



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

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

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

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

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

Market Responses to Information Conveying Mixed Messages – Prediction of Informational Impacts on Consumer Willingness to Pay for Eggs from Welfare Enhanced Cage Systems using Discrete Choice Experiments¹

Ying (Jessica) Cao^{12*}, Chen Chen¹, John Cranfield¹, Tina Widowski³

¹ Dept. of Food, Agricultural and Resource Economics, University of Guelph

² Division of Health Services Policy & Practice, The State University of New York at Buffalo

³ Dept. of Animal Biosciences, University of Guelph

* Corresponding author: Cao, 268H Farber Hall, 3435 Main St., Buffalo, NY 14214 USA. ycao25@buffalo.edu, 1(716)829-5369.

Abstract

Consumers ascribing value to animal welfare related attributes has become a common interest for various stakeholders. This study aims to investigate heterogeneous consumer preferences for eggs from the welfare enhanced production systems, and further, how the effects of information regarding these production systems would depend on consumers' previous shopping experience and initial perceptions. A nationally representative sample of respondents completed a self-reported survey and a set of discrete choice experiments on egg products. Respondents were randomly assigned into two groups, with one group being offered additional information regarding the pros and cons of each housing system on various aspects (i.e., animal welfare and environment). Using conditional logit models, preliminary results showed consumers' willingness to pay (WTP) for egg attributes depend on previous purchase experiences, those who had purchased cage-free eggs before were willing to pay higher premiums for advanced cages. Furthermore, informational impact depends on consumers' previous purchase experiences and initial perceptions. Inexperienced consumers were more responsive to information comparing to experienced consumers. When confronted with mixed information about pros and cons, inexperienced consumers with higher perceived importance on welfare or environmental issues showed more preference updates. While the prior attitudes helped the experienced consumers to differentiate between products, additional information lowered these attitudinal effects. These results implied that information that aims to educate the general public has higher marginal effects on the inexperienced consumers than on the experienced ones. Moreover, egg producers who want to switch between cage systems should take the different market profit ranges into account during the public information dissemination process.

Key words:

Discrete Choice Experiment (DCE), Informational Impact, Consumption Experience, Prior Attitude, Food Marketing

¹ Manuscript prepared for presentation (#1982) at the 2017 Agricultural and Applied Economics Association (AAEA) annual meeting in Chichago, IL, July 30-August 1, 2017.

1. Introduction

As animal welfare issues become a common concern for the general public, parties of interest are continuously challenged to assess the value consumers ascribe to this key credence attribute attached to the products. Further, consumers rely on publicly available information to learn about animal welfare and the newly developed products that carry these attributes. However, such information often conveys mixed messages of pros and cons in terms of the potential improvements for production practice. One example would be egg production. The welfare enhanced cage systems (e.g. free-run, free-range) improve animal welfare but in the meantime would add extra burdens to the environment. Little is known so far about how consumers would respond to information with mixed messages when making purchase decisions. This study aims to investigate this “mixed-message” informational influence on consumer willingness to pay for eggs from the welfare enhanced production systems, and further, how “mixed-message” informational influence would differ depending on consumers’ previous shopping experience and initial perceptions.

Literature Review

Informational Impacts

Cognitive Bias and Information Processing

Consumption Experience and Prior Attitudes

Our contribution ... & scientific impacts...

3. Experimental Design

3.1 Choice Experiment and Information Treatment

This study collected online survey responses from a nationally representative sample of consumers in Canada and conducted repeated rounds of discrete choice experiments on eggs. Five attributes were used to characterize an egg product alternative in the choice experiment: price per dozen (\$2.80, \$3.80, \$4.80, \$5.80), cage system (conventional cage, enriched cage, free-run, free-range), organization that verifies the cage systems (no verification, government verification, third-party verification, industrial verification), color (brown, white) and nutrition (Omega-3, not). Table 1 showed a list of these attributes and their corresponding levels.

Each respondent (i.e. perspective consumer) was asked to complete 8 choice tasks, each of which included 2 egg product alternatives and 1 opt-out option. Figure 1 showed how a typical choice task looks like. A total of 4 blocks of 8 choice tasks were generated using SAS 9.3 program for randomizing designs (Kuhfeld, 2005) and randomized among all respondents. Restrictions were also imposed so that dominated alternatives were excluded. The fractional

factorial design yielded a D-efficiency score of 71.3, which was only slightly lower than that of a full factorial design 71.7, suggesting a balanced design between orthogonality and statistical efficiency (Hensher et al., 2005).

The respondents were also randomly assigned into two groups. In the *Basic Information* group, the respondents were only offered basic information about alternative cage systems (definition and description of the cage, etc.) to help with the choice tasks. In the *Additional Information* group, the respondents were offered both basic and additional information regarding various aspects of each cage system measured by stars (i.e. animal welfare, food safety and environmental friendliness, etc.; more stars means better). Figure 2 showed how the additional information sheet looks like. This additional information sheet served as a comprehensive information set describing the pros and cons of each cage system.

The respondents also completed a survey. Information such as demographics, previous purchase experience and self-reported perceived importance of various aspects (e.g. animal welfare, food safety, environment concern, etc.) when making purchase decisions was collected. A total of 3,072 full surveys were obtained, including $3,072 \times 8 = 24,576$ stated choices. Each information group had 1536 respondents, with about 62% having previous experience purchasing cage-free eggs (free-run or free-range). A comparison of demographics between the survey respondents and the 2011 population census was shown in Table 2. According to the results, the studied sample is representative for the country population, and well balanced by information group and experience level.

3.2 Analytical Plan

Preferences revealed from the stated choice tasks can be modeled using McFadden's (1974) Random Utility Model (RUM). The utility for individual respondent n ($n = 1, \dots, N$) by choosing product alternative j ($j = 1, \dots, J$) in choice task t ($t = 1, \dots, T$) can be expressed as U_{nj}^t . Further, this indirect utility can be separated into a deterministic part V_{nj}^t and a stochastic part ε_{nj}^t , with the deterministic part being a linear function of the product attributes X_{nj}^t and an alternative specific constant (ASC) α .

$$U_{nj}^t = V_{nj}^t + \varepsilon_{nj}^t = (\alpha + X_{nj}^t \cdot \beta) + \varepsilon_{nj}^t, \forall j \in \{1, \dots, J\}, t = 1, \dots, T \quad (1)$$

Assume that the stochastic terms are IID Type I extreme value distributed within each individual and that they are associated with scale parameters λ . λ is inversely related to the variance of the random term. In particular, $(\sigma)^2 = \frac{\pi^2}{6(\lambda)^2}$ (Louviere et al, 2000). The conditional logit probability of selecting alternative i over the choice set $\{1, \dots, J\}$ is:

$$P_{ni}^t = \frac{\exp[\lambda (\alpha + X_{ni}^t \cdot \beta)]}{\sum_{j=1}^J \exp[\lambda (\alpha + X_{nj}^t \cdot \beta)]}, \forall j \in \{1, \dots, J\}, t = 1, \dots, T \quad (2)$$

In the statistical model, one numeric price attribute and eight non-price attributes (i.e. 3 cage systems, 3 verification level, Omega-3 and brown color) were used to predict respondents' probability in choosing product alternatives relative to the reference (base) case. White eggs without Omega-3 produced by conventional cage systems with no organization for (cage system) verification were kept as the reference (base) case.

A non-price attribute was coded as 1 if an alternative had the attribute, 0 if not but had another non-base level (e.g. one of the three cage systems or verifications), and -1 if it had the base level (i.e. conventional cage, no verification, non-Omega-3, and white color). For the opt-out option, all nine attribute variables were coded as 0. An alternative specific constant (ASC), which was coded as 1 for all non-trivial product alternatives and 0 for opt-out option, was also estimated as the difference in utility when a respondent chose either one of the two non-trivial egg product alternatives instead of choosing opt-out (i.e. buy neither of the two).

Respondents were also differentiated by whether or not they were offered additional *Information*, or had previous experience of purchasing cage-free eggs as dummy indicators, as well as their self-reported perceived importance of animal welfare and environmental friendliness (of egg production practice), which were coded as 0 to 100 where higher number means more important. Since these variables stayed the same at the respondent level, they entered into the model as interaction terms with the attribute variables to capture the different sensitivities towards certain attributes due to these individual level characteristics. Whenever two or more of these individual traits were considered at the same time, models were run separately by a respondent's information and/or experience group. Table 3 listed the definition and coding of all variables.

$$Prob(Y = 1) = ASC + Attribute \cdot \beta + Attribute \times Indi_Trait \cdot \delta + \epsilon \quad (3)$$

One interesting question from the market perspectives is that how each attribute and individual trait would change the preference predictions and hence, the price premiums respondents are willing to pay for the corresponding attributes. The price premium for a certain (non-price) credence attribute is predicted as the negative ratio between the estimated parameters of this attribute and the price, and is called marginal willingness to pay (mWTP). mWTP measures the relative importance of an attribute relative to price when holding all other attribute levels at constant.

$$mWTP_{Attribute_k} = -\frac{\beta_{Attribute_k}}{\beta_{Price}} \quad (4)$$

In particular, with the interaction terms between the attribute and the individual trait, mWTP for attribute k could be calculated as:

$$mWTP_{Attribute_k} = -\frac{\beta_{Attribute_k} + Indi_Trait \times \delta_{Attribute_k}}{\beta_{Price}^t + Indi_Trait \times \delta_{Price}} \quad (5)$$

4. Results

4.1 Informational Impact

Table 4 showed the regression results for the two information groups. Marginal willingness to pay (mWTP) for each attribute was calculated accordingly. All price and non-price attributes were significant in predicting the stated choices at least at 95% significant level except industry verification label in the additional information group, which was only marginally significant at 90% significant level. In general, relative to the reference product alternative (i.e. conventional cage, no verification, non-Omega-3, and white color), consumers were willing to pay \$0.22 more for industry verification, \$0.16 more for third-party verification, \$0.70 more for government verification. The price premiums for welfare enhanced cage systems were \$1.14 for free-range, \$0.53 for free-run and -\$0.3 for enriched cage; and \$0.2 for Omega-3 nutritional content and -\$0.09 for brown color. Note that enriched cage and brown eggs were estimated with even lower willingness to pay (WTP) than the reference case, i.e. conventional cage and white color, which was counter intuitive. This might be due to the fact that respondents were learning to differentiate across different attributes and alternatives, and some attributes were placed in a non-prioritized position (e.g. color of egg) or became less salient when comparing with more advanced level (e.g. enriched cage).

Non-linear tests of equivalence were performed pair-wise for all 8 non-price attributes between the two information groups. Though respondents in the additional information group were in general willing to pay less than their counterparts in the basic information group, only WTPs for free-run and free-range were statistically significant between groups (\$0.86 for free-range and 0.28 for free-run). Results showed in Table 4 suggested that additional information regarding pros and cons of various aspects for the cage systems had limited impacts on consumer choices.

4.2 Consumption Experience

In order to further explore informational impacts on market behaviors, Table 5 separated the sample into experienced consumers and inexperienced consumers. Based on self-reported previous purchase experience, experienced consumers were defined as those who had purchased either free-run or free-range eggs in their shopping experience before. In contrast, inexperienced consumers were defined as those who had never purchased cage-free eggs. The additional information treatment entered into the model via multiple interaction terms with the attributes.

Results showed that the relative magnitudes of estimated coefficients for main attributes (top panel of Table 5) were consistent with the pooled regression in Table 4. Yet, experienced and inexperienced consumers were significantly different from each other in terms of attribute preferences and information sensitivity. In comparison, experienced consumers were less sensitive to price and ascribed less utility to the purchase/consumption itself relative to no consumption (i.e. lower ASC). Experienced consumers were also significantly willing to pay more for the third-party verification and the free-range cage, and less for the industry verification than inexperienced consumers. The significant level was at 95% or higher. The difference

between experienced and inexperienced consumers reflected their prior knowledge and confidence about the alternative cage systems and the related verifications.

When confronted with additional mixed information about each cage system's advantages and disadvantages, inexperienced consumers were shown to be more responsive to the additional information in updating their preferences (bottom panel of Table 5 on the interaction terms). They became more sensitive to price, willing to pay significantly less for free-run cage, industry verification and brown eggs than when they were without the additional set of information. The joint test of all information interaction effects was highly significant ($F=42.16$, $P<0.01$). In contrast, experienced consumers only significantly (95%) increased their price sensitivity and general utility of purchasing (ASC), while viewing all other attributes not significantly different from when they were without additional information.

Results shown in the bottom panel of Table 5 further refined the findings from Table 4. It is suggested that the addition mixed information decreased WTP for the free-run cage system, but it was only significant among the inexperienced consumers. The "limited impact" conclusion on information applied only to the experienced consumers, while inexperienced ones still showed to be responsive.

Table 6 calculated the WTPs for the 4 information-experience groups (2 by 2). It showed that experienced consumers were almost always willing to pay more for advanced egg attributes than inexperienced consumers. And mixed information decreased WTP for almost all attributes regardless of previous experience, suggesting that negative information on average hurts more than positive information would advocate. However, inexperienced consumers reflected more (significant) preference updating on the cage systems and related verifications than experienced consumers. Experienced consumers, after reinforcing their previous knowledge (about cages and verifications) via additional information, showed improved valuation for other attributes (e.g. color, nutrition), even though not statistically significant.

4.3 Consumer Attitudes

It is interesting to find out further why information had different marginal impacts on consumers with various purchase experience. An initial attempt to approach this question is to investigate how experienced and inexperienced consumers are different in terms of their attitudes and prior perceptions toward various product attributes. In the survey, respondents were asked to distribute a total of 100 points across 11 food attributes to indicate their perceived importance when purchasing egg products. Table 7 listed the ranks and the average scores for experienced and inexperienced consumers.

In general, the point score distribution of the inexperienced consumers were more widely dispersed. Though the relative ranking was to some extent comparable, the actual scores for each attribute were all significantly different between the two groups except food safety, nutritious content, and brand name (which were ranked to be somewhat equally high, medium and low important respectively). Interestingly, experienced consumers ranked and scored the animal welfare concerns much higher than inexperienced consumers (the 4th vs. 8th important out

of 11; 12.04 vs. 6.26, $F=6.09$, $P<0.01$), but both groups ranked the environmental impact of production practice to be the third last important attribute (th 9th important), although experienced consumers still claimed significantly higher scores than the inexperienced ones (5.55 vs. 3.84, $F=4.39$, $P<0.01$). Figure 3 and 4 showed more detailed distributions of the perceived importance scores for these two attributes. Experienced groups perceived higher importance than inexperienced groups at all levels. The difference in relative ranking between experienced and inexperienced groups implied that animal welfare is a much more salient and well-awared attribute than the environmental friendliness attribute for the specialty egg products.

Table 8 and 9 showed the regression results which used these two perceived importance scores as interaction terms with the egg product attributes for all 4 information-experience groups. The changing patterns would provide insights on how attitudes could shape consumer preferences and further transform into various reactions depending on previous purchase experience and new information provision.

The top panel of Table 8 about the main attritutes provided consistent results with Table 5 and 6 on preference by information-experience group, suggesting that information had higher marginal impacts on the inexperienced consumers than the experienced ones. Moving to the bottom panel of Table 8 for the interaction terms with animal welfare perceived importance scores, results suggested that attitudes on perceived importance changed the ways in which consumers response to additional information between the two experience groups.

For the inexeperienced group, without the additional information on the relative pros and cons of the cage systems, the higher perceived importance score only significantly contributed to lower price sensitivity and lower ASC (general utility of consumption vs. no consumption), but not to the non-price attributes (expect free-range which was marginally significant). With additional information, consumers with higher perceived importance showed significant differentiation for the two cage-free systems and the industry verification. This change suggested that among the inexperienced consumers, those with higher perceived importance digested and responded to the additional information more than those with lower attitude level.

For the experienced group in contrast, without the additional information, those with higher perceived importance on animal welfare showed significantly more differentiation across product attributes. Yet, after being offered additional information, the effects of prior attitudes were significantly reduced. The attitude effect changes before and after information provision suggested that experienced consumers rely on their (relatively better established) prior attitude to differentiate across produce attributes, and additional information works as a substitute to prior attitude in shaping their preferences.

Table 9 followed the same structure of Table 8 and focused on consumer perceived importance of environment impacts of egg production practice. Similar to attitude on animal welfare, consumer prior attitudes changed the ways they responded to additional information. Inexperienced consumers with higher perceived importance scores increased product differentiation after information provision (e.g. with free-range and third-party verification). Experienced consumers with higher attitude levels showed higher product differentiation, and

additional information “muted” (or replaced) these attitudinal effects to some extent. Comparing the significance level changes before and after information provision in Table 8 and 9, results suggested that prior attitudes on animal welfare, a more salient and well-awared attribute, interacted with information more than environment concerns, a less-awared attribute be the public.

5. Discussion and Conclusion

Using choice experiements and a between-subject study design on information treatment, this study investigated how consumers responded to mixed layers of information (positive and negative of various aspects) differently depending on their previous purchase experience and established attitudes.

Results showed that mixed information decreased consumers’ willingness to pay (WTP) for various housing systems and the related verification labels at all levels, suggesting that negative information looms larger than positive ones when yielding net effects. Further, the informational impacts happened quite differently among consumers with different purchase experiences. Experienced consumers who had purchased free-run or free-range eggs before showed less marginal effects of additional information than inexperienced consumers.

A deeper look into the preference differences between experienced and inexperienced consumers suggested that experienced consumers were willing to pay higher (price premiums) for welfare enhanced cage systems, yet slightly lower (or more moderately) for verification systems than inexperienced consumers. These findings implied that experienced consumers may have established better abilities and confidence in differentiating across egg alternatives. Less price sensitivity and less utility ascribed to general consumption (relative to no consumption, reflected by ASC) among experienced consumers also supported this argument.

Furthermore, experienced and inexperienced consumers were also found to be different in their self-claimed prior attitudes regarding the two primary aspects of enhanced egg production practice, i.e. animal welfare and environmental impact. Experienced consumers reported higher perceived importance of both aspects than the inexperienced ones.

These differentiated attitudes systematically changed how consumers with different experiences responded to the additional (mixed) information. Those inexperienced consumers with higher perceived importance updated preferences more than those with lower perceived importance, implying that inexperienced consumers with higher concerns learnt from and responded more to the additional information. For the experienced consumers, those with higher concerns differentiated across products and attributes more than those with lower concerns. Yet, additional information worked somewhat like a substitute to replace the attitudinal effects among these experienced consumers.

Findings in this study implied that information that aims to educate the general public has disproportionally higher marginal effects on the inexperienced consumers than on the experienced ones. The informational influence would “phase out” once a consumer established his/her own consumption experience and judgment. Due to the net effects of mixed messages

conveying both positive and negative aspects of a certain production practice, consumers tend to give favorable consideration to the production practice or credence attribute that addresses one aspect of concerns (e.g. either animal welfare or environmental issue) to the best level. However, they would not be willing to pay too much on a practice/attribute which tries to address more than one aspects in compromised ways (e.g. free-run in addressing both welfare and environment). This result suggests that those egg producers who want to switch between cage systems should take the different market profit ranges into account.

This study is not without limitations. Future studies will benefit by addressing the following concerns.

First, in the study design, this study offered an additional comprehensive information sheet to the treatment group regarding the pros and cons of each production practice through various aspects (such as food safety, animal welfare and environmental impacts, etc.). While this treatment setting is more consistent with the real life situation in which consumers were exposed to a full set of information, empirical findings from the study were limited to the final net effects of information. Future studies will benefit from separating information messages and investigating the differentiated positive and negative informational impacts on each individual aspect.

Second, informational research on the relative effectiveness always depends on consumer segmentation and prior attitude differentiation. This study used self-reported previous purchase experience as a way for segmentation. Although the experience level was comparable between the two (information) study groups in this study, future research would benefit from randomization over both information treatment and experience levels. Further, prior attitudes (as well as awareness, knowledge, etc.) and consumption experiences may not coincide or be consistent with one another all the time. Multiple solicitations of attitude before and after information treatment and/or purchase behaviors will help to disentangle the multi-dimensional association and make causal inference on the informational or (purchase) behavioral impacts on attitude or the opposite.

Last but not the least, this study offered some initial findings on how prior attitudes and previous experiences interact with one another in affecting the informational impacts on consumer preference and market acceptance of alternative egg attributes. As the discussion involves learning (among the inexperienced consumers) and substituting effects (among the experienced consumers), more advanced modeling techniques for consumer choices would generate additional interesting findings even with the current study design. For example, with the random parameter model or generalized mixed logit model, one could track the changing patterns of decision variation (e.g. via a scale parameter) and/or parameter randomness (e.g. via standard deviation of selected attributes) either by information-experience group or by repeated rounds of choice tasks or both. Findings will add additional insights on information research in the market setting.

Reference:

- Anderson, C.A. 2007.** Belief perseverance. In *Encyclopedia of Social Psychology* edited by R. F. Baumeister and K. D. Vohs, pp. 109-110. Thousand Oaks, CA: Sage.
- Asselin, E. M. 2005.** Eggcentric Behavior – Consumer Characteristics that Demonstrate Greater Willingness to Pay for Functionality. *American Journal of Agricultural Economics* 87(5): 1339–1344.
- Baker, G. A. and T. A. Burnham. 2001.** Consumer response to genetically modified foods: Market segment. *Journal of Agricultural and Resource Economics* 26(2): 387–403.
- Bech, M. and D. Gyrd - Hansen. 2005.** Effects coding in discrete choice experiments. *Health economics* 14(10):1079-1083.
- Bejaei, M., K. Wiseman and K. M. Cheng. 2015.** Developing Logistic Regression Models Using Purchase Attributes and Demographics to Predict the Probability of Purchases of Regular and Specialty Eggs. *British Poultry Science* 56 (4): 425–35.
- Bejaei, M., K. Wiseman, K. M. Cheng, Copulsky W., Drewnowski A., Fearne A. and Fearne A. 2011.** Influences of Demographic Characteristics, Attitudes, and Preferences of Consumers on Table Egg Consumption in British Columbia, Canada. *Poultry Science* 90 (5):1088-95.
- Chaiken, S., J. W. Fee Iii and K. John. 1980.** Heuristic Versus Systematic Information Processing and the Use of Source Versus Message Cues in Persuasion. *Journal of Personality and Social Psychology* 39(5): 752–766.
- Chang, J.B., J.L. Lusk and F.B. Norwood. 2010.** The price of happy hens: A hedonic analysis of retail egg prices. *Journal of Agricultural and Resource Economics* 35(3):406–423.
- Doyon, M., S. Bergeron, J. Cranfield, L. Tamini and G. Criner. 2016.** Consumer preferences for improved hen housing: is a cage a cage? *Canadian Journal of Agricultural Economics/Revue Canadienne D'agroeconomie* 64(4): 739–51.
- Fazio, R.H. and M.P. Zanna. 1981.** Direct Experience and Attitude-Behavior Consistency. *Advances in Experimental Social Psychology* 14:161–202.
- Fazio, R.H., M.P. Zanna and C. Joel. 1978.** Direct Experience and Attitude-Behavior Consistency: An Information Processing Analysis. *Personality and Social Psychology Bulletin* 4(1):48–51.
- Fearne, A. and D. Lavelle. 1996.** Perceptions of food “quality” and the power of marketing communication: results of consumer research on a branded-egg concept. *Journal of Product and Brand Management* 5(2): 29–42.

- Fox, J. A., D. J. Hayes and J. F. Shogren. 2002.** Consumer Preferences for Food Irradiation: How Favorable and Unfavorable Descriptions Affect Preferences for Irradiated Pork in Experimental Auctions. *Journal of Risk and Uncertainty* 24(1): 75–95.
- Francisco, A.J., A.S. Bruce, J.M. Crespi, J.L. Lusk, B. Mcfadden, J.M. Bruce, R.L. Aupperle, and S.L. Lim. 2015.** “Are consumers as constrained as hens are confined? Brain activations and behavioral choices after informational influence.” *Journal of Agricultural and Food Industrial Organization*. 13(1):113-119
- Frewer, L. J., C. Howard and R. Shepherd. 1998.** The influence of initial attitudes on responses to communication about genetic engineering in food production. *Agriculture and Human Values* 15(1): 15–30.
- Goddard, E., P. Boxall, J.P. Eunu, C. Boyd, A. Asselin, and A. Neall. 2007.** Consumer Attitudes, Willingness to Pay and Revealed Preferences for Different Egg Production Attributes: Analysis of Canadian Egg Consumers. Project Report #07-03, Department of Rural Economy, University of Alberta.
- Hamilton, R.W. and D.V. Thompson. 2007.** Is There a Substitute for Direct Experience? Comparing Consumers’ Preferences after Direct and Indirect Product Experiences. *Journal of Consumer Research* 34(4):546–555.
- Hoch, S.J. and J. Deighton. 1989.** Managing What Consumers Learn from Experience. *Journal of Marketing* 53(2):1–20.
- Huang, L. 2013.** Factors Affecting Consumers Preferences for Specialty Eggs in Canada. M.Sc. thesis. Saskatchewan: University of Saskatchewan.
- Huffman, W. E., M. Rousu, J. F. Shogren and A. Tegene. 2007.** The effects of prior beliefs and learning on consumers’ acceptance of genetically modified foods. *Journal of Economic Behavior & Organization* 63: 193–206.
- Jang, S. M. 2014.** Seeking Congruency or Incongruency Online? Examining Selective Exposure to Four Controversial Science Issues. *Science Communication* 36(362): 143–167.
- Kahneman, D. 2011.** *Thinking, fast and slow*. Macmillan.
- Kahneman, D., and A. Tversky. 1979.** Prospect Theory: An Analysis of Decision under Risk. *Econometrica* 47(2):263–292.
- Lagerkvist, C. J. and S. Hess. 2011.** A meta-analysis of consumer willingness to pay for farm animal welfare. *European Review of Agricultural Economics* 38(1): 55–78.
- Lancaster, K. J. 1966.** A New Approach to Consumer Theory. *Source Journal of Political Economy* 74(2): 132–157.

- Louviere, J., D. Hensher and J. Swait. 2000.** *Stated choice methods analysis and applications*. New York, NY: Cambridge University Press.
- Lu, Y. 2013.** Consumer Preference for Eggs from Enhanced Animal Welfare Production System: A Stated Choice Analysis. M.Sc. thesis. Guelph: University of Guelph.
- Lusk, J.L. 2010.** The Effect of Proposition 2 on the Demand for Eggs in California. *Journal of Agricultural & Food Industrial Organization* 8(1): 3.
- Lusk, J. L., House, L. O., Valli, C., Jaeger, S. R., Moore, M., Morrow, J. L. and Traill, W. B. 2004.** Effect of information about benefits of biotechnology on consumer acceptance of genetically modified food: evidence from experimental auctions in the United States, England, and France. *European Review of Agricultural Economics*, 31(2), 179–204.
- Lusk, J. L., T. Nilsson and K. Foster. 2007.** Public Preferences and Private Choices: Effect of Altruism and Free Riding on Demand for Environmentally Certified Pork. *Environmental and Resource Economics* 36(4): 499–521.
- McFadden, B. R. and J. L. Lusk. 2015.** Cognitive biases in the assimilation of scientific information on global warming and genetically modified food. *Food Policy* 54: 35–43.
- Millar, M.G. and K.U. Millar. 1996.** The Effects of Direct and Indirect Experience on Affective and Cognitive Responses and the Attitude–Behavior Relation. *Journal of Experimental Social Psychology* 32(6):561–579.
- Mørkbak M.R. and J. Nordström. 2009.** The impact of information on consumer preferences for different animal food production methods. *Journal of Consumer Policy* 32(4):313-31.
- Paivio, A. 1991.** Dual Coding Theory: Retrospect and Current Status. *Canadian Journal of Psychology* 45(3):255–287.
- Petty, R. and J. Cacioppo. 1986.** *Communication and persuasion: Central and peripheral routes to attitude change* (Springer series in social psychology). New York, NY: Springer-Verlag.
- Plous, S. 1991.** Biases in the Assimilation of Technological Breakdowns: Do Accidents Make Us Safer? *Journal of Applied Social Psychology* 21(13): 1058–1082.
- Radecki, C. M. and J. Jaccard. 1995.** Perceptions of Knowledge, Actual Knowledge, and Information Search Behavior. *Journal of Experimental Social Psychology* 31(2): 107–138.
- Raju, P. S., S. C. Lonial and W. G. Mangold. 1980.** Differential Effects of Subjective Knowledge, Objective Knowledge, and Usage Experience on Decision Making: An Exploratory Investigation. *Journal of Consumer Psychology* 4(2): 153–180.

- Raun Mørkbak, M. and J. Nordström. 2009.** The Impact of Information on Consumer Preferences for Different Animal Food Production Methods. *Journal of Consumer Policy* 32: 313–331.
- Revelt, D. and K. Train. 1998.** Mixed Logit with Repeated Choices: Households' Choices of Appliance Efficiency Level. *Review of Economics and Statistics* 80(4): 647–657.
- Romanowska, P. E. 2009.** Consumer Preferences and Willingness to Pay for Certification of Eggs with Credence Attributes. M.Sc. thesis. Alberta: University of Alberta.
- Rozin, P. and E. B. Royzman. 2001.** Negativity Bias, Negativity Dominance, and Contagion. *Personality and Social Psychology Review*, 5(4), 296–320.
- Sherwin, C.M., G.J. Richards, and C.J. Nicol. 2010.** Comparison of the welfare of layer hens in 4 housing systems in the UK. *British Poultry Science* 51(4):488–499.
- Smith, R.E. and W.R. Swinyard. 1983.** Attitude-Behavior Consistency: The Impact of Product Trial versus Advertising. *Journal of Marketing Research* 20(3):257–267.
- Spooner, J.M., C.A. Schuppli, and D. Fraser. 2014.** Attitudes of Canadian citizens toward farm animal welfare: A qualitative study. *Livestock Science* 163(1):150–158.
- Sumner, D.A., W.A. Matthews, J.A. Mench, and T.J. Rosen-Molina. 2010.** The Economics of Regulations on Hen Housing in California. *Journal of Agricultural and Applied Economics* 42(3):429–438.
- Thompson, D. V., R. W. Hamilton and R. T. Rust. 2005.** Feature fatigue: When product capabilities become too much of a good thing. *Journal of Marketing Research* 42(4): 431-442.
- Tonsor, G.T. and R.S. Shupp. 2011.** Cheap Talk Scripts and Online Choice Experiments: 'Looking Beyond the Mean.' *American Journal of Agricultural Economics* 93(4):1015–1031.
- Train, K. 2003.** *Discrete choice methods with simulation*. New York, NY: Cambridge University Press.
- Tversky, A. and D. Kahneman. 1974.** Judgment under Uncertainty: Heuristics and Biases. *Source: Science, New Series* 185(4157): 1124–1131.
- Vanhonacker, F., E. Poucke and F.A.M. Tuytens. 2007.** Segmentation Based on Consumers' Perceived Importance and Attitude toward Farm Animal Welfare. *International Journal of Sociology of Food and Agriculture* 15(3): 84-100

Van Loo, E., V. Caputo, R.M. Nayga Jr., J.-F. Meullenet, P.G. Crandall and S.C. Ricke. 2010. Effect of Organic Poultry Purchase Frequency on Consumer Attitudes Toward Organic Poultry Meat. *Journal of Food Science* 75(7): S384–S397.

Verbeke, W. 2005. Agriculture and the food industry in the information age. *European Review of Agricultural Economics* 32(3): 347–368.

Verbeke, W. 2008. Impact of communication on consumers' food choices. *Proceedings of the Nutrition Society* 67(3):281–288.

Verbeke, W., I. Sioen, Z. Pieniak, J. Van Camp and S. De Henauw. 2004. Consumer perception versus scientific evidence about health benefits and safety risks from fish consumption. *Public Health Nutrition* 8(4): 422–429.

Table 1: List of Egg Product Attributes for Choice Experiment

Attributes	Levels
Price(\$/dozen)	<ul style="list-style-type: none"> · \$2.80 · \$3.80 · \$4.80 · \$5.80
Cage System	<ul style="list-style-type: none"> · Conventional Cage · Enriched Cage · Free Run · Free Range
Verification Label for the Cage System	<ul style="list-style-type: none"> · No Verification · Government Verification · Third-Party Verification · Industrial Verification
Color	<ul style="list-style-type: none"> · White · Brown
Nutrition/Omega-3	<ul style="list-style-type: none"> · Yes · No

Table 2: Summary Statistics

		ALL	INEXPERIENCED		EXPERIENCED CONSUMERS		Canadian
			Basic Info	Basic+Add	Basic Info	Basic+Add	
Age Group	Age 18-24	2.93%	2.54%	2.53%	5.08%	2.04%	11.57%
	Age 25-34	14.45%	13.02%	13.93%	14.21%	17.05%	16.30%
	Age 35-44	21.68%	25.07%	21.51%	20.30%	18.67%	16.93%
	Age 45-54	21.39%	19.05%	24.37%	20.82%	20.91%	20.07%
	Age 55-64	16.70%	16.83%	16.54%	16.75%	16.84%	16.53%
	Age 65+	22.85%	23.49%	21.20%	22.84%	24.49%	18.61%
Gender	Male	14.16%	13.02%	16.14%	11.17%	15.82%	49.03%
	Female	85.84%	86.98%	83.86%	88.83%	84.18%	50.97%
Region	BC	15.04%	6.98%	7.28%	30.64%	25.00%	13.14%
	AB	10.94%	7.94%	12.97%	11.17%	12.24%	10.89%
	MB/SK	5.67%	6.67%	5.06%	4.06%	6.63%	6.70%
	ON	36.33%	40.63%	33.23%	35.53%	35.20%	38.39%
	QB	26.37%	32.06%	32.91%	15.23%	17.86%	23.61%
	Atlantic	5.66%	5.70%	8.54%	3.55%	3.06%	6.95%
Education	Less than	4.30%	4.76%	5.70%	1.50%	4.00%	23.76%
	Graduated	15.43%	18.10%	16.77%	12.69%	11.73%	25.54%
	Graduated	25.10%	23.81%	25.95%	24.37%	26.53%	28.13%
	Some	9.86%	11.43%	8.45%	9.14%	10.20%	4.43%
	Undergradua	24.22%	19.05%	25.95%	30.46%	23%	13.54%
	Graduated	8.50%	7.30%	6.65%	8.63%	13.27%	4.60%
Income	Less than	2.34%	2.22%	4.75%	0.51%	0.51%	5.06%
	\$10,000-	9.18%	9.52%	6.96%	12.18%	9.18%	10.21%
	\$20,000-	10.55%	10.47%	11.71%	10.66%	8.67%	10.46%
	\$30,000-	10.55%	12.38%	9.81%	7.11%	12.24%	10.97%
	\$40,000-	11.03%	12.38%	12.03%	10.15%	12.24%	9.93%
	\$50,000-	11.14%	11.39%	9.17%	11.17%	13.26%	8.80%
	\$60,000-	4.69%	4.76%	5.38%	5.59%	2.55%	7.90%
	\$70,000-	6.15%	4.26%	7.60%	7.11%	4.59%	6.82%
	\$80,000-	3.71%	3.18%	3.48%	3.56%	5.10%	5.75%
	\$90,000-	4%	5.71%	3.80%	3.56%	2.04%	4.73%
	\$100,000-	5.76%	4.44%	4.75%	6.60%	8.67%	8.25%
	\$125,000-	1.37%	1.27%	1.90%	1.02%	1.02%	4.52%
	\$150,000 or	2.64%	2.22%	2.85%	1.52%	4.08%	6.59%
	Prefer not to	16.89%	17.14%	15.82%	19.29%	15.82%	
N=		3072	945	948	591	588	

Table 3 Interpretation and coding of main variables used in choice models

Variables	Abbreviation	Description
Price	price1	Continuous variable (CA\$); price1 = 2.8, 3.8, 4.8 or 5.8
Industry Verification	veri2	Dummy variable; =1 if veri2, =-1 if no verification, =0 if otherwise
Third Party Verification	veri3	Dummy variable; =1 if veri3, =-1 if no verification, =0 if otherwise
Government Verification	veri4	Dummy variable; =1 if veri4, =-1 if no verification, =0 if otherwise
Enriched Cage	house2	Dummy variable; =1 if house2, =-1 if conventional cage, =0 if otherwise
Free Run Cage	house3	Dummy variable; =1 if house3, =-1 if conventional cage, =0 if otherwise
Free Range Cage	house4	Dummy variable; =1 if house4, =-1 if conventional cage, =0 if otherwise
Brown Shell Color	color2	Dummy variable; =1 if brown, =-1 if white
Omega-3 enriched	omega2	Dummy variable; =1 if omega-3, =-1 if not
Information treatment	info	Dummy variable; =1 if information provided, =0 no information
Perceived importance of animal welfare	awscore	Continuous variable; 0 to 100
Perceived importance of environmental friendliness	envscore	Continuous variable; 0 to 100

Table 4 Consumer preferences for egg attributes and the impact of information

VARIABLES	Basic Information		Basic+Additional Information		Delta Test Statistics (p-value)
	Coefficients (Std. Err)	WTP	Coefficients (Std. Err)	WTP	
price1	-0.553*** (0.02)		-0.622*** (0.02)		
ASC	2.374*** (0.10)		2.608*** (0.10)		1.49 (0.22)
veri2	0.121*** (0.04)	0.22	0.0698* (0.04)	0.11	1.20 (0.27)
veri3	0.0902** (0.04)	0.16	0.112*** (0.04)	0.18	0.03 (0.87)
veri4	0.386*** (0.04)	0.7	0.373*** (0.04)	0.6	0.90 (0.34)
house2	-0.166*** (0.04)	-0.3	-0.206*** (0.04)	-0.33	0.09 (0.77)
house3^a	0.293*** (0.04)	0.53	0.171*** (0.04)	0.28	6.29*** (0.01)
house4^a	0.630*** (0.04)	1.14	0.537*** (0.04)	0.86	6.39*** (0.01)
color2	0.112*** (0.02)	0.2	0.101*** (0.02)	0.16	0.01 (0.44)
omega2	-0.0521** (0.02)	-0.09	-0.0625*** (0.02)	-0.1	0.59 (0.91)
Observations	12,288		12,288		

*** p<0.01, ** p<0.05, * p<0.1

^a WTP for attribute is significantly different at 0.01 level

Across treatments, consumers showed similar tastes for egg attributes. When exposed to information, consumers decreased WTP for free run and free range systems.

Table 5 Information Impacts by Previous Purchase Experience

VARIABLES	Inexp.	Exp.
	Coefficients (Std. Err)	Coefficients (Std. Err)
Price	-0.657*** (0.03)	-0.405*** (0.04)
ASC	2.748*** (0.13)	1.837*** (0.16)
Industry verification	0.209*** (0.05)	-0.011 (0.07)
Third party verification	0.019 (0.06)	0.206*** (0.07)
Government verification	0.404*** (0.05)	0.370*** (0.07)
Enriched cage	-0.119** (0.05)	-0.237*** (0.07)
Free-run	0.268*** (0.05)	0.345*** (0.06)
Free-range	0.489*** (0.05)	0.863*** (0.07)
Omega-3 enriched	0.108*** (0.03)	0.115*** (0.04)
Brown eggshell	-0.072** (0.03)	-0.011 (0.04)
Info*Price	-0.075* (0.04)	-0.112** (0.05)
Info*ASC	0.096 (0.18)	0.678*** (0.23)
Info*Enriched cage	-0.005 (0.08)	-0.054 (0.10)
Info*Free-run	-0.198** (0.08)	-0.052 (0.09)
Info*Free-range	-0.1 (0.08)	-0.091 (0.09)
Info*Industry Verification	-0.164** (0.08)	0.088 (0.09)
Info*Third Party Verification	0.076 (0.08)	-0.054 (0.09)
Info*Government Verification	0.012 (0.07)	-0.066 (0.09)
Info*Brown eggshell	-0.071* (0.04)	0.054 (0.05)
Info* Omega-3 enriched	-0.029 (0.04)	0.022 (0.05)
Observations	15,144	9,432
Test statistic (interaction term jointly=0)	42.16	18.76
p-value	(0.00)	(0.04)
Log-likelihood	-4715.55	-2934.36
LR Chi ² (20)	1660.5	1039.36
Prob > Chi ²	0	0
Pseudo R ²	0.15	0.151

*** p<0.01, ** p<0.05, * p<0.1

Table 6 Calculated Willingness to Pay (WTP: \$/dozen) by Information Treatment and Purchase Experience

Egg Attributes	Basic information			Basic and additional information		
	Inexp.	Exp.	Wald Test p-value	Inexp.	Exp.	Wald Test p-value
Enriched cage	-0.18	-0.59	0.03**	-0.17	-0.56	0.01***
Free-run	0.41	0.85	0.02**	0.1	0.57	0.00***
Free-range	0.74	2.13	0.00***	0.53	1.49	0.00***
Industry verification	0.32	-0.03	0.05**	0.06	0.15	0.55
Third party verification	0.03	0.51	0.01***	0.13	0.29	0.27
Government verification	0.62	0.91	0.15	0.57	0.59	0.9
Brown egg shell	-0.11	-0.03	0.39	-0.2	0.08	0.00***
Omega-3	0.16	0.28	0.23	0.11	0.26	0.04**
N=	7,560	4,728		7,584	4,704	

*** p<0.01, ** p<0.05, * p<0.1

Table 7 Consumer Perceived Importance of Product Characteristics

Rank (Most Important First)	Inexperienced Consumers		Experienced Consumers	
	Product Characteristics	Importance Score (0-100)	Product Characteristics	Importance Score (0-100)
1	Freshness	17.83	Freshness	14.26
2	Price	15.98	Food safety	14.13
3	Food safety	14.58	Animal welfare in production	12.04
4	Taste	12.91	Price	10.9
5	Nutritious content	8.96	Taste	10.18
6	Country of origin	8.2	Country of origin	9.88
7	Appearance	6.36	Nutritious content	9.67
8	Animal welfare in production process	6.26	Organic	6.06
9	Environmental impact of production	3.84	Environmental impact of production	5.55
10	Organic	2.77	Appearance	5.17
11	Brand name	2.32	Brand name	2.16

Table 8 Informational Impacts Depend on Attitudes – Perceived Importance of Animal Welfare

VARIABLES	Inexperienced Consumers			Experienced Consumers		
	Basic Info	Basic+Add Info	P(>F)	Basic Info	Basic+Add Info	P(>F)
Price	-0.768*** (0.04)	-0.779*** (0.04)	0.8439	-0.462*** (0.05)	-0.501*** (0.05)	0.5391
ASC	3.230*** (0.15)	3.118*** (0.16)	0.6118	2.435*** (0.20)	2.778*** (0.21)	0.244
Industry Verification	0.211*** (0.06)	-0.07 (0.07)	0.0015***	0.0655 (0.08)	0.170** (0.08)	0.3564
Third-party Verification	-0.000528 (0.06)	0.09 (0.07)	0.3296	0.0841 (0.08)	0.121 (0.08)	0.7476
Government Verification	0.439*** (0.06)	0.423*** (0.06)	0.855	0.361*** (0.08)	0.313*** (0.08)	0.6856
Enriched cage	-0.074 (0.06)	-0.135** (0.07)	0.5029	-0.0968 (0.09)	-0.256*** (0.09)	0.1846
Free-run	0.231*** (0.06)	0.145** (0.07)	0.354	0.258*** (0.08)	0.238*** (0.08)	0.8616
Free-range	0.448*** (0.06)	0.285*** (0.07)	0.0722*	0.665*** (0.08)	0.504*** (0.08)	0.1766
Omega3-enriched	0.117*** (0.03)	0.0735** (0.04)	0.3587	0.114*** (0.04)	0.189*** (0.04)	0.2139
Brown eggshell	-0.0847** (0.03)	-0.121*** (0.04)	0.4507	0.0438 (0.04)	-0.00354 (0.04)	0.4276
awscore*Price	0.0163*** (0.00)	0.00712* (0.00)	0.0472**	0.00590* (0.00)	-0.00217 (0.00)	0.0412**
awscore*ASC	-0.0720*** (0.01)	-0.0439*** (0.02)	0.1534	-0.0604*** (0.01)	-0.0169 (0.01)	0.0181**
awscore*Enriched cage	-0.00603 (0.00)	0.00293 (0.01)	0.286	-0.0159** (0.01)	-0.00192 (0.01)	0.1044
awscore*Free-run	0.00289 (0.01)	-0.0129* (0.01)	0.0727*	0.0113** (0.01)	0.00697 (0.00)	0.5597
awscore*Free-range	0.00742* (0.00)	0.0185*** (0.01)	0.1777	0.0232*** (0.01)	0.0247*** (0.00)	0.8468
awscore*Industry Verif.	0.0000829 (0.00)	0.0199*** (0.01)	0.0098***	-0.00849 (0.01)	-0.00863* (0.00)	0.9833
awscore*Third party	0.00293 (0.00)	0 (0.01)	0.9149	0.0132** (0.01)	0.00213 (0.00)	0.0928*
awscore*Government	-0.00468 (0.00)	0 (0.01)	0.4872	0.00194 (0.01)	-0.000305 (0.00)	0.7701
awscore*Brown eggshell	0.000531 (0.00)	0 (0.00)	0.3302	-0.00669** (0.00)	0.00454* (0.00)	0.0034***
awscore*Omega3	-0.002 (0.00)	0.001 (0.00)	0.5121	-0.000314 (0.00)	-0.00518** (0.00)	0.209
Observations	7,560	7,584		4,728	4,704	
Joint Test Interaction	43.77	31.49		65.79	62.82	
Log-likelihood	-2324.011	-2347.824		-1433.151	-1413.255	
LR chi2(20)	888.98	858.94		596.52	618.74	
Pseudo R ²	0.161	0.155		0.172	0.18	

*** p<0.01, ** p<0.05, * p<0.1

^ap-value of tests of equality of the coefficients of the attributes across treatments

Table 9 Informational Impacts Depend on Attitudes – Perceived Importance of Environmental Friendliness

VARIABLES	Inexperienced Consumers		P(>F)	Experienced Consumers		P(>F)
	Basic Info	Basic+Add Info		Basic Info	Basic+Add Info	
Price	-0.737*** (0.04)	-0.816*** (0.04)	0.1634	-0.514*** (0.05)	-0.474*** (0.05)	0.5575
ASC	3.040*** (0.17)	3.158*** (0.16)	0.6165	2.624*** (0.21)	2.488*** (0.21)	0.6526
Industry Verification	0.217*** (0.07)	0.08 (0.07)	0.1395	0.0589 (0.09)	0.09 (0.09)	0.7785
Third-party Verification	-0.0647 (0.07)	-0.04 (0.07)	0.7872	0.166* (0.09)	0.149* (0.09)	0.8901
Government Verification	0.416*** (0.07)	0.435*** (0.06)	0.8442	0.374*** (0.09)	0.279*** (0.09)	0.4487
Enriched Cage	-0.160** (0.07)	-0.1 (0.07)	0.5371	-0.119 (0.09)	-0.151* (0.09)	0.7953
Free-run	0.194*** (0.07)	0.08 (0.07)	0.2556	0.271*** (0.08)	0.248*** (0.08)	0.8392
Free-range	0.420*** (0.07)	0.280*** (0.07)	0.148	0.780*** (0.09)	0.638*** (0.09)	0.2501
Omega3-enriched	0.0906** (0.04)	0.0637* (0.04)	0.5986	0.0644 (0.05)	0.128*** (0.04)	0.3114
Brown Eggshell	-0.131*** (0.04)	-0.120*** (0.04)	0.839	0.0195 (0.05)	0 (0.04)	0.7289
envscore*Price	0.0168*** (0.01)	0.0199*** (0.01)	0.7175	0.0205*** (0.01)	-0.01 (0.01)	0.0005
envscore*ASC	-0.0617** (0.03)	-0.0755*** (0.03)	0.7135	-0.142*** (0.02)	0.01 (0.03)	0.0001
envscore*Enriched Cage	0.0145 (0.01)	-0.01 (0.01)	0.1909	-0.0237** (0.01)	-0.0289** (0.01)	0.7538
envscore*Free-run	0.0171 (0.01)	0 (0.01)	0.1621	0.0168* (0.01)	0.01 (0.01)	0.6865
envscore*Free-range	0.0162 (0.01)	0.0303*** (0.01)	0.3587	0.0178* (0.01)	0.0260** (0.01)	0.5843
envscore*Industry Verif	-0.0044 (0.01)	-0.01 (0.01)	0.7614	-0.0125 (0.01)	0 (0.01)	0.4999
envscore*Third party Verif	0.0218** (0.01)	0.0351*** (0.01)	0.387	0.00779 (0.01)	0 (0.01)	0.6141
envscore*Government Verif	-0.00282 (0.01)	0 (0.01)	0.9827	0.000915 (0.01)	0 (0.01)	0.8197
envscore*Brown Eggshell	0.0135** (0.01)	-0.01 (0.01)	0.0137**	-0.00522 (0.01)	0.01 (0.01)	0.0833
envscore*Omega3-enriched	0.00462 (0.01)	0.00471 (0.01)	0.9912	0.0109* (0.01)	0 (0.01)	0.258
Observations	7,560	7,584		4,728	4,704	
Joint Test Interaction Terms	43.66	41.42		62.99	17.88	
Log-likelihood	-2326.952	-2344.336		-1443.448	-1446.208	
LR chi2(20)	883.1	865.91		575.93	552.83	
Pseudo R ²	0.16	0.166		0.156	0.161	

*** p<0.01, ** p<0.05, * p<0.1

^a p-value of tests of equality of the coefficients of the attributes across treatments

34. During a shopping trip when you purchase Canadian large Grade A eggs, if the following options were the only ones available, which would you purchase? (*Check one*)

	Option A	Option B	Option C
Price (CND \$)	\$3.80	\$2.80	I choose to buy neither of option A or B
Color	White	Brown	
Housing system	Conventional cage	Free range	
Organization that verifies housing system	Industry	Third Party	
Omega-3	Yes	No	
I will choose	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 1 Example on one choice task in the choice experiment

	Cage	Enriched cage	Free run	Free range
Hens have opportunity to exhibit natural behaviours	★	★★	★★★	★★★★
Lowers the likelihood of hens suffering from injury, disease or pain	★★★★	★★★	★★	★★
Lowers the likelihood of hens suffering from fear or emotional discomfort	★	★★	★★★	★★★★
Environmentally friendly	★★★	★★★	★★	★

- ★★★★ Extremely likely
- ★★★ Likely
- ★★ Unlikely
- ★ Extremely unlikely

Figure 2 Information Sheet on Impacts of Various Systems on Hen's Health, Welfare and Environment

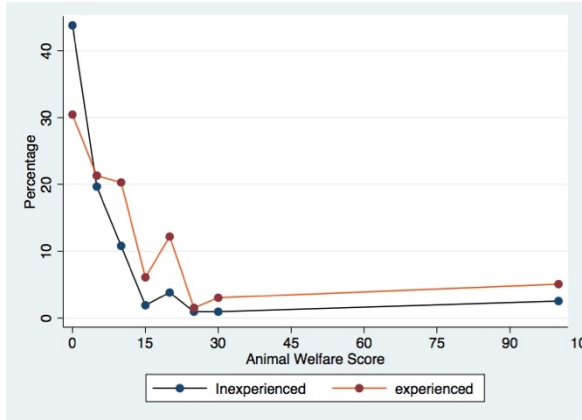


Figure 3 Percentage of consumers' perceived importance of animal welfare in production process

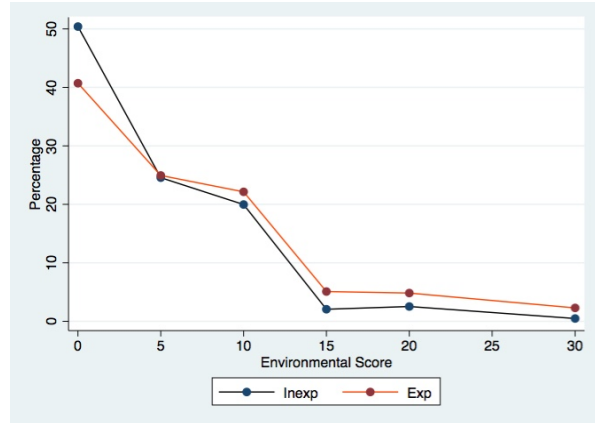


Figure 4 Percentage of consumers' perceived importance of environmental friendliness in production process

Experienced consumers gave higher score to importance of animal welfare and environmental friendliness than inexperienced consumers.