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Analysis

Eco-labeling in the Fresh Produce Market: Not All Environmentally Friendly Labels Are Equally Valued

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ABSTRACT

Previous research indicates that consumers have a higher willingness to pay (WTP) for food products grown using sustainable production methods due to the perceived environmental benefits. Fresh produce can be produced using numerous sustainable methods, but it remains unclear which method is valued the most by consumers. In this study, we estimate consumer preferences for fresh strawberries with various sustainable claims: two based on production techniques (reduced pesticides and less fertilizer use) and three based on outcomes associated with ecosystem services (reduced negative impacts on air, soil, or water). While consumers are willing to pay more for fresh strawberries produced with sustainable practices, the premiums differ by the production method. Consumers are willing to pay the highest price premium for fresh strawberries produced with reduced pesticide use, followed by those produced with reduced impacts on water quality. Demographic variables (such as income), purchase habits (such as price normally paid for strawberries), and perception variables (such as importance rating of strawberry attributes) are significant factors affecting consumer preference for strawberries produced using environmentally friendly techniques. Consumers who have a better knowledge of GMO fresh strawberries in the market are willing to pay significantly less for all types of eco-labeled fresh strawberries.

1. Introduction

Farmers use a variety of inputs such as labor/machinery, seeds, fertilizer, and pesticides to produce food and raw materials. They also take advantage of natural capital such as soil fertility, oxygen, rainfall/groundwater, and pollination: the ecosystem services (ES) that are crucial for linking the functionality of the ecosystem and human welfare (Fisher et al., 2009; Takatsuka et al., 2009). Concerns about ES degradation due to excessive use of chemical fertilizers and pesticides have increased as growers have become more reliant on chemicals to maintain or increase crop yields (Miranowski and Carlson, 1993; Moon et al., 2002). The adverse effects of contaminated soil, water, and air on human health and the ecosystem have attracted intense scrutiny from policymakers, environmentalists, ecologists, and consumer groups worldwide (Hammitt and Zhou, 2006; Lal and Stewart, 2012; Pargal and Wheeler, 1995). As a result, governmental and private organizations have encouraged growers to adopt more sustainable practices that use less chemical inputs. Despite these efforts, potential economic losses keep some growers from adopting sustainable practices even though they may favor protecting the environment and ecosystems (Conroy and Litvinoff, 1988; Pannell et al., 2006).

Prior research has concluded that ES plays a major role in supporting or contributing directly to the economic output, including that from agriculture (Heal and Small, 2002; Moonen and Barberi, 2008; Takatsuka et al., 2009). However, the absence of ownership of ES can result in the neglect of ES conservation as farmers target maximizing profit. Because there is no instant financial consequence of either conserving or neglecting ES, farmers and producers may apply high levels of inputs, such as synthetic fertilizer, pesticides, and irrigated water, to maximize the yield and short-term profit (Takatsuka et al., 2009). These actions may have harmful impacts on natural capital stocks such as water quality, air quality, and soil quality, as well as future soil fertility.

One way that could promote ES conservation among growers is to use eco-labeling to distinguish from conventional counterparts and potentially increase growers' income, such as organic eco-labeling. Numerous researchers have found that consumers are willing to pay a price premium for food products labeled as environmentally friendly (Krystallis and Chryssohoidis, 2005; Loureiro et al., 2002; Nimon and Beghin, 1999). Most of the research focuses on consumer preferences

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for products characterized by sustainable production methods (process-based), such as organic, naturally grown, and pesticide-free (Loureiro et al., 2001; Van Amstel et al., 2008). The underlying reason for consumers' favor of these products is the perceived higher quality of sustainably produced products that are fresher, safer, and more nutritious (Loureiro and Hine, 2002; Teisl et al., 2002). These findings imply that consumers may care more about the consequences/outcomes associated with environmentally friendly techniques rather than the techniques themselves. The implicit connection between production methods and their environmental impacts suggests that growers can market their products by focusing on either environmentally friendly production techniques or the outcomes associated with these production techniques, such as their impact on ES (process-based vs. outcome based). For example, eco-labels claiming less fertilizer or pesticide use could also claim less air, soil, and water pollution as well, which may sound more attractive to consumers who care more about ES.

To date, no studies have systematically examined consumer preference for food produced using different types of environmentally friendly techniques, and few consumer preference studies have focused on foods produced with various impacts on ES. The objectives of this study are (1) to estimate consumer WTP for fresh strawberries produced using different environmentally friendly techniques and (2) to determine the demographic and attitudinal factors that affect consumer WTP for products grown using these techniques.

We contribute to the literature by examining consumer WTP for both process-based and outcome-based eco-labels. These labels include two based on production techniques (reduced pesticides and less fertilizer use) and three based on outcomes associated to ES (reduced negative impacts on air, soil, or water) to better understand consumer preference for specific sustainable labels. Eliciting consumer preference for products with specific components in eco-labels will help growers to predict the premiums they can anticipate for each type of sustainable practice. This knowledge will also help growers to market their sustainable products more efficiently by emphasizing the environmentally friendly aspects that consumers prefer.

This study also contributes to the literature by determining consumer preference for fresh strawberries with different types of eco-labels. As an important fruit in the global market, strawberry production requires significant use of chemical inputs to achieve profitable yields and ensure fruit quality (Porter and Mattner, 2002). The implementation of environmentally friendly techniques may provide a substantial benefit to the ecosystem in major strawberry production regions such as China, the United States, Mexico, Turkey, and Spain.

2. Literature Review

With the advent of the Green Revolution, agriculture has become more intensive in the use of agrochemicals around the world (Glendining et al., 2009; Pretty et al., 2003; Williams and Richardson, 2004). The intensive use of modern agricultural technologies and chemicals significantly improves food production output while at the same time results in harmful impacts on ES. These impacts include high nitrate levels in groundwater, degradation of lowland streams and lakes, decreased soil fertility, and increased greenhouse gas emissions (Takatsuka et al., 2009; Williams and Richardson, 2004). Increased concerns about these impacts on ES have led industry stakeholders and policymakers to explore new ways to protect the environment while obtaining adequate financial returns for farmers to sustain or grow their businesses. Using eco-labels to reveal sustainable techniques is becoming popular for farmers involved in the sustainable production to receive premiums for their products.

Food eco-labels rely on certification by a variety of third-party programs that extend labels to growers when production techniques conform with practices that are believed to be environmentally or socially beneficial in some way (Moon et al., 2002). Examples of such practices include 1) conservation of soil and water, 2) reduced use of pesticides and synthetic fertilizers, 3) integrated pest management (IPM), 4) elimination of genetically engineered crops, 5) worker health and safety, and 6) worker compensation (Health Care Without Harm, 2007). As a result, food product eco-labeling may include many different types of certifications and claims. These certifications and claims can be presented in various formats (e.g., graphics vs. text, different colors, shapes) that may trigger different perceptions (Kapsak et al., 2008; Shen et al., 2018). Understanding which components of food eco-labels are most important for consumers is essential for producers to make sound decisions about the adoption and promotion of various environmentally friendly techniques based on the potential benefits and costs.

Although eco-labels seem to offer the promise of economic value, there has been a debate about whether a price premium exists for these products. Teisl et al. (1999) and Wessells et al. (1999) find that some products with eco-labels are ranked higher regarding consumer preference, but there is no significant increase in the WTP for these commodities. Other research shows that consumers are willing to pay a higher premium for environmentally friendly food products than for conventional food products (Bernard and Bernard, 2009; Blend and Van Ravenswaay, 1999; Bougherara and Combris, 2009; Gao et al., 2016a; Loureiro et al., 2002; Xu et al., 2012). Among many factors, the impact of knowledge, perceptions, familiarity, and awareness have been proven to be substantial because consumers have to rely on the information to choose among different eco-labels (Grankvist and Biel, 2001; Loureiro et al., 2001; Teisl and Roe, 2005; Taufique et al., 2016; Zepeda et al., 2013).

Previous literature has mainly focused on process-based eco-labels such as organic (Bernard and Bernard, 2009; Loureiro and Hine, 2002; Loureiro et al., 2002), naturally-grown (Wessells et al., 1999; Xu et al., 2012), less pesticide use (Fu et al., 1999; Loureiro and Hine, 2002; Loureiro et al., 2001), and less fertilizer use (Berghoef and Dodds, 2011; Delmas and Grant, 2008). Various labels provide information on how different eco-labeled products protect the environment and contribute to sustainability. However, few studies have estimated consumer preference for outcome-based eco-labels (ES associated with sustainable practices), although there exists a large body of literature on public preference for ES such as management practices or policies to reduce negative impacts on air, soil, water, and other environmental qualities (Boxall et al., 1996; Loureiro et al., 2002; Michaud et al., 2012; Takatsuka et al., 2009; Upham et al., 2011; Vanclay et al., 2011). Considering the ultimate goal of promoting sustainable practices is to protect the environment through sustaining ES, it is critical to determine consumer preference for eco-labels comprehensively by examining both process-based and outcome-based eco-labels.

3. Data Collection

Survey data were collected online by Toluna[1] in June and July of 2014 using a nationally representative consumer panel across the United States. The initial section of the survey poses demographics and consumption questions such as price paid for last purchased box (16 oz) of fresh strawberries. Qualifications for respondents include being over 18 years of age, being the primary food shopper in the household, and having purchased fresh strawberries within the past six months. Using a five-point Likert scale, qualified respondents were asked to rate the importance of some key fresh strawberry attributes, including intrinsic

[1] The questionnaire was designed and hosted on Qualtrics. Toluna, Inc., an international professional market research company, helped distribute the survey to its national representative consumer panels in the United States. All qualified respondents who finished the survey received the same amount of point rewards. At the end of the qualification, there were 2608 qualified respondents who finished the survey and 2525 of these were chosen for the analysis. 83 respondents were eliminated because of missing information.