and ventilation. Kinder processing techniques by skilled workers and compliance with food safety and environmental regulations are also a part of this program. Beak trimming of hens and turkeys are allowed only under certain circumstances. | Animal Welfare Institute (2012) Humane Farm Animal Care (2009) |
| Certified Organic | Yes | Standards are defined by regulations of the National Organic Program and compliance with the standards is verified by a USDA-accredited organic certifying agency. It primarily involves preservation of natural resources and biodiversity, support for animal and health welfare and outdoor access along with exposure to sunlight. This program allows using only approved materials prohibiting use of genetically modified products | Animal Welfare Institute (2012) USDA National Organic Policy (2013) |

(Continued)

| Type of label | Third Party Verification Required | Definition/Specific Requirements | Reference |
|----------------------|-----------------------------------|---|---|
| 'Fresh' | No | This label ensures that whole poultry and cuts have never been exposed to temperature at which poultry freezes (below 26 °F). Also, it should not be hard to touch or frozen solid, as per consumer expectations. Fresh poultry should always bear a "keep refrigerated" statement | USDA Food Safety and Inspection Service (2011) |
| 'Natural' | No | Generally referred to a product that contains no artificial ingredient or added color and is only minimally processed wherein 'minimal processing' means that the product was processed in a manner that does not fundamentally alter the product. The label must include a statement explaining the meaning of the term natural (such as "no artificial ingredients", "minimally processed") | Animal Welfare Institute (2012) USDA Food Safety and Inspection Service (2011) |
| No Added Hormones | No | Use of hormones is essentially prohibited in raising poultry. Therefore, the claim "no hormones added" cannot be used on the labels of poultry unless it is followed by a statement that mentions "Federal regulations prohibit the use of hormones." | Animal Welfare Institute (2012) USDA Food Safety and Inspection Service (2011) |
| No Antibiotics Added | No | Antibiotics may be used in animals/birds to prevent disease and increase feed efficiency. Hence, this claim is allowed by the USDA if the producer can provide documented proof that the animals/birds have not received antibiotics at any point in their lives for any purpose, including treatment of illness. | Animal Welfare Institute (2012) USDA Food Safety and Inspection Service (2011) |

(Continued)

| Type of label | Third Party Verification Required | Definition/Specific Requirements | Reference |
|---|-----------------------------------|---|--|
| Non-GMO Project | Yes | <p>GMOs, or “Genetically Modified Organisms,” are plants or animals created via biotechnological techniques like gene splicing (or genetic engineering). This technology creates unstable combinations of plant, animal, bacterial and viral genes by merging DNA from different species. The result of this technology produces species that cannot occur in nature or in traditional crossbreeding. There are concerns regarding the safety of consuming these products.</p> <p>The Non-GMO Project is a third-party, non-profit organization aiming to protect the non-GMO food supply and allows consumers to identify a process or product that does not employ GM processes or inputs</p> | <p>http://www.nongmoproject.org/ (Official website: Non-Gmo Project)</p> |
| USDA Process Verified | No | <p>The USDA Process Verified Program follows the International Organization for Standardization ISO 9000 series to maintain documented management system with an aim to assure consumers of uniform quality products.</p> <p>USDA Agricultural Marketing Service offers this seal to producers as a marketing tool. Participating producers submit their standards for consideration, and after approval is granted, USDA conducts audits to verify that the company is following its own standards in raising animals</p> | <p>Animal Welfare Institute (2012) USDA Agricultural Marketing Service (2013)</p> |
| ‘Vegetarian Fed’ or ‘Fed All Vegetarian Diet’ | No | <p>USDA allows this label if the producer provides proof that the diet/feed of the bird/animal did not contain any animal/bird byproducts</p> | <p>Animal Welfare Institute (2012) USDA Food Safety and Inspection Service (2011)</p> |

USDA is responsible for delivering product information to the consumers via packaging labels so that the consumers make more informed and healthier food choices. However, very few consumers are correctly aware about these label claims. It is possible that the consumers might not completely understand the significance of these labels and hence are unable to interpret the given information correctly or as expected by the manufacturing agencies. As discussed below, label information plays a major role in building consumer perception of food products. Therefore, increasing consumer awareness about label claim becomes extremely important.

2. Consumer awareness and attitude towards label claims in poultry product

2.1. Consumer awareness towards label claims in poultry product

With increasing poultry product demand, consumers are expecting to have maximum product information at hand to be sure of its safety and quality. In this regard, label claims act as a tool of communication between food manufacturers and consumers. However, it is not necessary that consumers completely understand these label claims. Nutritional labeling is by far the most understood claim according to Sharf et al. (2014). Since sustainability claims are relatively new to in the market, understanding is these claims is very limited. Gifford and Bernard (2011) evaluated consumer awareness about “natural” and “organic” chicken. They found that consumers tend to overestimate the significance of “natural” chicken and consider it to be at par with “organic” chicken. Additionally, majority of consumers were not aware that “Non-GMO” was a requirement for a product to be “organic”. Similarly, Harper and Makatouni (2002) provided evidence of confusion between “free-range” and “organic” chicken among consumers. Thus, even though poultry manufacturers take a lot of efforts to ensure sustainability and process-related label claims on their products, the information is not effectively conveyed to the consumers.

Interestingly, consumers have reported to readily accept only that food label information, which is easy to understand. Complex information about food processing needs to be carefully addressed for consumers to understand and accept it. In other words, consumers prefer their food to be processed in a simple and natural way (i.e., not involving too much processing to change the inherent quality of the food) (De Barcellos et al., 2010). A major reason for this is lack of consumer awareness regarding food

processing techniques. In other words, most of the consumers are not very knowledgeable about these technologies and are more acceptable towards food that has been processed by a method they clearly understand. In a study by Lenhart et al. (2008), senior aged and women of child-bearing age were recruited and analyzed for their awareness about *Listeria* health hazards and interpretation of label on RTE meat and poultry products. Food safety labels were witnessed to influence consumer perceptions and affect their purchase intentions. Statements like ‘*Sprayed with a solution of sodium lactate to prevent the growth of L. monocytogenes,*’ and ‘*Contains sodium diacetate and sodium lactate to prevent growth of Listeria,*’ were not well received by the consumers who admitted that they would probably not buy a product with such claims. Certain claims were considered to be too “technical” by the consumers owing to their limited understanding restricting their product acceptance and liking. In similar vein, a study by van Wezemael et al. (2012) showed that consumer acceptance of beef products increased when detailed information about the processing technology involved was explained to the participants. They also provided participants with brief information (such as only name of the technology) and found that acceptance of product was not as high as when detailed information was given. Hence, it can be noted from prior literature that there is a need for higher label awareness among consumers not only for making more informed choices, but to enhance their product liking and acceptance.

2.2. Current strategies of increasing consumer awareness of poultry product label

As mentioned earlier, improving upon methods to increase label awareness is of utmost importance to self-equip consumers in making better food choices. USDA provides all the information necessary for this to consumers on its website so that no consumer misinterprets label information due to lack of knowledge. Recently, even chicken processing companies started realizing the importance of educating consumers about various label terms found on their chicken products to increase product acceptability. In one such endeavor, a leading company conducted a consumer awareness campaign in 2009 to educate them about “plumped” or salt-water injected chicken and health issues associated with it. Their public campaign included online and media sources like television to spread awareness among consumers. Their findings suggest that 63.1% people were unaware of “plumping” practice and 85.4% vowed that

they would pay more attention to the labels and avoid saltwater-injected chicken (World Poultry, May 2009).

Apart from traditional awareness techniques, novel ways are being researched to enhance upon the process of providing information to the consumers regarding food label understanding. One interesting methodology was suggested by Sonnenberg et al. (2013) who followed the traffic light intervention to study consumer label awareness. They segregated certain cafeteria items as red (unhealthy), yellow (less healthy) and green (healthy). It was found that this strategy of traffic light food labels helped consumers to make healthier choices as about 61% consumers identified health as an important consideration during their purchase after labeling as opposed to 46% who considered it before labeling. In terms of technological innovation, Dunford et al. (2014) recently developed a mobile phone application that gives information about nutritional labels so that consumers can make more informed choices. With the help of this application, every food product is given a nutrient score so as to rank it in terms of its nutritional benefits. Scanning the barcode of any packaged food provides detailed information on its nutritional benefit helping consumers to make healthier food choices. The underlying objective of these methods to explain the significance of the label claims to the consumers to increase their understanding. In addition to the above-mentioned strategies, there are studies being carried out at research level involving presentations and flyers to educate consumers about label information (Gifford & Bernard, 2011; Lusk et al., 2004). The advantage of this approach is that consumers have greater trust in sources like research institutes and professional moderators when it comes to authenticity of the information provided.

3. Effects of label on eating and purchasing behaviors

3.1. Effects of label on sensory perception and acceptability

Consumer acceptance is dictated by a lot of factors that including sensory as well as non-sensory parameters. Sensory parameters are mainly taste, texture, aroma and flavor. Fernqvist and Ekelund (2014) highlighted that non-sensory factors such as credence cues (e.g., information about health, organic food, origin, production methods, descriptive food names, brand, and ethics) generate sensory expectations toward food products, which affect consumers' quality perception and acceptability of the

products.

Recent years have seen a rapid increase in exposure to credence cues associated with sustainability such as organic, origin, production method, and ethics. Consumers have questioned whether food products manufactured in sustainable conditions (e.g., organic, animal welfare, and fair trade, etc.) can show better sensory-quality than those that have been manufactured in the conventional way on condition that no information about products is provided. Previous studies have not shown any strong evidence to prove this since findings have been highly product-specific. For example, Fillion and Arazi (2002) examined whether organic and conventional foods are different with respect to sensory quality. While organic orange juice tasted better than conventional counterpart, organic whole-milk did not show any advantage over conventional one. Another aspect to look into is whether consumers' quality perception and acceptability can vary with presence and absence of the information about sustainability provided on the products. Based on earlier findings, sustainability and process-related label claims affect consumers' acceptability as well as their quality perception of food, whether or not the food is actually produced in a sustainable condition. In one such study, Hoogland, De Boer, and Boersema (2007) worked towards determining if consumers understood and valued environmental sustainability logos of products like chicken fillet. The interventions included providing samples with "only logo" and "logo with information" about the same. Interestingly, chicken fillet samples provided with information about the logo were considered significantly more tastier, healthier, animal friendly and better for the nature compared to the one with only logo (without information). In a similar study conducted by Sörqvist et al. (2013), coffee labeled with "eco-friendly" was rated to have superior taste to coffee labeled with "not eco-friendly" claim when in reality both coffee samples were the same product. On the contrary, consumers' taste acceptability for orange juice did not differ among the three label-claim conditions, i.e., "eco", "fair-trade", and no-label condition (Grankvist, Lekedal, & Marmendal, 2007). In a study conducted by Napolitano et al. (2013), sensory characteristics as well as consumer liking were compared between organic and conventional chicken breast meats. Trained panelists were able to differentiate organic and conventional chicken meats in terms of texture characteristics. However, untrained consumer panelists were unable to detect such a significant difference with respect to sensory liking when information about organic production was not provided. However, when sustainability information, that chicken was raised in organic

environment, was presented, consumer panelists expected organic chicken to be more palatable than conventional chicken. Moreover, consumer panelists liked organic chicken product significantly more when information about organic production was presented compared to when no information was given (i.e., in the blind condition). In that sustainability and process-related label information appears to affect consumers' acceptability of food product. This further illuminates that there is a possibility of increasing consumers' product acceptance by increasing their label understanding.

3.2. Effects of label on eating behavior

Strong links between consumer's label considerations and eating practices have been established in previous studies. Kreuter, Brennan, Scharff, and Lukwago (1997) consumers' personal health interests dictate their label preferences. More specifically, it is possible for consumers to refer only those claims they feel are important. For example, people suffering from high blood pressure looked out for sodium content on the nutritional label more than any the other claims. Similarly, people having high cholesterol paid more attention to the cholesterol and saturated fat claims. McCann et al. (2013) highlighted the intricate relation between eating behavior, especially meat size portions. In this particular study, subjects were served identical lunches on three separate days, but the information given to name on all the days was manipulated as 'high energy', 'low energy' and 'baseline'. Differences were seen in the food portion size and energy consumption that differed with BMI of the consumers and demographics. It was found that mainly men as compared to women, moreover with a high BMI, tend to consume more energy when consuming the low fat/energy product indicating consumption of larger portion of these products compared to baseline. This shows that label claims have potential to manipulate consumers' attitude towards different aspects affecting their eating patterns and habits. However, most of the research studying association of label claims and consumers' eating behavior has been restricted to nutritional claims. Much work has not yet been done to identify a relationship between sustainability and process-related label claims and eating behavior of consumers.

3.3. Effects of label claims on purchasing behavior

Purchase behavior of consumers cannot be attributed to any one factor. It is, in fact, a culmination of different factors that dictate consumers' food choices and purchase decisions. As suggested by Bower, Saadat, and Whitten (2003), health benefits was one of the factors that stimulated purchase of the product for consumers in their study, whereas 'high price' was a definite factor for 'not buying' certain products. Consumers' personal interests and demographics are also instrumental in influencing their purchase behavior.

Willingness to buy food products with sustainable label claims (for example "organic") has been observed among consumers. A study by van Loo, Caputo, Nayga, Meullenet, and Ricke (2011) analyzed consumer intention to purchase "organic" chicken meat. Comparison was done between general and "USDA certified organic" label. It was found that habitual buyers of "organic" chicken were willing to spend a premium of 146.6% for general and 244.3% for "USDA certified organic" labeled chicken breast. Overall, the "USDA certified organic" chicken meat was valued higher than the one with general label indicating consumer trust in USDA verified products. Similarly, a Norwegian study by Olesen, Alfnes, Rora, and Kolstad (2010) evaluated consumer preference towards animal welfare and organic labeled salmon. It was found that consumers were willing to pay an extra price for welfare-labeled salmon contributing to better animal welfare and enhanced sustainable environment. There is definite evidence that sustainability information plays a major role in purchase intent and willingness to pay of food products. Moreover, studies show that consumers who are concerned about the environment are the ones who purchase sustainable food products.

It is suggested that even if consumers are concerned about sustainability, a definite gap between consumer's perception of knowledge and actual implementation to purchase decision is visible, probably due to price and availability barriers (Vermeir & Verbeke, 2006); Vanhonacker & Verbeke, 2009; Grunert et al., 2014). More specifically, consumers might have environmental concerns but that does not necessarily motivate them to buy sustainable food products. According to a study by Vanhonacker and Verbeke (2009), majority of consumers fall under the category of 'high attitude and high buying intentions' (35.96%) or 'low attitude and low buying intentions' (37.06 %). However, there are group of people who fall under 'high attitude and low buying intentions' (9.42%) and 'low attitude and high buying intentions' (17.54 %). A study by Wandel and Bugge (1997) evaluated purchase priorities of Norwegian consumers

while purchasing meat and meat products, They found that 31% consumers gave priority to freshness of the product, whereas 20% consumers chose taste and another 20% consumers considered nutritional value as top purchase priority. Only a handful of 5% selected environmental aspects to be a top consideration while buying meat and meat products. Price might be a major reason why not many consumers buy sustainable products. These discrepancies in attitudes towards buying sustainable product versus actual purchase of the same are possibly due to restricted knowledge among consumers.

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CHAPTER 3

The effect of varying educational intervention on consumers' understanding and attitude toward sustainability and process-related labels found on chicken meat products

ABSTRACT

This study focused on comparing the efficiency of educational intervention on improving consumers' understanding and attitude toward sustainability and process-related label claims. Participants were randomly distributed into 1 of 3 educational-intervention groups: (1) active learning (discussing label claims with other participants), (2) passive learning (reading a flyer about label claims), and (3) passive learning with an authoritative effect (attending a professor's lecture on label claims). Participants were asked to fill out a survey regarding their understanding and attitude toward 10 sustainability and process-related labels commonly displayed on chicken meat products at 3 different times: before, immediately after, and 2 weeks after educational intervention. Participants' subjective understanding (self-rated awareness) and objective understanding (recall of actual knowledge) of the label claims significantly increased following educational intervention, independent of the particular type of such intervention. Participants' attitudes toward label claims varied, however, by the type of educational intervention. Passive learning led participants not only to more trust, but also to consider label claims to be more important when purchasing chicken meat products. In contrast, active learning induced no significant change in the trustiness to label claims and additionally led participants to consider label claims to be of less importance with respect to their purchasing decision. In conclusion, educational intervention, whether based on passive or active learning, improves consumers' label understanding of chicken meat products. However, since attitude toward label claims varies by the type of educational intervention, poultry processors and researchers should take further steps in designing more effective ways to mediate the information regarding label claims.

Keywords: *Label claims, educational intervention, sustainability, poultry meat products, understanding, consumer attitude*

INTRODUCTION

In the presence of enormous market competition, food manufacturers today rely on packaging information to differentiate their products from those of others. In 2005, the U.S. food industry spent \$32 billion on advertising and \$66.5 billion on packaging to effectively provide consumers with essential product information (United States Department of Agriculture Economic Research Service, 2007). Consumers may expect their acceptability of certain products based on a variety of cues seen prior to purchase (also referred to as “search qualities”; e.g., appearance, packaging, etc.) (Nelson, 1970). After using the products, consumers tend to evaluate perceived product-qualities (also referred to as “experience qualities”) based on their prior expectations, which may modulate consumer acceptability of the products (e.g., assimilation-contrast model; Anderson, 1973; Cardello, 1994). In addition, perceived “credence qualities”, reflecting the credibility of the seller toward the buyer, is thought of as another class of properties influencing consumers’ acceptability of products (Darby & Karni, 1973). Credence includes use of information formats that enhance consumer knowledge about a product with respect to its nutritional value, ethics, or trust (Darby & Karni, 1973; Grunert, 1997; Fernqvist & Ekelund, 2014).

Credence qualities involve label information that consumers often read on a variety of food-product-packaging. Surprisingly, many consumers tend to overestimate their understanding of label information (Hoogland, Boer, & Skelton, 2007; Sharf et al., 2012). For example, in a survey among 120 young adults aged from 18 to 40 years examining consumers’ understanding of food labels, the “self-reported” expertise of 43.9% of the participants reflected a sound knowledge of food labels, but only 27.2% of the total number of participants actually scored “high” in the questionnaire about the food labels (i.e., 8-10 correct-answers in a total number of 10 questions) (Sharf et al., 2012). Of particular interest was the fact that only 22% of the participants who felt they had strong knowledge of the nutritional declaration (e.g., “without cholesterol”, “contains no caffeine”) were found to score “high” on the questionnaire. In another study conducted by Hoogland et al. (2007), many Dutch consumers were found to not have a full understanding of what a “certified organic” logo actually means even though they reported themselves to be familiar with the logo. In addition, consumers’ label understanding and their label usage when purchasing food products varies by label type. For example, consumers in European countries self-reported that they most frequently look for price, best before/use by date, and brand among

14 different types of information available on food packages when purchasing food and drink products. In contrast, they tend to give little attention to information regarding ethical impact (e.g., working condition, fair trade), environmental impact (e.g., production, transport), and allergies in food/drink purchasing (Grunert, Hieke, & Wills, 2014). Furthermore, consumers who have previously seen ethical and environmental claims are more likely to understand such claims than those who have not seen them before (Grunert et al., 2014). Based on these results, consumers' actual understanding of ethical and environmental labels is expected to be lower than that of other more popular point-of-sale labels (e.g., best before/use by date, ingredient list, and nutritional benefits). However, there has been a significant increase in the number of sustainability label claims that include ethical and environmental information (e.g., "animal welfare", "fed all vegetarian diet", or "free range" etc.) in the food industry (van Loo, Caputo, Nayga, & Verbeke, 2014). Accordingly, in recent years, consumers in the U.S. have become more interested in information regarding how foods are produced with respect to environmental, ethical, and animal welfare conditions. However, it remains doubtful as to whether consumers have a correct understanding of the sustainability label claims. Thus, building on increased concerns about sustainability labels, this study was designed to compare the effectiveness of educational intervention on consumers' understanding and attitudes toward label claims related to ethical and environmental information.

Improving the formation of labels is intended to make them as clear as possible in terms of their visualization and logo content, and it has been suggested as a means for increasing consumers' label understanding (Sharf et al., 2012). However, just using a logo/symbol appears not to be enough to increase consumers' positive attitude toward food products, especially when the logo/symbol is not completely understood. Hoogland et al. (2007) demonstrated that participants' beliefs about products were enhanced when a sustainability logo was presented in detail compared to when only a logo was presented. However, when we consider that consumers prefer simplified information on labels (Cowburn & Stockley, 2005) and that packaging space for labels is limited, providing a detailed explanation about labels is impractical. Thus, other educational approaches for improving consumers' label understanding could be used, in turn minimizing the necessity for additional explanation of label claims.

Educational intervention regarding label claims can be performed using either "passive" or "active" learning. Passive learning involves knowledge acquisition via didactic teaching characterized by

absence of resistance to what is learned (Krugman & Hartley, 1970; Haidet, Morgan, O'Malley, Jeann, Moran, & Richards, 2004). For example, learners can obtain information by reading educational materials. In contrast to passive learning, active learning emphasizes dynamic communication among learners with respect to a subject to be learned. Participants in the active learning mode are more accustomed to engaging with educational materials and with each other than those functioning in the passive learning mode (Haidet et al., 2004). However, some learners have found that they are able to make more appropriate use of knowledge gained through passive learning than through active learning even though both modes can be effective in improving learners' knowledge (Haidet et al., 2004).

Little research has directly compared passive- and active-learning methods with respect to the efficiency of improving consumers' knowledge or attitudes with respect to food labels, especially sustainability labels. Most studies have focused on either passive- or active-learning intervention. Some studies have used flyers or information sheets to provide information on the labels to test whether passive-learning intervention is effective (Lusk et al., 2004). These researchers compared participants' knowledge of the label claims and their willingness to pay both before and after they were provided with information about the label claims via a flyer. Alternatively, passive-learning intervention can be achieved through television, internet, personal communication, and teaching; indeed, the popularity of such methods has continued to grow. Notably, consumers have been found to consider medical doctors and research institutes as the most trustworthy sources of information with respect to food-related hazards (Liu, Pieniak, & Verbeke, 2014). In other words, when information regarding label claims is presented by authentic trusted figures or institutes, consumers are inclined to rely more on the authoritative effect as compared to when the information is provided by a flyer. Active-learning intervention has also been used through focus-group discussions designed to educate panel participants regarding food product label claims or new preservation techniques (Haugaard, Hansen, Jensen, & Grunert, 2014). However, to the best of the authors' knowledge, no comparison with other types of educational intervention with respect to the effectiveness of such intervention on consumers' label understanding has been performed.

This study aims to determine whether the type of information provided through label claims affects consumers' understanding and attitude toward sustainability label claims commonly found on chicken meat products. More specifically, this study will determine which of three types of educational

intervention, i.e., active learning, passive learning, and passive learning with an authoritative effect (see below), is most effective in improving not only consumers' label understanding, but also their attitude toward the label claims. In this study, chicken meat was chosen as the target food because it occupies a prominent position in U.S. consumers' diets and meets their increasing health concerns (Consumer Reports, 2014).

2. MATERIALS AND METHODS

The protocol used in this study was approved by the Institutional Review Board of the University of Arkansas (Fayetteville, AR, U.S.A.) (Appendix 1A). Prior to participation, the experimental procedure was explained to all participants and a written informed consent was obtained from each.

2.1. Participants

Volunteers were recruited through a consumer profile database of the University of Arkansas Sensory Service Center (Fayetteville, AR, U.S.A.) that contains information about more than 6,200 Northwest Arkansas residents. To minimize the potential effect of variation in background knowledge, only those with no prior academic courses related to food science, poultry/animal science, or nutrition were invited. A total of 135 volunteers were randomly assigned to one of three education groups (45 volunteers per group); however, only 110 participants completed this study: active learning group ($N = 33$), passive learning group ($N = 34$), and passive learning with authority group ($N = 43$).

Table 1 shows demographic profiles of the three groups. To minimize potential influences of demographic profiles on participants' understanding and attitudes toward label claims (Cannoosamy, Pugo-Gunsam, & Jeewon, 2014; Davies, Titterington, & Cochrane, 1995) the authors ensured that the three groups did not differ significantly with respect to their demographic profiles. That is, they did not significantly differ in terms of gender ratio, mean age, marital status, annual income level, and frequency of purchasing chicken products (raw fresh, raw frozen, and processed) (for all, $P > 0.05$). A slight difference in the education level according to the likelihood ratio was found ($P = 0.05$), but a two-way analysis of variance, treating "education level" as a fixed effect and "panel" as a random effect revealed

that education level did not affect objective- and subjective-understanding ratings of label claims or trust and importance-level ratings associated with label claims (for all, $P > 0.05$).

2.2. Label claims

A total of ten label claims mainly associated with sustainability were considered in this study. Most of these label claims used are commonly found on chicken products and have been considered in prior studies involving consumer perception based on claims (Fillion & Arazi, 2002; Gifford & Bernard, 2011). Among the selected claims, six are required to be mandatorily approved by U.S. Department of Agriculture (USDA): “*No Hormones or Steroids Added*”, “*All-Natural*”, “*Fresh*”, “*No Antibiotics Ever*”, “*Fed-All Vegetarian Diet*”, “*USDA Process Verified*”. Four additional claims (logo type) are certified by third-parties: “*Animal Welfare Approved*”, “*Non-GMO Project Verified*”, “*Certified Organic (USDA)*”, and “*Certified Humane*”.

2.3. Type of educational intervention on the label claims

There were three treatments of differing educational approaches to providing information on the label claims; each participant was asked to learn about the label claims using one of three educational approaches.

a. Active learning (AL): participants were asked to freely discuss label claims with other participants for 20 min.; a flyer including information on the label claims was provided only for reference.

b. Passive learning (PL): participants were asked to read information on the label claims on a flyer for 20 min.; questions and discussion were not permitted.

c. Passive learning with an authoritative effect (PA): participants were asked to attend a lecture by a professor (Department of Food Science, University of Arkansas, Fayetteville, AR) for 15 min. and then read information on the label claims from the flyer for 5 min.; additional questions and discussion were not allowed.

2.4. Survey

A survey of 40 questions was designed to determine the effect of varying educational approaches to label claims on consumers’ understanding and attitude toward such claims (Appendix 2). For each of

the 10 label claims, 4 questions (2 regarding label understanding and 2 regarding attitude toward the label) were given. Participants were first asked to rate their subjective understanding (i.e., self-rated awareness; *“How well do you think is your understanding of this label claim on chicken products?”*) on a 9-point Likert scale ranging from 1 (extremely poor) to 9 (extremely good). Subjective understanding of label claims was measured by averaging the scores of 10 label claims, with scores range from 1 to 10. Second, participants’ objective understanding (i.e., actual knowledge) of each label claim was assessed. The participants were asked to select from among four statement choices to answer the question: *“Which statement best describes the significance of the above label claim found on chicken products?”* Objective understanding of label claims was measured by counting the number of correct answers for the 10 questions (1 question per label claim), with a score ranging from 0 to 10.

The third and fourth questions were associated with consumers’ attitude toward label claims. Participants were also asked to rate the extent to which they trust the label claim using a 9-point Likert scale ranging from 1 (extremely distrustful) to 9 (extremely trustful): *“How much do you trust this label claim?”* Finally, the participants were asked to rate to what extent each label claim is important to them when making a decision to purchase chicken products using a 9-point Likert scale ranging from 1 (extremely unimportant) to 9 (extremely important): *“How important is this label for you to decide purchasing chicken products?”* Both parameters, i.e., trustworthiness of label claims and importance level of label claims, were measured by averaging the ratings of 10 label claims, with scores ranging from 1 to 9, respectively.

Participants were asked to rate the importance level of 7 attributes related to chicken products with respect to their purchasing decisions using 9-point Likert scales ranging from 1 (extremely unimportant) to 9 (extremely important), respectively. They were asked to consider seven attributes: price, safety, brand, sensory quality, environmental sustainability, packing design, and nutritional benefit.

2.5. Procedure

This study was conducted with all three educational interventions over a span of two different days.

On Day 1, each participant in the three educational-intervention groups was asked to fill out the survey (explained above) to assess his/her initial awareness and attitude toward the ten label claims commonly displayed on chicken products. Next, each participant attended to one of the three educational interventions for 20 min. Following this educational intervention, each participant was asked to fill out the same survey once again; the order of choices for each question was randomly changed. Participants were provided no feedback regarding the survey score. To determine retention knowledge regarding label claims, all participants were called in again two weeks after the educational session (Day 2) and asked to fill out the same survey; the order of choices at each question was again randomly changed.

Participants were asked to answer additional questions in addition to survey questions described above about the educational session that they attended. Specifically, they were asked to rate the extent to which the educational session was efficient in enhancing their knowledge about the label claims using a 9-point Likert scale ranging from 1 (extremely inefficient) to 9 (extremely efficient). They were also asked to rate the extent to which the educational session was trustworthy as a source of information about label claims using a 7-point Likert scale ranging from 1 (distrust strongly) to 7 (trust strongly). Finally, the participants were asked to rate the extent to which the educational intervention contributed to their informed choices regarding chicken products. That is, the participants were asked to rate the extent to which they agreed with the statement: *“After attending this education session I have a better idea of what the labels on chicken products mean and this will help me make better purchase choices”*, using a 7-point Likert scale ranging from 1 (disagree strongly) to 7 (agree strongly).

2.6. Data Analysis

Data was analyzed using JMP® Pro Version 11.0 (SAS Institute Inc., Cary, NC, U.S.A.) and SPSS 21.0 for Windows™ (IBM SPSS Inc., Chicago, IL, USA). To determine whether participants' label understanding and their attitude toward label claims vary by the type of educational intervention, a repeated measures analysis of variance (RM-ANOVA) treating “survey session” as a within-participant factor and “education type” as a between-participant factor. If a sphericity assumption was violated via the Mauchly's sphericity test, the degrees of freedom were adjusted by using “Greenhouse-Geisser” correction. If a significant difference in means was indicated by the RM-ANOVA, post-hoc comparisons

between independent variables were performed using Bonferroni *t*-tests. A Pearson correlation analyses were used to examine relationships between the participants' label understanding and their attitude toward label claims. A statistically significant difference was defined as when $P < 0.05$.

3. RESULTS

3.1. Effects of educational intervention on participants' understanding of label claims

3.1.1. Subjective understanding

No significant interaction between education type and survey session was found for the subjective understanding of label claims (i.e., self-rated awareness) [Greenhouse-Geisser correction: $F(3.23, 172.72) = 1.48, P = 0.22$]. As shown in Figure 1 (A), participants' subjective understanding of label claims significantly differed among the three survey-sessions [$F(2, 214) = 105.76, P < 0.001, power = 1.00$]. After the educational intervention participants stated that they were more aware of label claims than in the pre-education session; this trend was observed across all three educational approaches: active learning (AL), passive learning (PL), and passive learning with an authoritative effect (PA) ($P < 0.001$). The participants' confidence about label claims was retained after two weeks in AL ($P = 0.47$) and PL ($P = 0.13$) groups, i.e., there was no significant change between the two sessions, one immediately after and one two weeks after the educational intervention. However, the PA group showed a significant decrease in their subjective understanding after two weeks ($P = 0.002$); however, subjective understanding at the two-week follow-up session was still significantly higher than at the pre-education session ($P < 0.001$).

Subjective understanding of label claims did not significantly differ as a function of type of educational intervention [$F(2, 107) = 1.59, P = 0.21$].

3.1.1. Objective understanding

A RM-ANOVA revealed no significant interaction between education type and survey session with respect to objective understanding of label claims [$F(4, 214) = 0.20, P = 0.94$]. As shown in Figure 1 (B), participants' objective understanding (i.e., recall of actual knowledge) of label claims differed among the three survey-sessions [$F(2, 214) = 20.12, P < 0.001, power = 1.00$]. Objective understanding significantly increased immediately after the educational intervention ($P < 0.001$) and was sustained over the next two

weeks ($P = 0.20$), indicating that the educational intervention not only increased consumers' label understanding, but helped most participants retain the knowledge over a two-week interval.

Objective understanding of label claims did not significantly differ among the three types of educational intervention [$F(2, 107) = 0.25, P = 0.78$], indicating that the three means of providing information on label claims are equally effective in increasing the objective understanding of label claims.

3.2. Effects of educational intervention on participants' attitude toward label claims

3.2.1. Trustiness to label claims

A significant interaction between education type and survey session was found in participants' trust of label claims [$F(4, 214) = 5.97, P < 0.001, power = 0.98$]. Figure 2 (A) shows that after learning label claims either from a flyer (i.e., PL) or through a lecture (i.e., PA), participants trusted the label claims significantly more than did those in the pre-education session (for both cases, $P < 0.001$). Furthermore, their trust in label claims was sustained without significant change over a two-week interval in both PL ($P = 1.00$) and PA ($P = 1.00$) groups. However, participants who attended a group discussion on label claims (i.e., AL) did not differ in their trust in label claims across the three survey-sessions, i.e., there was no significant effect of active learning on trust of label claims ($P = 0.46$).

3.2.2. Importance level of label claims for purchase decision-making

There was a significant interaction between education type and survey session in participants' ratings on the importance level of label claims for purchase decision-making [$F(4, 214) = 5.34, P < 0.001, power = 0.97$]. Participants who attended a lecture (i.e., PA; $P = 0.22$) or a group discussion (i.e., AL; $P = 0.25$) did not differ among the three survey-sessions in their ratings of the importance level of label claims for purchase decision-making. However, after being exposed to information on label claims via a flyer (i.e., PL), participants rated label claims to be more important than they did in the pre-education session ($P < 0.001$), and this attitude regarding importance of label claims was maintained without significant change over a two-week interval ($P = 1.00$).

3.2.3. Importance level of product components for purchase decision-making

Participants were asked to rate the importance of seven product-components (price, safety, brand, environmental sustainability, sensory quality, packaging design, and nutritional benefit) with respect to their purchase of chicken products.

The RM-ANOVAs revealed no significant interaction between education type and survey session in any of the seven components (for all, $P > 0.05$). There was a significant effect of survey session with respect to the importance level of “environmental sustainability” for purchase decision-making [Greenhouse-Geisser correction: $F(1.66, 177.61) = 4.45$, $P = 0.02$, $power = 0.70$]. Participants considered “environmental sustainability” to be more important with respect to their purchase decision-making immediately after the educational session than before the session ($P = 0.004$) and this trend was maintained without significant change over a two-week interval ($P = 1.00$). In addition, there was a significant effect of survey session on the importance level of “packaging” for purchase decision-making [Greenhouse-Geisser correction: $F(1.67, 178.85) = 3.41$, $P = 0.04$, $power = 0.58$]. Participants considered “packaging” to be more important for their purchase decision-making immediately after the educational session than before the session ($P = 0.01$). However, other product components did not significantly differ among the three survey-sessions: before, immediately after, and two weeks after the educational intervention (for all, $P > 0.05$).

Initially, the importance levels of product components, except “safety”, did not significantly differ with respect to type of educational intervention (for all, $P > 0.05$). Compared to the AL group, the PL group rated the safety component to be significantly more important for their purchase decision-making over the three survey-sessions [$F(2, 107) = 4.07$, $P = 0.02$, $power = 0.71$].

3.2.4 Relationships between participants' label-understandings and their attitudes toward label claims

Figure 3 (A) demonstrates that participants' trust in label claims positively correlated with their subjective understanding (self-rated awareness), independent of the type of educational intervention (for all, $P < 0.001$). As participants became more self-confident in their knowledge of label claims, they increasingly trusted the label claims. However, as shown in Figure 3 (B), the relationship between trust and objective understanding of label claims differed with respect to the type of educational intervention. In

other words, participants' trust in label claims positively correlated with their objective understanding in the AL group ($r = 0.30$, $P = 0.003$), but not in the PL ($P = 0.64$) and PA ($P = 0.90$) groups.

In a similar fashion to trust in label claims, as participants became more self-confident in their knowledge of label claims, they considered such claims to be more important for their purchase decision-making in all three groups of educational intervention: AL ($r = 0.38$, $P = 0.001$), PL ($r = 0.47$, $P < 0.001$) and PA ($r = 0.31$, $P < 0.001$) groups [Figure 4 (A)]. In addition, participants' ratings of the importance level of label claims with respect to purchase decision-making significantly correlated with their objective understanding in the AL group ($r = 0.24$, $P = 0.01$), but not in the PL ($P = 0.66$) and PA ($P = 0.71$) groups [Figure 4 (B)].

3.3. Comparisons of the three educational-interventions with respect to their efficiency and contribution to the improvement of label understanding and attitude toward label claims.

3.3.1. Efficiency of educational intervention on the improvement of claim knowledge

Participants in the three groups of educational intervention rated efficiency of the educational intervention with respect to improving their knowledge about label claims twice: both immediately after and two weeks later; two participants did not complete both ratings.

There was no significant interaction between education type and the survey session [$F(2, 104) = 0.32$, $P = 0.72$]. In addition, the ratings of educational efficiency were not significantly different between the two survey-sessions ($P = 0.88$). As shown in Table 2, the efficiency level of educational intervention on the improvement of label-claim knowledge significantly differed among the three types of educational intervention [$F(2, 104) = 3.35$, $P = 0.04$, $power = 0.62$]. The PA group's ratings were significantly higher than the AL group's ratings with respect to the educational efficiency in terms of improvement in label-claim knowledge ($P = 0.047$).

3.3.2. Trust in educational intervention as an information source

There was no significant interaction between education type and survey session [$F(2, 104) = 0.94$, $P = 0.39$]. The ratings of trust to educational intervention significantly increased with survey time [F

(1, 104) = 7.64, $P = 0.007$, $power = 0.78$]; the trust was greater when it was rated two weeks after rather than immediately after the educational intervention.

The type of educational intervention significantly differed with respect to trust in educational intervention as an information source [$F(2, 104) = 6.74$, $P = 0.002$, $power = 0.91$]. As shown in Table 2, the ratings of trust to educational intervention were significantly lower in the AL group than in the PL group ($P = 0.003$) and in the PA group ($P = 0.01$).

3.3.3. Contribution of label education to participants' making informed-choice

There was no significant interaction between education type and survey session with respect to the contribution of label education to participants' informed choice on chicken meat products [$F(2, 104) = 0.28$, $P = 0.75$]. The ratings of label-education contribution remained essentially constant between the survey-sessions immediately after and two weeks after the educational intervention ($P = 0.68$).

With respect to the contribution of label education to making informed choices, significant differences were present among the three types of educational intervention [$F(2, 104) = 5.73$, $P = 0.004$, $power = 0.86$]. Table 2 shows that the AL group's ratings were significantly lower than the PL group's ratings ($P = 0.006$) and the PA group's ratings ($P = 0.02$) with respect to the contribution level of label education to participants' informed choice on chicken meat products.

4. DISCUSSION

Credence qualities such as label claims can help consumers form their own opinions about food products and increase expectations with respect to product quality (Grunert, 1997). However, consumers are inclined to interpret food labels based on their own backgrounds, and often they appear to give little attention to what the food labels actually signify. Since label information can be complex, it is important for food manufacturers to minimize consumers' misinterpretation with respect to the meaning of label claims (Gellynck, Verbeke, & Vermeire, 2006). One approach for achieving this is to provide an educational intervention to consumers with respect to label claims. Since there are various types of educational intervention, this study highlighted how the effect of educational intervention on consumers'

label understanding and their attitudes toward label claims varied as a function of the type of educational intervention, i.e., active learning, passive learning, and passive learning with an authority effect.

This study demonstrated that educational intervention regarding label claims, irrespective of type, increased not only participants' objective understanding, but also their subjective understanding. That is, our findings showed that both active and passive learning can help consumers improve their knowledge of label claims and make them more confident in their own knowledge (Figure 1). These results suggest that "providing educational intervention" in and of itself are sufficiently effective in improving consumers' understanding of the label claims commonly found on chicken meat products. Similarly, previous research has demonstrated that learning effects did not significantly differ between active- and passive-learning approaches (Benware & Deci, 1984; Michel, Cater, & Varela, 2009).

It is also interesting to note that in all three approaches an increased awareness of label claims was retained for at least two weeks after the educational intervention, meaning that the effect of educational intervention on consumers' label understanding is not temporary. It should furthermore be noted that since no test score feedback was given to the participants, the improved and retained awareness of label claims resulted from the educational intervention about label claims rather than from the three survey repetitions.

It has been found that as consumers have more information on a certain product, they have a positive outlook toward the product and are more inclined to purchase it (Yee, Yeung, & Morris, 2005; De Barcellos et al., 2010; Verbeke, Rutsaert, Bonne, & Vermeir, 2013). In a similar vein, our findings demonstrated that educational intervention regarding label claims not only increased participants' trust in label claims, but also led to their considering label claims to be more important when they made chicken product purchases (Figure 2). However, the effect of educational intervention on participants' attitudes toward label claims varied by type of educational approach. Passive learning (i.e., reading a flyer about label claims) helped participants build positive trust in label claims, while active learning (i.e., discussing label claims with other participants) showed a potential for decreasing their trust in label claims. Similarly, passive learning led participants to consider label claims to be more important, while active learning drove them to consider label claims as less important when purchasing chicken products, compared to before educational intervention. What created this difference that happened in spite of passive and active

learning not significantly differing with respect to the participants' label understanding? Figure 3 shows that participants' attitudes to label claims are more associated with their self-rated awareness (i.e., subjective understanding) than actual knowledge (i.e., objective understanding). In other words, as consumers are more confident in their own understanding of label claims, they become more trusting of label claims. In this sense, it should be noted that, in contrast to passive learning, active learning allows participants to be more exposed to other participants' comments on label claims, including even negative comments and wrong information. Furthermore, compared to passive learning, active learning has been found to make participants more intrinsically motivated to learn (Benware & Deci, 1984; Haidet et al., 2004). Thus, through group discussion, a participant's label understanding can be affected by other participants' incorrect or confusing information (Wong, 2008) about the label claims, resulting in a decrease in self-confidence with respect to label understanding. As a result, the participant's trust in label claims might decrease following a period of active learning.

However, it is worth noting that participants' attitudes (i.e., trust in label claims and importance of label claims when making purchase decisions) toward label claims were significantly correlated with their objective understanding of label claims as shown in Figure 3. In other words, as a participant developed a stronger knowledge of label claims, he/she would be less affected by other participants' comments during group discussion. In contrast, when the participant had poor knowledge of label claims, his/her attitudes toward label claims could be easily affected by others' negative or confusing comments during the discussion, thereby decreasing his/her trust in the label claims. Thus, when educational intervention based on active learning is conducted, a moderator should provide consistently correct information about label claims to participants so that they can gain robust knowledge not easily alterable by incorrect or negative information raised by other participants during group discussion.

Our findings demonstrate that, following educational intervention, participants came to consider "environmental sustainability" of chicken products to be more important when making purchasing decisions of chicken product. This means that educational intervention regarding label claims can affect consumers' purchasing behavior. This result is in line with previous findings that environmental sustainability and safety concerns have been found to affect consumers' food choices (Ophius & Peter, 1994; Dransfield et al., 2005; Grankvist, Lekedal, & Marmendal, 2007; van Wezemael, Ueland,

Rødbotten, De Smet, Scholderer, & Verbeke, 2012; Verbeke et al., 2013). It has been generally observed that consumers who exhibit a “pro-welfare behavior” (i.e., willingness to contribute to sustainable environment) tend to have a strong attachment to ethical issues when making purchase decisions. In other words, they have a greater tendency to buy sustainable products when compared to consumers with little concern about environmental sustainability (Vanhonacker & Verbeke, 2009; Grunert et al., 2014). Thus, it is to be expected that an increased concern regarding environmental sustainability gained throughout educational intervention may lead learners to purchase chicken products with environmental sustainability labels more frequently than those without such labels.

The three types of educational intervention on label claims did not significantly differ with respect to participants’ subjective and objective label understanding. Nevertheless, participants considered the active-learning approach (i.e., discussing label claims with other participants) to be less trustworthy and efficient with respect to their making informed choices about chicken meat products compared to passive learning with/without an authoritative effect (Table 2). These results might result from the fact that passive learning with/without an authoritative effect increased participants’ positive attitude toward label claims, while active learning showed either no effect or a negative effect with respect to their attitude. These results implying a lower efficiency of active learning are in line with previous findings comparing the effects of active- and passive-learning interventions with respect to participants’ knowledge about medical topics (Haidet et al., 2014). That is, the amount of improved knowledge was not significantly different between active- and passive-learning interventions, but active-learning intervention was evaluated to be less useful than passive-learning intervention as an educational method. However, in that active learning has been found to make learners more intrinsically motivated to learn than passive learning (Benware & Deci, 1984), active learning has a huge potential to be used as educational intervention with respect to label claims, especially for a large group. Thus, further research should be conducted to determine the optimum approach to performing active learning-based educational intervention with respect to label claims.

5. CONCLUSION

To summarize, providing educational intervention regarding label claims, irrespective of the

approaching used, not only increased participants' objective understanding, but also their subjective understanding of such claims. However, the effect of educational intervention on participants' attitude toward label claims varied by method. Active learning (discussing with other participants) showed either no effect or a negative effect on participants' attitudes, while passive learning (reading a flyer) and passive learning with an authoritative effect (attending a lecture by a professor) tended to increase their positive attitude toward label claims. In addition, passive learning was found to be more efficient and trustworthy than active learning as an educational intervention technique. In conclusion, educational intervention plays an important role in improving consumers' label understanding. However, since consumers' attitudes toward label claims vary by type of educational intervention, poultry processors and researchers must take further steps in designing more effective ways for mediating information about label claims without incurring negative attitudes associated with label claims affected by educational intervention.

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Table 1. Demographic profiles of the three educational-intervention groups.

| | Type of Educational Intervention ¹ | | | | | |
|---|---|------|----------------------|-------|----------------------|------|
| | AL (Group discussion) | | PL (Flyer) | | PA (Lecture) | |
| | <i>N</i> | % | <i>N</i> | % | <i>N</i> | % |
| Number of participants | 33 | | 34 | | 43 | |
| Gender | | | | | | |
| Men | 18 | 54.6 | 12 | 35.3 | 17 | 39.5 |
| Women | 15 | 45.4 | 22 | 64.7 | 26 | 60.5 |
| Mean age (\pm standard deviation) | 47 (\pm 17) years | | 45 (\pm 17) years | | 48 (\pm 16) years | |
| Marital status | | | | | | |
| Single | 16 | 48.5 | 14 | 41.2 | 19 | 44.2 |
| Married | 15 | 45.5 | 18 | 53.0 | 19 | 44.2 |
| Widowed | 1 | 3.0 | 1 | 2.9 | 3 | 7.0 |
| Living with partner | 1 | 3.0 | 1 | 2.9 | 2 | 4.6 |
| Education level² | | | | | | |
| High School | 0 | 0.0 | 4 | 11.76 | 6 | 14.0 |
| Some college | 13 | 39.4 | 11 | 32.35 | 9 | 20.9 |
| 2-4 year college degree | 15 | 45.5 | 14 | 41.18 | 15 | 34.9 |
| Master or PhD degree | 5 | 15.1 | 5 | 14.71 | 13 | 30.2 |
| Annual income level³ | | | | | | |
| < \$20,000 | 16 | 48.5 | 15 | 44.1 | 21 | 48.9 |
| \$20,000 to \$39,999 | 6 | 18.2 | 9 | 26.5 | 9 | 20.9 |
| \$40,000 to \$59,999 | 4 | 12.1 | 4 | 11.7 | 3 | 7.0 |
| \$60,000 to \$79,999 | 1 | 3.0 | 0 | 0.00 | 1 | 2.3 |
| > \$80,000 | 6 | 18.2 | 6 | 17.7 | 9 | 20.9 |
| Purchase frequency⁴ | | | | | | |
| Raw fresh chicken | | | | | | |
| Never | 8 | 24.2 | 6 | 17.7 | 12 | 27.9 |
| 1-3 times | 9 | 27.3 | 9 | 26.5 | 17 | 39.5 |
| 3-5 times | 11 | 33.3 | 13 | 38.2 | 6 | 14.0 |
| 5-7 times | 2 | 6.1 | 3 | 8.8 | 4 | 9.3 |
| >7 times | 3 | 9.1 | 3 | 8.8 | 4 | 9.3 |
| Raw frozen chicken | | | | | | |
| Never | 8 | 24.2 | 9 | 26.5 | 7 | 16.3 |
| 1-3 times | 17 | 51.5 | 11 | 32.3 | 20 | 46.5 |
| 3-5 times | 5 | 15.2 | 9 | 26.5 | 10 | 23.3 |
| 5-7 times | 3 | 9.1 | 2 | 5.9 | 5 | 11.6 |
| > 7 times | 0 | 0.00 | 3 | 8.8 | 1 | 2.3 |

(Continued)

| | Type of Educational Intervention ¹ | | | | | |
|--|---|-------------------------------|---------------|-------------------------------|-----------------|--------------------------------|
| | AL (Group discussion) | | PL (Flyer) | | PA (Lecture) | |
| | <i>N</i> | % | <i>N</i> | % | <i>N</i> | % |
| Processed chicken | | | | | | |
| Never | 7 | 21.2 | 9 | 26.5 | 8 | 18.6 |
| 1-3 times | 13 | 39.4 | 13 | 38.2 | 19 | 44.2 |
| 3-5 times | 7 | 21.2 | 6 | 17.7 | 9 | 20.9 |
| 5-7 times | 2 | 6.1 | 3 | 8.8 | 4 | 9.3 |
| > 7 times | 4 | 12.1 | 3 | 8.8 | 3 | 7.0 |
| Purchase priority⁵: mean (\pm standard deviation) | | | | | | |
| Price | | 6.5 ^a (\pm 2.3) | | 7.3 ^a (\pm 1.6) | | 7.3 ^a (\pm 2.0) |
| Safety ⁶ | | 6.2 ^b (\pm 2.8) | | 8.0 ^a (\pm 1.3) | | 7.3 ^{ab} (\pm 2.2) |
| Brand | | 5.2 ^a (\pm 2.1) | | 5.9 ^a (\pm 1.8) | | 5.9 ^a (\pm 1.9) |
| Sensory quality | | 6.4 ^a (\pm 1.9) | | 6.8 ^a (\pm 1.6) | | 6.5 ^a (\pm 1.6) |
| Environmental | | 5.5 ^a (\pm 2.1) | | 6.3 ^a (\pm 1.4) | | 5.9 ^a (\pm 2.0) |
| Sustainability | | | | | | |
| Packaging design | | 4.5 ^a (\pm 2.1) | | 4.6 ^a (\pm 2.0) | | 4.8 ^a (\pm 1.6) |
| Nutritional benefit | | 6.6 ^a (\pm 2.4) | | 7.3 ^a (\pm 1.8) | | 7.2 ^a (\pm 1.8) |

¹: AL: active learning, PL: passive learning, PA: passive learning with an authoritative effect.

²: Two categories of education level, "master degree" and "doctoral or professional degree", were combined since the number of each case was small.

³: Two categories of annual income level, "\$80,000 to \$99,999 per year" and "more than \$100,000 per year", were combined since the number of each case was small.

⁴: Four categories of purchase frequency, "7 - 9 times", "10 - 12 times", "13 - 15 times", and "more than 15 times", were combined since the number of each case was small.

⁵: Purchase priority of each product-component was rated on 9-point Likert scale ranging from 1 (extremely unimportant) to 9 (extremely important).

⁶: Mean ratings with different superscripts within the same row represent a significant difference between the educational intervention groups ($P < 0.05$).

Table 2. Comparisons of the three educational-interventions with respect to their efficiency and contribution to the improvement of label understanding and attitude toward label claims.

| | Type of Educational Intervention ^{1,2} | | |
|---|---|--------------------------------|-------------------------------|
| | AL (Discussion) | PL (Flyer) | PA (Lecture) |
| Efficiency on the improvement of label-claim knowledge³ | 7.09 ^b (± 0.15) | 7.40 ^{ab} (± 0.16) | 7.71 ^a (± 0.12) |
| Trust in educational intervention as information source | 6.09 ^b (± 0.09) | 6.51 ^a (± 0.10) | 6.52 ^a (± 0.08) |
| Contribution to making informed-choice on chicken meat products | 6.03 ^b (± 0.10) | 6.41 ^a (± 0.10) | 6.41 ^a (± 0.08) |

¹: AL: active learning, PL: passive learning, PA: passive learning with an authoritative effect.

²: Mean ratings (± standard deviation)

³: Mean ratings with different superscripts within the same row represent a significant difference between the educational intervention groups ($P < 0.05$).

Figure Legend

Figure 1. Effects of educational intervention on subjective (A) and objective (B) understandings of label claims commonly found on chicken meat products. There were three treatments of differing educational approaches to providing information on the label claims: AL (active learning), PL (passive learning), and PA (passive learning with an authoritative effect). Mean ratings with different letters within each type of educational intervention represent a significant difference between the survey sessions ($P < 0.05$). Error bars represent standard error of the means.

Figure 2. Effects of educational intervention on trust of label claims (A) and importance level of label claims for chicken-meat product purchase decision-making (B). There were three treatments of differing educational approaches to providing information on the label claims: AL (active learning), PL (passive learning), and PA (passive learning with an authoritative effect). Mean ratings with different letters within each type of educational intervention represent a significant difference between the survey sessions ($P < 0.05$). Error bars represent standard error of the means.

Figure 3. Correlations of participants' trust in label claims with their subjective (A) and objective (B) understandings of label claims as a function of the type of educational intervention. There were three treatments of differing educational approaches to providing information on the label claims: AL (active learning), PL (passive learning), and PA (passive learning with an authoritative effect). Small dots represent individual participants' ratings. A gray background indicates a confidence of fit.

Figure 4. Correlations of participants' importance level of label claims for chicken-meat product purchase decision-making with their subjective (A) and objective (B) understandings of label claims as a function of the type of educational intervention. There were three treatments of differing educational approaches to providing information on the label claims: AL (active learning), PL (passive learning), and PA (passive learning with an authoritative effect).

Small dots represent individual participants' ratings. A gray background indicates a confidence of fit.

Figure 1.

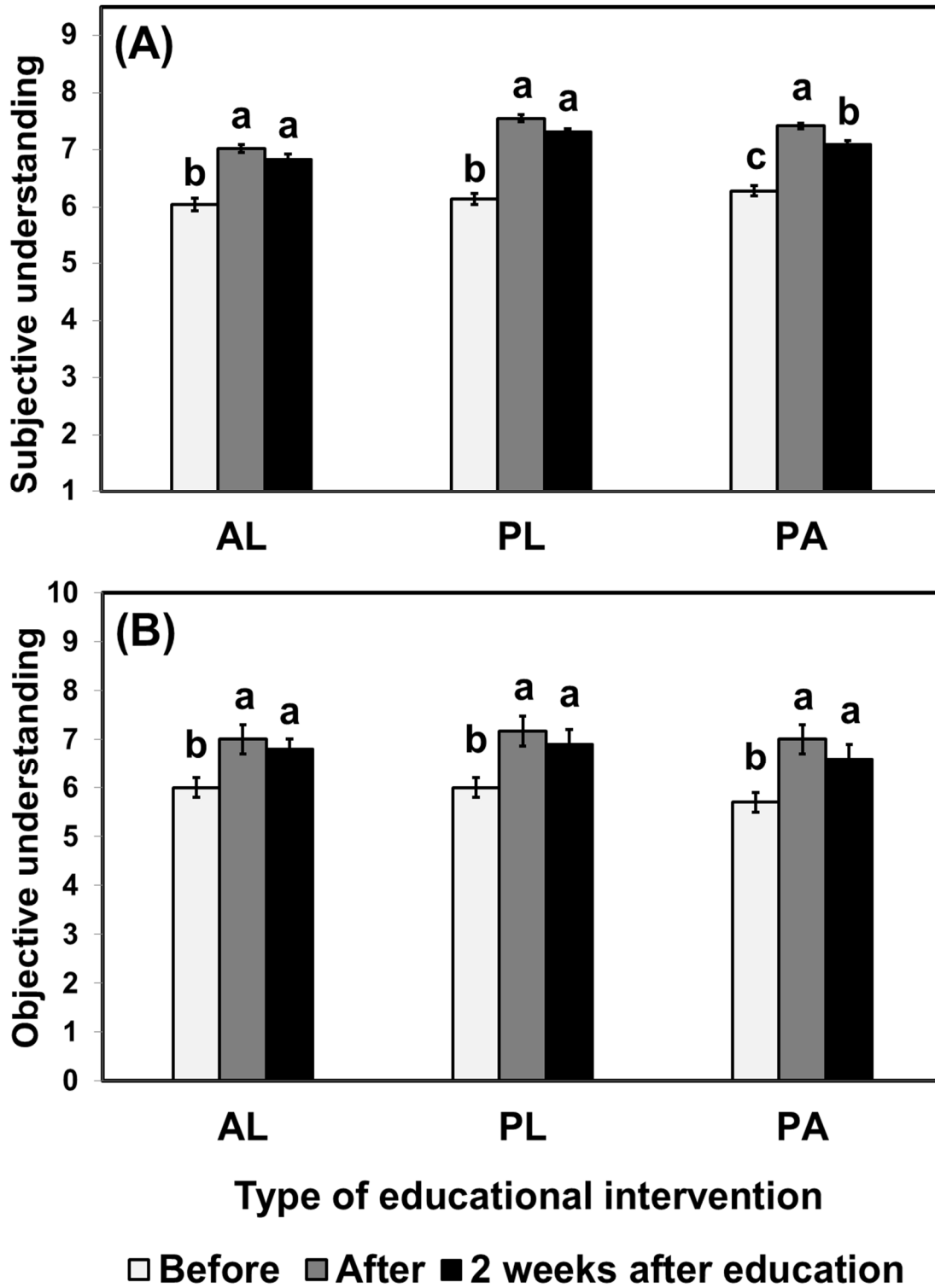


Figure 2.

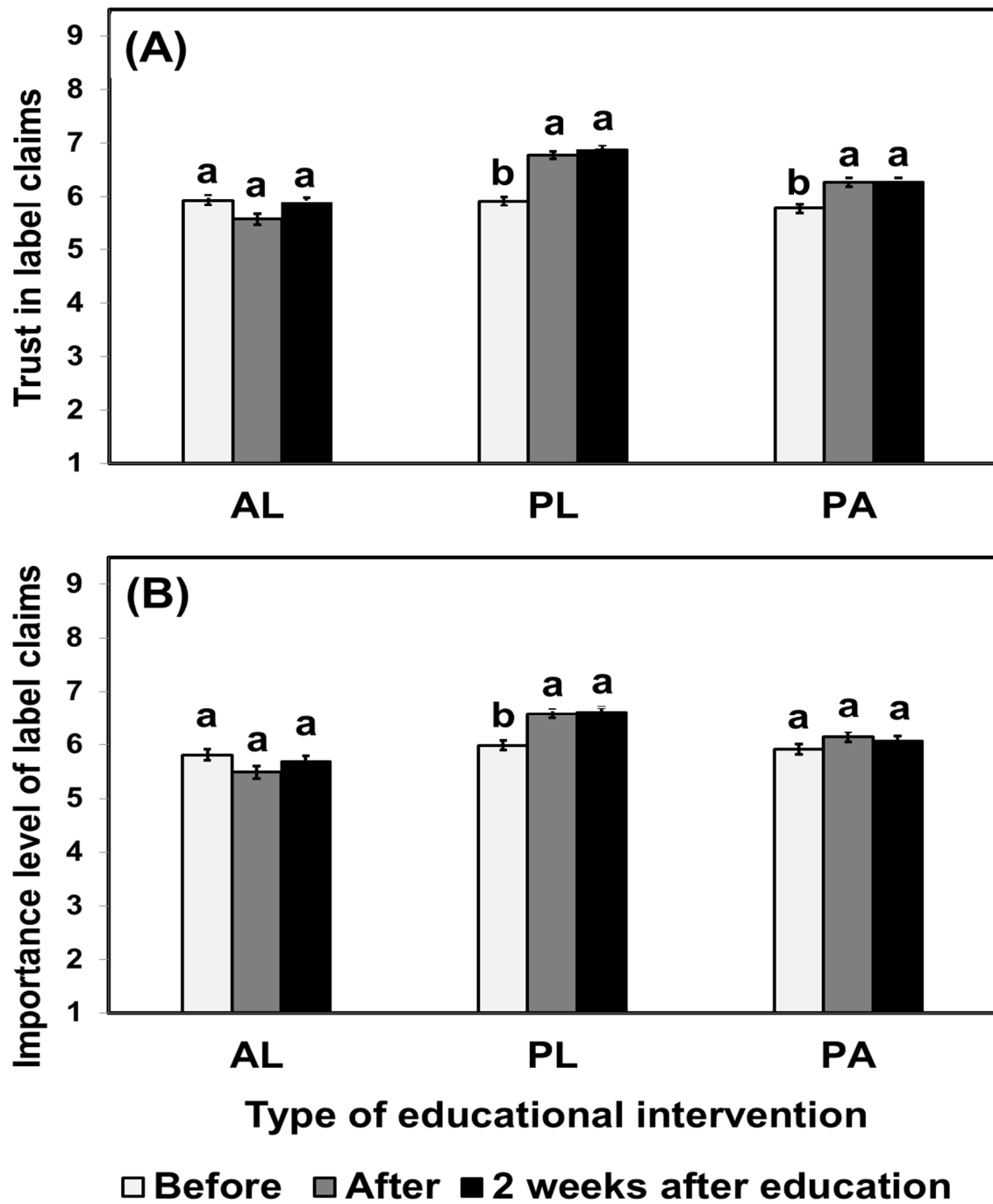


Figure 3.

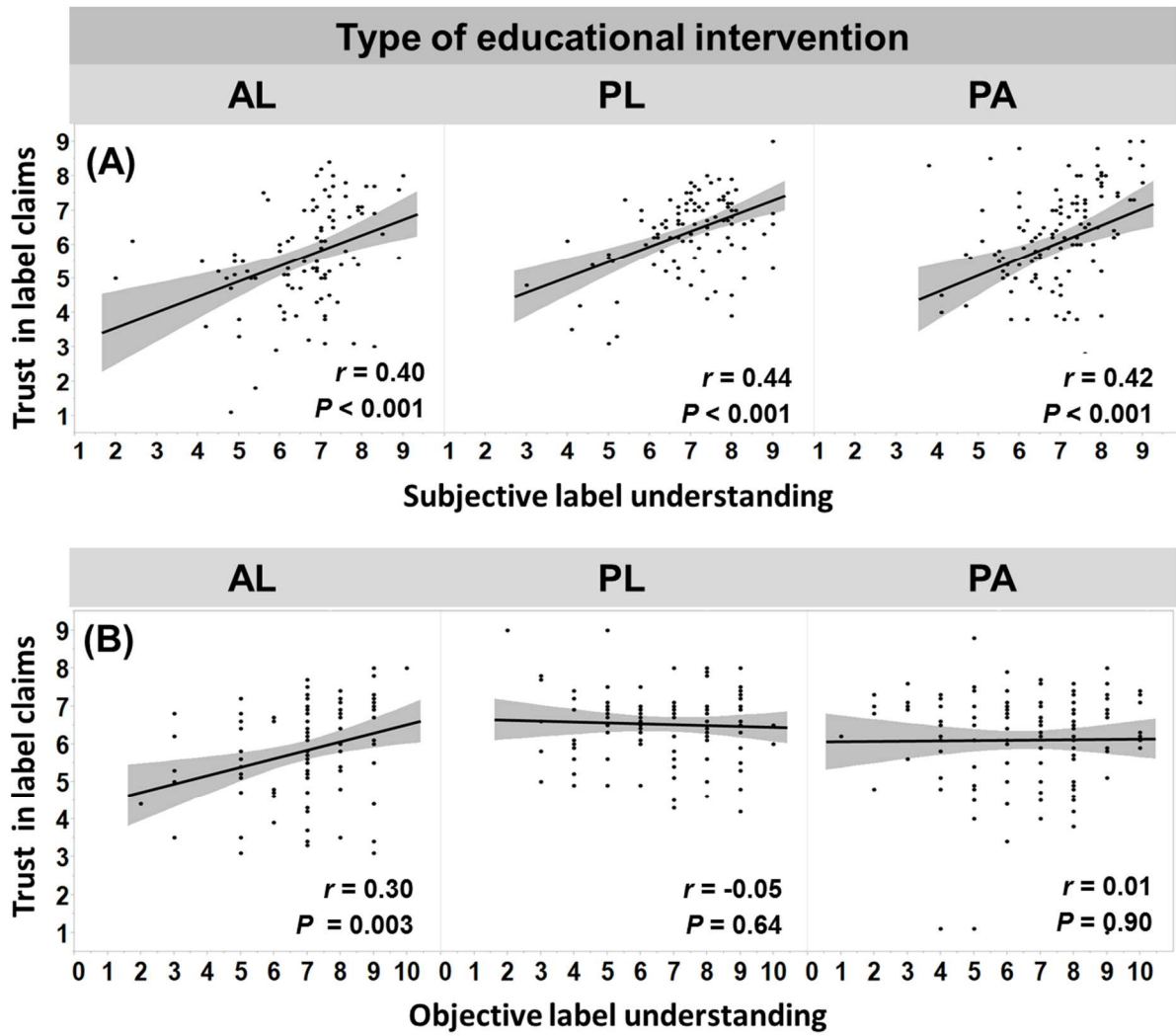
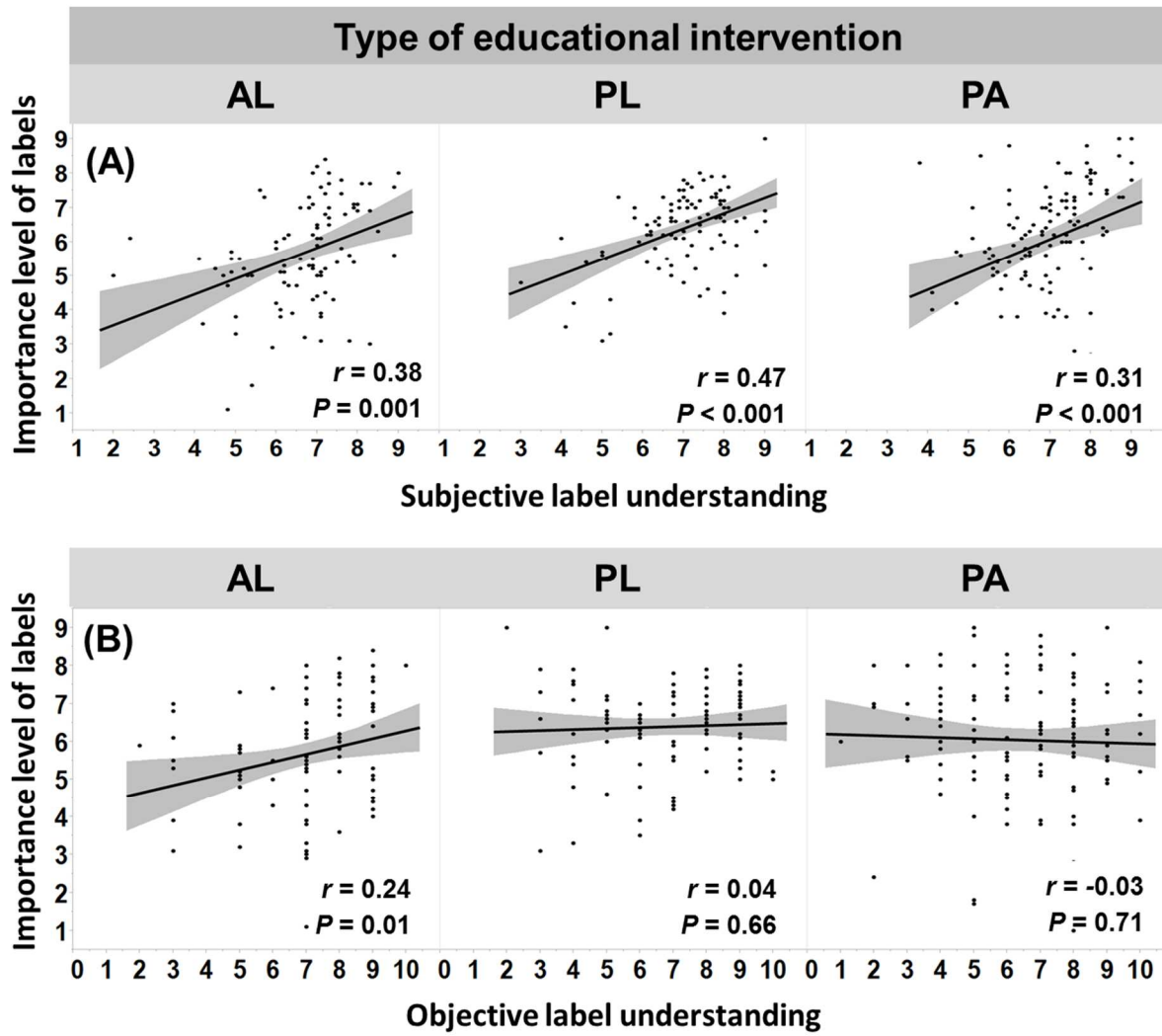


Figure 4.



CHAPTER 4

Quality perception and acceptability of chicken breast meat labeled with sustainability and process-related claims vary as a function of consumers' label-understanding level

ABSTRACT

Consumers often view a variety of sustainability and process-related label claims displayed on chicken meat products in marketplace. However, it is questionable as to how well consumers understand the label claims and whether their label-understanding level can affect quality perception and sensory aspect of the products. This study aimed to determine whether impacts of sustainability and process-related label claims on quality perception and acceptability of chicken breast meat can differ by consumers' label-understanding level. Among 110 participants who attended a prior educational intervention about label claims, 33 top-scorers of the survey examining knowledge about label claims participated as "High Label-Understanding (HLU)" group. Additionally, 33 counterparts who had no educational intervention about label claims participated as "Control (CNTL)" group; both groups were matched with respect to demographic profiles and purchase frequency of chicken-meat products. Participants in both groups evaluated the same, four chicken-meat samples, but which were labeled with four different label-claims, i.e., "USDA organic", "No Hormones Added", "USDA Process Verified", and no-label condition. For HLU group, chicken meat significantly differed among the four label-claim conditions with respect to overall quality, trust in quality, freshness perception, and overall liking. However, such significant differences were not observed in CNTL group. In addition, these label claims did show little impact on sensory attribute intensity of chicken-meat samples in both groups. In conclusion, the present findings demonstrated that the effects of sustainability and process-related label claims on quality perception and acceptability of chicken breast meat become pronounced when consumers well understood and trusted the label claims.

Keywords: *Sustainability, Label understanding, quality perception, sensory acceptability, chicken meat products*

1. INTRODUCTION

“I like this chicken product because meat is more tender and juicier than others.” Many consumers like a specific food product due to its palatable appearance, aroma, flavor, taste, and/or texture. It should, however, be noted that consumers do not always want to eat or choose the appetizing product. In addition to sensory characteristics, non-sensory factors such as demographic profiles, personal health, production technology, price, branding, convenience, and contexts were found to modulate consumers' acceptability and choice of the food product (Jaeger, 2006).

“I like this chicken product because it was made from organic chicken.” In recent years, many consumers have become more concerned about “credence cues” among non-sensory factors influencing consumers' liking and choice of foods. The credence, characterized as “credibility of the seller toward the buyer”, includes label information with respect to nutritional value, food safety, and environmental sustainability/ethics (Grunert, 1997). In a recent systematic review regarding effects of credence cues on consumers' food acceptability, Fernqvist and Ekelund (2014) highlighted that credence cues (e.g., information about health, organic food, origin, production methods, descriptive food names, brand, and ethics) generate sensory expectation toward food products, resulting in individual variations of consumers' quality perception and acceptability of the products. If consumers' sensory expectation, induced by credence cues displayed on food products, is consistent with their perceived quality of the products, they tend to like the food products in a more positive direction. However, the effect of credence cues appears to be highly dependent on type of label claims as well as type of products being provided. For example, health-related claims were found to increase consumer liking of muffins (Baixauli, Salvador, Hough, & Fiszman, 2008), but not liking of chocolate bars since consumers do not associate chocolate bars with health claims (Di Monaco, Ollila, & Tuorila, 2005). While health-related credence cues have been found to show an inconclusive effect on quality perception and sensory acceptability (Prescott, Young, Zhang, & Cummings, 2004; Fernqvist & Ekelund, 2014), organic-related credence cues appear to improve quality perception and sensory acceptability (Caporale & Monteleone, 2004; Fernqvist & Ekelund, 2014).

In recent years, there has been a rapidly growing interest in credence cues associated with sustainability such as organic, origin, production method, and ethics. As a result, more attention has been

paid to the question as to whether sustainability and process-related label claims affect quality perception and sensory aspects of foods. There have been two perspectives of focusing on the effect of sustainability and process-related credence cues on quality perception and acceptability of foods. First, it has been investigated whether food products that have been manufactured in particular sustainable conditions (e.g., organic, animal welfare, and fair trade, etc.) can show better sensory-quality than those that have been manufactured in the conventional way when no credence cue is provided (i.e., in the blind condition). Previous studies have not shown any conclusive evidence in this regard since their findings have been highly product-specific (Bourn & Prescott, 2002). For example, Fillion and Arazi (2002) examined whether organic and conventional foods are different with respect to sensory quality. While organic orange juice tasted better than conventional counterpart, such a superior taste of organic sample to conventional counterpart was not present in whole-milk. Conversely, consumers were found to prefer meat of artificially-reared lambs to meat of ewe-reared lambs in terms of sensory aspects (Napolitano et al., 2007). However, when information about farming system and welfare condition (i.e., artificially- versus ewe-reared lambs) was presented, participants preferred meat of ewe-reared lambs to meat of artificially-reared lambs. This result is related to the second perspective of focusing on the effect of sustainability and process-related credence cues on quality perception and acceptability of foods. It has been questioned as to whether consumers' quality perception and acceptability of the same food can be different between presence and absence of the information about sustainability condition (i.e., sustainability and process-related label claims). Based on earlier findings, sustainability and process-related label claims seem to affect consumers' acceptability as well as their quality perception of food, whether or not it is actually produced in a sustainable condition. In a study conducted by Sörqvist et al. (2013), coffee labeled with "eco-friendly" was rated to have superior taste to coffee labeled with "not eco-friendly" claim when in reality both coffee samples were the same product. However, no significant effects of sustainability and process-related label claims on quality perception and sensory acceptability of food products have been observed as well. For example, consumers' taste acceptability for orange juice did not differ among the three label-claim conditions, i.e., "eco", "fair-trade", and "no-label" condition (Grankvist, Lekedal, & Marmendal, 2007).

The effects of credence cues on quality perception and consumer acceptability have been found

to vary depending on the type of food products being considered. In this sense, the present study focuses on chicken-meat product since it holds a prominent position in U.S. consumers' diets and there is an increasing health-concern on chicken-meat products (Consumer Reports, 2014). Most previous studies on chicken products have highlighted consumer attitude and behavior toward sustainability and process-related label claims (Gifford & Bernard, 2011; van Loo et al., 2011). However, little is known about the influence of sustainability and process-related label claims on "sensory aspects" of chicken-meat products. In a study conducted by Napolitano et al. (2013), sensory characteristics as well as consumer liking were compared between organic and conventional chicken-breast meats. While trained panelists were able to differentiate organic and conventional chicken meats in terms of texture characteristics, untrained consumer panelists were unable to show such a significant difference with respect to sensory liking when information about organic production was not provided. However, when sustainability information, that chicken was raised in organic environment, was presented, consumer panelists expected organic chicken to be more palatable than conventional chicken. Moreover, consumer panelists liked organic chicken product significantly more when information about organic production was presented compared to when no information was given (i.e., in the blind condition).

In that sustainability and process-related label information would affect consumers' acceptability of food products a further question is whether the amount or depth of information being provided can vary food acceptability. Van Wezemaal et al. (2012) examined whether consumer liking of beef could be different by information about the processing technologies involved. In their study consumers were provided with either basic (just mentioning technology name) or detailed information (explaining the technology used in detail) about beef processing. Consumers were found to like beef product paired with detailed information regarding the processing technology significantly more than product paired with basic information. In other words, the more consumers understood the beef processing technology, the higher became their liking of beef product.

Herein, another question is raised: *"Do consumers who better understand label claims behave differently with respect to quality perception and sensory aspect of chicken products labeled with sustainability claims compared to those who have poor label-understanding?"* To the best of the authors' knowledge, no such comparison between levels of label understanding with respect to quality perception

and sensory aspect of chicken-meat products has been performed. To answer the question, this study is designed to determine whether the effects of sustainability and process-related label claims on quality perception and sensory acceptability can vary as a function of consumers' understanding level of the label claims, i.e., high versus low levels of label-understanding.

2. MATERIALS AND METHODS

This study was conducted according to the Declaration of Helsinki for studies on human subjects. The protocol used in this study was approved by the Institutional Review Board of the University of Arkansas (Fayetteville, AR, U.S.A.) (Appendix 1A). Prior to participation, the experimental procedure was explained to all participants and a written informed consent was obtained from each.

2.1 Participants

This study was conducted as a continuation of the previous study that investigated the effect of label education on consumers' awareness and attitude toward label claims found on chicken products (Chapter 3; Samant, Crandall, & Seo, 2015). In their study, a total of 110 participants received educational intervention with respect to 10 sustainability and process-related label claims commonly displayed on chicken-meat products. Participants were asked to fill out a survey with respect to their subjective understanding (i.e., self-rated awareness) and objective understanding (i.e., recall of actual knowledge) of the ten sustainability label claims at three different times: before, immediately after, and two weeks after educational intervention.

Among the 110 participants, 33 top-scorers on the objective understanding of the label claims (referred to as "High Label-Understanding (HLU)" group) were invited to the present sensory testing. In other words, 33 participants (14 men and 19 women; mean age \pm standard deviation (SD) = 46 \pm 6 years) were found to have superior knowledge of the 10 sustainability and process-related label claims. Another 33 volunteers (14 men and 19 women, mean age \pm SD = 44 \pm 15 years), who had never been part of any prior education regarding food label claims, participated as "Control (CNTL)" group. To compare their initial awareness of sustainability and process-related label claims, participants in CNTL group were asked to fill out the survey used in the previous study (Chapter 3; Samant et al., 2015). HLU group (mean

\pm SD = 8.5 \pm 1.2) was significantly higher than CNTL group (mean \pm SD = 6.0 \pm 1.7) with respect to mean score of objective understanding of 10 label claims [F (1, 64) = 37.74, P < 0.001].

Table 1 shows demographic profiles of the two groups. Both HLU and CNTL groups did not differ significantly in terms of their demographic profiles except annual income level. A significant difference in annual income level according to the Likelihood ratio was found (P = 0.003), but a two-way analysis of variance, treating “annual income level” as a fixed effect and “panel” as a random effect revealed that annual income level did not significantly affect sensory attributes and impression ratings of chicken-meat products in this study (for all, P > 0.05).

2.2. Food samples and preparation

Thin, sliced boneless chicken breast (TSD Sales and Distribution, Springdale, AR) was used as food sample. The sample was purchased from a local market (Fayetteville, AR) and stored at approximately 4 °C before preparation.

The whole breast added with salt (1 g) was heated in an air-convection oven (Model No. KERS206XBL1, KitchenAid®, Benton Harbor, MI) at 191 °C for 90 min. to an internal temperature of 165 °C. If the same type of chicken breast meat is repeatedly presented four times, there may be a chance for participants to recognize that the four samples are identical even though they would be presented with different label-claims (see below). Thus, to minimize any learning effect, additional samples of chicken breast meat (referred to as “filler”) were also presented. For the filler sample, the whole breast added with both salt (1 g) and pepper (0.25 g) were cooked in an air-convection oven at 191 °C for 90 min. to an internal temperature of 165 °C. A preliminary study found that both test and filler samples were different in terms of overall sensory attribute.

2.3. Procedure

Sensory testing was conducted at individual sensory booths in the University of Arkansas Sensory Service Center (Fayetteville, AR). Four test-samples were presented in one of four label-conditions, i.e., “No Hormones Added”, “USDA Organic”, “USDA Process Verified”, and “no-label” (referred to as “baseline”). Two filler-samples were presented without any label claim. More specifically, as shown in

Figure 1, each participant was asked to view a sheet (21.5 cm x 12.3 cm) regarding each condition of label claim for 15 s prior to each sample presentation.

A total of six samples (4 test- and 2 filler-samples) were presented in a sequential monadic fashion based on the William Latin Square design (Williams, 1949). For each sample, three to four cubes were presented on a white plastic plate (diameter: 15.4 cm) labeled with three digit random codes. After tasting each sample, participants were asked to rate overall liking using on a 9-point hedonic scale ranging from 1 (dislike extremely) to 9 (like extremely). In addition, using on 9-point Likert scales, participants were asked to rate overall quality (1 = extremely poor to 9 = extremely good), trust in the quality (1 = distrust extremely to 9 = trust extremely), and freshness perception (1 = extremely low to 9 = extremely high) of each sample. Additionally, participants were asked to rate perceived intensities of tenderness, juiciness, and chicken flavor using on 9-point Likert scales ranging from 1 (extremely low) to 9 (extremely high), respectively.

The time interval between sample presentations was approximately 60 s. During the break, 120-mL of spring water (20 °C; Clear Mountain Spring Water, Taylor Distributing, Heber Springs, AR) and unsalted crackers (Nabisco Premium Unsalted Tops Saltine Crackers, Mondelēz Global LLC, East Hanover, NJ) were provided to for participants' palate cleansing.

2.4. Data Analysis

Data was collected using Compusense® five (Release 5.6, Compusense Inc., Guelph, ON, Canada) software and analyzed using JMP® Pro Version 12.0 (SAS Institute Inc., Cary, NC). Data of two filler-samples were not used in data analysis. For the purpose of comparing the effect of label-claim condition on quality perception and sensory aspect of chicken breast meat in each group, a two-way analysis of variance (ANOVA) was performed treating “type of label claim” as a fixed effect and “panel” as a random effect. In addition, both HLU and CNTL groups were compared with respect to the label claims-induced quality perception and sensory aspect (i.e., label-claims condition – no-label condition) using a two-way ANOVA treating “label-understanding level” (i.e., HLU versus CNTL) as a fixed effect and “panel” as a random effect. If a significant difference in mean ratings was indicated by the ANOVA, post hoc comparisons between independent variables were performed using Tukey's Honest Significant Difference

(HSD) method. Pearson correlation analyses were used to examine relationships between participants' label understanding, their attitude toward label claims, quality perceptions and sensory acceptability of chicken breast meat. A statistically significant difference was defined as when $P < 0.05$.

3. RESULTS

3.1. Effects of label claims on quality perception of chicken breast meat with respect to label-understanding level

3.1.1. Overall quality

For High Label-Understanding (HLU) group, overall quality of chicken breast meat significantly differed among the four label-conditions [$F(3, 96) = 5.92, P < 0.001$]. As shown in Figure 2 (A), chicken meat labeled with "USDA Organic" was rated to be of higher quality than chicken meat labeled with "USDA Process Verified" ($P = 0.01$) or chicken meat without any label (i.e., baseline) ($P = 0.001$). There were no significant differences with respect to overall quality of chicken meat among the three label-conditions: "No Hormones Added", "USDA Process Verified", and "no label" (for all, $P > 0.05$). However, for Control (CNTL) group, there were no significant differences among the four label-conditions with respect to overall quality of chicken breast meat [$F(3, 96) = 0.71, P = 0.55$] (Figure 2B).

To what extent do sustainability and process-related label claims affect quality perception of chicken breast meat compared to no-label condition? Can the label claims-induced change in quality perception of chicken meat vary as a function of consumers' label-understanding level? Figure 3 shows a group comparison between HLU and CNTL groups with respect to the label claims-induced change in overall quality of chicken breast meat (i.e., "label claims" condition – "no-label" condition). The effect of sustainability and process-related label claims on overall quality of chicken meat appears to be higher in HLU group than in CNTL group, yet there was no statistical difference between the two groups [$F(1, 64) = 2.31, P = 0.13$].

3.1.2. Trust in quality

For HLU group, trust in the quality of chicken breast meat significantly differed among the four label-claim conditions. [$F(3, 96) = 12.11, P < 0.001$]. As shown in Figure 2 (A), participants trusted quality

of chicken sample labeled with “USDA Organic” the most among the four chicken-samples. In addition, they trusted quality of chicken sample labeled with “No Hormones Added” significantly more than quality of chicken sample without any label claim ($P = 0.02$). However, for CNTL group, trust in quality of chicken meat did not significantly differ among the four label-claim conditions [$F(3, 96) = 0.68, P = 0.57$] (Figure 2B).

Figure 3 demonstrates a significant group difference between HLU and CNTL groups with respect to the label claims-induced trust in quality of chicken breast meat [$F(1, 64) = 4.41, P = 0.04$]. In other words, the effect of sustainability and process-related label claims on trust in quality of chicken breast meat was more pronounced when participants were well aware of what the label claims meant.

3.1.3. Freshness

For HLU group, freshness perception of chicken breast meat significantly differed among the four label-claim conditions [$F(3, 96) = 8.26, P < 0.001$]. In a similar fashion to the result of trust in quality, chicken meat was rated to be fresher when it was labeled with “USDA Organic” than when labeled with other claims including “no-label” condition (for all, $P < 0.05$) [Figure 2 (A)]. However, such a significant difference among the label-claim conditions was not observed in CNTL group [$F(3, 96) = 1.00, P = 0.40$] [Figure 2 (B)].

As shown in Figure 3, there was a significant group difference between HLU and CNTL groups with respect to label claims-induced freshness in chicken breast meat [$F(1, 64) = 6.28, P = 0.01$]. Again, the impact of sustainability and process-related label claims on freshness of chicken meat became more obvious when participants had a higher level of label understanding.

3.1.4. Relationships of meat quality perception with understanding and attitude toward sustainability and process-related label claims.

Table 2 shows Pearson’s correlation coefficients of meat quality perception (i.e., overall quality, trust in quality, and freshness) with label-claim understanding, as well as attitude toward label claims. For HLU group, participants’ ratings of overall quality, trust in quality, and freshness of chicken breast meat were significantly correlated with extent to which they trusted the label claims (for all, $P < 0.01$). However,

participants in CNTL group showed a different pattern in those relationships. That is, participants' ratings of overall quality ($r = 0.35$, $P = 0.046$) and trust in quality of chicken breast ($r = 0.62$, $P < 0.001$) meat were significantly associated with the subjective understanding level of the label claims.

3.2. Effects of label claims on sensory perception and impression of chicken breast meat with respect to label-understanding level

3.2.1. Overall liking

For HLU group, overall liking of chicken breast meat significantly differed among the four label-claim conditions [$F(3, 96) = 3.50$, $P = 0.02$]. As shown in Figure 4 (A), participants liked chicken meat labeled with "USDA Organic" significantly more than chicken meat labeled either with "USDA Process Verified" ($P = 0.04$) or without any label claim ($P = 0.03$). However, for CNTL group, overall liking of chicken breast meat did not significantly differ among the four label-claim conditions [$F(3, 96) = 0.70$, $P = 0.56$] [Figure 4 (B)].

HLU group (mean \pm SD = 0.42 ± 1.37) showed higher mean with respect to the label claims-induced overall liking of chicken breast meat (i.e., "label-claims" condition – "no-label" condition) than did CNTL (0.02 ± 1.40), but the mean difference was not statistically proved ($P > 0.05$).

3.2.2. Intensities of chicken flavor, tenderness, and juiciness

For HLU group, as shown in Figure 4 (A) chicken breast meat labeled with "USDA Organic" appears to be the most intense with respect to chicken flavor, tenderness, and juiciness among the four label-claim conditions, but such trends were not statistically significant (for all, $P > 0.05$). For CNTL group, there were no significant differences among the four label-claim conditions with respect to intensities of chicken flavor, tenderness, and juiciness (for all, $P > 0.05$) [Figure 4 (B)].

There were no significant mean differences between the HLU and CNTL groups with respect to the label claims-induced intensities of tenderness (HLU versus CNTL: 0.35 ± 1.41 versus -0.10 ± 1.67), juiciness (0.44 ± 1.43 versus 0.01 ± 1.88), and chicken flavor (0.38 ± 1.60 versus 0.21 ± 1.60) of chicken breast meat (for all, $P > 0.05$).

3.2.3. Relationships of meat sensory perception with understanding and attitude toward sustainability and process-related label claims.

As shown in Table 3, for HLU group, overall liking of chicken breast meat was significantly correlated with either trust level in label claims ($r = 0.59, P < 0.001$) or importance level of label claims when purchasing chicken meat product ($r = 0.36, P = 0.04$). However, such significant correlations were not observed in CNTL group. In addition, for both HLU and CNTL groups, intensity ratings of tenderness, juiciness, and chicken flavor were not significantly associated with either subjective or objective label-understanding, but also attitudes toward label claims (in terms of trust and importance level of label claims) (for all, $P > 0.05$).

4. DISCUSSION

Quality perception and acceptability of food products have been found to vary by not only sensory characteristics, but also non-sensory factors including credence cues such as label information (Grunert, 1997; Fernqvist & Ekelund, 2014). However, little is known whether consumers truly understand the label claims of food products and whether their understanding level of the label claims can affect quality perception and sensory aspect of the food products.

This study demonstrates that sustainability and process-related label claims affect quality perception of chicken-meat products as a function of consumers' understanding level of the label claims. More specifically, for participants with a high level of label-claim understanding, the presence of sustainability and process-related label claims improved overall quality, trust in meat quality, and freshness perception of chicken breast meat. However, such a significant effect of label claims was not observed among the control counterparts who did not receive educational intervention on sustainability and process-related label claims. These results indicate that the effect of sustainability and process-related label claims on quality perception in chicken-meat products becomes obvious when those labels are highly understood by consumers. Grunert (2002) mentioned that communication between credence cues and consumers is dependent on consumers' ability to recognize what label claims mean. In other words, consumers' knowledge about label claims appears to be a prerequisite for effectively delivering information on label claims to them. In this way, the result, that sustainability and process-related label

claims did not work for those who did not receive prior educational intervention about the label claims, is understandable.

Interestingly, objective label-understanding had little impact on quality perception in terms of overall quality, trust in quality, and freshness of chicken breast meat. Notably, the factors influencing overall quality rating of chicken breast meat were different between the HLU and CNTL groups. As shown in Table 2, participants in HLU group appear to rate overall quality of chicken breast meat based on their trust-level toward the label claims found on the meat. In other words, as consumers trust the label claims found on chicken meat products more, they consider the meat to be higher quality and more fresh. However, participants who did not receive label education appear to evaluate overall quality of chicken breast meat based on their self-awareness of the label claims. In fact, since participants in CNTL group did not have enough knowledge of label claims, their subjective label-understanding was lower (mean \pm SD = 6.3 ± 1.4) than HLU group's one (7.3 ± 1.0), thus resulting in no significant effect of label claims on overall quality in the CNTL group.

The effect of sustainability and process-related label claims on quality perception and acceptability of chicken breast meat significantly differed by the type of sustainability label claims. That is, even though many label-claims are associated with sustainability, their impacts on quality perception and consumer liking can vary. In this study, among the three sustainability and process-related labels, i.e., "USDA Organic", "USDA Verified", and "No Hormones Added", "USDA Organic" label showed the highest impact on consumers' quality perception of chicken breast meat, which might be due to popularity and market awareness of "organic" claim. In a study reviewing characteristics of organic food consumers, Hughner et al. (2007) found that consumers purchase organic food because they consider it to be healthier and better taste than conventional food. As a result, when consumers look at chicken breast meat labeled with "organic" claim, they may expect the meat to be better quality and taste than meat labeled with other label claims (Fernqvist & Ekelund, 2014). In this way, the increased expectation toward the meat labeled with "organic" claim appears to increase consumers' ratings for overall quality and acceptability of the meat. Indeed, previous studies have demonstrated that "organic" label increases consumers' acceptability and/or quality perception toward food products such as bread (Kihlberg, Johansson, Langsrud, & Risvik, 2005), soup (Di Monaco, Cavella, Torrieri, & Masi, 2007), yogurt (Toschi

et al., 2012), tomato (Napolitano et al., 2013), and chicken meat (Napolitano et al., 2013). However, other label claims, which are not as well-known as “organic”, did not impact on consumers’ quality perception and acceptability of chicken breast meat to such a great extent in the present study. An interesting observation is that “USDA Process Verified” label, in fact, did not provide any advantage over “no-label” condition. In earlier studies, label claims related to “production method” have shown a different pattern with respect to the influence on consumer liking of food products. More specifically, while label claims of “traditional production” increased quality perception and acceptability of food products, label claims associated with “modernity” or “industrialized food” showed no or negative effects (Fernqvist & Ekelund, 2014). For example, in a study conducted by Di Monaco et al. (2007) when participants were informed that soup was produced with organic ingredients, their liking of soup significantly increased compared to either when they were informed that soup was produced with conventional ingredients or when they were in the blind condition. However, information on stabilization technologies (e.g., chilled fresh soup, frozen soup, and canned soup) did show no significant impact on participants’ acceptability for soup samples. Especially, information on stabilization technologies decreased soup acceptability of participants who often consume soup in everyday life. Thus, based on previous findings (Fernqvist & Ekelund, 2014), participants in the present study may have had a low (or negative) concern about “USDA Process Verified” claim, thereby leading no significant effect on quality perception and acceptability of the meat labeled with the claim. In this regard, another perspective can explain the reason why “USDA Process Verified” claim showed a smaller impact than did “USDA Organic” or “No Hormones Added” in this study. In the authors’ previous study (Chapter 3; Samant et al., 2015), providing educational intervention on sustainability and process-related label claims was found to lead participants to consider environmental sustainability component to be more important when making purchase decisions of chicken-meat products. Hence, HLU group relative to CNTL group might be, in general, more considerate about environmental sustainability aspect of chicken-meat product. In this sense, the increased concern about environmental sustainability in the HLU group might positively influence quality perception ratings with respect to the label claims that ensure environmental sustainability (e.g., “USDA Organic” and “No Hormones Added”). However, the label claim of “USDA Process Verified” might not appear to be directly

associated with environmental sustainability, so that it did not affect participants' quality perception to a great extent.

As opposed to overall liking, perceived intensities of sensory attributes such as tenderness, juiciness, and chicken flavor did not significantly vary by understanding level of label claims as well as type of the label claims. In a similar vein, Goerlitz and Delwiche (2004) demonstrated that providing product information did not prove to be of any benefit with respect to overall liking and perceived intensity of sensory attributes (e.g., saltiness, thickness, and pulpiness) in their study using soy-enhanced tomato juice. In another study by Kähkönen and Tuorila (1998), intensities of juiciness, saltiness and fattiness of "Bologna" sausages did not significantly differ between presence and absence of information about fat content. No significant influence of sustainability and process-related label claims on sensory attribute intensity has been observed in other products such as pineapple (Poelman, Mojet, Lyon, & Sefa-Dedeh, 2008). Based on the past and present findings, the impact of sustainability and process-related label claims appears to be less profound on sensory attribute intensity than on quality perception and acceptability of food products.

Nowadays, poultry manufacturers have more concern about providing sustainability and process-related label claims on the packaging of their meat products. However, consumer understanding of these label-claims appears to be a wide individual variation as well as a label-specific. As shown in this study, the effect of sustainability and process-related label claims on quality perception and acceptability of chicken breast meat is modulated not only by types of label claims, but also understanding level of the claims. Thus, poultry processors and marketers need to find the best way to mediate information on label claims to consumers. One way is to provide educational intervention on label claims to potential consumers (Chapter 3; Samant et al., 2015). Samant et al. (2015) demonstrated that educational intervention, independent of the particular type of such intervention, improves consumers' knowledge and attitude toward sustainability and process-related label claims commonly found on chicken products. Another way is to reformulate label claims (or logos) to be self-explanatory, so that even consumers who have no knowledge of label claims can easily understand what they mean (Grunert, Hieke, & Wills, 2014). Especially, information technology including smartphone applications may provide an effective solution to mediate information about the label claims displayed on chicken-meat products to consumers in the

supermarket. For example, Dunford et al. (2014) recently developed a mobile-phone application providing consumers with nutritional information about packaged food products via barcode scanning method. The technology was found to be popular among the crowd since it provides a nutrient profile score to each product, so that consumers can better understand the nutrient information and make healthier food choices. In a similar vein, applications for sustainability and process-related labels can help consumers better understand the label claims and make more informed choices. However, poultry processors and marketers should note that credence cues such as label claims are not at the cost of compromising sensory quality of food products (Solheim, 1992; Meillon, Urbano, Guillot, & Schlich, 2010). In other words, poultry processors have a responsibility to maintain their required quality standards and not expect elaborate label information to compensate for a poor quality product. To exert the positive effect of sustainability and process-related label claims on quality perception and sensory aspect, food products should have a desirable sensory quality, which may result in an assimilation effect. In contrast, if consumers' perceived sensory quality does not match with their expectation induced by sustainability labels, they would not appreciate the chicken products to a greater extent, thus leading a contrast effect, i.e., decreasing acceptability.

5. CONCLUSION

To summarize, there were five main findings of this study. Firstly, sustainability -related label claims increased quality perception and acceptability of chicken breast meat only when participants were well aware of the label claims. Secondly, the effect of sustainability and process-related label claims on quality perception and acceptability of chicken breast meat varied by type of the label claims. Thirdly, the positive effect of sustainability label claims on quality perception and acceptability was associated with participants' increased trust in the label claims through educational intervention. Fourthly, participants who did not attend educational intervention on label claims rated quality and acceptability of chicken breast meat based on their self-awareness (or confidence) of the label claims. Finally, sustainability and process-related label claims showed little impacts on sensory attribute intensity of chicken breast meat. In conclusion, based on these findings, the effect of sustainability and process-related label claims on

quality perception and acceptability of chicken breast meat is dependent on consumers' label-understanding level, as well as on type of the claims.

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Table 1. Demographic profiles of the High Label-Understanding (HLU) and Control (CNTL) groups.

| | HLU Group | | CNTL Group | |
|--|----------------------|------|---------------------|------|
| | <i>N</i> | % | <i>N</i> | % |
| Number of participants | 33 | | 33 | |
| Gender | | | | |
| Men | 14 | 42.4 | 14 | 42.4 |
| Women | 19 | 57.6 | 19 | 57.6 |
| Mean age (\pm SD) | 44 (\pm 15) years | | 46 (\pm 6) years | |
| Education level¹ | | | | |
| High School | 1 | 3.0 | 4 | 12.1 |
| Some college | 11 | 33.3 | 14 | 42.4 |
| 2-4 year college degree | 13 | 39.4 | 7 | 21.2 |
| Master or PhD degree | 8 | 24.3 | 8 | 24.3 |
| Annual income level² | | | | |
| < \$20,000 | 16 | 48.5 | 5 | 15.2 |
| \$20,000 to \$39,999 | 7 | 21.2 | 6 | 18.2 |
| \$40,000 to \$59,999 | 1 | 3.0 | 6 | 18.2 |
| \$60,000 to \$79,999 | 1 | 3.0 | 8 | 24.2 |
| > \$80,000 | 8 | 24.3 | 8 | 24.2 |
| Purchase frequency³ | | | | |
| <i>Raw fresh chicken</i> | | | | |
| Never | 4 | 12.1 | 5 | 15.2 |
| 1-3 times | 15 | 45.5 | 19 | 57.6 |
| 3-5 times | 8 | 24.2 | 5 | 15.2 |
| 5-7 times | 2 | 6.1 | 3 | 9.0 |
| >7 times | 4 | 12.1 | 1 | 3.0 |
| <i>Raw frozen chicken</i> | | | | |
| Never | 5 | 15.2 | 3 | 9.1 |
| 1-3 times | 16 | 48.5 | 14 | 42.4 |
| 3-5 times | 9 | 27.3 | 8 | 24.3 |
| 5-7 times | 1 | 3.0 | 5 | 15.1 |
| > 7 times | 2 | 6.0 | 3 | 9.1 |
| <i>Processed chicken</i> | | | | |
| Never | 8 | 24.2 | 6 | 18.2 |
| 1-3 times | 14 | 42.4 | 15 | 45.5 |
| 3-5 times | 5 | 15.2 | 9 | 27.3 |
| 5-7 times | 3 | 9.1 | 1 | 3.0 |
| > 7 times | 3 | 9.1 | 2 | 6.0 |

(Continued)

| | HLU Group | CNTL Group |
|--|-------------------------------|-------------------------------|
| Purchase priorities⁴: mean (\pm standard deviation) | | |
| Price ⁵ | 7.3 ^a (\pm 2.0) | 7.1 ^a (\pm 2.1) |
| Safety | 7.3 ^a (\pm 1.7) | 6.9 ^a (\pm 1.9) |
| Brand | 5.6 ^a (\pm 2.1) | 5.0 ^a (\pm 1.8) |
| Sensory quality | 6.8 ^a (\pm 1.8) | 6.4 ^a (\pm 1.9) |
| Environmental sustainability | 6.5 ^a (\pm 2.1) | 5.1 ^b (\pm 1.8) |
| Packaging design | 5.2 ^a (\pm 2.2) | 4.4 ^a (\pm 1.6) |
| Nutritional benefit | 7.7 ^a (\pm 1.8) | 7.1 ^a (\pm 2.2) |

¹: Two categories of education level, “master degree” and “doctoral or professional degree”, were combined since the number of each case was small.

²: Two categories of annual income level, “\$80,000 to \$99,999 per year” and “more than \$100,000 per year”, were combined since the number of each case was small.

³: Four categories of purchase frequency, “7 - 9 times”, “10 – 12 times”, “13 - 15 times”, and “more than 15 times”, were combined since the number of each case was small.

⁴: Purchase priority of each product-component was rated on a 9-point Likert scale ranging from 1 (extremely unimportant) to 9 (extremely important).

⁵: Mean ratings with same subscripts within the same row represent no significant difference between the two groups ($P > 0.05$).

Table 2. Pearson correlation coefficients in the relationships of meat quality perception with understanding and attitude toward sustainability and process-related label claims in the High Label-Understanding (HLU) and Control (CNTL) groups.

| | Label claim understanding | | Attitude toward label claims | |
|-------------------------|-------------------------------|--------------------------------|------------------------------|----------------------------------|
| | Objective label understanding | Subjective label understanding | Trust in label claims | Importance level of label claims |
| Overall quality | | | | |
| HLU group | -0.12 | 0.30 | 0.49** | 0.21 |
| Control group | -0.31 | 0.35* | 0.15 | 0.14 |
| Trust in quality | | | | |
| HLU group | -0.17 | 0.36* | 0.53** | 0.14 |
| Control group | -0.08 | 0.62*** | 0.49** | 0.32 |
| Freshness | | | | |
| HLU group | 0.05 | 0.21 | 0.48** | 0.14 |
| Control group | 0.005 | 0.32 | 0.16 | 0.12 |

*, **, and *** represent a significance at $P < 0.05$, $P < 0.01$, and $P < 0.001$, respectively.

Table 3. Pearson correlation coefficients in the relationships of meat sensory perception with understanding and attitude toward sustainability and process-related label claims in the High Label-Understanding (HLU) and Control (CNTL) groups.

| | Label claim understanding | | Attitude toward label claims | |
|--|-------------------------------|--------------------------------|------------------------------|----------------------------------|
| | Objective label understanding | Subjective label understanding | Trust in label claims | Importance level of label claims |
| <i>Overall impression</i> | | | | |
| HLU group | -0.09 | 0.33 | 0.59*** | 0.36* |
| Control group | -0.25 | 0.26 | 0.09 | 0.16 |
| <i>Tenderness intensity</i> | | | | |
| HLU group | 0.02 | 0.28 | 0.34 | 0.30 |
| Control group | -0.19 | 0.003 | -0.10 | 0.06 |
| <i>Juiciness intensity</i> | | | | |
| HLU group | -0.05 | 0.13 | 0.22 | 0.07 |
| Control group | -0.17 | 0.001 | -0.17 | 0.02 |
| <i>Chicken flavor intensity</i> | | | | |
| HLU group | -0.03 | 0.10 | 0.04 | -0.02 |
| Control group | -0.18 | 0.34 | 0.10 | 0.14 |

*** represents a significance at $P < 0.001$.

Figure Legend

Figure 1. A scheme of sample presentation used in this study. A total of six samples (4 test- and 2 filler-samples) were presented in a sequential monadic fashion based on the Williams Latin square design (Williams, 1949). Four test-samples were presented in one of four label-conditions, i.e., “No Hormones Added”, “USDA Organic”, “USDA Process Verified”, and “no-label” (referred to as “baseline”). Two filler-samples were presented without any label claim. For each sample, three to four cubes were presented on a white plastic plate (diameter: 15.4 cm) labeled with three digit random codes.

Figure 2. Effects of label-claim conditions on overall quality, trust in quality, and freshness perception of chicken breast meat in the High Label-Understanding (A) and Control (B) groups. *N.S.* represents no significant difference between the label-claim conditions ($P > 0.05$). ** and *** represent a significant difference between the label-claim conditions at $P < 0.01$ and $P < 0.001$, respectively. Different small letters indicate a significant mean-difference between the label-claim conditions at $P < 0.05$. Error bars represent standard error of the means.

Figure 3. Mean comparison between the High Label-Understanding and Control groups with respect to label claims-induced overall quality, trust in quality, and freshness perception of chicken breast meat. *N.S.* represents no significant mean-difference between the two groups ($P > 0.05$). * represents a significant mean-difference between the two groups at $P < 0.05$. Error bars represent standard error of the means.

Figure 4. Effects of label-claim conditions on overall liking, tenderness, juiciness, and chicken flavor of chicken breast meat in the High Label-Understanding (A) and Control (B) groups. *N.S.* represents no significant difference between the label-claim conditions ($P > 0.05$). * represents a significant mean-difference between the label-claim conditions at $P < 0.05$. Different

small letters indicate a significant difference between the label-claim conditions at $P < 0.05$. Error bars represent standard error of the means.

Figure 1.

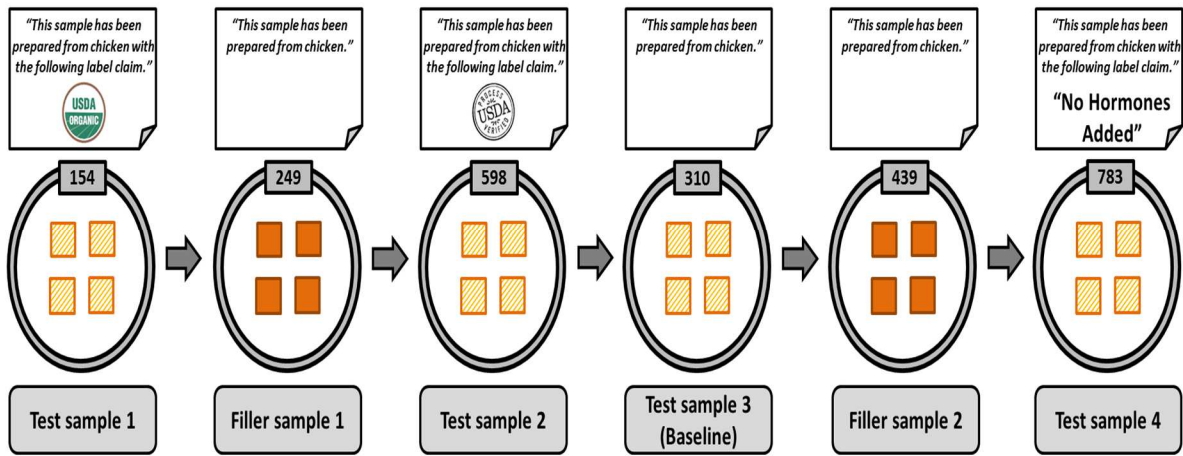


Figure 2.

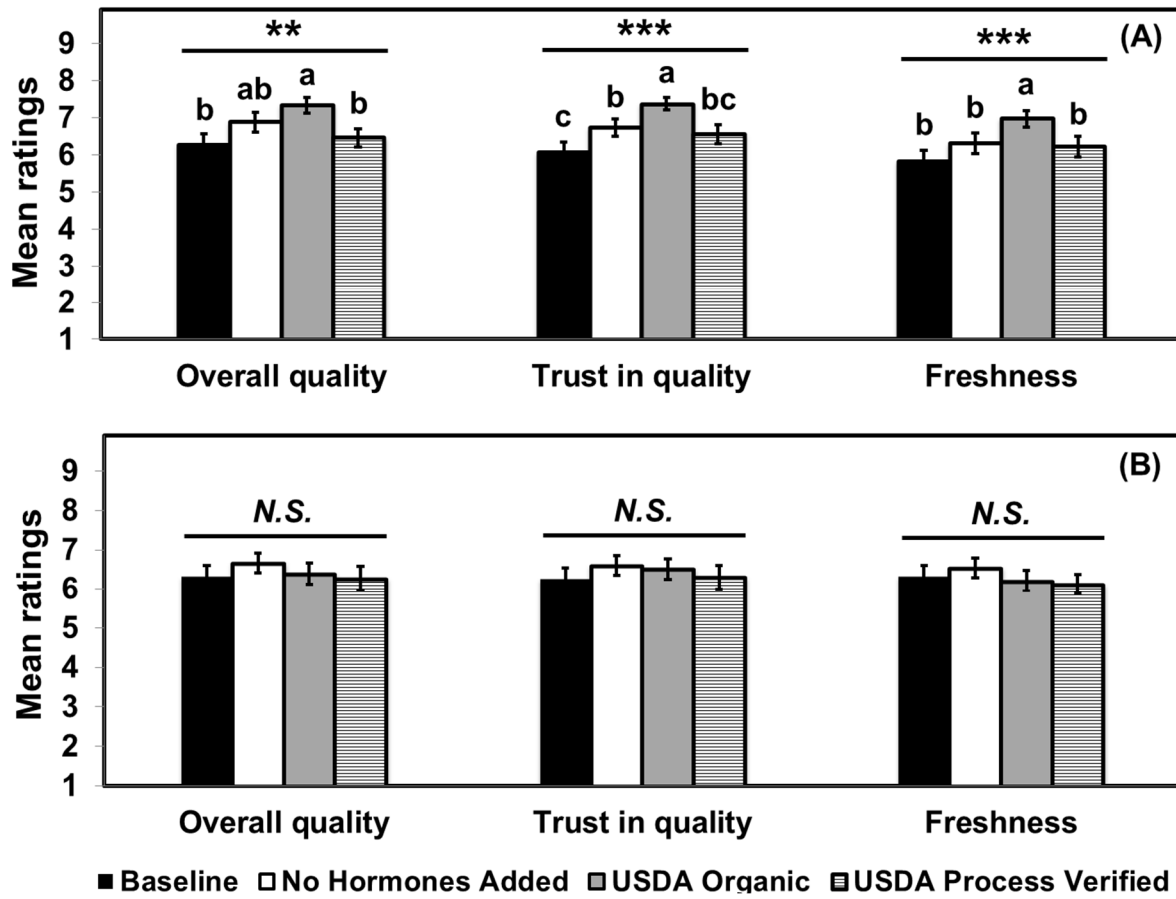


Figure 3.

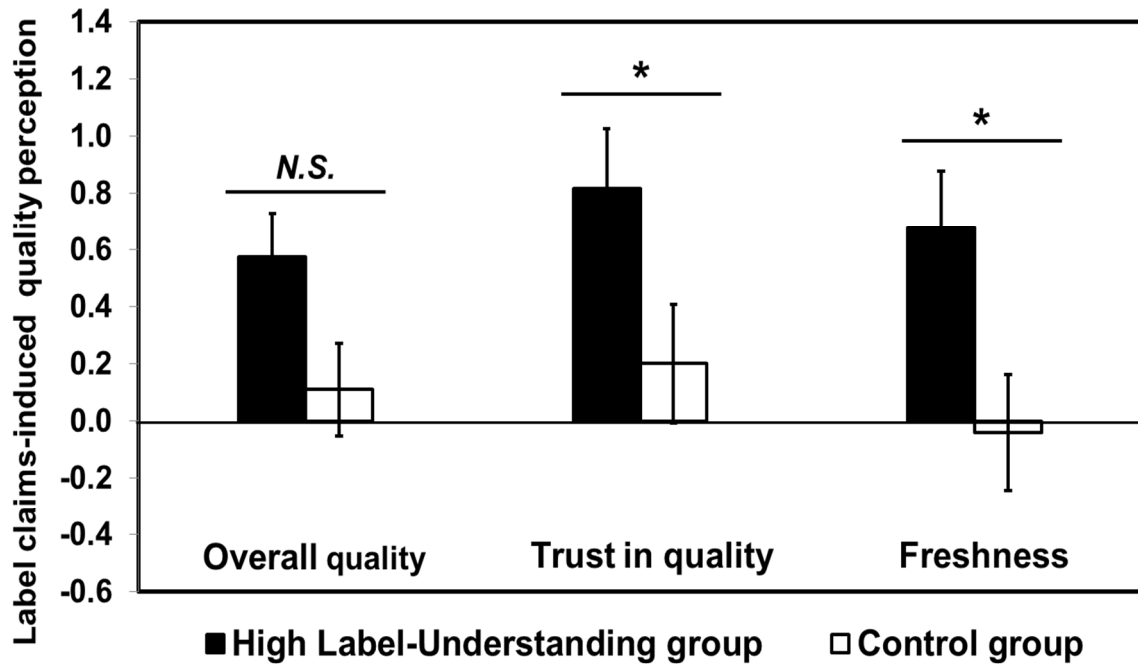
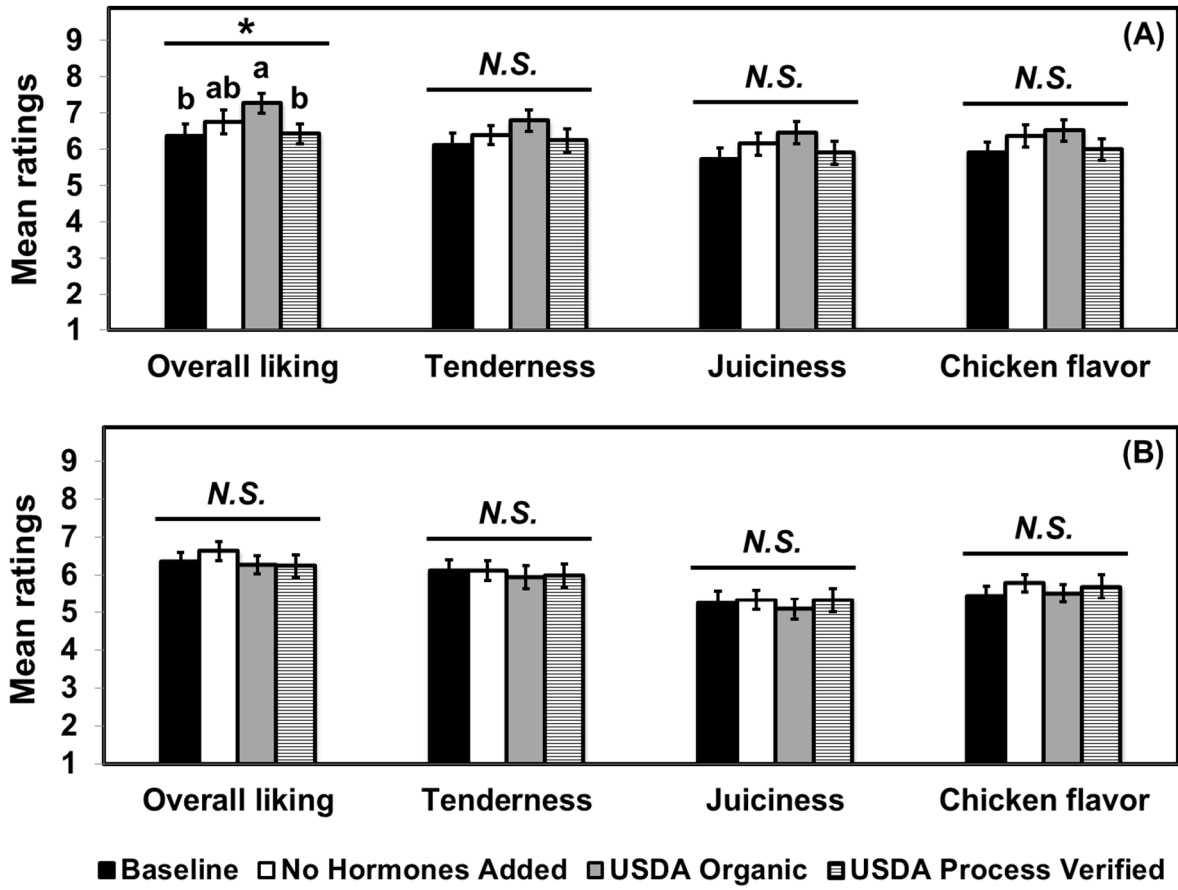


Figure 4.



CHAPTER 5
EFFECTS OF LABEL UNDERSTANDING ON PURCHASE INTENTIONS OF CHICKEN MEATS: AN
EYE-TRACKING STUDY

ABSTRACT

Consumers' food purchase behavior is influenced by label information provided on the product. However, consumers vary in their label knowledge, which affects their individual product quality perception and purchase intent. Eye-tracker is an objective methodology that has been used in the past to analyze consumers' purchase behavior in terms of their visual attention to labels. The aim of this study was to examine the effect of label education on consumers' purchase behavior measured in terms of their visual attention to label claims on chicken products. Participants with prior food label education were chosen to represent the 'High Label Understanding (HLU) group. Additionally, twenty-nine new participants without any kind of prior label education were selected as Control (CNTL) group. Each participant viewed chicken product images using the eye-tracker. Additional subjective questions relating to consumers' purchase behavior (purchase intent, trust in product and overall liking) were asked. High label education increased consumers' visual attention to label claims found on chicken products. Furthermore, HLU group participants liked and trusted the chicken products more than the CNTL group. Our findings provide evidence that participants' visual attention to labels increases with enhanced label knowledge with a possibility of translation into positive purchase behavior.

Keywords: *Label understanding, Sustainability, visual attention, eye-tracking, chicken meat products*

1. INTRODUCTION

USDA Economic Research Service (2014) reported that consumers spent almost 10% of their disposable personal income on food purchases in 2013. Since food is an important commodity, it is valuable to better understand the driving factors of consumers' food purchase as well as acceptability. . Rozin, Pelchat, and Fallon (1986) suggested that when it comes to purchase behavior of consumers, their psychological interpretation of product quality plays a very strong role. In other words, consumers' own perceptions of product parameters like food quality (Cranage, Conklin, & Lambert, 2008) and safety (Yeung & Morris, 2001) majorly govern their purchase intentions. Perceived value of food, that is, wholesomeness of the food according to consumers is built with the help of label information provided on the food products. Cranage et al. (2008) found that providing label information in the form of nutritional value of the food resulted in higher repurchasing intentions among consumers as opposed to when no such information was provided. In addition to nutritional claims, other label information about brand, descriptive food name, health benefit, origin, organic food, production method, and ethics, have been reported to affect consumers' purchase intentions (Gifford & Bernard, 2011) and acceptability (Grunert, 1997). These aspects of label information are collectively known as "credence" (Fernqvist & Ekelund, 2014) and are essentially characterized as "credibility of the seller toward the buyer",. In previous studies, trust and loyalty of brand majorly were found to influence customer satisfaction and commitment, playing as a driving factor of positive purchase intention (Delgado-Ballester & Munuera-Aleman, 2001). With respect to information about origin, consumers have shown preference for food products manufactured locally than those imported from elsewhere (Hoffmann, 2000). Bower, Saadat, and Whitten (2003) showed that health-related credence cues (e.g., "proven to lower cholesterol") positively affected consumers' purchase intention of reduced-fat spreads. Additionally, van Wezemael et al. (2010) found that providing detailed information about beef processing technology increased consumer liking of the beef product. Hence, label information does more than just provide product-related knowledge to consumers, affecting their liking and purchase intention.

Another aspect of label information is ethical claims providing sustainability information (such as "Animal Welfare"). However, consumer attitude towards this type of claims vary depending on their personal interests, demographic profiles and most importantly, environmental concerns (Davies,

Titterington, & Cochrane, 2005; Cannoosamy, Puno-Gunsam, & Jeewon., 2014). It has been found that consumers who show preference for food products with ethical claims are those who are genuinely concerned about environment sustainability. However, studies have also shown that there is a gap between consumers' environmental concern and their actual purchase with respect to sustainable products (Grunert, Hieke, & Wills, 2014). In other words, consumers may have environmental concerns, but it does not directly affect their purchase decision. Wandel and Bugge (1997) evaluated purchase priorities of Norwegian consumers while purchasing meat products, Thirty-one percentage of consumers gave priority to freshness of the product, whereas 20% of consumers chose taste and another 20% of consumers considered nutritional value as their top purchase-priority. Only a handful of 5% selected environmental aspects to be a top consideration while buying meat products. Price issue might be a major reason why only small portion of consumers consider environmental aspects of meat products while making purchase decisions. In addition, consumers' inability to completely understand the significance or meaning of the environments-related label claims might be another possible reason.

Earlier findings suggest that label understanding affects consumer perceptions, thus affecting their purchase intentions. Lenhart et al. (2008) found that label information on production method or technology (e.g., "*Sprayed with a solution of sodium lactate to prevent growth of L. monocytogenes*") was not well accepted by consumers. They thought of this information as being "too technical" owing to their limited understanding and showed low purchase-intentions for product with the claim. In another study by de Carneiro et al. (2001) purchase intentions were found to be lesser for soybean oil labeled with the "transgenic" claim compared to soybean oil without the claim, which was mainly because consumers did not completely understand significance of the claim. Hence, based on previous finding, there is a possibility of increasing consumers' acceptability and purchase intentions of labeled products by increasing their label understanding itself.

Most studies regarding the effect of label claims on consumers' purchase behavior have used a self-administrated survey. It has been observed that when participants' self-report their answers on such questionnaires, there is a possibility of them significantly overestimating their actual use and understanding of label claims (Grunert, Willis, & Fernandez, 2010). Higginson, Rayner, Draper, and Kirk (2002) mention a very interesting phenomenon known as social desirability bias that might be governing

this over estimation. In other words, while self-reporting responses, consumers tend to give answers that put them in the best possible light (Fisher, 1993). For instance, a consumer might show a high willingness to buy sustainable food products when asked during a research study as he/she does not want to come across as someone who does not care about the environment. However, in a real-life scenario, this consumer might not actually buy a sustainable food product from the grocery store. Merely examining consumers' self-reported purchase "intentions" does not provide any concrete evidence of their purchase probability (Juster, 1966). Thus, there is a need for more practical and evidence-based tools to measure consumer purchase behavior and factors that prioritize their decision.

One approach to analyze consumers' natural behavior and purchase priority is to use an eye-tracking method that allows researchers to trace participants' visual attention toward area of interest. Even though it can be argued that eye-tracker only measures consumers' visual pattern that does not guarantee what or how much they understood information on the label claims, it should be noted that visual attention toward label claims is considered as a primary precursor to utilizing them. Graham and Jeffery (2012) examined consumers' visual attention toward nutritional labels found on 64 different food-products. Additionally, their purchase intention of the food products was examined in an online shopping scenario. Consumers were found to spend more time looking at the label claims of the food products that they ultimately chose to purchase. It suggests that eye-tracking method can provide information about consumer's visual search on food labels, giving an idea of their purchase intention.

Most of the past research using eye-tracking for evaluating food labels as consumers' purchase priority has been restricted to nutritional labels. Information about "how long consumers look at labels" and/or "how often they look at labels" provides a basis for determining importance of these labels in purchase decisions (Goldberg, Probart, & Zak, 1999; Jones & Richardson, 2007). However, there were only a few published studies demonstrating the effect of sustainability and process-related label claims on consumers' purchase behavior. Moreover, as mentioned above, there is a possibility that consumers' label-understanding level can affect their purchase behavior. Thus, this study aims to determine whether consumers' visual attention toward sustainability and process-related label claims as well as purchase intention can vary as a function of their label-understanding level, i.e., high versus low levels of label-understanding. Since the label-claim influence on consumers' acceptability and purchase intention are

product-dependent (Fillion & Arazi, 2002; Di Monaco, Ollila, & Tuorila, 2005; Baixauli, Salvador, Hough, & Fiszman, 2008), chicken breast meat was chosen as the target product for this study. Chicken meat is the prominent position in U.S consumers' diet and there is an increasing health concern about chicken meat products (Consumers Report, 2014)

2. MATERIAL AND METHODS

This study was conducted according to the Declaration of Helsinki for studies on human subjects. The protocol of this study was approved by the Institutional Review Board of the University of Arkansas (Fayetteville, AR, U.S.A.) (Appendix 1B). The experimental procedure was explained to all participants and a written informed consent was obtained prior to the participation.

2.1 Participants

Present study was conducted as a continuation of the previous study that determined the influence of label education on consumers' awareness and attitude toward sustainability and process-related label claims commonly found on chicken meat products (Chapter 3; Samant, Crandall, & Seo, 2015). Briefly, in their study, 110 participants received educational intervention on 10 sustainability and process-related label claims displayed on chicken meat products. Following the educational intervention, participants filled out a survey examining their subjective understanding (i.e., self-rated awareness) and objective understanding (i.e., recall of actual knowledge) of the ten label-claims at three different times: before, immediately after, and two weeks after educational intervention.

Among the 110 participants, 29 top-scorers on the objective understanding of the label claims (henceforth referred to as "High Label-Understanding (HLU)" group) were invited to the present eye-tracking study. That is, these 29 participants (11 men and 18 women; mean age \pm standard deviation (SD) = 44 \pm 14 years) could recall actual knowledge of the 10 label claims better than the other participants. In addition, 29 participants (16 men and 13 women, mean age \pm SD = 36 \pm 5 years) who had never been in a part of any food label education were selected as "Control (CNTL)" group. Participants in CNTL group were asked to fill out the survey used in the previous study (Samant et al., 2015) to compare both HLU and CNTL groups in terms of their initial label-understanding. Mean score of objective

understanding of label claims was significantly higher for HLU group (mean \pm SD = 7.83 \pm 1.28) than CNTL group (6.17 \pm 1.65) [F (1, 56) = 18.20, P < 0.001].

Demographic profiles of participants in both groups are given in Table 1. Both HLU and CNTL groups did not differ significantly in terms of their demographic profiles except mean age (P = 0.006). However, a two-way analysis of variance, treating “age” as a fixed effect and “panel” as a random effect revealed that age did not affect eye-tracking parameters (see below) and purchase attitudes in this study (for all, P > 0.05).

2.2. Image samples of chicken meat products

Packaging images of six chicken-meat-products were chosen as image samples in this study. These included 2 types of products, i.e., 1) chicken drumsticks and 2) boneless, skinless chicken breast. Each type of product was chosen for three brands, 1) Tyson® (Tyson Foods, Inc., Springdale, AR, USA), 2) Harvestland® (Harvestland Beaver Dam, KY, USA) and 3) Smart Chicken® (Tecumseh Poultry LLC, Waverly, NE, USA). All products were purchased from local food-stores (Fayetteville, AR, USA). Images of the products were modified using Photoshop® software (Adobe Systems Inc., San Jose, CA) ensuring appropriate market price and sell-by-date in all product-images.

2.3. Procedure

Each participant was seated at a distance of 60 cm from the 22-inch monitor screen equipped with an integrated eye-tracker (Model: RED, SensoMotoric Instruments GmbH, Teltow, Germany). Sampling rate for the eye-tracker was 120 Hz with a tracking spatial resolution of 0.03°. Individual calibration was done using a five-point calibration method ensuring a tracking error of less than 0.4° (Zhang and Seo, 2015).

Two warm-up images (i.e., geometric-shape images) were displayed on the monitor to minimize the first-sample bias (Plemmons & Resurreccion, 1998), as well as to allow participants to be familiar with an experimental situation. Following which, participants were asked to look at six packaging-images of chicken meat products in a sequential monadic fashion. The image samples were randomly presented with the help of stimulus-presentation software (Experiment suite 360™, Sensomotoric Instruments

GmbH, Teltow, Germany). Participants were asked to look at each image sample considering that they had to make a purchase decision about the product shown in the monitor. The participants could *ad libitum* proceed to the next image by pressing the right arrow-key on the keyboard once they had made their purchase decision. Following the eye-tracking session of each image sample, participants were asked to rate how likely they were to buy that product on a 9-point Likert scale ranging from 1 (extremely likely) to 9 (extremely unlikely). Next, the participants were asked to rate how much they liked the product on a 9-point Likert scale ranging from 1 (dislike extremely) to 9 (like extremely). Finally, they were asked to rate how much they trusted the product on a 9-point Likert scale ranging from 1 (distrust extremely) to 9 (trust extremely). Between image-sample presentations, participants were asked to look at a fixed black cross displayed on white background for 4,500-5,500 ms (inter-stimulus interval).

2.4. Data Analysis

BeGaze™ software (SensoMotoric Instruments GmbH, Teltow, Germany) was used to analyze the eye-tracking data. For each image of chicken-product packaging, a total of eight packaging-components were selected as “Area of Interest” (AOI). Figure 1 shows an example of image sample including eight AOIs: brand (e.g., Tyson®), instruction (e.g., “keep refrigerated”), label claim (e.g., “USDA Organic), meat type (e.g., “chicken drumsticks”), price, appearance, indicator date, and weight.

Performance parameters chosen for this study were “fixation time” and “fixation count” for individual AOIs. Fixation time refers to the sum of fixation duration onto each AOI (Zhang & Seo, 2015) and fixation count represents the number of fixations onto each AOI. As participants are more interested in a specific AOI, their fixation time and fixation count for that AOI increases. Thus, these parameters can gauge how important or how interested each AOI is to the participants in HLU and CNTL groups.

Both eye-tracking and behavioral data were analyzed using SPSS 22.0 for Windows™ (IBM SPSS Inc., Chicago, IL, U.S.A.). The eye-tracking data with total fixation time less than 65% of total recording time (end time) was considered incomplete and not included in data analysis; data of six participants (4 HLU and 2 CNTL) were not used. Since the Shapiro-Wilk test revealed that data of fixation time ($W = 0.648, P < 0.0001$) and fixation count ($W = 0.707, P < 0.0001$) were not normally distributed, the Mann-Whitney U-test was performed to compare HLU and CNTL groups with respect to fixation time and

fixation count for each AOI. Mean ratings of purchase intent, trust in product, and overall liking were compared between the HLU and CNTL groups using a two-way ANOVA. A statistically significant difference was defined as when $P < 0.05$.

3. RESULTS

3.1. Effect of label-understanding level on visual attention toward sustainability and process-related label claims

3.1.1. Fixation time

As shown in Figure 2, the HLU group showed significantly higher “fixation time” for the AOI of label claims ($U = 10172.00$, $P = 0.01$), price ($U = 9976.00$, $P = 0.006$), and weight ($U = 10447.00$, $P = 0.03$) of the product than did the CNTL group. That is, participants in the HLU group looked at sustainability/quality-related label claims, price, and weight significantly longer than did those in the CNTL group. In contrast, the CNTL group looked at the appearance of chicken meat significantly longer than did HLU group ($U = 8538.00$, $P < 0.001$).

No significant differences between the HLU and CNTL groups were observed with respect to fixation time for the AOIs of brand ($U = 11811.50$, $P = 0.67$), instructions ($U = 11499.00$, $P = 0.39$), meat type ($U = 10917.50$, $P = 0.12$), and indicator date ($U = 11812.00$, $P = 0.66$).

3.1.2. Fixation count

As shown in Figure 3, the HLU group showed significantly higher “fixation count” for the AOI of label claims ($U = 10384.00$, $P = 0.03$) and price ($U = 10040.50$, $P = 0.007$) than the CNTL group. Similar marginal difference was also observed for the AOI of weight ($U = 10742.00$, $P = 0.06$). In contrast, “fixation count” for the AOI of appearance was significantly higher for the CNTL group compared to the HLU group ($U = 8257.50$, $P < 0.001$). These differences between the HLU and CNTL groups with respect to visual attention are observed in the heat maps (Figure 4). More specifically, the CNTL group [(B) and (D)] looked at the appearance of chicken meat more frequently and longer (see more blue and green spots on chicken meat) than did the HLU group [(A) and (C)].

No significant differences between the HLU and CNTL groups were observed with respect to fixation time for the AOIs of brand ($U = 11723.50$, $P = 0.59$), instructions ($U = 11630.50$, $P = 0.49$), meat type ($U = 11812.50$, $P = 0.67$), indicator date ($U = 12048$, $P = 0.90$).

3.2. Effect of label-understanding level on purchase intent, trust, and overall liking for chicken meat products.

3.2.1. Purchase intent

As shown in Figure 5, participants in HLU group (mean \pm SD = 6.51 ± 1.37) appeared to show higher purchase intentions of chicken meat products displayed on the monitor than did those in CNTL group (6.08 ± 1.1), yet the difference was not statistically proved [$F(1, 56) = 1.90$, $P = 0.17$].

3.2.2. Trust in product

Participants in HLU group trusted the chicken meat products displayed on the monitor significantly more than did those in CNTL group [$F(1, 56) = 4.61$, $P = 0.04$] (Figure 5).

3.2.3. Overall liking of chicken meat products

Figure 5 shows that participants in HLU group liked the chicken meat products displayed on the monitor significantly more than did those in CNTL group [$F(1, 56) = 5.57$, $P = 0.02$].

4. DISCUSSION

In recent years, not only consumers but also food manufactures have paid more attention to sustainability and process-related label claims in food products. Poultry meat product is no exception. Herein, it should be noted that many consumers, in reality, do not well understand what sustainability labels actually mean (Gifford and Bernard, 2011). For example, earlier findings show that consumers are generally not sure about significance of claims such as “free-range” (Harper & Makatouni, 2002) and “natural” (Gifford and Bernard, 2011). They are also often confusing with “organic” claim. In fact, participants of CNTL group in this study were, on average, correctly aware of six among the ten sustainability and process-related label claims even when four choices of answer were given. These

results raise a question as to whether consumers' purchase intent of food products labeled with sustainability and process-related label claims can be modulated by their understanding level of the claims. A lack of label understanding might restrict consumers to correctly process information about the claim (Grunert, 2002), leading to misinterpretation or misunderstanding. This might have a negative impact on not only consumers' quality perception, but also their purchase intent. To answer the above question, this study compared two groups having a different level of label understanding (i.e., high label-understanding group versus control counterpart group) with respect to visual attention toward the sustainability and process-related label claims, as well as subjective ratings of purchase intent, trust in quality, and overall liking of the products displayed on the monitor.

This study provides empirical evidence that a high level of label-claim understanding can result in a longer visual fixation onto the label claims found on chicken meat products than a normal level of label understanding. In other words, through education intervention, when learners well understood information on sustainability and quality-related label claims, the educational intervention can be effective in attracting the learners' attention toward the claims displayed on chicken meat products while purchasing the products. Since participants in this study were instructed to look at the images of food packaging as if they had to decide whether they wanted to purchase it, higher fixation time and fixation count of the high label education group suggest that label education increased participants' interest in the label claims. It is possible that familiarity of the claims as well as high level of understanding might be responsible for motivating participants to look at the label claims for a longer time while making purchase decisions. It has been found that familiarity with certain label claims increases visual attention toward the claims (Goldbert et al., 1999; Bialkova & van Trijp, 2010). For example, Bialkova and van Trijp (2010) demonstrated that participants' familiarity with nutritional labels was one of the key determinants affecting consumers' attention toward the labels. It is worth noting that longer fixation time appears to be associated with higher chance of purchase decision (Bialkova & van Trijp, 2011). Bialkova and van Trijp (2011) mentioned that label components which receive higher attention from consumers are more likely to influence their final purchase-decision. In a study conducted by Graham and Jeffrey (2012), they examined the relationship between consumers' visual attention to labels and their purchase decision-making for 64 food items including the labels. Participants' longer time spent in looking at label

components was found to be a sign of positive purchase decision. In the present study, participants with prior label education gave importance to the label claims while making purchase decisions, whereas participants without prior label education associate greater importance to product appearance.

Consumers have been found to have higher potential of buying products that they trust and like (Napolitano et al., 2010; Deli-Gray, Haefner, & Rosenbloom, 2012). Higher label-understanding resulted in higher trust in the chicken meat product, as well as higher liking of the product (Figure 4). Thus, HLU group was expected to show higher purchase intent than CNTL group. However, HLU group did not significantly differ from CNTL group with respect to self-reported purchase intent. There are two plausible explanations for the lack of significant group difference in the purchase intent. Firstly, as mentioned above, it is possible that control group participants overestimated their purchase intent due to social desirability bias. Prior studies show that in situations where consumers are expected to self-report their answers, they are likely to give “right” or “desirable” answers as opposed to what they truly feel because they want to be considered in the best of light (Fisher, 1993; Higginson et al., 2002). Secondly, it possible that apart from label education, other components such as brand and price might have played in modulating consumers’ purchase intent toward sustainability and process-related products. Even though consumers might be aware of ethical labels and might also have high concerns about environmental components, they might have been affected by other components such as price when they made a decision of purchasing sustainable meat products (Cowburn & Stockley, 2005; Grunert et al., 2014).

During eye-tracking session, participants with high label-understanding gave a priority to sustainability and process-related label claims over other components while making purchase decisions on chicken meat products by looking at the sustainability and process-related label claims for a longer time. Additionally, label education increased participants’ trust and liking towards the products, though it did not directly influence their purchase intent. Since this study relied on visual attention cues on product images and self-reported answers, further studies with real-life shopping scenario may provide greater insights into effect of label education on consumers’ purchase behavior.

5. CONCLUSION

To summarize, high level of label-understanding, as a result of label education, increased participants' visual attention toward sustainability and process-related label claims found on chicken meat products. More specifically, it motivated participants to look out for sustainability and process-related label claims while making purchase decisions of chicken meat products. Even though self-reported purchase intent of chicken meat products did not significantly differ with respect to label understanding level, improved understanding of sustainability and process-related label claims resulted in higher liking and trust to the sustainable chicken products. In conclusion, high understanding-level of sustainability labels positively influences consumers' purchase behavior toward sustainable chicken meat products. Hence, poultry processors and researchers are encouraged to take further steps for enhancing consumers' label understanding for achieving higher acceptance and purchase intent directed toward their meat products.

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Table 1: Demographic profiles of the High Label-Understanding (HLU) and Control (CNTL) groups

| | HLU group | | CNTL group | |
|--|------------------------------|------|-----------------------------|------|
| | <i>N</i> | % | <i>N</i> | % |
| Number of participants | 29 | | 29 | |
| Gender | | | | |
| Men | 11 | 37.9 | 16 | 55.2 |
| Women | 18 | 62.1 | 13 | 44.8 |
| Mean age¹ (± SD) | 44 ^a (± 14) years | | 36 ^b (± 6) years | |
| Education Level² | | | | |
| High School | 3 | 10.3 | 1 | 3.5 |
| Some college | 7 | 24.1 | 5 | 17.3 |
| 2-4 year college degree | 12 | 41.4 | 16 | 55.1 |
| Master or PhD degree | 7 | 24.2 | 7 | 24.1 |
| Annual income level³ | | | | |
| < \$20,000 | 13 | 44.8 | 13 | 44.8 |
| \$20,000 to \$39,999 | 7 | 24.1 | 10 | 34.6 |
| \$40,000 to \$59,999 | 2 | 6.9 | 3 | 10.3 |
| \$60,000 to \$79,999 | 2 | 6.9 | 0 | 0.00 |
| > \$80,000 | 5 | 17.3 | 3 | 10.3 |
| Purchase frequency⁴ | | | | |
| <i>Raw fresh chicken</i> | | | | |
| Never | 7 | 24.1 | 4 | 13.8 |
| 1-3 times | 9 | 31.1 | 14 | 44.8 |
| 3-5 times | 7 | 24.1 | 6 | 20.7 |
| 5-7 times | 4 | 13.8 | 5 | 17.2 |
| >7 times | 2 | 6.9 | 1 | 3.5 |
| <i>Raw frozen chicken</i> | | | | |
| Never | 4 | 13.8 | 5 | 17.2 |
| 1-3 times | 17 | 58.6 | 15 | 51.7 |
| 3-5 times | 5 | 17.2 | 7 | 24.2 |
| 5-7 times | 0 | 0.00 | 2 | 6.9 |
| > 7 times | 3 | 10.4 | 0 | 0.00 |
| <i>Processed chicken</i> | | | | |
| Never | 10 | 34.5 | 11 | 37.9 |
| 1-3 times | 8 | 27.6 | 13 | 44.8 |
| 3-5 times | 8 | 27.6 | 3 | 10.3 |
| 5-7 times | 2 | 6.9 | 1 | 3.5 |
| > 7 times | 1 | 3.5 | 1 | 3.5 |

(Continued)

| | HLU group | CNTL group |
|---|--------------------------|--------------------------|
| Purchase priorities⁵ (± SD) | | |
| Price | 7.6 ^a (± 1.5) | 7.1 ^a (± 2.0) |
| Safety | 8.0 ^a (± 1.2) | 7.3 ^a (± 2.0) |
| Brand | 5.7 ^a (± 2.0) | 5.5 ^a (± 2.2) |
| Sensory quality | 6.7 ^a (± 1.8) | 6.7 ^a (± 1.8) |
| Environmental | | |
| Sustainability | 5.7 ^a (± 1.8) | 5.6 ^a (± 2.2) |
| Packaging design | 4.9 ^a (± 2.0) | 5.0 ^a (± 2.2) |
| Nutritional benefit | 7.7 ^a (± 1.6) | 7.0 ^a (± 2.2) |

¹: Different subscripts within the same row represent significant between two groups difference ($P < 0.05$).

²: Two categories of education level, “master degree” and “doctoral or professional degree”, were combined since the number of each case was small.

³: Two categories of annual income level, \$80,000 to \$99,999 per year and more than \$100,000 per year, were combined since the number of each case was small.

⁴: Four categories of purchase frequency, “7 - 9 times”, “10 – 12 times”, “13 - 15 times”, and “more than 15 times”, were combined since the number of each case was small.

⁵: Purchase priority of each product-component was rated on a 9-point Likert scale ranging from 1 (extremely important) to 9 (extremely unimportant).

Figure Legend

Figure 1. Sample chicken product image including 8 AOIs used in the study.

Figure 2. Comparisons between the High Label-Understanding and Control groups with respect to fixation time of visual attention. “Fixation time” refers to the sum of fixation duration onto the AOI. *N.S.* represents no statistical difference between the two groups ($P > 0.05$). *, ** and *** represents a significant difference between the two groups at $P < 0.05$, $P < 0.01$ and $P < 0.001$. Error bars represent standard error of the means. Error bars represent standard error of the means.

Figure 3. Comparisons between the High Label-Understanding and Control groups with respect to fixation count of visual attention. “Fixation count” refers to number of fixations side each AOI. *N.S.* represents no statistical difference between the two groups ($P > 0.05$). *, ** and *** represents a significant difference between the two groups at $P < 0.05$, $P < 0.01$ and $P < 0.001$, respectively. Error bars represent standard error of the means.

Figure 4. Heat map of chicken image samples demonstrating fixation time and fixation count between High label-understanding (A and C) and Control (B and D) groups. Heat maps provide gaze patterns visualized by different colors based on amount of attention received. Blue color represents least attention and red color represents highest attention.

Figure 5. Comparisons between the High Label-Understanding and Control groups with respect to purchase intent, trust, and overall liking of chicken meat products displayed on the monitor. *N.S.* represents no statistical difference between the two groups ($P > 0.05$). * represents a significant difference between the two groups at $P < 0.05$. Error bars represent standard error of the means. Error bars represent standard error of the means.

Figure 1.











- | | | | | | |
|---|-------------|---|--------|---|----------------|
|  | Appearance |  | Brand |  | Instructions |
|  | Label claim |  | Price |  | Indicator date |
|  | Type |  | Weight | | |

Figure 2.

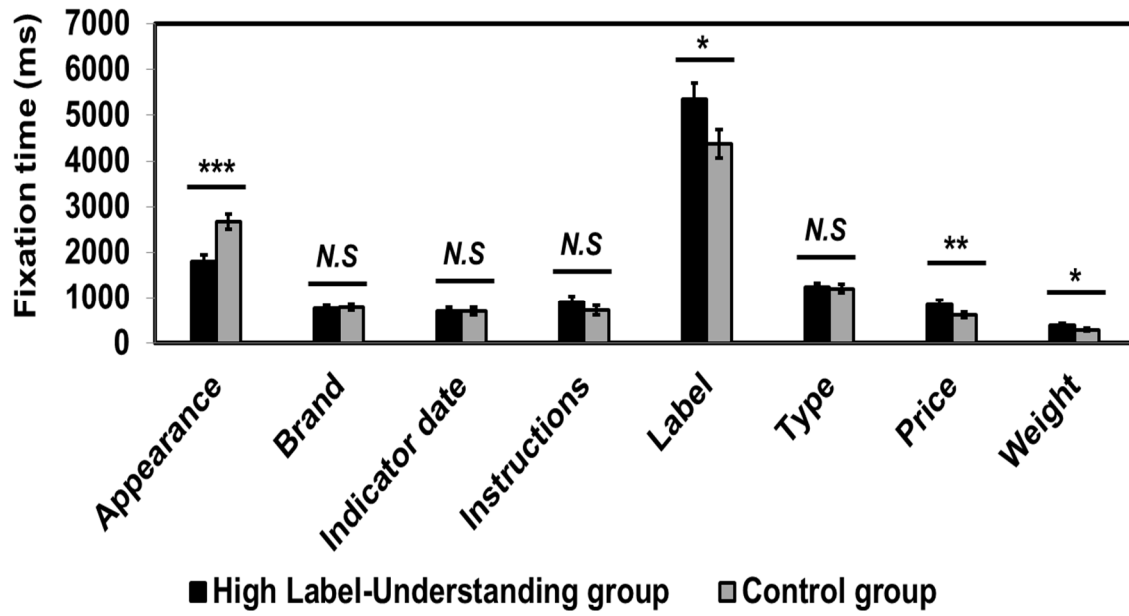


Figure 3.

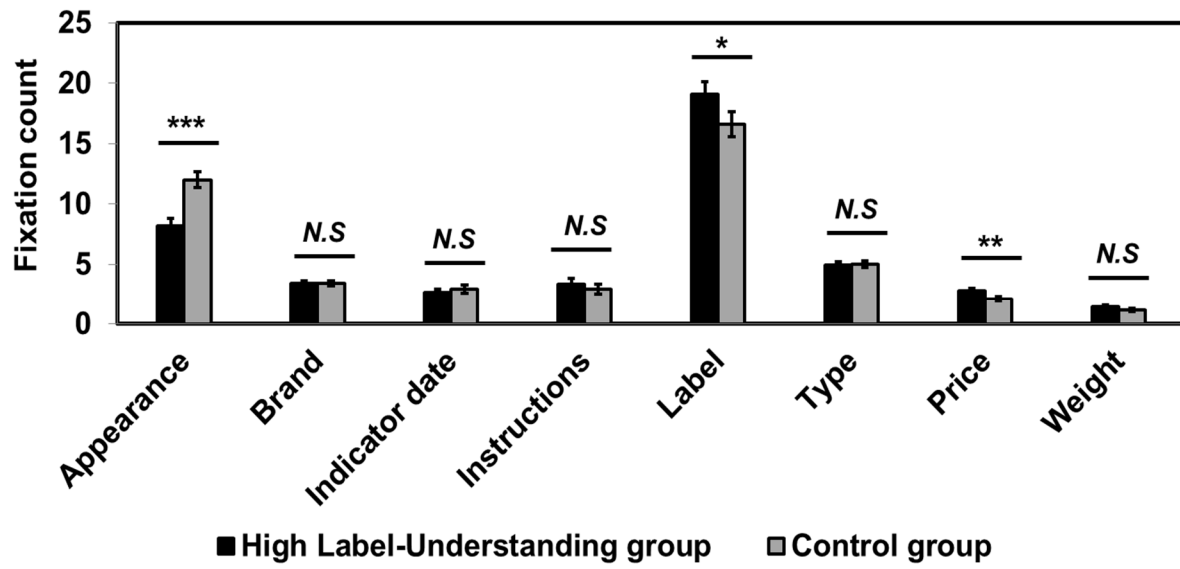


Figure 4.



(A)



(B)

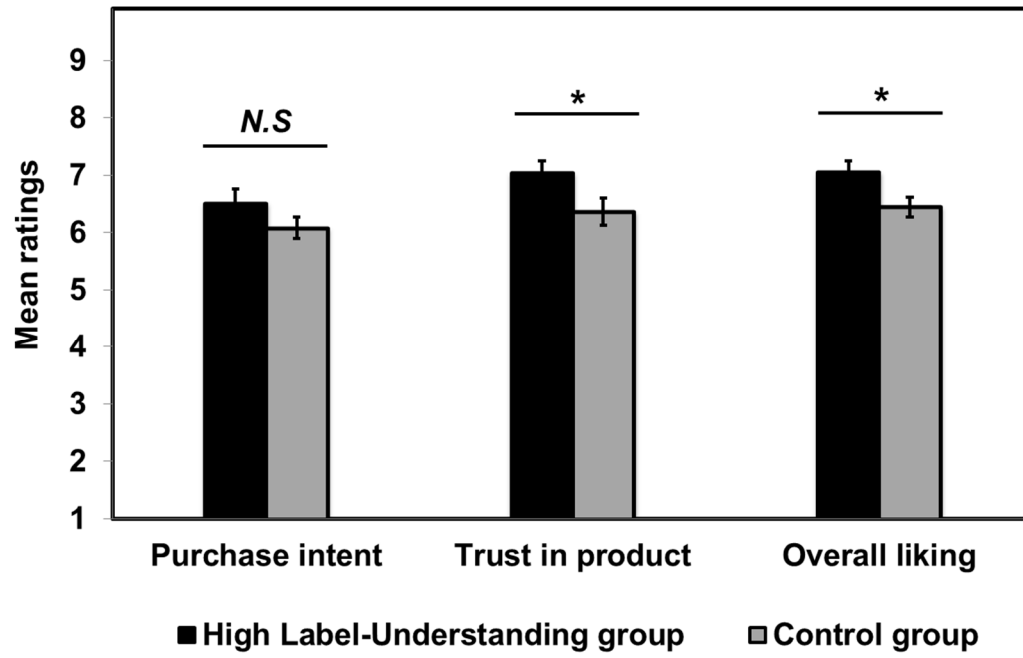


(C)



(D)

Figure 5.



CHAPTER 6
OVERALL CONCLUSION

To summarize, this study in Chapter 3 demonstrated that providing label education was effective in increasing participants' label understanding, positively influencing their attitude toward sustainability and process-related label claims found on chicken products. In Chapters 4 and 5, this study showed that high label-understanding induced by label education had a positive impact on participants' quality perception and purchase behavior of chicken meat products with sustainability and process-related label claims. More specifically, label education, irrespective of the approach, increased participants' actual (objective) as well as self-rated (subjective) label knowledge. However, participants' attitude toward the label claims varied as a function of method of providing education. Passive learning (reading a flyer) and passive learning with an authoritative effect (attending lecture by a professor) displayed potential to induce a positive attitude toward label claims among participants, whereas active learning (discussing with other members) either had no effect or a negative effect. In addition, passive learning was found to be more efficient and trustworthy as a mode of providing label education compared to active learning. Furthermore, providing label education, as an approach to increase label understanding, was successful in increasing participants' quality perception and acceptance of chicken breast meat. In other words, high label understanding among participants' resulted in them considering the labeled chicken breast meat to be of higher quality and more acceptable than its non-labeled counterpart. Moreover, effect of label claims on quality perception and acceptability varied by type of label claims. Not only label understanding, but participants' attitude toward label claims affected their quality perception. Specifically, if participants had higher trust in label claims, they tended to show higher quality perception and acceptability of the product as well. Even though label awareness showed little or no impact on intensity of sensory attributes of the chicken meat product, it was found that participants without prior label education showed evidence of rating their quality and acceptability of chicken breast meat subjectively, that is, depending on their self-awareness of label claims. If participants had confidence in their understanding of label claims, they considered product with that claims to be of higher quality. In addition to sensory and quality perception, high label understanding via label education demonstrated an impact on purchase behavior of the participants. Interestingly, high label understanding motivated participants to look out for label claims while making purchase decisions about chicken products. Higher liking and trust was associated with the chicken products having sustainable label claims due to enhanced label understanding. In conclusion,

providing label education is an effective approach not only to improve consumers' label understanding and attitude toward label claims, but also to improve their sensory acceptability and purchase intentions in chicken meat products. Hence, it is highly advisable for poultry processors and researchers to take further steps to enhance consumers' label understanding for achieving higher acceptability of chicken meat products, ultimately resulting in higher purchase intent directed toward their products.

APPENDIX 1

Research compliance protocol letters

(A)



UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

August 13, 2014

MEMORANDUM

TO: Han-Seok Seo
Tonya Tokar
Shilpa Samant

FROM: Ro Windwalker
IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 14-08-047

Protocol Title: *Awareness and Attitude towards Label Claims in Poultry Products*

Review Type: EXEMPT EXPEDITED FULL IRB

Approved Project Period: Start Date: 08/13/2014 Expiration Date: 08/12/2015

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (<http://vpred.uark.edu/210.php>). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 300 participants. If you wish to make any modifications in the approved protocol, including enrolling more than this number, you must seek approval prior to implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.

210 Administration Building • 1 University of Arkansas • Fayetteville, AR 72701
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The University of Arkansas is an equal opportunity/affirmative action institution.

(B)



UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

March 5, 2015

MEMORANDUM

TO: Han-Seok Seo
Tonya Tokar
Shilpa Samant

FROM: Ro Windwalker
IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 15-02-500

Protocol Title: *Visual Attention toward Chicken Products*

Review Type: EXEMPT EXPEDITED FULL IRB

Approved Project Period: Start Date: 03/04/2015 Expiration Date: 02/19/2016

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (<https://vpred.uark.edu/units/rscp/index.php>). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 200 participants. If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior* to implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 109 MLKG Building, 5-2208, or irb@uark.edu.

APPENDIX 2

Survey questionnaire about 10 label claims found on chicken products

Part I. Label on Chicken Products

This part is designed to assess your awareness and attitude towards the labels commonly used in chicken products. Here are a total of 10 different labels commonly shown on the chicken product packaging. Please answer following questions.

Label 01 "No Hormones Added"

Q1-1) How well do you think is your understanding of the above label claim on chicken products?

- Extremely poor Very poor Moderately poor Slightly poor Neither poor nor good Slightly good Moderately good Very good Extremely good

Q1-2) Which statement best describes the significance of the above label claim found on chicken products?

- This label claim differs with what kind of hormone is being used
 This label claim can be found on chicken products only if followed by the statement 'Federal regulations prohibit the use of hormones'
 This label claim signifies that no chemical agents, whatsoever, have been administered inside the body of the chicken
 This label describes that the chicken is not fed with any antimicrobials

Q1-3) How much do you trust this label claim?

- Extremely distrustful Very distrustful Moderately distrustful Slightly distrustful Neither distrustful nor trustful Slightly trustful Moderately trustful Very trustful Extremely trustful

Q1-4) How important is this label for you to decide purchasing chicken products.

- Extremely unimportant Very unimportant Moderately unimportant Slightly unimportant Neither unimportant nor important Slightly important Moderately important Very important Extremely important

Label 02 "All Natural"

Q1-1) How well do you think is your understanding of the above label claim on chicken products?

- Extremely poor Very poor Moderately poor Slightly poor Neither poor nor good Slightly good Moderately good Very good Extremely good

Q1-2) Which statement best describes the significance of the above label claim found on chicken products?

- Chicken product is made from organic sources
 Chicken product has been manufactured under conditions approved by the USDA (U.S. Dept. of Agriculture)
 Chicken is not treated with antibiotics
 Chicken product contains no artificial ingredient or added color and is minimally processed

Q1-3) How much do you trust this label claim?

- Extremely distrustful Very distrustful Moderately distrustful Slightly distrustful Neither distrustful nor trustful Slightly trustful Moderately trustful Very trustful Extremely trustful

Q1-4) How important is this label for you to decide purchasing chicken products.

- Extremely unimportant Very unimportant Moderately unimportant Slightly unimportant Neither unimportant nor important Slightly important Moderately important Very important Extremely important

Label 03



Q1-1) How well do you think is your understanding of the above label claim on chicken products?

- Extremely poor Very poor Moderately poor Slightly poor Neither poor nor good Slightly good Moderately good Very good Extremely good

Q1-2) Which statement best describes the significance of the above label claim found on chicken products?

- Protection of the chicken by allowing them to behave naturally in social environment ensuring physical and psychological well-being
- Welfare of the farmer by promoting agriculture and enhanced poultry handling practices
- Ensuring wellness of the chicken by maintaining natural environment inside the cage and processing it minimally
- Chicken are not treated with antibiotics

Q1-3) How much do you trust this label claim?

- Extremely distrustful Very distrustful Moderately distrustful Slightly distrustful Neither distrustful nor trustful Slightly trustful Moderately trustful Very trustful Extremely trustful

Q1-4) How important is this label for you to decide purchasing chicken products.

- Extremely unimportant Very unimportant Moderately unimportant Slightly unimportant Neither unimportant nor important Slightly important Moderately important Very important Extremely important

Label 04



Q1-1) How well do you think is your understanding of the above label claim on chicken products?

- Extremely poor Very poor Moderately poor Slightly poor Neither poor nor good Slightly good Moderately good Very good Extremely good

Q1-2) Which statement best describes the significance of the above label claim found on chicken products?

- Reduction in amount of pesticides used while producing feed for the chicken
- Encouragement for production of chicken products that are of natural origin and do not have any chemicals added
- Chicken that has not been modified with DNA from bacteria, viruses or other animals
- Chicken which has not been treated with any genetically harmful drugs

Q1-3) How much do you trust this label claim?

- Extremely distrustful Very distrustful Moderately distrustful Slightly distrustful Neither distrustful nor trustful Slightly trustful Moderately trustful Very trustful Extremely trustful

Q1-4) How important is this label for you to decide purchasing chicken products.

- Extremely unimportant Very unimportant Moderately unimportant Slightly unimportant Neither unimportant nor important Slightly important Moderately important Very important Extremely important

Label 05



Q1-1) How well do you think is your understanding of the above label claim on chicken products?

- Extremely poor
 Very poor
 Moderately poor
 Slightly poor
 Neither poor nor good
 Slightly good
 Moderately good
 Very good
 Extremely good

Q1-2) Which statement best describes the significance of the above label claim found on chicken products?

- Chicken product has been produced through approved methods that integrate cultural, biological, and mechanical practices and consider cycling of resources and conserve biodiversity
- Chicken product which does not contain any added chemical
- Chicken are not treated with antibiotics
- Chicken that is minimally processed and not subjected to any mechanical treatment

Q1-3) How much do you trust this label claim?

- Extremely distrustful
 Very distrustful
 Moderately distrustful
 Slightly distrustful
 Neither distrustful nor trustful
 Slightly trustful
 Moderately trustful
 Very trustful
 Extremely trustful

Q1-4) How important is this label for you to decide purchasing chicken products.

- Extremely unimportant
 Very unimportant
 Moderately unimportant
 Slightly unimportant
 Neither unimportant nor important
 Slightly important
 Moderately important
 Very important
 Extremely important

Label 06

“No Antibiotics Ever”

Q1-1) How well do you think is your understanding of the above label claim on chicken products?

- Extremely poor
 Very poor
 Moderately poor
 Slightly poor
 Neither poor nor good
 Slightly good
 Moderately good
 Very good
 Extremely good

Q1-2) Which statement best describes the significance of the above label claim found on chicken products?

- Chicken was never given any growth hormone or steroids
- Chicken product contains all natural ingredients
- Chicken does not undergo any chemical treatment ever during processing
- Chicken is raised without any antibiotics

Q1-3) How much do you trust this label claim?

- Extremely distrustful
 Very distrustful
 Moderately distrustful
 Slightly distrustful
 Neither distrustful nor trustful
 Slightly trustful
 Moderately trustful
 Very trustful
 Extremely trustful

Q1-4) How important is this label for you to decide purchasing chicken products.

- Extremely unimportant
 Very unimportant
 Moderately unimportant
 Slightly unimportant
 Neither unimportant nor important
 Slightly important
 Moderately important
 Very important
 Extremely important

Label 07



Q1-1) How well do you think is your understanding of the above label claim on chicken products?

- Extremely poor
- Very poor
- Moderately poor
- Slightly poor
- Neither poor nor good
- Slightly good
- Moderately good
- Very good
- Extremely good

Q1-2) Which statement best describes the significance of the above label claim found on chicken products?

- Chicken product is safe for consumption
- Chicken product has been manufactured under conditions approved by the USDA (U.S. Dept. of Agriculture)
- Chicken that is minimally processed and not subjected to any foreign treatment
- USDA takes responsibility for the distribution of these chicken products

Q1-3) How much do you trust this label claim?

- Extremely distrustful
- Very distrustful
- Moderately distrustful
- Slightly distrustful
- Neither distrustful nor trustful
- Slightly trustful
- Moderately trustful
- Very trustful
- Extremely trustful

Q1-4) How important is this label for you to decide purchasing chicken products.

- Extremely unimportant
- Very unimportant
- Moderately unimportant
- Slightly unimportant
- Neither unimportant nor important
- Slightly important
- Moderately important
- Very important
- Extremely important

Label 08

“Fresh”

Q1-1) How well do you think is your understanding of the above label claim on chicken products?

- Extremely poor
- Very poor
- Moderately poor
- Slightly poor
- Neither poor nor good
- Slightly good
- Moderately good
- Very good
- Extremely good

Q1-2) Which statement best describes the significance of the above label claim found on chicken products?

- Chicken product has never been subjected to freezing temperature and is not hard to touch
- Chicken has been just processed
- Chicken does not contain any chemical ingredients
- Chicken that was once frozen but is thawed before selling, hence, it is not hard to touch

Q1-3) How much do you trust this label claim?

- Extremely distrustful
- Very distrustful
- Moderately distrustful
- Slightly distrustful
- Neither distrustful nor trustful
- Slightly trustful
- Moderately trustful
- Very trustful
- Extremely trustful

Q1-4) How important is this label for you to decide purchasing chicken products.

- Extremely unimportant
- Very unimportant
- Moderately unimportant
- Slightly unimportant
- Neither unimportant nor important
- Slightly important
- Moderately important
- Very important
- Extremely important

Label 09



Q1-1) How well do you think is your understanding of the above label claim on chicken products?

- Extremely poor
- Very poor
- Moderately poor
- Slightly poor
- Neither poor nor good
- Slightly good
- Moderately good
- Very good
- Extremely good

Q1-2) Which statement best describes the significance of the above label claim found on chicken products?

- Ensuring humanly treatment of the chicken by maintaining sanitation inside the cage
- Aiming for improved lives of the chicken and kinder processing approaches from birth to slaughter
- Raising and handling of the chicken under conditions specified by the USDA
- Chicken product contains no artificial ingredient or added color and is minimally processed

Q1-3) How much do you trust this label claim?

- Extremely distrustful
- Very distrustful
- Moderately distrustful
- Slightly distrustful
- Neither distrustful nor trustful
- Slightly trustful
- Moderately trustful
- Very trustful
- Extremely trustful

Q1-4) How important is this label for you to decide purchasing chicken products.

- Extremely unimportant
- Very unimportant
- Moderately unimportant
- Slightly unimportant
- Neither unimportant nor important
- Slightly important
- Moderately important
- Very important
- Extremely important

Label 10

“Fed All Vegetarian Diet”

Q1-1) How well do you think is your understanding of the above label claim on chicken products?

- Extremely poor
- Very poor
- Moderately poor
- Slightly poor
- Neither poor nor good
- Slightly good
- Moderately good
- Very good
- Extremely good

Q1-2) Which statement best describes the significance of the above label claim found on chicken products?

- Birds were not fed with the same feed everyday
- Feed of the bird did not contain any ingredient derived from other animals/birds
- Feed of the bird was mainly corn and soybean meal with traces of fats and proteins from poultry-by products
- Feed of the bird contained only certain vegetables

Q1-3) How much do you trust this label claim?

- Extremely distrustful
- Very distrustful
- Moderately distrustful
- Slightly distrustful
- Neither distrustful nor trustful
- Slightly trustful
- Moderately trustful
- Very trustful
- Extremely trustful

Q1-4) How important is this label for you to decide purchasing chicken products.

- Extremely unimportant
- Very unimportant
- Moderately unimportant
- Slightly unimportant
- Neither unimportant nor important
- Slightly important
- Moderately important
- Very important
- Extremely important

Part II. Consumer Behavior for Chicken Products

This part is designed to examine your eating and purchasing behaviors for chicken products. Please answer following questions.

Q2-1) How often did you purchase (raw and processed) chicken products for last month?

| | Never | 1-3 times | 3-5 times | 5-7 times | 7-9 times | 10-12 times | 13-15 times | More than 15 times |
|--------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Raw fresh chicken | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Raw frozen chicken | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Processed chicken | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Q2-2) While purchasing chicken products, how important are the following attributes for you?

| | Extremely unimportant | Very unimportant | Moderately unimportant | Slightly unimportant | Neither unimportant nor important | Slightly important | Moderately important | Very important | Extremely important |
|------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Price | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Safety | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Brand | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sensory quality | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Environmental sustainability | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Packaging design | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Nutritional benefit | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Part III. Demographics

Q1) Gender: _____ Male _____ Female

Q2) Age (in years): _____

Q3) Marital status:

_____ Single _____ Married
_____ Widowed _____ Living with partner

Q4) Number of persons living in your home, including yourself: _____ person(s)

Q5) Number of children younger than 18 years old living with yourself: _____ children.

Q6) Education level:

_____ Less than High School
_____ High School
_____ Some College
_____ 2-Year or 4-Year College Degree
_____ Master Degree
_____ Doctoral (PhD) or Professional Degree (MD, JD)

Q7) Have you ever studied Food Science/Poultry Science/Nutrition/Other related topics as a part of your academic coursework?

_____ Yes
_____ No

Q8) Which category best represents your annual pretax household income?



_____ Less than \$20,000 per year
_____ \$20,000 to \$39,999 per year
_____ \$40,000 to \$59,999 per year
_____ \$60,000 to \$79,999 per year
_____ \$80,000 to \$99,999 per year
_____ More than \$100,000 per year

Q9) Ethnic background:

_____ White/Caucasian _____ Hispanic / Latin American _____ Black / African American
_____ Asian _____ Pacific Islanders _____ Other

APPENDIX 3



Flyer on the 10 label-claims found on chicken products used in the educational intervention

| | |
|---|---|
| <p>"No Antibiotics Ever"</p> | <p>✓ This claim is allowed by the USDA if the producer can show documented proof that the birds have not received antibiotics at any point in their lives for any purpose, including treatment of illness</p> |
|  | <p>✓ A third-party welfare certification program administered by the non-profit organization Animal Welfare Institute. It includes:</p> <ul style="list-style-type: none"> Ensuring wholesome and nutritious feed without antibiotics or hormones Prohibition of housing in cages, maintaining enough space requirements and ventilation Kinder processing techniques by skilled workers Complying with food safety and environmental regulations |
| <p>"Fed All Vegetarian Diet"</p> | <p>✓ This claim is used when the diet of the bird does not contain any animal/bird byproducts</p> <p>✓ Composition of feed is regulated by Association of American Feed Control Officials (AAFCO)</p> <p>✓ Poultry feed mainly consists of corn and soybean meal (May contain processed proteins and fats from meat/meat products)</p> |
|  | <p>Participating producers submit their standards for consideration, and after approval is granted, USDA conducts audits to verify that the company is following its own standards in raising animals, and processing methods</p> |

References
 United States Code, 2011. Food and Drugs: Poultry and Poultry Products Inspection, 21: Sec 453
 A Consumer's Guide to Food Labels and Animal Welfare, August (2012), Animal Welfare Institute.
 United States Department of Agriculture, Food Safety and Inspection Service, 2013. Meat and Poultry Labeling Terms, Standards Manual Chickens, 2009. Humane Farm Animal Care Animal Care Standards
 Reliable Internet Source

- ✓ Label is defined as 'a display of written, printed, or graphic matter upon any article or the immediate container (not including packaged liners) of any article'
- ✓ Label is a tool of communication between food manufacturer and consumer
- ✓ Food Safety and Inspection Service (FSIS) is a public health agency of U.S. Department of Agriculture (USDA) which is responsible for maintaining labeling standards and specifications and ensuring safety of meat, poultry and egg products

Some Food Labels found on Chicken Product:


| Label | Significance |
|---|--|
|  | <ul style="list-style-type: none"> Ensures natural behavior, social interaction, physical comfort and psychological sanity USDA-approved third-party certification label that supports and promotes farmers who raise their animals with the highest standards The program is administered by Animal Welfare Institute (non-profit organization) Raising poultry in cages and beak cutting is prohibited |
|  | <ul style="list-style-type: none"> Compliance with the standards is verified by a USDA-accredited organic certifying agency. It ensures - <ul style="list-style-type: none"> Preservation of natural resources and biodiversity Support for animal and health welfare Outdoor access along with exposure to sunlight Using only approved materials |

FOOD LABELS FOUND ON CHICKEN PRODUCTS



**Dept. of Food Science
University of Arkansas**




| | |
|---|---|
| <p>"All-Natural" "Natural"</p> | <ul style="list-style-type: none"> ✓ A product containing no artificial ingredient or added color and is only minimally processed (<i>Minimal processing means that it is processed in a manner that does not fundamentally alter the product</i>) ✓ Label must explain the use of the term |
| <p>"No Hormones added"</p> | <ul style="list-style-type: none"> Essentially, the external administration of hormones to stimulate growth is prohibited in raising poultry ✓ Therefore, the claim "no hormones added" cannot be used on the labels of poultry unless it is followed by a statement that says "Federal regulations prohibit the use of hormones" |
|  | <ul style="list-style-type: none"> ✓ This certification program allows consumers to identify a process or product that does not employ GM processes or inputs ✓ GMO: Genetically Modified Organism ✓ Non-GMO: A plant, animal, or other organism or derivative of such an organism whose genetic structure has not been altered by merging DNA from different species |
| <p>"Fresh"</p> | <ul style="list-style-type: none"> ✓ Whole chicken and cuts have never been below 26 °F (the temperature at which poultry freezes) ✓ Consistent with consumer expectations of "fresh" poultry, i.e., not hard to touch or frozen solid ✓ 'Fresh' chicken must always bear a 'keep refrigerated' statement |