



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.*

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

DIFFERENTIATING “SUSTAINABLE” FROM “ORGANIC” AND “LOCAL” FOOD CHOICES: DOES INFORMATION ABOUT CERTIFICATION CRITERIA HELP CONSUMERS?

Hillary Sackett

Department of Economics and Business Management, Westfield State
University, USA, E-mail: hsackett@westfield.ma.edu

Robert Shupp

Department of Agricultural, Food, and Resource Economics, Michigan State
University, USA

Glynn Tonsor

Department of Agricultural Economics, Kansas State University, USA

Abstract

This paper seeks to estimate the effect of different certification claims on consumer preferences for food labeled as “sustainable”, “organic”, or “local”. The first phase of analysis estimates the effect of information provision about detailed certification standards on choice over eco-labeled food products. The second phase estimates the marginal effect of certification level on the probability of choosing a product with a given label. Finally, the third phase of analysis compares willingness to pay for each eco-label, providing insight into perceived value trade-offs. Results suggest weak differentiation between labels but potential for capturing price premiums with government-backed certification claims.

Keywords: Sustainable Agriculture, Food Labels, Discrete Choice Experiment, Certification Criteria, Consumer Behavior

JEL Codes: Q11, Q13, Q18, Q55

1. Introduction

In practice, the word “sustainable” has been attributed to everything from the foods we eat, to the structures we build, to the way we raise our families and run our businesses. However, as a concept, there remain inconsistencies in the way definitions of “sustainability” are applied. In the food economics literature, alternative agricultural production systems (such as those described as “sustainable”) are said to generate value-added food attributes used for product differentiation (Robinson and Smith 2002). “Sustainably produced” food labels have rapidly grown in popularity over the past decade, while there is little consensus among experts on a clear definition.

Compared to USDA Organic certification, governmental oversight of sustainability claims is limited. The USDA Food Safety and Inspection Service (FSIS) is the public health branch of the USDA responsible for “ensuring the nation's commercial supply of meat, poultry, and egg products is safe, wholesome, and correctly labeled and packaged”. USDA FSIS has created specific guidelines for several labeling claims such as free range, natural, and hormone-free. A producer or marketer may submit other production claims, such as “sustainably produced”, for approval with supporting documentation including operational

protocol. However, the operation is never physically inspected prior to approval. USDA inspectors conduct random annual inspections, ensure adherence to required practices and check operational protocol meets the agreed upon measures to qualify for the voluntary production claim. However, there is currently no unifying standard or certification under the USDA for sustainable production practices, so consumers in the United States may still exhibit confusion about the production attributes communicated through a “sustainable” label.

Few economic studies examine sustainability attributes in the context of food production specifically. A review of the literature in Tanner and Woelfing Kast (2003) reveals no studies at that time in the realm of consumer preferences regarding food industry sustainability claims. Another updated review of studies on fruit and vegetables conducted by Moser et al. (2011) yielded few instances relevant to sustainability claims. Sporleder et al. (2014) similarly found studies on consumer preferences regarding sustainable food industry products are surprisingly rare. To the authors’ knowledge, the following eight published studies have directly addressed consumer attitudes and preferences towards sustainable attributes of food in an economic framework.

The effect of attitudes and norms on preference for organic and fair trade products, described as “sustainably produced” was studied by Lehnert (2009), concluding consumers are only aware of labels (and the associated production practices) already of interest to them. Similarly, Tonsor and Shupp (2009) observed higher purchase frequency led consumers to be willing to pay higher price premiums on sustainably labeled products. Clonan et al. (2010) assessed UK consumer attitudes towards sustainably produced food using a questionnaire about previous purchases and a Likert scale ranking of preferences. Purchasing behavior recall in this study demonstrated “free range” and “local” products took precedence over other sustainability attributes. Saunders et al. (2010) used a discrete choice experiment to investigate UK consumers’ decisions to purchase sustainably labeled foods, after displaying information about reduced carbon emissions. The authors find carbon reduction appears to play a role in purchasing behavior, as respondents preferred choice alternatives with lower carbon levels. They also found consumers required relatively large improvements in the other attributes to compensate for an increase in carbon emissions. Saunders et al. (2011) continue this work in an international context, aimed at assessing other environmental and social attributes (i.e. recyclability and animal welfare).

Sackett et al. (2013) assessed U.S. consumer perceptions of sustainable agriculture attributes using a best-worst ranking methodology. Findings from that study suggested local production and “GMO-free” attributes ranked highly important among consumers, while economic variables such as food prices and financial stability of the farm ranked low in terms of importance to a sustainable label. Dowd and Burke (2013) used the Theory of Planned Behaviour (TPB) to develop an online questionnaire of U.S. consumers to explore intentions to purchase sustainably sourced food. They found only health and ethical values significantly predicted intention to purchase sustainably sourced food. Most closely related to the study presented here, Sporleder et al. (2014) examined German consumer preferences concerning sustainably produced bananas in relation to indexed perceptions of price orientation, quality orientation, and trust in the certifying organization along with measured attitudes towards “green”, fair trade, and carbon neutral products. Results indicated trepidation on behalf of the consumer in accepting a sustainable label encompassing organic, fair trade, and carbon neutral attributes. Results, however, did confirm trust in the standard setter played a particularly important role for the choice of a label. The primary difference in this study lies in the separation of label and certification attributes, whereas in the aforementioned study these were combined.

Labels are just one form of regulation used to improve the performance of markets with asymmetric information (Caswell and Padberg 1992). The information asymmetries present

in markets for credence goods have led economists to conclude these markets should have well-defined and verifiable standards (Caswell and Mojdzuska 1996). From the producer's perspective, it is widely accepted in trade literature that credence goods should carry a certification if the benefits of regulation exceed the costs (Golan, et. al., 2001; McCluskey, 2000). It has also been shown when certification standards do not align with producer's preference for quality it reduces the net benefits enough to outweigh the price premium captured by certified products (Roe and Sheldon 2007; Holland 2015). Additionally, Holland (2015) finds the degree to which a consumer trusts the certification standard governing a credence good has important effects on certification-based labeling regulation.

Eberle et al. (2011) found label credibility and general acceptance to be greatly influenced by consumer preferences for label design and information. In combination with the design and format of the information given, perceived credibility and trust in the standard setter (or certifier) is a factor in purchase decisions and is one of the most important dimensions explaining its success in the market (Hobbset al. 2010; Teisel et al. 2002). Certification labeling decisions have been mostly addressed in regards to organic agricultural standards (Giannakas 2002; Ward, Hunnicutt, and Keith 2004). In the context of sustainability, Lehnert (2009) found consumers with a high degree of trust in organic and fair trade certification labels have greater preference for products with sustainable production attributes. Likewise, mistrust in certification has been found to reduce preference (Roehr et al. 2005). Further, Jensen and Sandoe (2012), as well as Sirieix et al. (2011) find certifications related to sustainable agriculture awarded by independent organizations were evaluated more positively than those administered by food producers or distributors in the European food market.

The existence of a USDA-endorsed certification for organic agricultural production in the United States suggests certification criteria contribute to the differentiability of value-added food labels. Thus, a question arises about the impact of a hypothetical USDA-endorsed certification for sustainable agricultural production on purchasing behavior. If information about certification criteria is successful in decreasing uncertainty over choice, it could be used towards better market differentiation between sustainable and organic principles. Additionally, willingness to pay estimates on products with varying degrees of certification can provide insight into the value trade-offs perceived between current eco-labeling schemes, and the potential for differentiating "sustainably produced" products from their "organic" and "local" counterparts.

Using data from a discrete choice experiment embedded in a national online survey, this article aims to assess the effect of varying levels of certification on consumer preferences for sustainably labeled food products in three phases of analysis. Specifically, this study seeks to answer the following research questions:

- Does detailed information provision about certification standards increase the likelihood consumers will purchase sustainably labeled food products?
- When faced with competing eco-labels (i.e. sustainable, organic, and local) do consumers have a preference for USDA, private third party, or farm-level certification claims?
- Do consumers perceive a value differentiation between the existing USDA organic product and the hypothetical USDA certified sustainable product?
- How much are consumers willing to pay (in price premiums) for sustainably labeled food products relative to their organic and local counterparts?

2. Research Methodology

Discrete Choice Experiments

Discrete choice experiments arose from conjoint analysis, but differ in the choice task to be completed. Unlike conjoint analysis, which utilizes scaled ranking or rating systems, choice experiments more closely mirror real shopping environments where products are differentiable based on a set of varying attribute levels. Choice experiments are compatible with random utility theory and are thus useful for determining the share of preference a given attribute has in a particular market. Hypothetical choice experiments provide a richer description of the attribute trade-offs consumers are willing to make, than more traditionally used contingent valuation methods.

In a discrete choice modeling framework, all respondents are assumed to be utility maximizers, facing a choice among competing alternatives that return different levels of utility. The analyst cannot directly observe respondent utility, but can observe attributes about the competing alternatives. The present choice experiment was constructed from alternative bundles of three attributes (label, certification, and price) with varying levels.

In the past, choice experiments have been used successfully by economists to measure the effect of environmental improvements and the value of quality differentiation (Boxall and Adamowicz_1998). Economists have also employed choice experiments to value other eco-labels such as local, organic and natural as well as more tangible values in the realm of food nutrition and safety such as traceability, animal welfare and genetic modification. These studies generally show, on average, consumers are willing to pay positive price premiums for food produced outside of the conventional agricultural model. See Lusk, Norwood and Pruitt (2006), Liljenstolpe (2010), and Onozaka and Thilmany-McFadden (2011) for an extensive list of examples.

Alternative Specific Design

This study utilized an alternative specific design to capture labeling scheme tradeoffs. In an alternative specific design, each choice scenario presents all (three) level alternatives of a given attribute (Label) while allowing the remaining attributes to vary across all levels. Respondents were faced with a set of choice scenarios in which they were asked to choose between the three labeled food products (sustainable, organic, and local) and the unlabeled product. In each choice scenario, the three labeled products varied in certification and all products varied in price. Additionally, each choice scenario presented the option of not buying any of the products presented. By allowing respondents the choice not to purchase any option in each choice scenario, the assumption of market participation is removed, reducing potentially “forced” choices.

Choice Attributes and Levels

The label attribute took four levels: sustainable, organic, local, or unlabeled. Each label was defined for the consumer preceding the choice experiment describing the type of agricultural system within which the food was produced. Sporleder et al. (2014) define “sustainable” as a combination of (organic + fair trade + carbon neutral). In contrast to Sporleder et al. (2014), organic production attributes were not imposed as a subset of sustainable production practices in the label descriptions provided to participants in this study. The certification attribute took one of three levels: USDA, private third party or self. The unlabeled product was reported to have no certification. All certifications referred to verification of all processes used in production and claims made by an accompanying

labeling scheme. Private third party certification was described to the consumer as verified by an independent entity unrelated to the farm of origin or retailer of the product. “self” certification was defined for the consumer to describe labeling claims made by the farmer producing the food. The price attribute took one of three discrete levels: (0.99/lb, 1.49/lb, or 1.99/lb) for apples and (5.99/lb, 8.99/lb, or 11.99/lb) for ribeye steak, as determined by U.S. national market trends at the time of survey design, provided by the USDA Agricultural Marketing Service (Table 1).

It should be noted the choice experiment task was hypothetical in nature and consumers were asked to consider products labeled as sustainable or local carrying a USDA certification, although these certifications were not available in existing markets. Inclusion of these hypothetical products allows for investigation into consumer valuation of a USDA-backed certification of sustainable or local labels for future policy prescriptions implicated by this work.

Table 1. Choice Experiment Attributes and Levels

Attribute	Levels
Label	Sustainable Organic Local No Label
Certification	USDA Private Third Party Self
Product Specific Prices	
Price (Apple)	\$0.99/lb \$1.49/lb \$1.99/lb
Price (Steak)	\$5.99/lb \$8.99/lb \$11.99/lb

To maintain orthogonality and independence across the choice experiment, a main effects orthogonal experimental design was employed. In a main effects orthogonal design, a subset of the full factorial design is selected such that all linearly additive utility terms are identifiable. Specifically, the ORTHOPLAN procedure in SPSS Conjoint identified an orthogonal design based on two attributes (price and certification), each with three levels, yielding a choice set of eighteen alternatives. For the sake of brevity, and to lower the complexity of the overall task, the respondents were randomly assigned to answer one of two blocks of nine questions. The order of the alternatives in each choice set was randomized to mitigate any ordering bias and no pictures were used in the survey. An example of a choice faced by apple survey respondents follows (Table 2).

Table 2. Choice Experiment Example

Label	Sustainable	Organic	Local	No Label	I choose not to purchase any of these options.
Certification	Private 3 rd Party	USDA	None		
Price	\$1.49/lb	\$1.99/lb	\$0.1.49/lb	\$0.99/lb	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Data Collection

The data used for this analysis were gathered in a 2010 U.S. national web-based survey of 1002 primary household shoppers. Respondents were recruited using Decipher, a marketing research and survey software firm. Two survey versions were developed; one for apples and one for steak (ribeye). Respondents were randomly assigned to complete only one product version of the survey. Data from vegetarian participants randomly assigned to the steak survey were removed before analysis. The choice experiment portion of the survey was preceded by questions about perceived importance of varying sustainable farming attributes using a best-worst framework (Flynn et al. 2007), as well as several Likert scale ranking tasks assessing previous knowledge of agricultural production system characteristics and food consumption history.

Table 3. Demographic Variables and Summary Statistics

Variable	Variable Description	Apple	Steak
Gender	% Male	51%	48%
	Total Participants	500	502
Age	Average Age in Years	51.48	50.92
Adults	# Adults in Household	2.06	2.05
Children	# Children in Household	0.48	0.51
Meals	# Meals with Product/Week	6.64	3.19
Shop	% Total Shopping at Location		
	Grocery Store	81.97	81.16
	Health Food Store	8.49	9.20
	Food Co-op	2.05	1.90
	Convenience Store	3.0	4.42
	Farmer’s Market	3.72	5.24
	Butcher	4.38	2.92
Assistance	On Food Assistance	13.2 %	11.95%
Education	Highest Level Completed		
	Did not graduate high school	2.2%	2.6%
	Graduates high school, no college	17.8%	18.1%
	Attended college, no degree	28.8%	33.7%
	Associate’s or Trade degree earned	15.4%	12.6%
	Bachelor’s degree earned	24.6%	22.5%
Household Income	Graduate or advanced degree earned	11.2%	10.5%
	Range of Pre-tax Income per Year		
	Less than \$20,000	20.8%	19.1%
	\$20,000 - \$39,999	26.4%	28.9%
	\$40,000 - \$59,999	18.4%	21.5%
	\$60,000 - \$79,999	17.6%	12.1%
	\$80,000 - \$99,999	8.2%	7.6%
	Greater than \$100,000	8.6%	10.8%

Information Treatment

Immediately prior to the hypothetical choice experiment each respondent was provided with one of two information treatments about sustainable agricultural production. Half of the respondents were randomly assigned to receive general information about sustainable agriculture from the USDA website, since there exists no current USDA-endorsed

certification scheme for sustainable practices. This information treatment outlined general principles of sustainability such as, “resource conserving”, “socially supportive”, and “economically viable”. Alternatively, the remaining half of respondents received information about sustainable agricultural practices that are components of a sustainable certification scheme from Food Alliance, a prominent third party certifier at the time of survey design. This information treatment provided eight detailed certification standards of sustainable agriculture such as energy conservation and waste recycling, reduced use of chemical inputs, and fair and ethical treatment of workers and livestock. The source of the information (USDA or Independent Third Party) was emphasized to the consumer. Full information treatments can be found in the Appendix to this work.

A summary of survey participant demographic statistics follows (Table 3). Due to the fact that primary household food shoppers were targeted, the average age is higher than that of the general population. Number of children residing in the household is also lower than that of the general population, likely due to the higher average age of the sample. Income and education are consistent with U.S. averages for this age bracket. The geographic distribution (not explicitly reported here) was representative of population density.

3. Analysis and Results

Phase 1: Information Treatment Test

Previous studies have found information provision about labeling claims increases purchase probability for value-added food products and, in general, a positive correlation between attitudes and predicted buying intention of sustainably produced products (Robinson and Smith 2002). If confusion persists in the consumer population about “sustainably produced” labeling claims, one might expect detailed information provision about the criteria for third-party certification could alter purchasing behavior by leveling information asymmetry. Moreover, existing evidence suggests the standards underlying a label are more important than the organization certifying the label (Sporleder et al. 2014). If information about certification criteria is successful in decreasing uncertainty over choice, it could be used towards better market differentiation between sustainable, organic, and local agricultural principles. To examine this, the first phase of analysis estimated the effect of information provision about detailed certification standards using a log likelihood test.

To specify the final model and determine if pooling was appropriate for the following parametric analysis, two separate multinomial logit models were estimated corresponding to each of the information treatments. The pooled data was then used to estimate the same model, where utility parameters were constrained to be equal across information treatments.

Table 4. Pooling Across Information Treatments: Apple Survey

Subsample Modeled	N	LL	p-Value
All Respondents	502	11198.3910	0.8807
USDA Information Treatment	251	-5568.8387	
Food Alliance Information Treatment	251	-5623.3510	
<i>H0: Pooling is Okay</i>			

Table 5. Pooling Across Information Treatments: Steak Survey

Subsample Modeled	N	LL	p-Value
All Respondents	500	10517.9060	0.3419
USDA Information Treatment	248	-5320.7855	
Food Alliance Information Treatment	252	-5193.1726	
<i>H0: Pooling is Okay</i>			

Comparing the two likelihood function values using the likelihood ratio test resulted with associated two-tailed p values of .88 for apples and .34 for steak (Table 4, Table 5), indicating information provision has no statistically significant effect on purchasing behavior in the discrete choice experiment, as the null hypothesis of pooling the model cannot be rejected.

Phase 2: Certification Level Effects

The results from Phase 1 suggest information about detailed certification standards fail to increase purchasing probability of sustainably labeled foods. However the rising popularity in the United States of USDA certified organic products suggests certification agency might contribute to the differentiability of value-added food labels. The next question arises about the impact of a hypothetical USDA-endorsed certification for sustainable agricultural production on purchasing behavior. The second phase of analysis estimated the marginal effect of certification level on the probability of choosing a product with a given label using logistic regression techniques.

For choice problems involving three or more alternatives, the multinomial technique is most often employed. In the multinomial framework, the data on a dependent variable can fall into one of several mutually exclusive categories. Analysis is not necessarily straightforward, as there are many different models for the probabilities of the multinomial distribution. Model selection depends on whether or not some of the individual specific regressors vary across alternatives and whether the categories are ordered or unordered (Cameron and Trivedi 2009). For the purposes of this analysis, the fit of three models were compared: the multinomial logit (MNL), the conditional logit (CL), and the random parameters logit (RPL). Using log likelihood as a measure of fit, the random parameters logit model was found to out-perform the multinomial and conditional logit models for both apple and steak samples. This result provides significant evidence of heterogeneity in consumer preferences in this sample.

In each model the dependent variable, choice, is coded as a dummy variable taking the value of 1 when the alternative was chosen and 0 otherwise. Therefore each choice scenario yielded four data observations for every respondent, corresponding to the four competing product alternatives. A dummy variable was included to indicate the no-purchase option. The independent variables reflect the attribute levels (label, certification, and price) of each product available for purchase along with a matrix of variables included to control for demographic differences. The unlabeled product variable was dropped to establish the unlabeled alternative as the baseline for comparison.

To avoid the assumption of equal marginal trade-offs, certification entered the model as an effects-coded variable. Two variables were included for certification, USDA and Private Third Party respectively. Each certification variable took a value of 1 for true and a value of

0 for false under each label alternative. Both certification variables took a value of -1 for the no purchase option. The remaining independent variables are alternative specific dummy variables corresponding to each of the three label attributes. Price was coded as a continuous variable.

An example of the data coding (Table 6) is included here for the choice experiment example outlined previously (Table 2). Assuming a participant selected the product labeled as organic in the example given, the five data observations for that single response would be coded as follows:

Table 6. Five Data Observations Per Respondent For Each Choice Scenario

Choice	Price	Private	USDA	Label S	Label O	Label L
0	1.49	1	0	1	0	0
1	1.99	0	1	0	1	0
0	1.49	0	0	0	0	1
0	0.99	0	0	0	0	0
0	0	-1	-1	-1	-1	-1

Therefore, the logistic regression to be estimated for participant i for each alternative j is as follows,

$$Choice_{ij} = \beta \text{ Price}_{ij} + \delta_1 \text{ Private}_{ij} + \delta_2 \text{ USDA}_{ij} + \gamma_1 \text{ LabelS}_{ij} + \gamma_2 \text{ LabelO}_{ij} + \gamma_3 \text{ LabelL}_{ij} + \varepsilon_{ij} \quad (4)$$

The parameter on price (β) approximates mean marginal utility of income and the parameters on each certification variable (δ_1 and δ_2) indicate the marginal (dis)utility associated with a change from USDA certification to private third party certification or self certification, respectively. The parameters on each label variable (γ_1 , γ_2 , γ_3) indicate the marginal utility gained from the labeling claim (or lack thereof) on each product relative to no-purchase.

The logistic regression results are as expected, as price coefficients are negative and significant, certification parameters are negative and significant, and label parameters are positive and significant (Table 7, Table 8).

The positive and statistically significant estimates on private third party certification and USDA certification indicate consumers receive greater utility from either of these certification schemes relative to the absence of certification, *ceteris paribus*. Accordingly, the relative magnitudes of the certification coefficients reveal product labels certified by a private third party are marginally preferred to USDA labeling, holding all other quality attributes constant, for both apple and steak samples.

Table 7. RPL Parameter Estimates: Apple Survey

Variable	RPL Coefficient
Price	-2.35*
Private	0.30*
USDA	0.11*
LabelS	3.61*
LabelO	3.75*
LabelL	3.93*
LogLikelihood	-5963.00

Note: (*) and (**) significant at 0.01 and 0.05 levels, respectively

Table 8. RPL Parameter Estimates: Steak Survey

Variable	RPL Coefficient
Price	-0.38*
Private	0.34*
USDA	0.23*
LabelS	2.97*
LabelO	2.99*
LabelL	2.99*
LogLikelihood	-5985.00

Note: (*) and (**) significant at 0.01 and 0.05 levels, respectively

Phase 3: Willingness to Pay Comparison

Phase 2 results are more easily interpretable once parameter estimates are converted into marginal effects. Since food production certification claims aim to differentiate value-added products through labeling, marginal effects estimates of value (willingness to pay) should be of particular interest to food chain managers. Willingness to pay estimates on products with varying degrees of certification can provide insight into the value trade-offs perceived between current eco-labeling schemes, and the potential for differentiating “sustainably produced” products from their “organic” and “local” counterparts. The third phase of analysis assessed value differentiation between the three eco-labels by comparing the estimated price premiums they capture in the parametric results.

From the logistic regression coefficient estimates, average willingness to pay for each label attribute, holding certification level constant across products, can be calculated as,

$$WTP(\text{Label } i) = \frac{\gamma_i}{\beta} \quad (1)$$

Similarly, average willingness to accept (due to negative sign) for each certification level relative to the absence of certification, holding label constant across products, can be calculated as,

$$WTA(\text{Certification } i) = \frac{\partial_i}{\beta} \quad (2)$$

Applying this simple welfare measurement to the RPL parameter estimates, marginal effects become directly comparable (Table 9, Table 10). However, the willingness to pay estimates calculated from the RPL parameters ignore the distribution of preferences around the mean of random parameters. To relax the strength of this assumption, simulation techniques prescribed in Tonsor et al. (2009) were followed. Specifically, the entire distribution of willingness to pay and the statistical variability in parameter estimates were considered to capture heterogeneous preferences and to empirically test the null hypothesis of equal willingness to pay across (alternative specific) labels.

A parametric bootstrapping technique proposed by Krinsky and Robb (1986) was employed to generate a distribution of 999 willingness to pay estimates from multivariate normal distributions around the coefficients from the logit model by resampling from the original sample with replacement. From this distribution, 95% confidence intervals were empirically derived. For tests at the α level or for $100(1-\alpha)\%$ confidence there are reasons for choosing the number of draws, B , such that $\alpha(B+1)$ is an integer. Therefore, this work

followed the advice of Cameron and Trivedi (2011) and used $B = 999$ for confidence intervals and hypothesis tests when $\alpha = 0.05$.

Table 9. Willingness to Pay for Label Attribute: Apple Survey

Welfare Measure	Marginal Effect	Average Total WTP (Krinsky-Robb)	95% Interval
WTP LabelS	\$0.37/lb	\$1.61/lb	(\$1.45/lb, \$1.79/lb)
WTP LabelO	\$0.43/lb	\$1.73/lb	(\$1.57/lb, \$1.93/lb)
WTP LabelL	\$0.51/lb	\$1.78/lb	(\$1.60/lb, \$1.97/lb)
WTP USDA	\$0.05/lb		
WTP Private	\$0.13/lb		

Table 10. Willingness to Pay for Label Attribute: Steak Survey

Welfare Measure	Marginal Effect	Average Total WTP (Krinsky-Robb)	95% Interval
WTP LabelS	\$2.24/lb	\$7.75/lb	(\$6.87/lb, \$8.74/lb)
WTP LabelO	\$2.29/lb	\$7.75/lb	(\$6.75/lb, \$8.32/lb)
WTP LabelL	\$2.29/lb	\$7.83/lb	(\$6.92/lb, \$8.82/lb)
WTP USDA	\$0.61/lb		
WTP Private	\$0.90/lb		

All willingness to pay estimates on labels should be interpreted relative to the unlabeled choice, after choosing to participate in the market, holding all else constant and assuming no uncertainty regarding choice. Willingness to pay on each certification level should be interpreted relative to the identically labeled, uncertified option. Accounting for heterogeneity, by employing the random parameters logit to model this data, WTP estimates for apples fall above and the WTP estimates for steaks fall below true market value for these products at 2010 price levels.

4. Discussion and Conclusions

The objectives of this paper were to employ a stated preference approach, utilizing a choice experiment framework, for measuring value associated with quality changes in sustainable agricultural production practices, and to determine if providing information about sustainable constructs and certification criteria affects purchase probability or willingness to pay. In the context of value-added production, results from previous studies suggest information provision, certification labeling, and trust in a standard setting agency contribute significantly to the differentiability of that product. Contrary to those expectations, however, this study found evidence that food production certification criteria alone have a negligible effect on purchasing behavior in the context of sustainable agricultural practices. However, consumers did exhibit different preferences for certification level (government, third party, self) when faced with choices over sustainable, organic, and local labels. Further examination into these preferences provided evidence of weak value differentiation between the three labels in terms of the price premiums they capture when holding certification level constant.

Differentiating “Sustainable” from “Organic” and “Local” ...

Phase 1: Information Treatment Test

The likelihood ratio test results imply detailed information from the USDA and Food Alliance about certification criteria had no statistically significant effect on choices made in the hypothetical choice experiment across labeling schemes. Consumers with more specific information about the production standards required for third party certification exhibited preferences similar to those receiving more general information about sustainable principles from the USDA. A control group, receiving no information, was not used. An interesting extension of this analysis could have included a third subsample, randomly assigned to receive no information, as was done in Lusk, Norwood and Pruitt (2006). The insignificance of the information treatment may be due to competing preconceptions about sustainability attributes, or it may be the persistence of general confusion over how these sustainable principles are implemented in practice.

Phase 2: Certification Level Effects

The positive and statistically significant estimates on certification confirm higher preference for private third party and USDA certification relative to none (or farm-level claims). This consumer sample indicated receiving less utility from governmental certification claims, holding label constant. Interestingly, the relative magnitudes of the certification coefficients reveal preference for food labels certified by third party labels, holding all other quality attributes constant, for both apple and steak samples.

These results may allude to general mistrust in government certification consistent with the findings of Hobbs et al. (2010) concluding that perceived credibility and trust in the standard setter (or certifier) is a factor in purchase decisions and is one of the most important dimensions explaining its success in the market. Additionally, preference for private third party certification claims is consistent with the findings of Jensen and Sandoe (2012), as well as Sirieix et al. (2011) who found certifications related to sustainable agriculture awarded by independent organizations were evaluated more positively than those administered by food producers or distributors in the European food market. This comparison between American and European consumer preferences is worth investigating further and should be considered carefully by managers working across both markets.

Phase 3: Willingness to Pay Comparison

The positive willingness to pay estimates on all labels implies all of the products individually are preferred to the unlabeled product. In both product versions of the survey, willingness to pay welfare measurements are close in magnitude, making it difficult to discern a true preference ordering for sustainable, organic, and local products. Replication of this experiment with a new sample could easily lead to a reversal of the preference ordering for these three label attributes.

The bootstrapped estimates of marginal effects revealed the 95% confidence intervals on all three credence labeling claims overlap for both apple and steak survey respondents. This result indicates consumers do not differentiate value-added between sustainable, organic, and local labels in a statistically significant way when certification level is held constant. However, because none of the three credence labeling attribute intervals overlap with the unlabeled product interval it can be concluded each of the credence labels individually is successfully differentiated from the unlabeled product. Additional work should be done to

replicate these premium estimates, as they are integral to the manager's decision to pursue certification of sustainable products.

5. Future Research

Results support previous studies of food attribute valuation (Bond et al. 2008, Lusk and Briggeman 2009) providing significant evidence of consumer heterogeneity in this sample and demonstrating positive price premiums can be captured by sustainably produced labeling claims, relative to similar unlabeled and conventionally produced food products. However, the price premiums calculated here reveal there is a comparable tradeoff in quality associated between local, organic and sustainably labeled food products. Furthermore, detailed information about sustainable certification guidelines had no significant impact on choosing the sustainably labeled products. Thus, the results suggest consumer demand for sustainably produced food may not be distinctly differentiable from its local and organic counterparts when certification level is unchanged. Addressing the specific question regarding the impact of a hypothetical USDA-backed certification of sustainable production attributes, this study finds the hypothetical USDA certified sustainable product and the existing USDA certified organic product do not capture significantly different premiums in this national sample. Abrams et al. (2010) found similar results when evaluating perceptions of "all natural" claims against organic. However, results do provide evidence that USDA certification itself can capture small price premiums uncertified products across all three eco-labels.

For managers considering the profitability of pursuing different labeling claims, this work arrives at the following conclusions:

- Providing the consumer with detailed information about certification standards has a negligible effect on purchasing behavior.
- American consumers prefer third party certification to USDA certification on sustainable, organic, and local foods, similar to what has been previously found in European markets.
- American consumers perceive little value differentiation between sustainable, organic, and local food products when the certifying agent is held constant.

The strengths of this study include the size and representativeness of the national sample, as well as the inclusion of three independent labels (in contrast to previous studies conflating organic and sustainable principles). Overall, these findings suggest profitable marketing opportunities may exist for firms interested in selling sustainably produced food products, however there needs to be considerable effort put into leveling information asymmetries about product quality if sustainable label claims are to be differentiated from the local food movement or more recognizable organic principles.

References

- Adamowicz, W., Boxall, R., Williams, M., & Louviere, J., (1998). Stated preference approaches for measuring passive use values: Choice experiments and contingent valuation. *American Journal of Agricultural Economics* 80, 64-75.
- Boxall, P. & Adamowicz, W., (2008). Understanding heterogeneous preferences in random utility models: A latent class approach. *Environmental and Resource Economics* 23, 421-446.
- Cameron, A.C. & P. K. Trivedi (2005). "Microeconometrics: Methods and Applications," Cambridge University Press, New York.
- Caswell, J. & D. Padberg. (1992). "Toward a More Comprehensive Theory of Food Labels." *American Journal of Agricultural Economics*, 74, 460-468.

- Caswell, J. & E. Mojduszka. (1996). “Using Informational Labeling to Influence the Market for Quality in Food Products.” *American Journal of Agricultural Economics*, 78, 1248-1253.
- Clonan, A., Holdsworth, M., Swift, J., & Wilson, P., (2010). UK consumers priorities for sustainable food purchases. Proceedings of the 84th Annual Conference of the Agricultural Economics Society, (2010). Edinburgh, Scotland. Available at <http://purl.umh.edu/91948>.
- Eberle, U.; Spiller, A.; Becker, T.; Heißenhuber, A.; Leonhäuser, I.-U. & Sundrum, A. (2011). Politikstrategie Food Labelling. Gemeinsame Stellungnahme der Wissenschaftlichen Beiräte für Verbraucher- und Ernährungspolitik und Agrarpolitik beim BMELV, Berlin 2011.
- Flynn, T.N., J.J. Louviere, T.J. Peters, & J. Coast. (2007). “Best-worst Scaling: What It Can Do for Health Care Research and How to Do It.” *Journal of Health Economics* 26:171–189.
- Giannakas, K. (2002). “Information Asymmetries and Consumption Decisions in Organic Food Product Markets.” *Canadian Journal of Agricultural Economics*, 50: 35-50.
- Golan, E., F. Kuchler & L. Mitchell. (2001). “Economics of Food Labeling.” Economic Research Service, U.S. Dept. of Agriculture, Agriculture Economic Report No. 793.
- Hobbs, J. E. (2010). Public and private standards for food safety and quality: international trade implications. *The Estey Centre Journal of International Law and Trade Policy* 11 (1): 136-152.
- Holland, S. (2015). “Lending Credence: Motivation, Trust and Organic Certification” Presented at Agricultural & Applied Economics Association and Western Agricultural Economics Association Annual Meeting, San Francisco, CA, Available at <http://purl.umh.edu/205192>.
- Jensen, K. K. & P. Sandoe. (2002). Food safety and ethics: The interplay between science and values. *Journal of Agricultural and Environmental Ethics* 15 (3): 245-253.
- Krinsky, I & A. L. Robb. (1986). On Approximating the Statistical Properties of Elasticities. *Review of Economic and Statistics* 68: 715-719.
- Lehnert, M. (2009). Praeferenzanalyse ethischer Produkte: Eine verhaltenswissenschaftliche Analyse am Beispiel von Bio und Fairtrade. Hamburg: Dr. Kovac.
- Liljenstolpe, C. (2010). Demand for value-added pork in Sweden: A latent class model approach. *Agribusiness* 27, 129-146.
- Lusk, J.L. & Briggeman, B., (2009). Food values. *American Journal of Agricultural Economics* 91, 1-13.
- Lusk, J.L., Norwood, F.B. & Pruitt, J.R. (2006). Consumer demand for a ban on antibiotic drug use in pork production. *American Journal of Agricultural Economics* 88, 1015-103
- McCluskey, J. (2000). “A Game Theoretic Approach to Organic Foods: An Analysis of Asymmetric Information and Policy.” *Agricultural and Resource Economics Review* 29: 1-9.
- Moser, R., R. Raffaelli & D. Thilmany-McFadden. (2011). Consumer preferences for fruit and vegetables with credence-based attributes: a review. *International Food and Agribusiness Management Review* 14 (2): 121-142.
- Onozaka, Y. & Thilmany-McFadden, D. (2011). Does local labeling complement or compete with other sustainable labels? A conjoint analysis of direct and joint values for fresh produce claims. *American Journal of Agricultural Economics* 93, 693-706.
- Roe & Sheldon. (2007). “Credence Good Labeling: The Efficiency and Distributional Implications of Several Policy Approaches.” *American Journal of Agricultural Economics*, 89(4): 1020-1033.
- Roehr, A., K. Lueddecke, S. Drusch, M. Mueller & R. Alvensleben. (2005). Food quality and safety: Consumer perception and public health concern. *Food Control* 16 (8): 649-655.

- Sackett, H. , Shupp, R. & Tonsor, G. T., (2013). Consumer Perceptions of Sustainable Farming Practices: A Best-Worst Scenario. *Agricultural and Resource Economics Review* 42 (2) 275-290.
- Saunders, C. et al. (2010). Consumer attitudes towards sustainability attributes on food labels. Presented paper at the New Zealand Agricultural and Resource Economics Society.
- Saunders, C., M. Guenther, P. Tait, W. Kaye-Blake, J. Saunders & S. Miller. (2011). Consumer attitudes towards sustainability attributes on food labels in the UK and Japan. 85th Annual Conference of the Agricultural Economics Society: 1-16.
- Sirieux, L., M. Delanchy, H. Remaud & L. Zepeda. (2011). How do consumers react in front of individual and combined sustainable food labels? A UK focus group study. Working paper UMR MOISA.
- Sporleder, E. et.al., (2014). Consumer Preferences for Sustainably Produced Bananas: A Discrete Choice Experiment. *International Food and Agribusiness Management Review* 17(1), 59 -82.
- Tanner, C. & S. Woelfing Kast. (2003). Promoting sustainable consumption: determinants of green purchases by Swiss consumers. *Psychology & Marketing* 20 (10): 883-902.
- Tonsor, G., & Shupp, R., (2009). Valuations of 'sustainably produced' labels on steak, tomato, and apple products. *Agricultural and Resource Economics Review* 38, 371-383.
- Teisl, M. F., N. E. Bockstael & A. S. Levy.(1997). Preferences for food labels: a discrete choice approach. In *Strategy and Policy in the Food System: Emerging Issues*, edited by J. A. Caswell and R. W. Cotterill, 171-194. Food Marketing Policy Center, University of Connecticut.
- Tonsor, G.T., & Shupp R. S. (2011). Cheap talk scripts and online choice experiments: looking beyond the mean. *American Journal of Agricultural Economics* 93, 1015-1031.
- Ward, R., L. Hunnicutt & J. Keith. (2004). "If You Can't Trust the Farmer, Who Can You Trust? The Effect of Certification Types on Purchases of Organic Produce." *International Food and Agribusiness Management Review*, 7(1): 60-77.