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Reprint of "Chinese producer behavior: Aquaculture farmers in southern China"☆

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ABSTRACT

The increasing share of imported food in developed countries, such as the U.S. and European Union countries, poses new challenges for food safety and quality regulators. China, as the world's biggest food producer, has the fastest growing share of fish and shellfish exports to these countries. While there have been an increasing number of studies conducted on consumer demand for various food product attributes, little research has focused on producer behavior, and studies on Chinese food producers are especially absent in the literature. The objective of this study is to assess Chinese aquaculture producers' willingness-to-change (WTC) and adopt certain production practices related to food safety. Producer preferences for enhanced food safety measures, and sustainable/eco-friendly production practices are assessed using a choice experiment. Primary data was collected in the leading aquaculture producing provinces of southern China. The average net income per farmer of our sample was 81,286 RMB/year of which approximately 72% originated from their aquaculture operation. Derived WTC estimates from a random parameters logit model suggest that the representative Chinese producer would require a 2.49% premium per *jin* of fish to adopt enhanced food safety practices such as those required for China GAP, and No Public Harm voluntary certifications and they would accept a 3.22% discount before being indifferent between having an antibiotic-free facility and using antibiotics. WTC estimates of sustainable eco-friendly practices and verification by various entities were also assessed. A latent class model (LCM) is used to segregate producers into groups with similar underlying characteristics to develop policies to improve producer practices and ultimately product safety and quality.

1. Introduction

The share of imported foods in developed countries, such as the U.S. and European Union countries, has shown steady growth over the past decade. Foods such as fish, shellfish, coffee, cocoa, and spices, have contributed to the increase of overall import shares due to their relatively low domestic production volumes. The globalized food industry offers Western consumers a more affordable spread of food products year round and it also increases market access for developing countries (Jerardo, 2008). However, the increasing share of imported food in developed countries poses new challenges for food safety and quality regulators. In recent years, China has emerged as an important supplier of food imports in the U.S., ranking third in value after North American neighbors Canada and Mexico. U.S. imports of Chinese food products increased roughly fivefold in value from $1 billion in 1998 to $5.2 billion in 2008 (Becker, 2008). Similarly, the Chinese share in Australia's food imports increased to 7.3% in 2010–2011 from 3.1% in 2000–2001 (Rushdi, 2012).

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Highly publicized incidents of food contamination and adulteration in both the Chinese domestic and export market have focused worldwide public concerns on the safety of food from China (Gale & Buzby, 2009). China's food safety problems stem in large part from loose regulations and China's highly fragmented food production. As a result of these issues, the U.S. government has taken swift action in addressing the safety of U.S. imports. In 2007, the Interagency Working Group on Import Safety issued a comprehensive Strategic Framework followed by a detailed Action Plan for Import Safety, which explicitly addressed the safety of U.S. imports from China.

Chinese food exports to the U.S. include a large variety of items; however three-fourths can be grouped into the following categories: aquaculture (mostly fish and shellfish), juices, fruits, vegetables and nut products. Of these broad groups, fish and shellfish account for the largest and fastest growing category of imported foods from China (Gale & Buzby, 2009). The majority of the Chinese aquaculture products exported to developed countries originate from factories in China's coastal provinces. Cultivation of fish and shellfish in this area is mainly done by small-scale farmers in ponds, lakes or reservoirs. Moreover, because of significantly lower processing costs, some North American and European fish and shellfish are currently being processed in China and re-exported to the U.S. and other high demand markets. Currently, the U.S., Japan and the European Union (most notably France, Greece, Italy, Portugal and Spain) account for approximately three-fourths of all aquaculture imports world-wide; the majority originating from China (Paquotte & Lem, 2008).

Food safety issues often arise from problems of asymmetric information between producers and consumers of food with regards to product-specific attributes or characteristics. Credence attributes, which are characteristics that consumers cannot discern before, during or even after consuming the product, are often used to signal information to consumers regarding intangible product characteristics (Caswell & Moiduzka, 1996). Product quality and safety certification, traceability networks, and third-party certification are examples of systems used to help bridge the information gap between market players and reduce inefficiencies that arise from asymmetric information. Because Western consumers do not have complete information about these credence attributes from Chinese food products, the Chinese food import market in the developed world is characterized by asymmetric information. Furthermore, the Chinese food processing sector does not have perfect information regarding product quality characteristics and thus quality regulation mechanisms are ineffective when firms are unable to reveal or guarantee information that they do not possess (Ubilava & Foster, 2009). Information on Chinese production processes that affect food safety and quality must be conveyed to consumers by the importer through a channel which consumers trust. Olynk, Tonsor, and Wolf (2010) explains that producers will seek to maximize profit through their selection of product-specific attributes to provide to the market and that producers will decide not to provide such attributes unless they are either required to do so, or find it profitable to supply.

It is crucial for food policy makers to understand both consumer and producer behavior as they propose and implement food safety regulation. Consumer preferences and demand for safety, quality and sustainable attributes have been investigated in previous research such as Shogren, Fox, Hayes, and Roosen (1999), Grunnert (2005), Jaffry, Pickering, Ghulam, Whitmarsh, & Wattage (2004). While there have been an increasing number of studies conducted on consumer behavior and willingness-to-pay for food safety and quality attributes, little research has been focused on producer behavior and studies focusing on Chinese producers are currently absent in the literature. The objective of this study is to assess Chinese aquaculture producers' willingness-to-change and adopt certain production practices. Their preferences for enhanced food safety measures, use of antibiotics and sustainable production practices are assessed.

2. Methods

Given that Chinese producer data are not widely available, fieldwork to gather primary data was necessary. A producer survey was developed to obtain information from Chinese aquaculture producers regarding socio-demographic characteristics, production practices, perceptions of select product attributes and preferences for various verification systems. A choice experiment (CE) was utilized to simulate realistic production decision scenarios in which producers chose between production practices and verification entities.

The producer survey was conducted in the summer of 2011 in the leading aquaculture provinces of China: Fujian, Guangdong and Guangxi. Expert advice was sought from applied economists as well as local county officials to obtain a sample of farmers from the region. Three to five counties with fishing villages were randomly selected in each of the provinces to make up our sample. The surveys were reviewed by agricultural economists from China and the U.S., and ten enumerators were trained to conduct the producer interview and administer the questionnaire and choice experiment. A total of 150 questionnaires were administered, of which 138 were complete and included in the data set used throughout this analysis.

The location of the provinces where the study was conducted and summary statistics of survey respondents and their aquaculture operations are presented in Fig. 1 and Table 1. In our sample, farmers from Fujian province were more export oriented than those in the provinces of Guangdong and Guangxi. As such, the scale of those operations was on average larger than in the other provinces (421*mu* in Fujian, 67*mu* in Guangdong, and 35*mu* in Guangxi). Overall, our sample of aquaculture farmers was predominately male, possessed 8.5 years of formal education and had been farming fish for an average of 10.9 years. The average net income per farmer was 81,286 RMB/year of which approximately 72% originated from their aquaculture operation. Small proportions of them operated under contracts or were members of a farm cooperative (12.3% and 6.5%, respectively). The majority of farmers (60.1%) reported operating an antibiotic-free operation.

The survey contained a choice experiment in which producers made decisions between various types of production methods to employ in their operations with varying levels of premiums or discounts per *jin* of product. These production methods included enhanced food safety measures, antibiotic use and environmentally sustainable practices. In addition, their preferences for a verification entity were assessed. Each respondent completed a CE designed to best resemble current and potential production-related decisions