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Factors Affecting the Propensity to Purchase Specialty Eggs in the United States

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Abstract

The popularity of specialty eggs has grown in the United States as eggs provide healthy fats and proteins in the American diet. To benefit from this new trend, producers must strategize their marketing efforts. Using 2015 Nielsen Homescan data and probit analysis, we developed a profile for consumers of specialty eggs that producers and marketers can use to determine the best allocation of resources. Results found that the average consumers of specialty eggs are young households with high income, high education, with no children who live in the Pacific region of the United States.

Keywords: Nielsen data, probit model, specialty eggs

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Introduction

The specialty food market in the United States is a relatively new phenomenon. Specialty foods, of which organic are the most popular, are defined as "foods or beverages of the highest grade, style, and/or quality in their respective categories. Their specialty nature derives from uniqueness, origin, processing method, design, limited supply, unusual application or use, extraordinary packaging, or channel of distribution or sales" (Purcell and Tanner, 2015). The U.S. food market has recently been flooded with specialty varieties of common products. Consumer preferences for specialty food products have experienced double-digit growth, outpacing mainstream food staples (Specialty Food Association, 2017). The increased demand for these products may be the result of Americans embracing lifestyles that focus not only on health but also on the origins and ingredients of food products.

New health trends have placed extreme importance on high protein, low carb, minimally processed diets, which have significantly altered the buying habits of U.S. consumers. Retail sales of specialty foods grew 19% over 2012–2014 (Purcell and Tanner, 2015). Purcell (2016) reported that the core group of specialty food consumers were 62% of men, 58% of women, and they are 25–44 years of age. The percentage of consumers purchasing specialty foods varied by region, making up 71% of the population in the Pacific region, 66% in the Mountain states, and 62% in the Mid Atlantic. Of these consumers, 85% nationwide earn more than $150,000 per year. Millennials were also found to be more likely to buy organic produce, indicating that the specialty market will continue to increase in coming years.

Today, eggs are marketed as a good source of protein, a healthy breakfast that gives you energy throughout the day and keeps you fuller longer, good for mental energy, and a good source of vitamin D. This has allowed them to regain their popularity in the American diet. In 2016, 88.4 billion eggs were sold as table eggs. The average American consumes 268 eggs annually (Statista, 2019a).

Egg consumption dropped slightly in 2015 (to 253 eggs per person) due to turmoil caused by an outbreak of avian influenza. Although the virus is not transferable to humans, the disease resulted in thousands of laying hens being euthanized, severely impacting egg and poultry production. Researchers have two different views regarding consumer behavior in 2015: One group believes that after the price increases caused by the avian flu, the lower price of conventional eggs was just too tempting for the average consumer, causing greater demand for conventional eggs than specialty eggs (Wong, 2017). This trend continued as prices for conventional eggs dropped considerably in the following 2 years, resulting in the lowest prices of the last decade and a decrease in purchases of cage-free specialty eggs (Hirsch, 2017).

The second group believes that "a sharp drop in U.S. egg production due to impacts from an outbreak of Avian Influenza would increase sales of specialty eggs such as cage-free and organic because the price between conventional eggs and specialty eggs narrowed" (Lee, 2015). Several organic egg producers saw an increase in demand for their products as supply tightened and conventional egg prices increased. From 2000 to 2005, organic egg sales grew by an average annual rate of 19% (Nutrition Business Journal, 2006). Using Nielsen Homescan data, the U.S. Department of Agriculture estimated that organic eggs accounted for 1% of the fresh egg market

in 2004. Growth in the specialty egg market is rapid, and organic eggs represent the fastest growing item in this category (Oberholtzer, Greene, and Lopez, 2006). However, specialty eggs go beyond organic and have expanded to include cage-free, free-range, nutrient-enhanced, omega-3, vegetarian-fed, and all-natural eggs. Aforementioned extra categories of specialty eggs on top of organic eggs are due to the extra production costs that are associated with choosing to forgo the conventional production process for the sake of satisfying the customer.

Companies have found that consumers will pay premium prices for goods with special nutritional claims on their labels, a behavior that the Agricultural Marketing Resource Center (2017) believes is a result of a combination of focus on consumer health, environmental concerns, and issues from animal welfare groups. Organic, free-range, cage-free, and omega-3 eggs have experienced growth in the recent marketplace. About 60% of consumers buy specialty eggs (Cowan, 2014), and sales of specialty eggs at U.S. retail stores increased from $28 million in 2014 to $78 million in 2016 (Statista, 2019b). A response to this increase in consumer demand has led about 100 grocery chains, 60 restaurant chains, and dozens of other major food businesses to promise to switch to cage-free eggs in the next decade (Wong, 2017). For the purposes of this research, any nontraditionally produced egg—including cage-free/free-roaming, free-range, organic, vegetarian-fed, pastured, nutrient-enhanced, and fertile—is considered a "specialty" egg.

The increased focus on health and natural eating in the United States has created a unique opportunity for specialty egg producers, making it important to identify characteristics of consumers of specialty eggs. This information will also provide the potential to grow target markets and create new customers who are willing to pay premium prices to purchase specialty eggs. Once target markets are identified, marketers and advertisers of specialty eggs can use this information to position and promote specialty eggs among those who buy as well as those who have not bought (the potential market for specialty eggs).

This study analyzes the socioeconomic and demographic factors affecting U.S. consumers' propensity to purchase specialty eggs. The specific objectives are to (i) determine the propensity to purchase of specialty eggs in the United States based on households' socioeconomic and demographic factors; and (ii) provide marketers of specialty eggs with recommendations on where to market to create maximum resource efficiency. We find that the average consumers of specialty eggs are young households with high income, high education, and no children who live in the Pacific region of the United States.

Data and Methodology

Using Nielsen Homescan panel data for 2015,[1] we identified households that purchased all eggs, regular eggs only, specialty eggs only, and both regular and specialty eggs. We used a probit model to determine the factors affecting households' propensity to purchase each type of egg.

[1] Based on data from the Nielsen Company (US), LLC, and marketing databases provided by the Kilts Center for Marketing Data Center at the University of Chicago Booth School of Business. The conclusions drawn from the Nielsen data are those of the researchers and do not reflect the views of Nielsen. Nielsen is not responsible for, had no role in, and was not involved in analyzing and preparing the results reported herein.

For a dichotomous event, 0 and 1, the probit model can be depicted as follows:

$$\Pr(Z = 1 \mid X, \beta) = F_P(Z_i) \tag{1}$$

$$\Pr(Z = 0 \mid X, \beta) = 1 - F_P(Z_i) \tag{2}$$

Probability is depicted by the standard normal cumulative distribution function as shown in equation (3):

$$P_i = F_P(X_i'\beta) = F_P(Z_i) = \int_{-\infty}^{Z_i} \frac{1}{\sqrt{2\pi}} e^{Z_i^2/2}\, ds \tag{3}$$

X are explanatory variables, β are associated regression coefficients, and $Z_i = X'\beta$ is the index value. Unknown parameters β are estimated using a maximum likelihood estimation technique.

Household demographics included in this analysis are income, household size, race, Hispanic ethnicity, education, age, child presence, employment, and region. Price of eggs was considered as an explanatory variable in each regression. For those households that did not purchase eggs, price of eggs was imputed using standard price imputation procedure in the literature (see Capps, et al., 1994; Alviola and Capps, 2010; Kyureghian, Capps, and Nayga, 2011; Dharmasena and Capps, 2012, Dharmasena and Capps, 2014; Wen et al., 2018).[2] All continuous variables (income, price, and household size) were converted to natural logarithms to improve model fit and statistical significance of parameter estimates. Table 1 reports the variables used and the respective base categories for dummy variables.

Results and Discussion

As shown in Table 2, the market penetration of households that purchased any type of eggs is 92.4%, regular eggs only is 59.2%, specialty eggs only is 6.7%, and both regular and specialty eggs is 32.1%. Each household purchased, on average, 15.41 dozen of any type of eggs, 14.3 dozen of regular eggs only, 9.4 dozen specialty eggs only, and 18.6 dozen both regular and specialty eggs. The average price was $2.22/dozen for regular eggs and $3.44/dozen for specialty.

The probit model uncovered factors affecting the propensity to purchase each type of eggs. For brevity, we only report such factors affecting the purchase of specialty eggs. An increase in household size makes the household less likely to buy only specialty eggs, but an increase in income makes a household more likely to purchase specialty eggs.

Compared to those classified as white, those classified as black were less likely and those classified as Asian were more likely to purchase specialty eggs. Compared to those with no high school education, college graduates were more likely to purchase only specialty eggs. This could

[2] These imputation regression results are not presented in the paper for brevity but are available from the authors upon request.

Table 1. Variables and Explanations

Variable Name	Description
ln_Price_Eggs	Natural logarithm of the price of eggs
ln_Price_RE	Natural logarithm of the price of regular eggs
ln_Price_SE	Natural logarithm of the price of specialty eggs
ln_Price_Both	Natural logarithm of the weighted average of both regular and specialty eggs
ln_household_size	Natural logarithm of the size of the household
ln_income	Natural logarithm of the size of the income of the household
Black	Race Black
Asian	Race Asian
Other	Race other
White (base)	Race White
Hispanic	Hispanic ethnicity
Non-Hispanic (base)	Non-Hispanic ethnicity
No-High School	No high school education
hs_grad	High school graduate education
Some_college	Some college-level education
College_grad	College education
Age_lt_ 35 (base)	Age under 35 years
Age36to50	Age 36–50 years
Age51to75	Age 51–75 years
Age 75plus	Age greater than 75 years
No-child (base)	No child in the household
Child	Child/children present in the household
Notforfullpay (base)	Employment not for full pay
Emphhpt	Employment part time
Emphhft	Employment full time
NewEng (base)	New England region
MidAtl	Mid-Atlantic region
EaNCen	East North Central region
WeNCen	West North Central region
SouAtl	South Atlantic region
EaSCen	East South Central region
WeSCen	West South Central region
Mount	Mountain region
Pacif	Pacific region

Table 2. Market Penetration, Price and Quantity

	Market Penetration	Quantity Purchased (dozens)	Average Price ($/dozen)
Purchased any type of eggs	92.4%	15.4	$2.41
Purchased regular eggs only	59.2%	14.3	$2.22
Purchased specialty eggs only	6.7%	9.4	$3.44
Purchased both regular and specialty eggs	32.1%	18.6	$2.71

Table 3. Probit Regression Results for Households that Purchased Specialty Eggs Only

Variable	Estimate	*p*-Value
Intercept	−3.2262	<0.0001
ln_Price_SE	0.0131	0.8210
ln_household_size	−0.2471	<0.0001
ln_income	0.1801	<0.0001
Black	−0.1478	<0.0001
Asian	0.1060	0.0078
Other	−0.0153	0.7149
Hispanic	−0.0525	0.1559
hs_grad	−0.0125	0.8527
Some_college	0.0684	0.3047
College_grad	0.2075	0.0017
Age36to50	0.0048	0.8978
Age51to75	−0.1360	0.0002
Age75plus	−0.1798	0.0001
Child	0.0121	0.6799
Emphhpt	0.0653	0.0049
Emphhft	−0.0251	0.2104
MidAtl	−0.1299	0.0015
EaNCen	−0.2847	<0.0001
WeNCen	−0.3050	<0.0001
SouAtl	−0.1631	<0.0001
EaSCen	−0.2394	<0.0001
WeSCen	−0.1783	<0.0001
Mount	−0.1250	0.0060
Pacif	0.2407	<0.0001

indicate that more education leads to healthier buying habits, or higher education could be correlated with an increase in income. Consumers under 35 years of age are more likely to purchase specialty eggs than those above the age of 51, which could be due to emerging health trends that have become popular among the millennial generation. Part-time workers are more likely to purchase only specialty eggs. These results could be associated with the fact that younger people purchase only specialty eggs, which is usually when part-time employment would be more common. Consumers in the Pacific region (Alaska, California, Hawaii, Oregon, and Washington) were most likely to purchase specialty eggs.

Conclusions, Recommendations, and Future Research

Based on the results, we are able to develop a profile of those consumers who are most likely to purchase –only specialty eggs. Producers and marketers of specialty eggs would benefit the most by placing their products in locations with not only a higher income level but also those in which income level is increasing. They should also market their products in areas with young populations and small average household size. Areas with higher percentages of single adults or young couples would be most desirable. It is probable that these areas would also have smaller numbers of children, which is another characteristic that matches the profile for a specialty egg consumer. This was the most surprising result from the data. Intuition would suggest that household would attempt to purchase specialty products in the presence of a child, but this was not the case for specialty eggs. It could be that specialty eggs are too expensive for the average household with children. It is more economical for parents to spend less per dozen by purchasing regular eggs. Consumers with higher levels of education were found to be more likely to purchase specialty eggs, so areas with high levels of education or towns where colleges are located would be the best places to sell specialty eggs. They should also be marketed in places with high levels of part-time employment. The Pacific region is best to market specialty eggs (California, Hawaii, Washington, Alaska, and Oregon). Producers of specialty eggs can use this information to market their products in areas that will create the most sales revenue and profit. Building on this work, quantitative estimation of marginal effects and demand elasticities for regular and specialty eggs is considered fruitful future research.

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