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Does safety information influence consumers' preferences for controversial food products?

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ABSTRACT

This paper uses experimental auctions to address two key research questions: are preferences for controversial food products a function of safety information, or personal attitudes and preferences? To what extent are consumers' preferences for a controversial food product influenced by positive and negative scientific information? Experimental auctions for pasteurized and unpasteurized artisan cheese were conducted on computer tablets with participants at farmers' markets in Michigan, New York and Vermont using a Becker-DeGroot-Marschak (BDM) auction mechanism. Along with the auctions, participants blindly evaluated the sensory characteristics of the cheeses and answered demographic questions and Likert scale questions about their attitudes towards food safety. We find that ideology, taste, and principle drive consumers' preferences for unpasteurized cheese, as opposed to misinformation or ignorance. There is also evidence that artisan cheese consumers exhibit confirmation bias when exposed to information about pasteurization.

1. Introduction

Consumers can be subjective in how they assess food safety risk. A consumer's assessment is a function of the information they have about the product or production technology as well as their attitude about food safety (Lobb, Mazzocchi, & Traill, 2007). Moreover, their attitude about food safety can influence how they respond to new information about a controversial food product or technology. From a policy perspective, the easiest way to ensure the safety of a food product and minimize risk to consumers is through government regulation of production practices. However, defining an optimal balance between food safety and consumer choice can be challenging for policymakers due to the heterogeneity in consumer attitudes about food safety and the heterogeneity in their preferences concerning the extent to which food safety should be pursued at the expense of other aspects of quality, such as taste.

There is an ongoing debate about the acceptability of risk in the food system (Nestle, 2010). The proliferation of small-scale "artisan" food producers has highlighted this debate and presents new concerns for policymakers. Artisan food products are often handmade, minimally processed, and highly diversified products in which the uniqueness of the product is of paramount importance to its demand. The uniqueness of these products however is the antithesis of standardization, which in the broader industrial scale food system has become the basis for ensuring the safety of food products. The emphasis on standardization to promote food safety presents challenges when it comes to regulating artisan products. In some cases, standardization of processes can improve food safety outcomes, although the standardization often comes at the expense of other aspects of quality including sensory characteristics, diversity of consumer choice, and health benefits. In many cases, there are divided opinions among both the public and scientists about the food safety outcomes of particular processes, such as the genetic modification of food (Funk & Rainie, 2015; European Network of Scientists for Social and Environmental Responsibility, 2014). The debate over the safety of unpasteurized or raw milk and more specifically the safety of cheese made from raw milk is another example where there are divisions among the public and the scientific community.

Previous consumer acceptance studies of controversial food technologies have tended to focus on mainstream products and markets (e.g. Nayga, Woodward, & Aiew, 2006; Rousu, Huffman, Shogren, & Tegene, 2002), thus omitting a unique subset of the changing food system. Artisan foods such as beer and cheese among many others are an increasingly important segment of the food market. Craft beer sales in the US capture 21% of the total beer market, 12% by volume, and expect to have a 50% market share in a decade (Shorto, 2016). Artisan cheese consumption is on the rise and the number of artisan cheesemakers in the US doubled between 2000 and 2007 to more than 400, with 75% of them using unpasteurized milk for at least

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some of their products (Roberts, 2007). Understanding the attitudes of artisan food consumers towards risk, their preferences, and their behavior is critical for designing policies that reflect consumers' demand for food safety. With artisan products becoming part of the broader food safety discussion they have placed policymakers in a challenging position with respect to the laws that govern food safety.

In this paper we examine how provision of information about the debate over pasteurization influences preferences for pasteurized and unpasteurized cheese. On one hand, pasteurization of milk has led to significant improvements in the safety of milk and milk products in the last century and is thus an obvious safety-enhancing procedure. On the other hand, pasteurization of milk used to produce cheese kills beneficial bacteria, which are the foundation of flavor development (Bachmann et al., 1998) and can improve safety by competing with harmful bacteria that may have been introduced post processing (Johnson et al., 1990). Pasteurization thus represents a tradeoff between safety and (sensory) quality for some consumers, particularly with artisan cheese, and this is what we explore in light of the positive and negative scientific information about pasteurization. By positive information we mean information in support of a particular practice, and by negative information we mean information in opposition to a given practice. We look at the effect of pro-pasteurization and pro-raw milk (unpasteurized milk) information on consumers' willingness to pay (WTP) for pasteurized cheese. We are particularly interested in whether consumers place greater weight on negative information as other researchers have found with other products (Fox, Hayes, & Shogren, 2002; Rousu, Huffman, Shogren, & Tegene, 2007).

2. Background

The practice of pasteurizing milk used in the production of cheese in the United States dates back to World War II when the United States Department of Agriculture (USDA) encouraged producers to pasteurize the milk used to produce the millions of pounds of cheese being supplied to US and allied troops abroad (Johnson et al., 1990). Following two outbreaks of typhoid fever in 1944, the Surgeon General declared that cheese must be made from pasteurized milk or be aged before sale to allow the beneficial bacteria time to proliferate. After some debate the Food and Drug Administration (FDA) passed 21 CFR 133 in 1949, requiring that cheese be made from pasteurized milk or aged no less than 60 days (at a temperature greater than 35 °F). D'Amico and Donnelly (2010) outline a series of early studies that may have laid the groundwork for the 60-day minimum aging period, namely a study by Gilman, Dahlberg, and Marquardt (1946), which found that undulant and typhoid fever epidemics had not been associated with cheese cured for more than 63 days.

This regulation has remained unchanged despite the changing nature of risk from dairy products and recent scientific findings that contradict the premise of the regulation. According to the Centers for Disease Control (CDC) database, safety of dairy products is now among the highest of all foods (CDC, 2014a). There have been no major outbreaks of milk or cheese-related illnesses in recent years as there have been with fruits and vegetables (such as spinach and cantaloupes). In addition to the decreased risk of dairy products, there is evidence that the 60-day aging period is arbitrary as recent research has demonstrated that pathogens can survive past 60 days (D'Amico, Druart, & Donnelly, 2008a), and that aging cheese supports the growth of the pathogen *Listeria monocytogenes,* regardless of pasteurization (D'Amico, Groves, & Donnelly, 2008b). Recent research has also found that in samples intended for cheese production, raw milk is not less safe than pasteurized milk (D'Amico & Donnelly, 2010).

Regulations such as mandating pasteurization of milk used in cheesemaking and setting a minimum aging period for cheese made from raw milk are designed to minimize the risk from consuming unpasteurized milk products. Given the heterogeneity in preferences for artisan food products and the contested science underlying this particular policy, it seems prudent to explore consumer behavior around this controversial food safety issue. We do this by looking at the role of safety information about pasteurization on consumer WTP for pasteurized and unpasteurized cheese in an experimental setting.

Much of the research testing the effect of information on controversial technology acceptance takes an experimental approach since it is possible to introduce information treatments and observe the change in consumers' responses to the new information. Studies have found that consumer preferences and acceptance of a specific food safety-enhancing process can be influenced by knowledge and information about the risks (Fox et al., 2002; Nayga, Woodward, and Aiew, 2006). Greater self-rated knowledge of a food technology is associated with positive attitudes about that technology, while increased knowledge of one technology leads to more negative attitudes towards other technologies (Teisl, Fein, & Levy, 2009). Lusk et al. (2004a) compared consumer acceptance of information about a controversial product and found that information on the product's benefits decreased the amount of compensation that subjects demanded to consume the food. Hayes, Shogren, Shin, and Kliebenstein (1995) investigated how subjects process information and found that they generally underestimated the probability of food-borne pathogens and placed more weight on their own prior perceptions of the odds of illness than on the new information presented to them during the study. Aschemann-Witzel and Grunert (2015) found that when US consumers were presented with contradictory information, they reduced their favorable attitude towards a risky product to a lesser extent in the presence of scientifically framed information than non-scientifically framed information. Rousu et al. (2007) developed a method for testing and calculating the economic value of the effects of objective information for a food product in a market with conflicting information.

This paper contributes to the literature by looking at a food product with a controversial safety-enhancing process where safety is intrinsically and inversely related to taste. We focus on consumers' attitudes towards food safety and their preferences for a controversial product or process in light of both positive and negative objective scientific information – information in support of or in opposition to that product or process, respectively.

3. Methods

3.1. Experimental auctions

The research reported here builds on the research presented in Waldman and Kerr (2015) regarding consumers' preferences between pasteurized and unpasteurized cheese and the associated tradeoff between food quality and safety. This paper relies on the same underlying experimental auction data in addition to a second round of observations following an information treatment. In this paper we examine the effect of providing consumers with information about the safety of pasteurization of milk used in artisan cheese production. We observe how this information changes consumers' WTP for the cheese and we explore the relationship between these changes and their underlying demographic characteristics, sensory preferences, and risk attitudes. We build on the method of valuing information outlined by Rousu et al. (2007) by sorting consumers into two endowment groups (pasteurized and unpasteurized cheese) in order to mitigate any signal of quality sent by the endowment and to better capture the heterogeneity of preferences. In addition, we conduct auctions and sensory experiments in a realistic field setting and we use an endow-and-upgrade approach to focus participants' attention on the marginal difference between the pasteurized and unpasteurized cheeses.

The auctions use the Becker-DeGroot-Marschak (BDM) auction mechanism (Becker, Degroot, & Marschak, 1964). In a BDM auction, a "market" price is randomly generated from a pre-specified distribution chosen by the experimenter and compared to the sealed bid the participant submits. If the individual's bid is greater than the market price,