Consumer Beliefs, Knowledge, and Willingness-to-Pay for Sustainability-Related Poultry Production Practices
Broiler Survey Report

Prepared for the Food Marketing Institute Foundation, Animal Agriculture Alliance, and the Foundation for Food and Agriculture Research

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EXECUTIVE SUMMARY

The overriding purpose of this project is to determine the market potential and consumer willingness-to-pay for chicken breast with different labels, with primary focus on slow growth labels. In November 2017, a national survey of over 2,000 U.S. chicken consumers was conducted. This survey provides a host of information on consumer preferences for chicken. A choice experiment, which simulates retail purchases, was included to compare slow growth chicken breast demand for consumers exposed to different types of information and who made choices in the presence or absence of brands. The core findings of this study are as follows.

- Willingness-to-pay for slow growth chicken, and importance of the attribute in consumer choice, is sensitive to the information provided and is generally lower in importance than other labels, except when consumers are provided pro slow growth information.
- Knowledge of slow-growth chicken is low. Only 1.2% of respondents report having previously purchased slow growth chicken, and only 12% and 17% agree with the statements "I am very knowledgeable of slow growth chickens" and "I have seen slow growth chicken for sale in my grocery store." Without pro slow growth information, consumers do not generally associate slow growth with high animal welfare. Only about 16% of respondents believe chicken breasts are currently too large.
- The presence of brands significantly lowered demand for label claims such as organic, non-GMO, and no antibiotics, suggesting brands partially serve as substitutes for these labels. Demand for slow growth labels was not much affected by presence of brands.
- If presented with a pair-wise choice between slow growth chicken priced at a $0.50/lb premium and an unlabeled chicken breast, slow growth is projected to be chosen by 45%, 54%, and 41% of respondents in the no added information, pro slow growth, and anti slow growth information conditions, respectively when no brands are present. With brands, the respective slow growth choice probabilities are 49%, 54%, and 39%.
- The most important attributes, in terms of the ability to move market share, in the no added information, no brand condition are price and the presence/absence of organic, non-GMO, and no added hormone labels. The two least important labels in this condition were slow growth and no antibiotics ever. When brands were present, the only label to increase in importance was an antibiotic absence label.
- There are multiple market segments consisting of consumers with distinct preferences for chicken breast attributes; depending on the treatment in question, 30% to 40% of consumers are insensitive to price changes. Consumer demographics are not predictive of willingness to pay premiums for slow growth labels. Only when pro slow growth information is provided do consumer's relative preferences for novelty, animal welfare, and naturalness correlate with willingness-to-pay premiums for slow growth.

Overall the results suggest uncertainty about the future market potential for slow growth chicken. At present, most consumers are unfamiliar with broiler production in general and with slow growth chicken in particular. Marketing campaigns to promote the label could enhance demand for the characteristics, but opposition information could have the opposite result.

CHAPTER 1: INTRODUCTION

There is increased pressure on food retailers to offer consumers alternatives that are perceived higher in animal welfare and sustainability. However, such meat options have higher production costs. Whether higher costs can be offset by consumer willingness-to-pay (WTP) is uncertain.

This is particularly true for a relatively new attribute – slow growth chicken. Genetic improvements have allowed poultry producers to rear broilers faster and to heavier weights than was possible in previous decades, with the result being more affordable chicken for consumers. However, some research has suggested that rapid growth may result in broilers that suffer from leg pain and damage, particularly breeder chickens (e.g., Sanotra, 2001). These ideas have recently gained traction in popular media and have led to calls for older heritage breeds of chickens, or newer slower growing chickens, that are argued to be associated with improved taste and higher broiler welfare (Charles, 2016; Strom, 2017), although some scientific research suggest little to no relationship between days of growth and consumer sensory evaluations of chicken (Fanatico et al., 2007).

The main objectives of this research are to determine consumers': 1) knowledge and beliefs about slow growth chicken, 2) demand for slow growth chicken breasts relative to other attributes that may be of importance, and 3) responsiveness of demand for slow growth to information and presence of common chicken brands.

Because this is a relatively novel attribute, grocery store scanner data are unable to yield information on consumer demand for slow growth chicken. Existing scanner data pertains to only a subset of un-representative consumers, and the slow-growth attribute is bundled with many other labels that make identification of the label's effect difficult. In addition, there is scant survey data on the subject. The only prior study on the topic was a survey conducted with Swedish consumers in 2004 (Carlsson et al. 2007). That study found consumer WTP for slow growth broilers was lower than the other chicken attributes considered (use of GMO feed, distance of transportation to slaughter, and outdoor access).

A downside of surveys is that consumers do not always shop in ways that are consistent with their survey answers. People tend to over-state the amount they say they are willing to pay on surveys relative to what they will do when money is on the line (Murphy et al., 2005). Nonetheless, research also shows that certain types of questioning techniques – in particular the so-called choice experiment (CE) method which forces a trade-off choice in a simulated retail choice environment – can produce WTP estimates that are not statistically different than from real-money purchases (Lusk and Schroeder, 2004). Other studies have found that CEs can generate market share predictions that are highly predictive of actual market shares revealed in scanner data (e.g., Brooks and Lusk, 2010; Chang, Norwood, and Lusk, 2009). Coupling the CE method with requests to consumers to answer honestly (i.e., using so-called "cheap talk"), can produce more reliable estimates (Tonsor and Shupp, 2011). This research brings to bear state-of-the-art choice experiments and latent class modeling to estimate heterogeneity in consumer preferences for egg labels and characteristics, which are then used to estimate willingness-to-pay (WTP) and market shares for slow growth chicken.

CHAPTER 2: METHODS AND PROCEDURES

- Survey Overview

A national survey of chicken consumers was conducted. The survey was programmed by the project director, delivered to an online panel maintained by Survey Sampling, International, and fielded in November 2017. An initial screener question asked "Do you eat chicken (e.g., breasts, thighs, wings, nuggets, tenders)?" Ninety-seven percent of respondents said "yes", and 3% who did not were immediately directed to the end of the survey and were excluded from analysis.

In total, 2,049 completed responses were obtained. At the conclusion of the survey, respondents answered demographic questions. Table 1 summarizes the characteristics of the sample. Overall, the sample demographic characteristics are similar to U.S. Census population data with a few exceptions. Our sample is slightly younger and contains fewer households in the highest income category of $160,000/year or more than is in the U.S population.

Of greater interest is whether the sample is representative of U.S. chicken consumers. Unfortunately, there is no census-level data on the characteristics of chicken consumers. However, the sample can be weighted according to the stated volume of eggs purchased by each respondent. As shown in table 1, such weighting had relatively minor effects on sample characteristics. The most notable changes were pulling up the share of consumers in the South, mean household size, and percentage of households with children (implying households that consume more chicken are more likely to live in the South, have more members in the household, and are more likely to have children).

The sensitivity of the main results to different weighting schemes was explored (see appendix table A2). Also explored was sensitivity to several tests for response reliability. In particular, toward the end of the survey, a "trap" question was included in a list asked people to check "somewhat disagree" if they were reading the question. About one fifth of the sample missed this trap question. However, as shown in the appendix, removing such individuals from the sample had minimal impacts on the results. As a result of these sensitivity checks, the choice was made to report the main results including all respondents who ate chicken without any special weighting. However, as will be described later in this section, an alternative method is used to control for individual who may have answered the choice questions randomly.

Table 1. Characteristics of Broiler Survey Sample

Characteristic	All Respondents Unweighted (N=2,049)	All Respondents Weighted by Chicken Purchase Volume (N=2,049)	U.S. Census Data
Resides in Northeast Census Region	18.5%	19.1%	17.5%
Resides in Midwest Census Region	21.9%	20.1%	21.1%
Resides in South Census Region	36.1%	40.0%	37.7%
Resides in West Census Region	21.5%	19.1%	23.7%
Female	54.2%	56.4%	51.4%
Age 18–24 years	17.2%	18.3%	12.9%
Age 25–34 years	19.7%	22.9%	17.6%
Age 35–44 years	17.7%	21.1%	17.0%
Age 45–54 years	17.4%	17.9%	18.4%
Age 55–64 years	14.0%	10.6%	16.1%
Age 65–74 years	10.0%	6.5%	10.0%
Age 75 or older	2.0%	1.1%	8.0%
Married	52.6%	55.1%	n/a
% of Grocery Shopping for Household	84.2%	85.68%	n/a
Mean Household Size (# people)	2.77	3.03	2.58
Children under 12 in Household	31.9%	42.5%	33.4%
SNAP (foodstamp) Participant	17.86%	20.08%	16.4%[a]
Collee Degree	33.3%	31.8%	29.3%
Income less than $20K	15.4%	15.2%	15.8%
Income $20K–$39K	20.5%	21.0%	18.9%
Income $40K–$59K	17.7%	19.1%	15.8%
Income $60K–$79K	15.0%	14.7%	12.4%
Income $80K–$99K	9.6%	9.1%	9.3%
Income $100K–$119K	6.9%	6.4%	7.1%
Income $120K–$139K	3.6%	3.1%	5.1%
Income $140K–$159K	4.3%	4.7%	3.8%
Income $160K or higher	5.0%	5.1%	11.7%
Hispanic[b]	14.7%	17.8%	16.9%
White	75.9%	72.5%	73.8%
Black or African American	12.2%	13.6%	12.6%

[a]Figure reported is household participation as reported by the USDA divided by number of US households.
[b]Following the Census Bureau, Hispanic origin is asked separate from other race questions; as a result, the percent indicating Hispanic, White, and Black sum to more than 100%.

- Choice Experiment Design

To estimate consumer demand for chicken labels, a choice experiment (CE) was created where participants made repeated choices between two packages of chicken breast and a "none of these" option. The CE method developed out of the conjoint analysis literature, with a focus to utilize questioning frameworks consistent with economic theory and were more similar to the sorts of decisions consumers make when actually shopping (see Louviere, Hensher, and Swait, 2000 for a dated but compressive treatment of the method).

The first step in the analysis is to identify the attributes of interest. Given the focus of this study, price and the presence/absence of a slow growth label were prerequisites. However, it is important to place these attributes in the context of other egg labels and attributes that also influence consumer choice. After consulting several supermarkets, prior studies, and scanner data, the following list of six attributes was selected for inclusion in the choice experiment: price, and the presence/absence of the following labels: organic, no antibiotics – ever, no hormones added, and non GMO. Because there is no commonly used slow growth chicken label, one was created by the investigator for use in this survey.

In addition, in some treatments, we also include brands because this is a common feature of the retail choice environment. However, there was some concern that the presence of brands might dominate consumer choice, and as such we conduct two different CEs, one that includes brands and one that does not.

To determine the range of chicken prices to utilize in the CE, price data from the US Bureau of Labor Statistics was consulted. The investigator also visited numerous supermarkets to determine typical premiums charged for organic chicken. Given this backdrop, the experiment design considered prices ranging from \$1.99 to \$5.99 in \$0.50 increments.

Even if price were varied at only two levels and there were no brands, there are $2^6 = 64$ different chicken breast packages that could be constructed based on variations in the six attributes (128 options if two brands are considered). To reduce the possibilities, an experimental design was constructed to minimize the standard errors of a multinomial logit choice model (i.e., to extract as much information as possible about consumer preferences while only asking consumers a reasonable small number of choices). The resulting design consisted of 12 choice questions.[1] Thus, each person answered 12 discrete choice questions regarding which carton of eggs they would buy. Table 2 lists the egg characteristics of the two options used in all 12 choice questions (the order of questions was randomized across respondents). As previously indicated, some consumers were not shown brands, and in these cases, the design was exactly the same except brands were not shown.

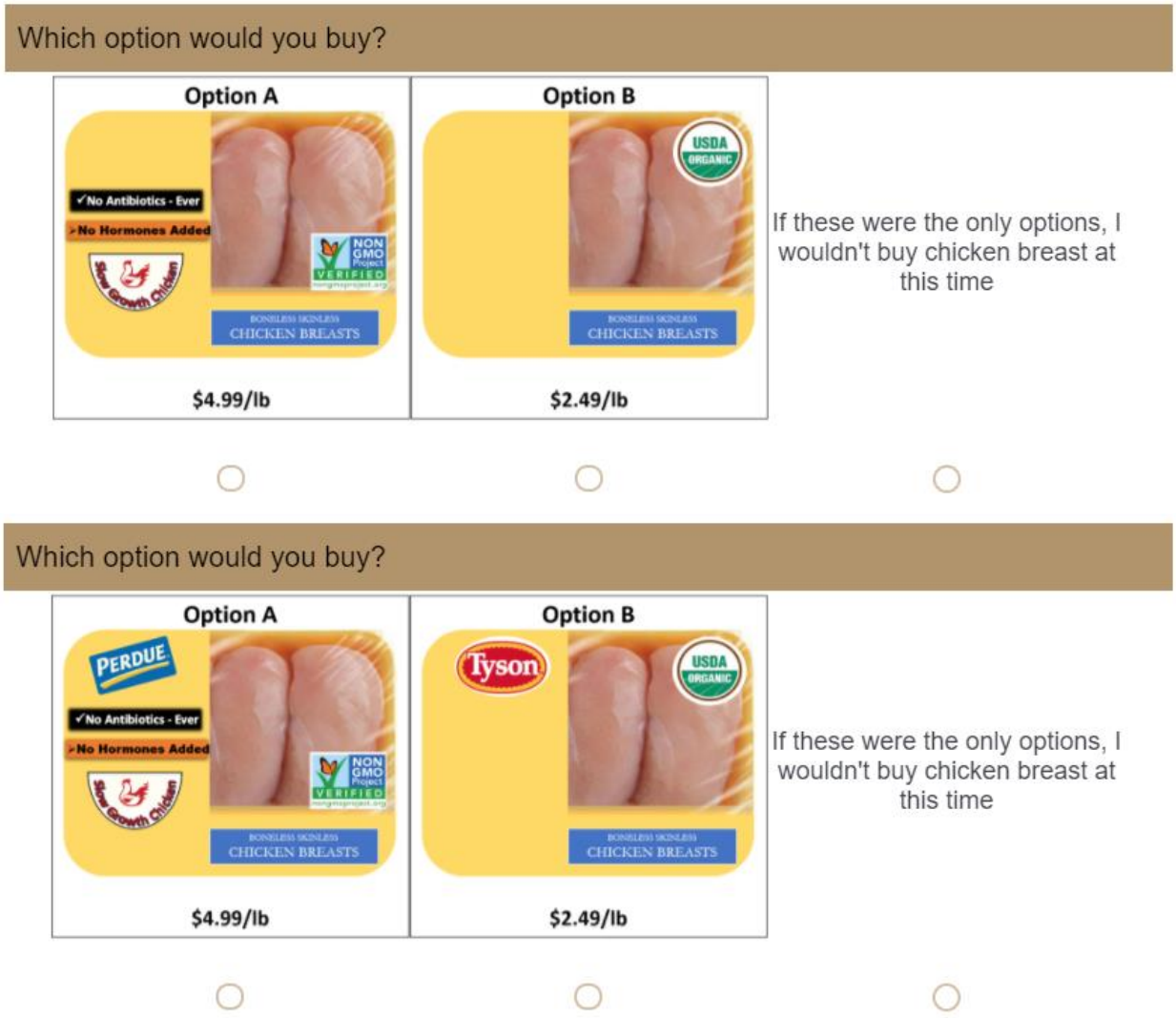
[1]The experiment was designed with the software Ngene. The D-optimal experimental design that minimizes the standard errors of the conditional logit depends on the true parameter values, which were assumed to be as follows for the design stage: Price (-0.5), Brand (0), organic (0.5), no antibiotics (0.2), no hormones (0.2), slow growth (0.2), non-GMO (0.3). The resulting design shown in table 2 has a D-error of 0.47, A-error of 0.53, and S-estimate of 55.

Table 2. Twelve Choice Experiment Questions Used in Study

	Option A							Option B						
Choice	Price	Brand	Organic	No Antiobiotics	No Hormones	Slow Growth	Non GMO	Price	Brand	Organic	No Antiobiotics	No Hormones	Slow Growth	Non GMO
1	$4.49	Perdue	-	✓	✓	✓	✓	$2.49	Tyson	✓	-	-	-	-
2	$1.99	Perdue	-	-	-	-	-	$4.99	Tyson	✓	✓	✓	✓	✓
3	$4.99	Perdue	✓	✓	-	-	✓	$1.99	Tyson	-	-	✓	✓	-
4	$2.49	Perdue	✓	-	✓	✓	✓	$3.49	Tyson	-	✓	-	-	-
5	$2.99	Tyson	-	-	✓	-	✓	$2.49	Perdue	✓	✓	-	✓	-
6	$2.49	Tyson	-	✓	-	✓	✓	$3.99	Perdue	✓	-	✓	-	-
7	$2.99	Perdue	-	-	-	✓	-	$2.99	Tyson	✓	✓	✓	-	✓
8	$3.49	Perdue	✓	✓	✓	-	-	$2.99	Tyson	-	-	-	✓	✓
9	$1.99	Tyson	-	✓	✓	-	-	$4.49	Perdue	✓	-	-	✓	✓
10	$5.99	Tyson	✓	✓	-	✓	-	$5.99	Perdue	-	-	✓	-	✓
11	$5.49	Tyson	✓	-	-	-	✓	$5.49	Perdue	-	✓	✓	✓	-
12	$3.99	Tyson	✓	-	✓	✓	-	$1.99	Perdue	-	✓	-	-	✓

Rather than simply presenting consumers with text descriptions, to increase realism and external validity, the choices were presented utilizing images of eggs, cartons, and labels. Figure 1 shows a screenshot of one of the choice experiment questions presented to respondents in the brand and no brand conditions (the questions in figure 1 correspond to the first choice shown in table 2).

Figure 1. Example Choice Experiment Questions in the No Brand and Brand Conditions



To analyze the effect of brand and information on consumer choice, respondents were randomly assigned to one of the four information treatments shown in table 3. Treatments 1 and 2 are the control and respondents were not provided any additional information. Treatments 3 and 4 showed excerpts of articles from National Public Radio (NPR) and the New York Times (NYT) that were highly favorable toward slow growth chicken (and are thus referred to as pro slow growth). Treatments 5 and 6 showed a graphic created by the National Chicken Council (NCC) that was critical of slow growth chicken. The goal was to present respondents with alternative types of objective information that might be encountered in daily life.

Table 3. Treatments

Treatment	Information	Brands?	N obs
1	No added information control	No	335
2	No added information control	Yes	357
3	NPR & NYT articles (pro slow growth)	No	347
4	NPR & NYT articles (pro slow growth)	Yes	328
5	National Chicken Council (anti slow growth)	No	342
6	National Chicken Council (anti slow growth)	Yes	339

Treatments 1 and 2 – No Information Control

Treatment 1 is the control in which there was no added information provided about slow growth chicken. Consumers utilized whatever beliefs they brought into the survey just as they would when entering a grocery store. Just prior to answering the choice questions, the following text was displayed:

> "Now, imagine you are shopping at your local grocery store.
>
> In what follows, we will ask you 12 different choice questions that are all similar to each other except for the characteristics and prices charged for a package of boneless skinless chicken breasts. The options are the same weight but they differ in terms of the price (ranging from $1.99/lb to $5.99/lb) and the presence or absence of several labels (organic, no antibiotics, no added growth hormones, non-GMO, and/or slow growth).
>
> For each question, we want to know which package of chicken you would be most likely to buy.
>
> Please answer as honestly as possible and in a manner that you think would truly reflect how you would actually shop. Don't choose a higher priced option unless you would really pay the higher price in the grocery store."

Treatments 2 and 3 – NPR & NYT Articles (Pro Slow Growth)

Treatments 2 and 3 included articles that were favorable towards slow growth chicken from National Public Radio (link to full article here) and the New York Times (link to full article here). Below are screen shots showing the excerpts that were presented to survey respondents.

The following is an excerpt from an article from National Public Radio.

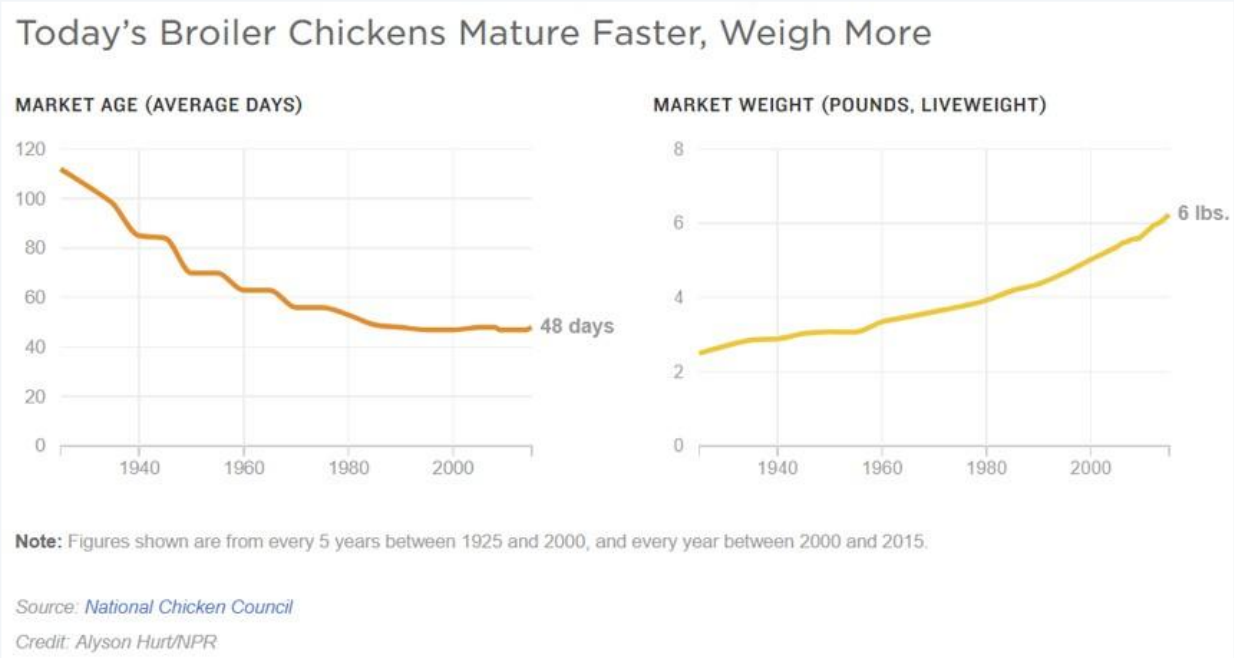
The "best" chicken, for the past century, has been one that put on muscle quickly. But according to Muir [a poultry geneticist at Purdue University], a trait that was great for the poultry industry turned out to be not so great for the chickens themselves.

All that weight, accumulated quickly, can overwhelm a young chicken's bones.

"We're having problems with legs," Muir says. "They can't support the weight. We have problems with splayed legs, joint problems. This is a major well-being concern, if the bird can't walk."

Studies have observed these problems in anywhere from 15 to 30 percent of chickens grown for their meat, known as broilers. . . .

For all those reasons, some animal welfare advocates have been calling on poultry companies to turn back the clock and return to slower-growing breeds of chickens.



Then, after clicking to see the next page, the following was also shown.

The following is a quote from a New York Times article. The New York Times

"A fast-growing cohort of companies that buy vast quantities of poultry, including Whole Foods Market and Panera Bread, are demanding meat from slow-growth chickens, contending that giving birds more time to grow before slaughter will give them a healthier, happier life — and produce better-tasting meat."

Following this, respondents were shown the same text as in the control just prior to answering the choice questions.

Treatments 5 and 6 – National Chicken Council (Anti Slow Growth)

Consumers randomly assigned to the fifth and sixth treatments were shown the information and graphic that follows.

> "In a moment, we are going to ask you which types of chicken you prefer to buy. Before proceeding, consider the following information about slow growth chicken. (note: this information and other resources are available from the National Chicken Council)."


SLOW GROWTH CHICKEN ENVIRONMENTAL IMPACT
Raising chickens for an ADDITIONAL 2 WEEKS can negatively impact our environment, the birds and consumer prices. As an industry, we strive to balance the good for all, and it's important you know the potential impact of this change.
LET'S SEE THE IMPACT
IF ONLY
ONE-THIRD OF THE INDUSTRY SWITCHES
20K = HOUSES
1/3 OF THE INDUSTRY


ADDITIONAL BIRDS NEEDED
OVER 1.5+ BILLION MORE BIRDS / YR!
TO PRODUCE THE SAME AMOUNT OF MEAT
ADDITIONAL ON-FARM DEATHS
72.4+ MILLION BIRDS/YR
ANNUAL SHORTAGE IN PRIME MEAT
27.5 BILLION LESS CHICKEN MEALS
THAT'S OVER 5.5 BILLION LBS/ YR!
ADDITIONAL LAND NEEDED TO GROW FEED
THE SIZE OF MARYLAND
OVER 7.6 MILLION ACRES / YR!
ADDITIONAL MANURE
A PILE ACROSS THE FIELD THAT'S 27X'S HIGHER THAN BALTIMORE M&T BANK STADIUM
SLIGHTLY OVER 28.5 BILLION LBS / YR!
WATER CONSUMED
APPROXIMATELY 8 THOUSAND OLYMPIC SIZED POOLS
JUST OVER 5.1 BILLION GAL / YR!

Following this, respondents were shown the same text as in the control just prior to answering the choice questions.

- Analysis of Choice Experiment Data

To begin consider the analysis of the choice data via a relatively simple multinomial logit (MNL) model. Consumer *i* in treatment *t* is assumed to derive the following utility from choice option *j*: $U_{itj} = V_{tj} + \varepsilon_{itj}$. If the ε_{itj} follow a Type I extreme value distribution and are independently and identically distributed across *i*, *t*, and *j*, then the conventional multinomial logit model (MNL) results:

(1) Prob(*i* chooses *j* in treatment *t*) = $\frac{e^{V_{tj}}}{\sum_{k=1}^{3} e^{V_{tk}}}$.

The systematic portion of the utility function is posited to be a linear function of chicken attributes:

(2) $V_{tj} = \beta_{tj} + \alpha_t p_j + \sum_{k=1}^{7} \theta_t^k d_j^k$,

where p_j is the price of alternative *j*, α_t is the marginal utility of a price change in treatment *t*, and β_{tj} is an alternative specific constant indicating the utility of option *j* in treatment *t* relative to the utility of the "no purchase" option, d_j^k are dummy variables indicating whether option *j* has one of the six labels (organic, no antibiotics, no added hormones, slow growth, brand and/or non-GMO), and θ_t^k reveal consumers' preferences for each of the k^{th} attribute in treatment *t*. Estimating the parameters of the model is straightforward using maximum likelihood estimation.

Once estimates are obtained, calculating market shares is achieved by utilizing equation (1). Also of interest in this study is the calculation of willingness-to-pay (WTP). WTP refers to the dollar premium that would induce a consumer to be exactly indifferent to buying an package of chicken breasts with one set of characteristics vs. another chicken option (or "none") with a different set of characteristics.

WTP for chicken option *j* in treatment *t* compared to "none" is calculated as $WTP_{tj} = -(\beta_{tj} + \sum_{k=1}^{7} \theta_t^k d_j^k)/\alpha_t$. This is the price that would make the average or representative consumer indifferent to chicken with the assigned characteristics and choosing "none." Also of interest is WTP for different labels. Consider two chicken options that are identical in all respects except on attribute contains a label (i.e., $d_{j=1}^k = 1$) and the other option does not (i.e., $d_{j=2}^k = 0$). The maxim premium a consumer would be willing to pay to have option 1 with the k^{th} label or characteristic vs. option 2 without the label or characteristic is simply $-\theta_t^k/\alpha_t$.

A key downside to the MNL is that it assumes all consumers have the same preference. Moreover, the MNL imposes some potentially restrictive assumptions on the substitutability of alternative choice options. The present analysis considered several different models that relax these restrictive assumptions. In particular, mixed logit (or random parameter logit) models were considered (see Train, 2009) in which preferences were assumed normally distributed in the population (except for price, which was considered constant, lognormal, or Rayleigh distributed). However, none of these models fit the choice data (according to AIC model fit criteria) as well as a latent class model (LCM) which assumes that there are several distinct consumer segments, each with their own particular set of preferences. As will be shown, this is likely because we find that the underlying consumer heterogeneity is quite distinct in a way not easily captured assuming that preferences are normally distributed. Another advantage of the LCM is that it

provides a convenient and straightforward way to identify and remove the effect of completely inattentive respondents (Malone and Lusk, 2017).

The LCM is given by:

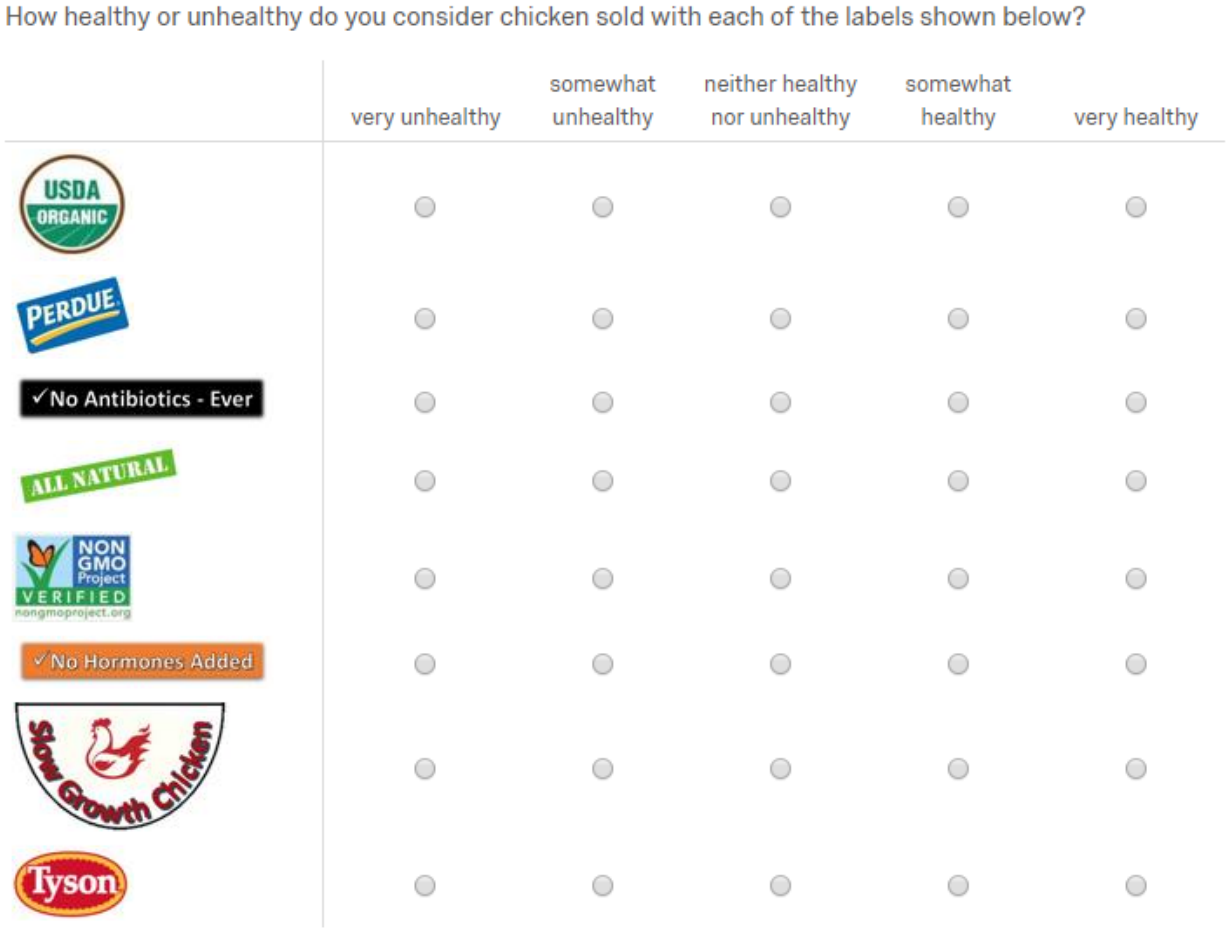
(3) Prob(i chooses j in treatment t) = $\sum_{c=1}^{C} P_{ic} \frac{e^{V_{tjc}}}{\sum_{k=1}^{3} e^{V_{tkc}}}$.

where P_{ic} is the estimated probability of individual i being in latent class (or segment) c, and V_{tjc} is the same as defined in equation (2) except now parameters are class/segment-specific as indicated by the c suffix. In this application we estimate four-class LCMs where all the parameters of the fouirth class are constrained to equal zero. A class with null parameter values implies responses that are completely random. Malone and Lusk (2017) denote the estimated probability of falling into this null class the "random response share" and suggest this approach as a means of removing the effect of inattentive, confused, or careless participants. In the analysis, we remove the impact of this null class (or any individual who is projected to fall into this class) when calculating WTP and making market share predictions. Estimates from (3) can be used to calculate WTP or market shares for each class, and then the class probabilities, P_{ic} (after adjusting for the "null" class) can be used to arrive weight each class and arrive at an aggregate market prediction. To explore the distribution in WTP, we use the estimates derived by equation (3) and utilize them as priors, and update them with each individual's choices to form posterior estimates of each individual's preferences and WTP (see Train, 2009 for details). These produce expected WTP conditional on an individual's choices, something referred to as "individual" WTP estimates.

- Belief Questions

A number of other questions were asked in the survey as will be revealed in the discussion of results. Some of these questions focused on consumers' beliefs about broiler production and in particular slow growth chickens. Questions were also asked to gather beliefs about the specific labels used in this study. Figure 2 shows one such set of question utilized to measure perceived healthiness of chicken with different labels.

Figure 2. Screen Shot of Question Measuring Health Beliefs (note: the question asked, "How healthy or unhealthy do you consider chicken sold with each of the labels shown below?")



Similar questions were used to measure other beliefs. In particular consumers were asked, "How expensive or inexpensive would you expect a package of chicken to be with each of the labels shown below?", "How tasty or untasty do you consider chicken sold with each of the labels shown below?", "How safe or risky, in terms of food safety, do you consider chicken sold with each of the labels shown below?", and "How high or low a level of chicken animal welfare is associated with each of the labels shown below?"

CHAPTER 3: RESULTS

- General Consumption Questions

The survey began with general questions about chicken consumption habits, beliefs about chicken, expected prices, and factors important when buying chicken. These questions were asked prior to the introduction of information, so the data are pooled across all information treatments and include all 2,049 respondents.

Respondents had overall favorable impressions about eggs (see table 4), with more than 91% agreeing that chicken tastes good. About 85% indicate chicken is affordable, easy to cook, and healthy. A slightly lower percentage, 69.8%, thought chicken was sustainable. Respondents were divided on whether all chicken taste about the same, suggesting a belief that some types of chicken are better tasting than others. The least amount of agreement was found with the statement that "meat producing chickens are well treated"; the most common response to this statement (chosen by 44.5% of respondents) was "neither agree nor disagree."

Table 4. General Beliefs about Chicken

Statement	Mean[a]	Standard Deviation[b]	% Strongly or Somewhat Disagree[c]	% Strongly or Somewhat Agree[d]
Chicken tastes good	4.482	0.771	2.7%	91.4%
Chicken is affordable	4.147	0.888	6.2%	84.4%
Chicken is easy to cook	4.297	0.860	4.9%	86.7%
All packages of chicken taste about the same	2.791	1.191	46.5%	32.0%
Chicken is healthy	4.207	0.849	3.9%	85.0%
Chicken is sustainable	3.898	0.896	5.3%	69.8%
Meat producing chickens are well treated	3.031	1.036	26.6%	28.5%

[a]Mean score on a scale of 1=strongly disagree, 2=somewhat disagree, 3=neither agree nor disagree, 4=somewhat agree, and 5=strongly agree.
[b]Numbers are standard deviation of score on the five-point scale.
[c]Numbers are the percent of respondents who somewhat or strongly agree with the statement.
[d]Numbers are the percent of respondents who somewhat or strongly disagree with the statement.

Table 5 provides summary statistics associated with several consumption questions. Respondents most frequently reported buying chicken once a week and buying 2lbs on each purchase. Chicken breasts with no hormone labels were most commonly reported as being purchased.

Table 5. Responses to Specific Consumption Questions

How often do you buy chicken?

Response Category	Percent of Respondents
Never	0.4%
2–3 Times a Year	3.0%
Once a Month	14.6%
2–3 Times a Month	31.2%
Once a Week	31.9%
2–3 Times a Week	17.8%
Daily	1.0%

When you buy chicken, how much do you normally buy?

less than 1 lb	3.2%
About 1 lb	17.7%
About 2 lbs	30.8%
About 3 lbs	21.2%
About 4 lbs	10.0%
5 lbs or more	17.1%

Which type of chicken do you normally buy? (*check all that apply*)

Breasts	74.8%
Boneless	60.2%
Thighs	40.0%
no added growth hormones	22.6%
raised without antibiotics	22.1%
conventional with no special labels	20.8%
free range	16.5%
Organic	14.6%
vegetarian fed	5.0%
slow growth	1.2%

What price ($ per pound) would you expect to pay for boneless skinless chicken breasts at the grocery store you normally shop at?

less than $2.00/lb	22.6%
$2.00/lb	19.0%
$2.50/lb	18.6%
$3.00/lb	17.4%
$3.50/lb	10.2%
$4.00/lb	5.4%
$4.50/lb	2.5%
$5.00/lb	3.1%
more than $5.00/lb	1.3%

One of the initial questions asked respondents, "Over the past five years, has your consumption of chicken increased or decreased?" 47.4% indicated consumption had increased, 48.5% responded "stayed the same," and the remaining 4.1% indicated consumption had decreased.

Respondents indicating an increase or decrease in consumption were given a conditional question asking why. Convenience, health, availability and taste were the most commonly stated reasons for increased consumption. Taste and competitive proteins were the most commonly stated reasons for decreased chicken consumption.

Table 6. Why has consumption of chicken increased? (N=971)

Reason	% Indicating Reason
Chicken has become more convenient to cook	38.3%
Chicken has become healthier	31.5%
More chicken options have become available	31.3%
Chicken has become tastier	25.0%
My household income has changed	23.4%
My health status has changed	22.6%
The price of chicken has fallen	21.7%
Other protein rich foods have become less attractive	20.0%
Chicken has become safer to eat	15.6%
Animal welfare has improved	8.1%
Other	5.8%

Note: total does not sum to 100% because respondents could pick more than one category.

Table 7. Why has consumption of chicken decreased? (N=85)

Reason	% Indicating Reason
Chicken has become less tasty	20.4%
Other	20.4%
Other protein rich foods have become more attractive	19.4%
My household income has changed	15.3%
The price of chicken has increased	15.3%
Chicken has become less safe to eat	15.3%
Animal welfare has fallen	11.2%
Chicken has become less healthy	10.2%
My health status has changed	9.2%
Chicken has become less convenient to cook	9.2%
Fewer chicken options are available	3.1%

Note: total does not sum to 100% because respondents could pick more than one category.

Respondents were presented with a trade-off question related to "food values" (Lusk and Briggeman, 2009). In particular, respondents were asked, "How important are the following items to you when deciding whether to buy chicken?" Thirteen items were shown and respondents had to pick four items and click and drag them into a box labeled "most important" and pick for other items and click and drag them into a box labeled "least important."

As shown in table 8, the 13 items are placed on a relative importance scale ranging from -100% to +100%. Relative importance is calculated as the percent of times an item was placed in the most important category minus the percent of times the same item was placed in the least important category. If all respondents placed an issue in the most important category, the score for the issue would be +100%; by contrast if all respondents placed an issue in the least important category, the score for the issue would be -100%. A score of zero could imply that no one put an item in the most or least important categories or that equal frequencies of respondents put an item in the most important category as did the frequency of respondents putting an item in the least important category.

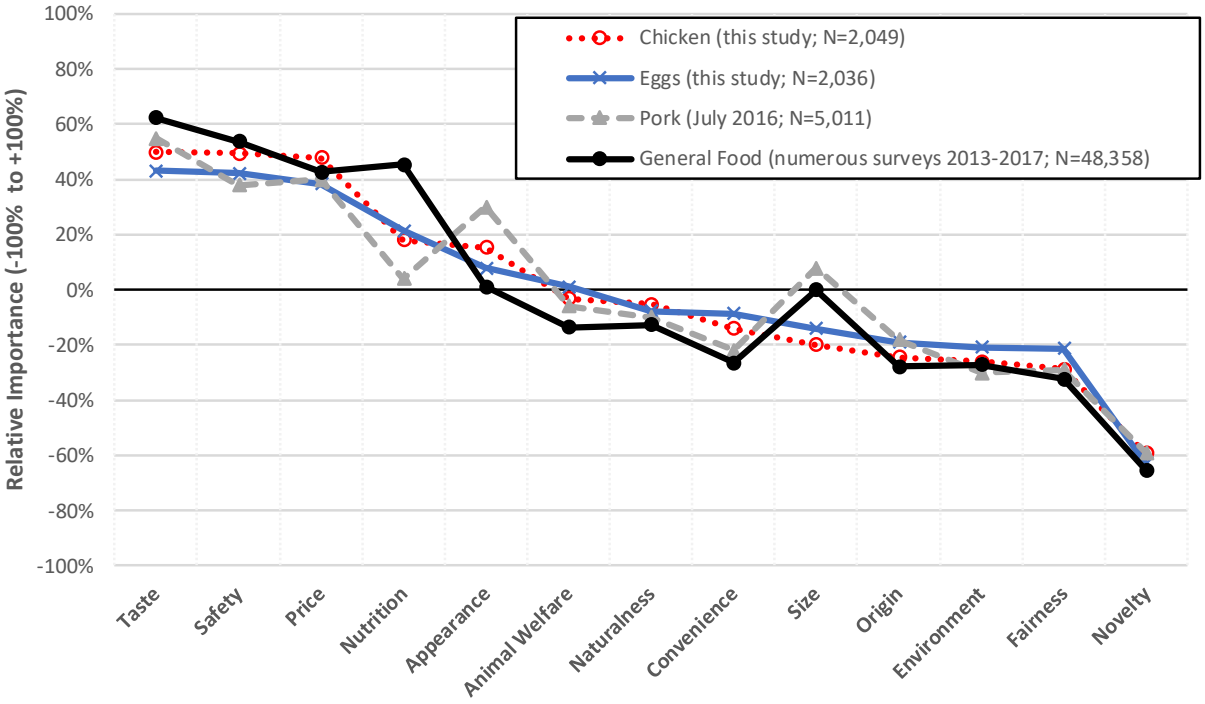
The most important overall attributes were taste, safety, and price. The least important attributes were environment, fairness, and novelty.

Table 8. Relative Importance of 13 Different Factors When Buying Chicken

Factor	Relative Importance
Taste (the flavor of the food in your mouth)	50.0%
Safety (eating the food will not make you sick)	49.5%
Price (price you pay)	47.9%
Nutrition (amount and type of fat, proteins, vitamins, etc.)	18.0%
Appearance (whether the food looks appealing and appetizing)	15.3%
Animal Welfare (well-being of farm animals used in food production)	-3.2%
Naturalness (made without modern food technologies and ingredients)	-5.3%
Convenience (how easy and fast the food is to cook and eat)	-14.0%
Size (small, medium, large, extra-large)	-20.0%
Origin (whether the food is grown locally, regionally, in the U.S. or overseas)	-24.4%
Environmental Impact (effects of food production the environment)	-26.1%
Fairness (farmers, processors, retails and consumers equally benefit)	-28.6%
Novelty (the food is something new you haven't tried before)	-59.2%

The food-values questions has been used in a number of prior studies, and as such it is instructive to compare what consumers state as being most important when purchasing chicken as compared to purchasing other food items. Figure 3 shows food values for chicken, eggs, pork, and for food more generally (the latter was taken from the data compiled from a series of monthly surveys as a part of the Food Demand Survey (FooDS) project).

Figure 3. Relative Importance of Product Attributes in Purchase Decisions for Chicken, Eggs, Pork, and General Food



Overall, the pattern of results is similar for all foods with a few exceptions. For general food (i.e., no specific food is mentioned), taste is most important followed closely by safety, nutrition, and price. Animal welfare is a more important driver of purchase for chicken than pork or general food. Price was more important, and size less important, for chicken than was the case for any of the other food options shown in figure 3.

- Choice Experiment Results

To determine consumer WTP and market shares, data from the 12 choice questions described in table 2 were analyzed. For background information, appendix table A1 shows the percentage of respondents who selected each choice option for each of the 12 questions in each information and brand treatment.

Model fit criteria indicate the latent class logit model (LCM) best fit the data. As such, results are reported separately for each information treatment (the results ignore the roughly 10% of respondents who were identified by the LCM as answering randomly). Table 9 reports the aggregate mean and median WTP estimates for each chicken label (underlying estimates of the models are provided in the appendix).

Focusing first on the results from the no information control, the estimates suggest median WTP for slow growth chicken (i.e., the dollar premium that would induce a consumer to be exactly indifferent to buying and not buying slow growth chicken breast) in the control, no added information scenario of $0.61/lb premium for slow growth chicken ($0.46/lb with brands); the mean WTP premium is $0.58/lb ($0.85/lb with brands).

As shown in table 9, mean and median WTP for other labels is typically higher than for the slow growth label, at least when no additional information is provided. For example, mean WTP premium for the organic label is $1.38/lb without brands and $1.87 with brands.

Table 9. Willingness-to-Pay ($/lb) Estimates from Latent Class Logit Models by Information and Brand Treatments

Attribute	Control No Information		NPR & NYT Pro Slow Growth		NCC Anti Slow Growth	
	No Brand	Brand	No Brand	Brand	No Brand	Brand
	$1.38[a] {0.52}[b] [1.24, 1.52][c]	$1.87 {0.29} [1.59, 2.15]	$1.34 {0.34} [1.20, 1.47]	$1.81 {0.26} [1.55, 2.07]	$1.24 {0.22} [1.10, 1.38]	$0.85 {0.19} [0.76, 0.94]
	$0.96 {0.22} [0.85, 1.06]	$1.84 {0.27} [1.58, 2.11]	$1.7 {0.42} [1.52, 1.88]	$1.56 {0.17} [1.34, 1.77]	$0.88 {0.33} [0.79, 0.96]	$0.81 {0.33} [0.73, 0.88]
	$1.11 {0.62} [1.01, 1.21]	$1.53 {0.23} [1.31, 1.75]	$1.75 {0.27} [1.55, 1.95]	$1.71 {0.20} [1.46, 1.96]	$0.91 {0.07} [0.79, 1.02]	$1.02 {0.27} [0.91, 1.12]
	$0.58 {0.61} [0.53, 0.62]	$0.85 {0.46} [0.78, 0.92]	$2.11 {0.61} [1.91, 2.31]	$2.44 {0.54} [2.14, 2.74]	$0.24 {0.21} [0.24, 0.25]	$0.43 {0.27} [0.40, 0.47]
	$1.21 {0.50} [1.10, 1.31]	$1.2 {0.29} [1.04, 1.35]	$1.55 {0.42} [1.39, 1.71]	$1.25 {0.23} [1.09, 1.41]	$1.25 {0.46} [1.13, 1.36]	$0.61 {0.37} [0.56, 0.65]
Brand A vs. B	---	$-0.34 {0.23} [-0.47, -0.21]	---	$-1.12 {0.36} [-1.36, -0.89]	---	$0.02 {0.08} [0.01, 0.04]

[a]Means
[b]Numbers in brackets{ }are medians
[c]Numbers in brackets[ ]are 95% confidence intervals for the mean

Figures 4 and 5 shows the heterogeneity in WTP for slow growth as compared to organic in the no added information condition without and with brands. For slow growth labels the most common category, representing over 40% of respondents, was a WTP between $0.80 and $1.00/lb; however, about 27% of respondents had a WTP between $0 and $0.25/lb. When brands were present, the most common category, with almost 70% of respondents, was a WTP between $0.40 and $0.60/lb. The figure also shows ample heterogeneity in WTP for organic, more so than exists with slow growth.

Figure 4. Distribution of Willingness-to-Pay ($/lb) for Slow Growth and Organic Labels without Brands

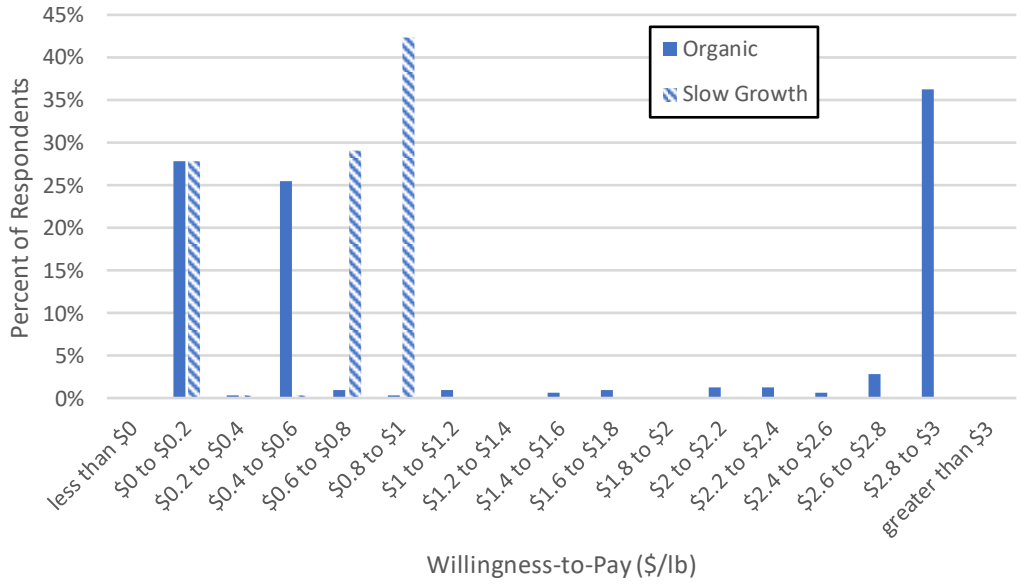
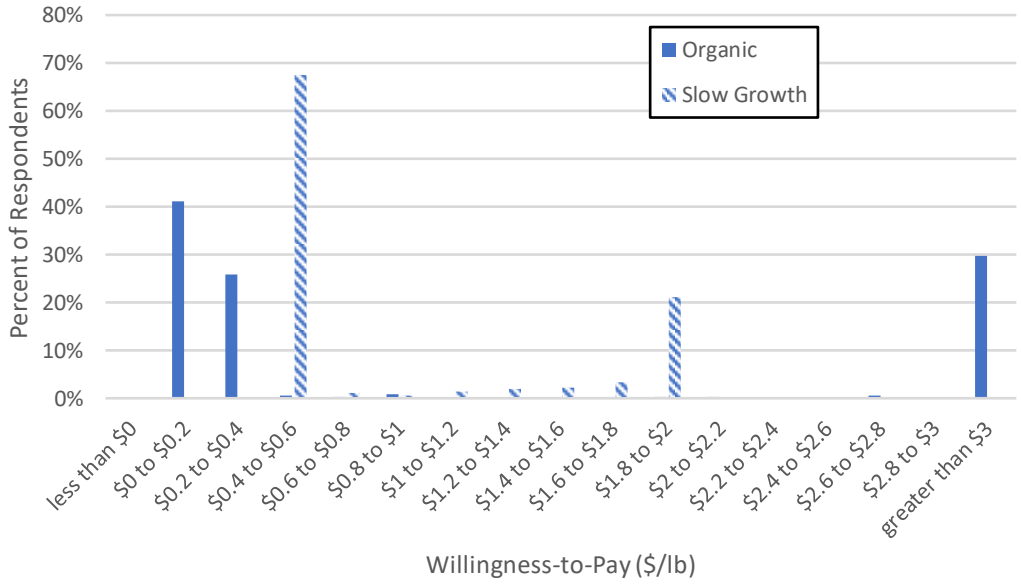


Figure 5. Distribution of Willingness-to-Pay ($/lb) for Slow Growth and Organic Labels with Brands



Turning now to the impact of information on WTP, results in table 9 indicate pro slow growth information increased increase mean WTP and negative information reduced mean WTP for slow growth chicken. Despite this result, the mean masks a great deal of underlying heterogeneity.

Figure 6. Distribution of Willingness-to-Pay ($/lb) for Slow Growth Label by Information Treatment without Brands

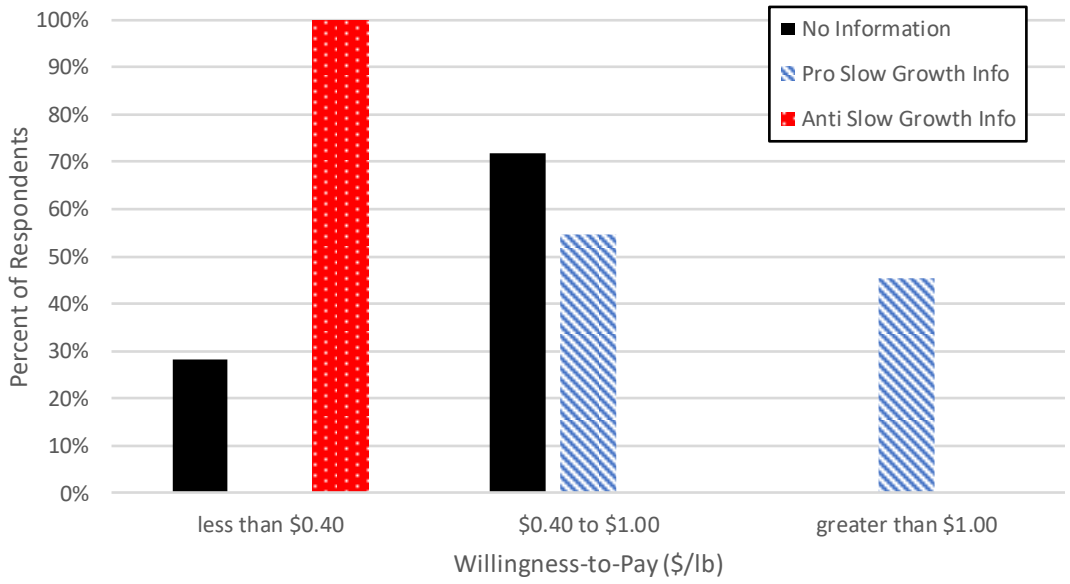


Figure 6 shows the distribution of WTP for slow growth chicken breast in the three information treatments without brands. In the no information condition, almost 30% of consumers have a willingness-to-pay less than $0.40/lb, and 70% have a value between $0.40 and $1.00/lb. In the pro slow growth information condition, about 45% of consumers were in the greater than $1.00/lb category. In NCC anti slow growth information condition, fully 100% of consumers had a WTP less than $0.40/lb.

The estimated models can be used to project choice probabilities under assumptions about the options available to consumers.

To demonstrate the results, it is useful to consider a simple choice scenario where there are only two options, A and B, that are identical in every respect. Under this simple baseline scenario, option A has a projected market share of 50% and option B has a projected market share of 50% (i.e., the chance of a consumer buying option A or B is as good as chance since the two options are identical). To determine the relative importance of the various attributes included in the study, one can investigate how projected market shares (or choice probabilities) change from the baseline when, for example, option B adds a label or changes price. These changes are referred to as marginal effects.

Table 10 below shows the marginal effects resulting from changes in the attributes under inquiry. In the no information condition, a $1 reduction in price from the baseline increases market share 26.4 percentage points. Starting again from the baseline 50%-50% scenario in the no information condition, the addition of a non-GMO label increased the market share 17.9%. In this sense, it can be said that price is more important than the non-GMO label. Table 10 carries out the same calculations for the other attributes. According to the ability to move aggregate market shares, price and the presence/absence of non-GMO and the organic labels are the most important attributes. Of lesser importance are the no antibiotic and slow growth labels.

Although brand, per se, is a relatively unimportant attribute, the addition of brands in the CE generally lower the importance of other chicken attributes. For example, in the no added information condition, without brands, the importance of the non-GMO label was 17.9% without brands and only 8.1% with brands. Curiously, the importance of slow growth labels remained essentially unchanged with or without brands in the no information condition. For almost every other label, the importance fell when brands were added

Table 10. Relative Importance (or Marginal Effects) of Chicken Attributes in Changing Market Shares

Change	Change in Market Share					
	Control No Information		NPR & NYT Pro Slow Growth		NCC Anti Slow Growth	
	No Brands	Brands	No Brands	Brands	No Brands	Brands
$1.00 reduction in price	26.4%	21.4%	20.6%	22.6%	23.4%	23.8%
addition of non-GMO label	17.9%	8.1%	11.0%	8.4%	15.3%	8.8%
addition of organic label	16.0%	8.3%	9.8%	8.7%	11.4%	7.8%
addition of no added hormone label	15.8%	8.1%	8.1%	5.4%	6.2%	7.9%
addition of slow growth label	11.9%	11.9%	16.4%	17.8%	5.8%	6.7%
addition of no antibiotics-ever label	7.9%	9.6%	9.8%	7.3%	11.1%	8.7%
brand A instead of brand B	---	8.5%	---	7.7%	---	6.1%

We utilize this same basic set-up to explore how the market share for slow growth chicken would change with a change in the premium charged for slow growth. Figures 7 and 8 show the results without and with brands. If presented with a pair-wise choice between slow growth chicken priced at a $0.50/lb premium and an unlabeled chicken breast, slow growth is projected to be chosen by 45%, 54%, and 41% of respondents in the no added information, pro slow growth, and anti slow growth information conditions, respectively when no brands are present. With brands, the respective slow growth choice probabilities are 49%, 54%, and 39%.

Figure 7. Predicted Market Share for Slow Growth Chicken Breast by Price Premium and Information Treatment without Brands

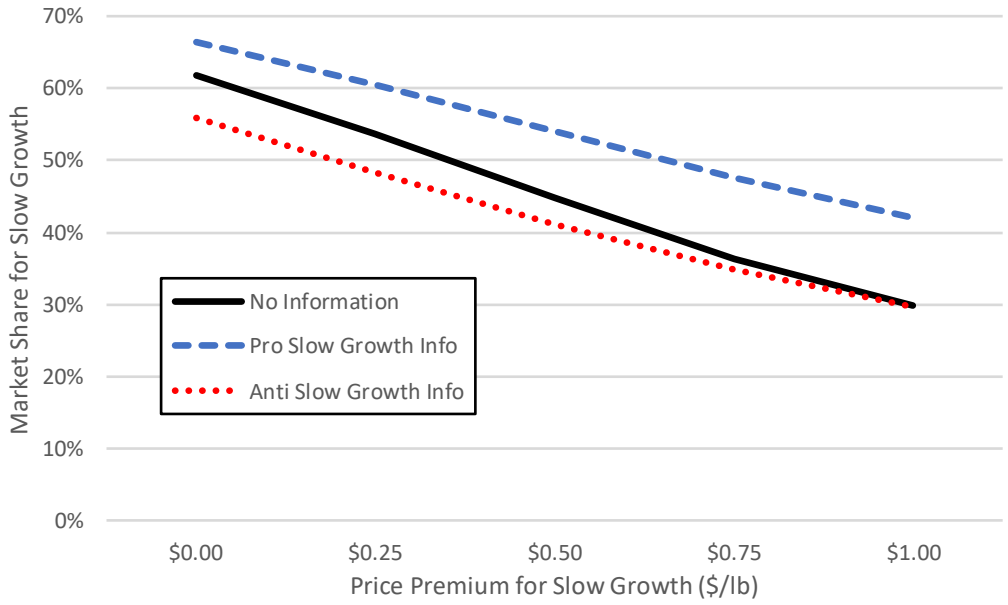
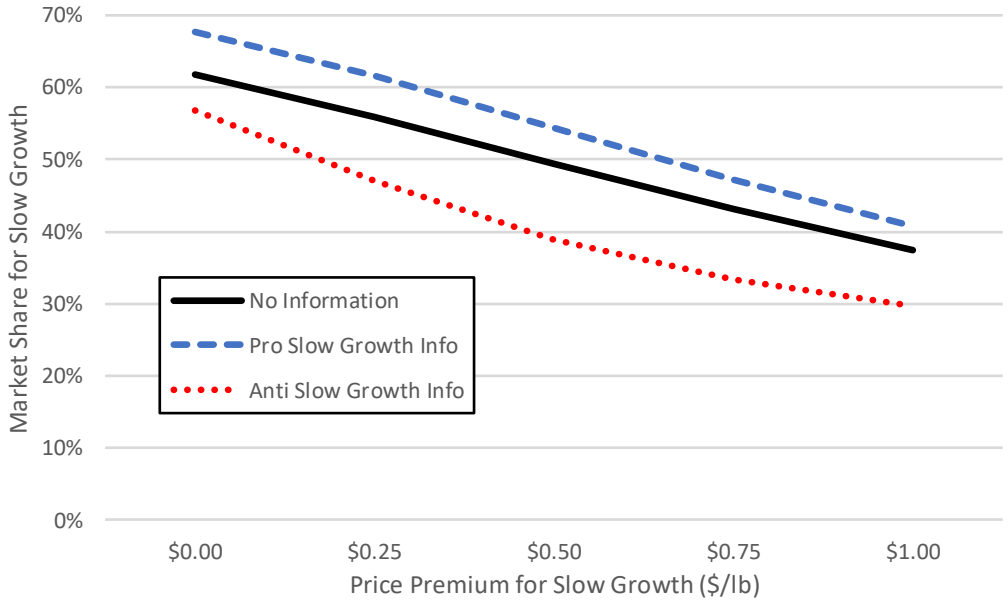


Figure 8. Predicted Market Share for Slow Growth Chicken Breast by Price Premium and Information Treatment with Brands



-Market Segments and Determinants of Heterogeneity

So far, the analysis has tended to focus attention to aggregate-level results from the CE. However, as revealed by the preceding figures, there is ample underlying heterogeneity. In fact, underlying the WTP estimates are distinct consumer segments revealed by the LCM. Tables 11 and 12 below shows the WTP estimates from three distinct segments from the no information control condition in the no brand and brand conditions (the class probabilities are conditional on respondents providing meaningful answers, and ignores the roughly 10% who have zero coefficients for all parameters).

As shown in table 11, the first segment, representing 27.9% of respondents, was sensitive to price changes, resulting in fairly low WTP values; this is particularly true for slow growth where mean WTP was essentially zero. Segments 2 and 3 were more label conscious. The distinctive characteristic of segment 3 was the low value placed on the no antibiotics label.

Table 11. Willingness-to-Pay ($/dozen) for Four Consumer Segments when Provided No Additional Information and No Brands

Attribute	Segment 1 Price Sensitive	Segment 2 Price Insensitive	Segment 3 Ignores Antibiotics
Organic	$0.08 [-0.05, 0.2]	$2.84 [1.38, 4.29]	$0.51 [0.39, 0.63]
No Antibiotics	$0.22 [0.1, 0.34]	$2.11 [0.84, 3.37]	-$0.01 [-0.12, 0.1]
No Hormone	$0.08 [-0.05, 0.22]	$2.13 [0.86, 3.4]	$0.61 [0.49, 0.74]
Slow Growth	$0.002 [-0.13, 0.13]	$0.93 [0.19, 1.67]	$0.61 [0.51, 0.70]
Non GMO	$0.25 [0.13, 0.36]	$2.34 [1.04, 3.63]	$0.49 [0.38, 0.59]
Probability	0.279	0.463	0.258

Figure 9 shows the demand curves for slow growth for the three market segments identified by table 11. Segment 2 is essentially unmoved by changes in price, and the market share for slow growth is about 50% regardless of price (not that a 50% share also implies the consumer is relatively indifferent between the conventional and slow growth chicken). Market share for slow growth is markedly higher for segment 3 than for segment 1 at all price premiums.

Figure 9. Predicted Market Share for Slow Growth Chicken Breast by Price Premium and Consumer Segment without Brands

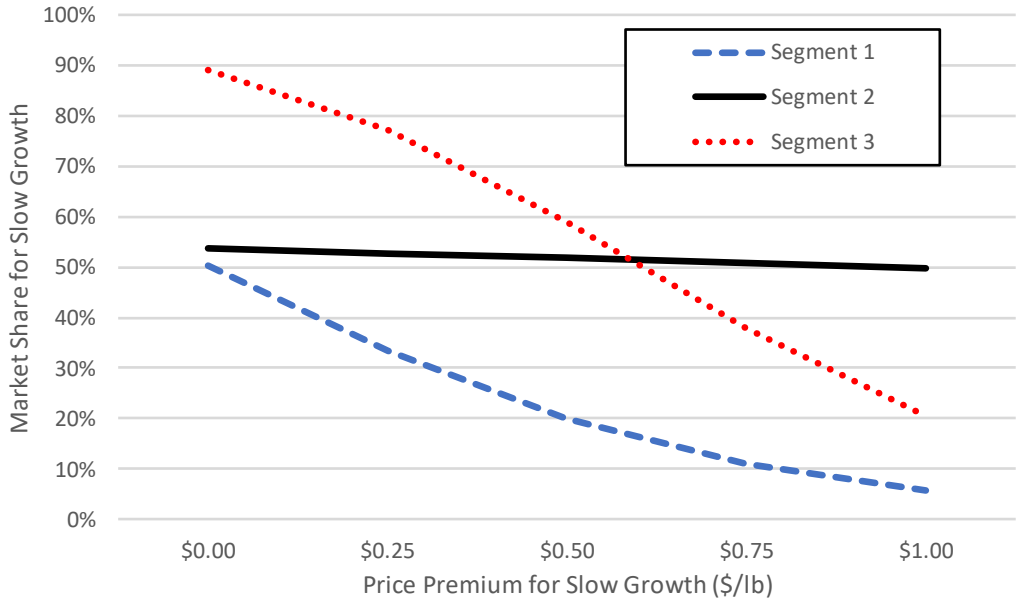


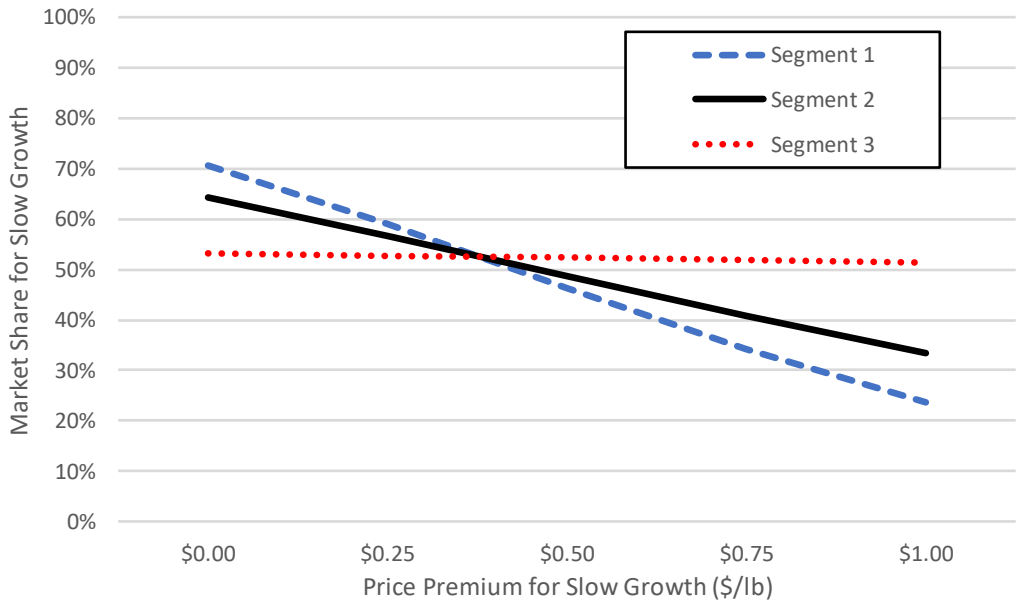
Table 12 shows WTP for consumer segments when brands are present. The first segment has a relatively high WTP for slow growth and the second segment a relatively high WTP for brand. Segment 3 basically ignored price, resulting in very high WTP values. Figure 10 shows the demand curves for slow growth for the three market segments identified by table 12. Segment 3 is unmoved by prices and segment 1, while initially having a higher market share for slow growth is more price sensitive and has a lower market share at higher price premiums.

Table 12. Willingness-to-Pay ($/dozen) for Three Consumer Segments when Provided No Additional Information and Brands

Attribute	Segment 1 Slow Growth	Segment 2 Brand Sensitive	Segment 3 Price Insensitive[a]
Organic	$0.29 [-0.01, 0.59]	$0.11 [-0.03, 0.25]	$6.20
No Antibiotics	$0.27 [0.12, 0.43]	$0.23 [0.07, 0.39]	$5.91
No Hormone	$0.19 [-0.04, 0.42]	$0.23 [0.08, 0.38]	$4.87
Slow Growth	$0.43 [0.22, 0.63]	$0.46 [0.29, 0.62]	$1.86
Non GMO	$0.18 [-0.08, 0.45]	$0.29 [0.11, 0.47]	$3.59
Brand A	$0.23 [-0.01, 0.47]	$0.54 [0.44, 0.65]	-$2.33
Probability	0.223	0.433	0.344

[a]The price parameter for this group is close to zero, and as a result, WTP is not well-defined; confidence intervals are not reported for this segment as they are quite large

Figure 10. Predicted Market Share for Slow Growth Chicken Breast by Price Premium and Consumer Segment with Brands



Attention is now turned to the individual-level determinants of WTP for the slow growth label. To carry out this analysis, several linear regression models were estimated.

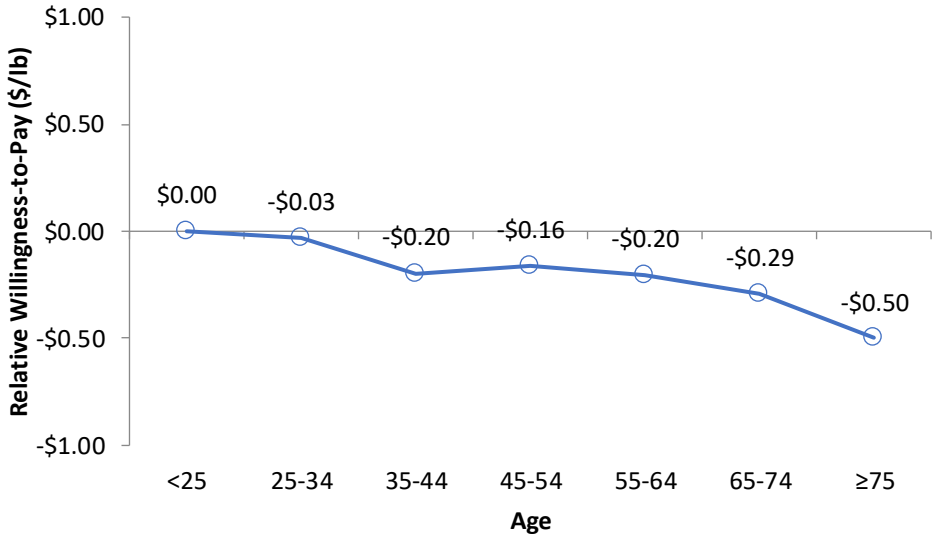
A word of caution is in order. As the previous tables showed, mean WTP for slow growth often diverges substantially from the median WTP. As such, the WTP data are not normally distributed. A linear regression model estimates impacts on the mean, and in the presence of non-normal data, the statistical significance tests are likely suspect, though the underlying parameter estimates may still provide useful information about the mean.

First, note the factors that are NOT associated with large or significant changes in WTP premiums for slow growth chicken breast:

- Gender
- Marital status
- Household size
- Presence of children in household
- Region of residence
- Income
- Education
- Race
- Grocery shopping frequency
- Frequency of chicken purchase
- Quantity of chicken purchased

Figure 11 shows the effect of the only significant demographic variable (age) on the mean WTP premium for slow growth chicken in the no information condition. Mean WTP for slow growth chicken tends to fall with the age of the shopper.

Figure 11. Variation in Mean Willingness-to-Pay for Slow Growth Chicken Breast by Age



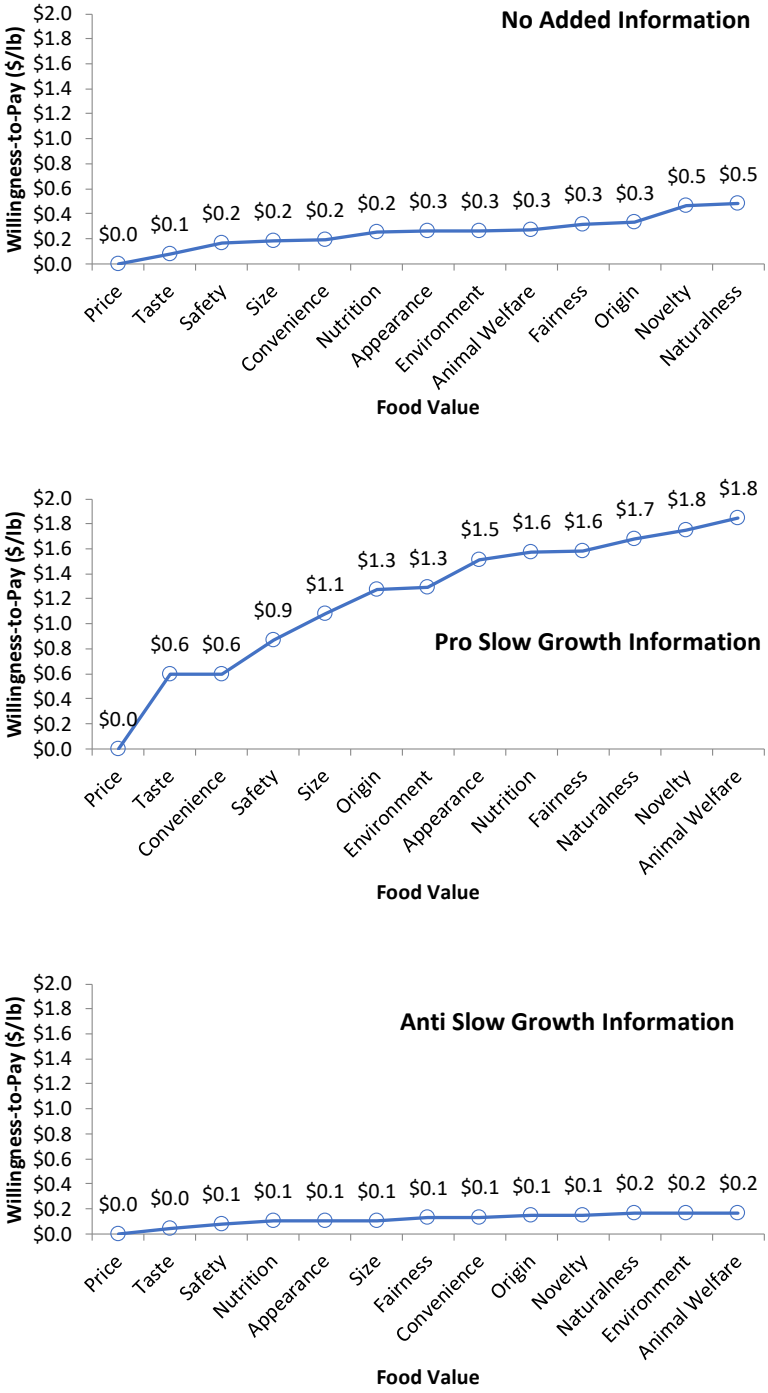


Figure 12. Variation in Mean Willingness-to-Pay for Slow Growth Chicken Breast ($/lb) by Food Values and Information Condition

Figure 12 shows the relationship between "food values" and WTP for slow growth chicken. In the no information condition, WTP for slow growth is highest among consumers relatively more concerned about novelty and naturalness and lowest among consumers relatively more concerned about price and taste.

Results indicate that if an individual who indicated naturalness as the least important food value (a score of -100) instead indicated naturalness as a most important food value (a score of +100), mean WTP for cage free would increase $0.50/lb. By contrast, greater importance placed on the food values of price and taste are associated with reductions in mean WTP for slow growth when no added information is provided. Only when pro slow growth information is provided do food values have large and statistically significant impacts on WTP. In this case, consumers most concerned about animal welfare have the largest WTP for slow growth.

While it may not be initially obvious, the results in figure 12 can be interpreted as providing evidence about people's beliefs about (or perceptions of) the slow growth label under different information conditions. Suppose an individual highly values animal welfare. Figure 12 shows that such an individual will tend to have a high WTP for slow growth labels when pro slow growth information is provided but not otherwise. As a result, it must be that slow growth is perceived to provide high animal welfare when pro slow growth information is provided but not otherwise. By this line of reasoning, figure 12 suggests that consumers, on average, perceive the slow growth label to signal chicken that is higher priced and poor in taste.

-Beliefs and Knowledge

After the CE questions, respondents were queried about their knowledge and beliefs surrounding broilers. Because these questions were asked after the provision of information, results are segmented by information treatment.

Only about 12% correctly indicated that between 0 and 19% of broilers in the US. are not given added growth hormones.

Table 13. Responses to Question, "What percent of meat producing chickens (also called broilers) in the United States are fed added growth hormones?"

Response Category	Control No Information	NPR & NYT Pro Slow Growth	NCC Anti Slow Growth
0 to 19%	11.3%	12.5%	12.5%
20 to 49%	33.8%	35.2%	35.5%
50 to 79%	46.5%	44.5%	42.3%
80 to 100%	8.4%	7.8%	9.7%

Table 14 shows the results associated with asking respondents the percent of meat producing chickens are cage free. Fewer than 3% of respondent picked the correct category, 80% to 100%.

Table 14. Responses to Question, "What percent of meat producing chickens (also called broilers) in the United States are cage free?"

Response Category	Control No Information	NPR & NYT Pro Slow Growth	NCC Anti Slow Growth
0 to 19%	46.9%	43.3%	44.6%
20 to 49%	35.4%	38.4%	38.8%
50 to 79%	15.2%	15.6%	13.9%
80 to 100%	2.5%	2.7%	2.8%

Table 15 shows consumers' perceptions of the average lifespan of a broiler. Consumers tend to believe broilers live longer than they actually do (the most frequently picked category is twice the lifespan of the average broiler).

Overall, results in tables 13, 14, and 15 indicate that consumers are woefully unknowledgeable of modern broiler production practices.

Table 15. Responses to Question, "How long does the typical meat producing chicken (also called a broiler) live?"

Response Category	Control No Information	NPR & NYT Pro Slow Growth	NCC Anti Slow Growth
About 1 week	6.8%	4.7%	6.6%
About 3 weeks	14.9%	11.1%	14.8%
About 6 weeks	23.8%	25.1%	23.4%
About 12 weeks	28.1%	26.0%	29.1%
About 24 weeks	17.7%	24.7%	19.5%
About 52 weeks	8.8%	8.4%	6.7%

Table 16 reports the extent to which consumers agree or disagree with several statements. There was more agreement than not that "slow growth chickens take longer to mature" and, to a lesser extent, "slow growth chickens will consume more feed than conventional chicken." There were low levels of agreement with the statements that "I am very knowledgeable of slow growth chickens", "chicken breasts are too large to eat or cook", and "I have seen slow growth chicken for sale in my grocery store."

Table 16. Consumer Beliefs about Chicken Production Practices by Information Treatment

Statement	Control No Information	NPR & NYT Pro Slow Growth	NCC Anti Slow Growth
Slow growth chickens take longer to mature	3.678[a] (0.937)[b] [8.6%][c] {60.9%}[d]	3.924 (0.98) [6.8%] {69.8%}	3.700 (0.898) [6.1%] {58.3%}
Slow growth chickens will consume more feed than conventional chickens	3.448 (0.933) [12.5%] {48.1%}	3.536 (0.988) [12.8%] {53.5%}	3.602 (0.943) [9.3%] {56.2%}
I am very knowledgeable of slow growth chickens	2.068 (1.143) [64.6%] {12.1%}	2.193 (1.149) [64.2%] {13.6%}	2.141 (1.16) [64.9%] {13.8%}
Chicken breasts are too large to eat or cook	2.217 (1.241) [62.5%] {16.8%}	2.227 (1.235) [61.9%] {17.8%}	2.235 (1.19) [61%] {16.6%}
I have seen slow growth chicken for sale in my grocery store	2.355 (1.178) [54.3%] {17.0%}	2.372 (1.183) [53.5%] {16.0%}	2.287 (1.182) [58.7%] {16.3%}
Number of Observations	678	662	669

[a]Mean score on a scale of 1=strongly disagree, 2=somewhat disagree, 3=neither agree nor disagree, 4=somewhat agree, and 5=strongly agree.
[b]Numbers in parentheses ( ) are standard deviation of score on the five-point scale.
[c]Numbers in brackets [ ] are the percent of respondents who somewhat or strongly agree with the statement.
[d]Numbers in brackets { } are the percent of respondents who somewhat or strongly disagree with the statement.

Table 17 shows the average beliefs about animal welfare, expense, healthfulness, safety, and taste of different labels in each information treatment.

In all treatments, slow growth labels tended to be associated with disadvantageous beliefs, except in the condition where pro slow growth information was provided, in which case it was associated with higher taste and animal welfare. Without additional information, slow growth labels are associated with signaling the lowest safety, taste, and health of the labels considered.

Table 17. Consumer Beliefs about Eight Labels by Information Treatment

Label	Healthiness[c]	Cost[b]	Taste[e]	Safety[d]	Animal Welfare
Control – No Information					
	4.076	3.837	3.823	3.977	3.597
	3.584	3.175	3.811	3.741	3.261
	3.969	3.557	3.757	3.824	3.461
	3.902	3.590	3.802	3.830	3.461
	3.977	3.687	3.773	3.955	3.529
	3.993	3.537	3.726	3.859	3.479
	3.511	3.488	3.714	3.646	3.498
	3.536	3.015	3.905	3.742	3.165
NPR & NYT -Pro Slow Growth					
	3.985	3.836	3.752	3.931	3.621
	3.597	3.097	3.738	3.699	3.260
	3.996	3.497	3.744	3.838	3.502
	3.915	3.616	3.823	3.872	3.550
	3.961	3.682	3.758	3.893	3.559
	3.972	3.542	3.735	3.845	3.544
	3.801	3.700	3.835	3.809	3.731
	3.533	2.987	3.788	3.669	3.159

	Healthiness[c]	Cost[b]	Taste[e]	Safety[d]	Animal Welfare
NCC – Anti Slow Growth					
USDA ORGANIC	4.022	3.854	3.791	3.902	3.618
PERDUE	3.594	3.142	3.744	3.706	3.259
✓No Antibiotics - Ever	3.966	3.556	3.744	3.821	3.498
ALL NATURAL	3.898	3.593	3.790	3.827	3.513
NON GMO Project VERIFIED nongmoproject.org	3.948	3.698	3.779	3.896	3.544
➢No Hormones Added	3.979	3.529	3.760	3.838	3.547
Slow Growth Chicken	3.414	3.574	3.659	3.659	3.426
Tyson	3.569	3.022	3.875	3.726	3.200

[a]Mean score on scale from 1 = very low hen welfare to 5=very high hen welfare
[b]Mean score on scale from 1 = very inexpensive to 5=very expensive
[c]Mean score on scale from 1 = very unhealthy to 5=very healthy
[d]Mean score on scale from 1 = very risky to 5=very safe
[e]Mean score on scale from 1 = very untasty to 5=very tasty
Note: green highlight indicates highest value in a column/treatment, red highlight indicates lowest value in a column/treatment, and yellow highlight indicates second lowest value in a column treatment.
Note: Sampling error for each mean is roughly +/- 0.08 on the 1 to 5 scale

CHAPTER 4: IMPLICATIONS

Overall, consumers report taste, safety, and price as the most important factors they consider when buying chicken. Without any additional information, consumers perceive slow growth labels as signaling lower safety, health, and taste.

Results indicate low levels of knowledge about broiler production in general and slow growth chicken in particular. Only about 3% of respondents correctly knew that broiler production is cage free, and almost 90% of respondents believe more than 20% of broilers are given added growth hormones. Only 1.2% of respondents report having previously purchased slow growth chicken, and only 12% said they were knowledgeable of slow growth chickens.

Results from a choice experiment, which simulates retail shopping choices, shows willingness-to-pay for slow growth chicken is highly dependent on the information provided, suggesting consumers do not have a high degree of knowledge or well formed preferences for the attribute. Simulations show that chicken with slow growth labels could pick up significant market share even at $0.50/lb to $1.00/lb price premiums. Much of this is explained not by strong preferences for slow growth chicken per se, but rather by a sizable segment of consumers who are insensitive to chicken prices.

Non-GMO and organic labels tend to be among the most important labels to consumers when brands are not present, but in the presence of prominent brands, these labels are less important determinants of choice and all labels considered have similar impacts on choice.

Given the disadvantageous beliefs consumers hold about slow growth claims, a substantial marketing effort would likely be needed for the attribute to become a major determinant of consumer choice. Given consumers' lack of knowledge about broiler production, simply informing consumers of already existing practices (e.g., cage free and no added hormones) could be a more cost effective way of boosting chicken demand. That said, it is possible that the presence of hormone absence labels may exacerbate the misinformation problem by indirectly suggesting that there are some brands of chicken that use growth hormones. While organic labels are associated with positive beliefs and are valued relatively highly by consumers, organic production entails significantly higher costs in comparison to non GMO or no antibiotic claims.

Perhaps the most significant factor explaining the increase in chicken consumption over the past several decades is price. Increases in production efficiencies have reduced chicken prices relative to the price of beef and pork. Perhaps not surprisingly then, this study also shows price to be a major determinant of choice for consumers. Nonetheless, there is a non-trivial minority of consumers who are relatively unconcerned about chicken prices, and these consumers are the target market for the label claims considered in this study.

CHAPTER 5: REFERENCES

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APPENDICES

Table A1. Percent of Consumers Choosing Options A, B, and C by Choice Scenario and Information Treatment

Choice Scenario	Control – No Info – No Brands (N=335)			Control – No Info - Brands (N=357)		
	Option A	Option B	No Purchase	Option A	Option B	No Purchase
1	28.4%	60.6%	11.0%	25.8%	65.3%	9.0%
2	56.4%	36.1%	7.5%	55.5%	37.3%	7.3%
3	26.6%	69.0%	4.5%	23.0%	72.0%	5.0%
4	80.3%	11.0%	8.7%	74.2%	16.5%	9.2%
5	27.2%	65.4%	7.5%	26.9%	66.4%	6.7%
6	73.4%	17.9%	8.7%	72.8%	19.6%	7.6%
7	11.0%	81.2%	7.8%	19.6%	71.1%	9.2%
8	35.2%	53.4%	11.3%	32.2%	58.3%	9.5%
9	74.6%	20.3%	5.1%	78.2%	17.6%	4.2%
10	34.9%	31.9%	33.1%	41.2%	29.7%	29.1%
11	29.0%	38.8%	32.2%	31.7%	40.9%	27.5%
12	25.1%	70.4%	4.5%	23.8%	71.7%	4.5%

Choice Scenario	Pro Slow Growth – No Brands (N=347)			Pro Slow Growth – No Brands (N=328)		
	Option A	Option B	No Purchase	Option A	Option B	No Purchase
1	38.6%	52.7%	8.6%	30.2%	61.6%	8.2%
2	49.3%	39.8%	11.0%	57.0%	33.2%	9.8%
3	23.6%	70.0%	6.3%	20.4%	74.7%	4.9%
4	80.1%	12.7%	7.2%	79.6%	14.3%	6.1%
5	22.5%	71.5%	6.1%	20.4%	73.2%	6.4%
6	76.4%	15.9%	7.8%	71.6%	20.7%	7.6%
7	25.1%	67.4%	7.5%	28.7%	64.9%	6.4%
8	32.9%	57.9%	9.2%	26.5%	64.3%	9.1%
9	70.6%	23.6%	5.8%	71.0%	25.6%	3.4%
10	44.1%	27.7%	28.2%	37.8%	29.9%	32.3%
11	23.3%	49.3%	27.4%	23.8%	43.0%	33.2%
12	31.1%	63.4%	5.5%	26.8%	70.4%	2.7%

Choice Scenario	Anti Slow Growth – No Brands (N=342)			Anti Slow Growth – No Brands (N=339)		
	Option A	Option B	No Purchase	Option A	Option B	No Purchase
1	27.5%	62.3%	10.2%	28.6%	63.4%	8.0%
2	54.4%	34.8%	10.8%	61.9%	32.4%	5.6%
3	26.3%	64.6%	9.1%	22.1%	70.5%	7.4%
4	78.7%	11.1%	10.2%	76.1%	16.2%	7.7%
5	29.8%	62.6%	7.6%	31.0%	62.8%	6.2%
6	70.8%	20.5%	8.8%	69.3%	24.5%	6.2%
7	17.3%	74.6%	8.2%	19.2%	70.5%	10.3%
8	40.6%	49.7%	9.6%	37.5%	51.6%	10.9%
9	76.3%	18.4%	5.3%	78.2%	18.6%	3.2%
10	32.5%	31.9%	35.7%	36.9%	32.2%	31.0%
11	36.3%	32.2%	31.6%	28.9%	41.0%	30.1%
12	20.8%	75.1%	4.1%	25.4%	70.8%	3.8%

Table A2. Multinomial Logit Estimates for Control with No Information and No Brands

Variable	Unweighted	Weighted by Chicken Purchase Volume	Remove Potentially Unreliable Respondents
Parameter Estimates			
None	-3.048 (0.092)[a]	-3.424 (0.057)	-3.192 (0.103)
Price	-0.694 (0.022)	-0.690 (0.013)	-0.750 (0.025)
Organic	0.464 (0.042)	0.471 (0.024)	0.475 (0.047)
Antibiotic free	0.356 (0.038)	0.314 (0.022)	0.420 (0.043)
Hormone free	0.253 (0.038)	0.224 (0.022)	0.267 (0.043)
Slow growth	0.224 (0.038)	0.187 (0.022)	0.232 (0.043)
Non GMO	0.484 (0.040)	0.559 (0.023)	0.537 (0.045)
Willingness-to-Pay ($/lb)			
Organic	$0.67	$0.68	$0.63
Antibiotic free	$0.51	$0.46	$0.56
Hormone free	$0.36	$0.33	$0.36
Slow growth	$0.32	$0.27	$0.31
Non GMO	$0.70	$0.81	$0.72
Number of choices	4020	3996	3300
Number of individuals	335	333	275

[a]Numbers in parentheses are standard errors.

Table A3. Multinomial Logit Estimates for Control with No Information and Brands

Variable	Unweighted	Weighted by Chicken Purchase Volume	Remove Potentially Unreliable Respondents
Parameter Estimates			
None	-3.100 (0.094)	-3.42 (0.056)	-3.418 (0.111)
Price	-0.646 (0.022)	-0.667 (0.013)	-0.746 (0.025)
Organic	0.350 (0.039)	0.400 (0.022)	0.405 (0.046)
Antibiotic free	0.334 (0.036)	0.288 (0.020)	0.401 (0.043)
Hormone free	0.148 (0.036)	0.227 (0.020)	0.148 (0.043)
Slow growth	0.242 (0.037)	0.188 (0.020)	0.297 (0.043)
Non GMO	0.336 (0.038)	0.452 (0.021)	0.425 (0.044)
Brand A	0.100 (0.036)	0.119 (0.020)	0.095 (0.042)
Willingness-to-Pay ($/lb)			
Organic	$0.54	$0.60	$0.54
Antibiotic free	$0.52	$0.43	$0.54
Hormone free	$0.23	$0.34	$0.20
Slow growth	$0.37	$0.28	$0.40
Non GMO	$0.52	$0.68	$0.57
Brand A	$0.15	$0.18	$0.13
Number of choices	4284	4284	3312
Number of individuals	357	357	276

Table A4. Latent Class Logit Estimates by Information Treatment, No Brands

Variable	No Information	Pro Slow Growth	Anti Slow Growth
Class 1			
None	-7.813 (0.666)	-5.429 (0.353)	-6.195 (0.401)
Price	-2.802 (0.246)	-2.065 (0.14)	-2.135 (0.146)
Organic	0.219 (0.178)	0.707 (0.162)	0.461 (0.165)
No Antibiot	0.607 (0.168)	0.269 (0.155)	0.462 (0.151)
No Hormon	0.236 (0.195)	0.274 (0.177)	0.114 (0.167)
Slow Growt	0.007 (0.178)	0.988 (0.172)	0.342 (0.165)
Non GMO	0.695 (0.167)	0.536 (0.15)	0.646 (0.154)
Brand A	---	---	---
Class 2			
None	-3.858 (0.334)	-3.168 (0.298)	-3.779 (0.394)
Price	-0.164 (0.04)	-0.102 (0.045)	-0.188 (0.049)
Organic	0.466 (0.063)	0.286 (0.062)	0.536 (0.069)
No Antibiot	0.347 (0.054)	0.377 (0.052)	0.34 (0.058)
No Hormon	0.35 (0.054)	0.403 (0.058)	0.417 (0.059)
Slow Growt	0.153 (0.053)	0.441 (0.054)	0.062 (0.06)
Non GMO	0.384 (0.057)	0.332 (0.057)	0.487 (0.062)
Brand A	---	---	---
Class 3			
None	-18.316 (2.189)	-11.286 (1.382)	-12.094 (1.338)
Price	-3.444 (0.474)	-1.803 (0.239)	-1.891 (0.224)
Organic	1.764 (0.406)	0.334 (0.161)	0.358 (0.151)
No Antibiot	-0.026 (0.183)	0.553 (0.157)	0.624 (0.189)
No Hormon	2.117 (0.442)	0.243 (0.211)	0.128 (0.161)
Slow Growt	2.085 (0.346)	0.859 (0.202)	0.396 (0.158)
Non GMO	1.685 (0.343)	0.568 (0.138)	0.857 (0.162)
Brand A	---	---	---
Class 4			
None	0	0	0
Price	0	0	0
Organic	0	0	0
No Antibiot	0	0	0
No Hormon	0	0	0
Slow Growt	0	0	0
Non GMO	0	0	0
Brand A	---	---	---
Class Prob			
Class 1	0.256 (0.024)	0.225 (0.024)	0.25 (0.025)
Class 2	0.425 (0.029)	0.441 (0.033)	0.39 (0.033)
Class 3	0.237 (0.025)	0.255 (0.03)	0.245 (0.03)
Class 4	0.082 (0.016)	0.079 (0.017)	0.115 (0.021)

Table A5. Latent Class Logit Estimates by Information Treatment, Brands

Variable	No Information	Pro Slow Growth	Anti Slow Growth
Class 1			
None	-6.254 (0.401)	-6.393 (0.303)	-11.106 (1.051)
Price	-2.051 (0.147)	-2.357 (0.144)	-4.157 (0.399)
Organic	0.598 (0.293)	0.602 (0.181)	0.415 (0.274)
No Antibiot	0.561 (0.17)	0.341 (0.194)	0.302 (0.237)
No Hormon	0.389 (0.259)	-0.016 (0.249)	0.143 (0.363)
Slow Growt	0.878 (0.227)	1.284 (0.205)	0.319 (0.31)
Non GMO	0.378 (0.26)	0.534 (0.214)	0.364 (0.349)
Brand A	0.474 (0.258)	0.838 (0.23)	0.951 (0.338)
Class 2			
None	-8.556 (0.496)	-25.338 (n/a)	-4.173 (0.388)
Price	-1.28 (0.080)	-0.069 (0.055)	-0.171 (0.041)
Organic	0.141 (0.096)	0.362 (0.082)	0.305 (0.059)
No Antibiot	0.295 (0.101)	0.308 (0.059)	0.272 (0.052)
No Hormon	0.293 (0.104)	0.349 (0.062)	0.367 (0.053)
Slow Growt	0.586 (0.117)	0.445 (0.045)	0.131 (0.052)
Non GMO	0.372 (0.113)	0.234 (0.062)	0.185 (0.055)
Brand A	0.696 (0.094)	-0.295 (0.048)	-0.023 (0.053)
Class 3			
None	-18.516 (n/a)	-9.643 (0.609)	-11.186 (1.086)
Price	-0.068 (0.062)	-1.398 (0.107)	-1.890 (0.188)
Organic	0.42 (0.068)	0.119 (0.13)	0.243 (0.143)
No Antibiot	0.401 (0.062)	0.235 (0.125)	0.530 (0.169)
No Hormon	0.331 (0.07)	0.271 (0.139)	0.385 (0.164)
Slow Growt	0.126 (0.062)	0.677 (0.127)	0.476 (0.147)
Non GMO	0.243 (0.055)	0.288 (0.13)	0.657 (0.169)
Brand A	-0.158 (0.053)	0.594 (0.118)	0.164 (0.135)
Class 4			
None	0	0	0
Price	0	0	0
Organic	0	0	0
No Antibiot	0	0	0
No Hormon	0	0	0
Slow Growt	0	0	0
Non GMO	0	0	0
Brand A	0	0	0
Class Prob			
Class 1	0.194 (0.023)	0.266 (0.025)	0.211 (0.023)
Class 2	0.377 (0.03)	0.347 (0.029)	0.431 (0.031)
Class 3	0.300 (0.027)	0.297 (0.028)	0.250 (0.028)
Class 4	0.128 (0.019)	0.091 (0.017)	0.108 (0.019)