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Cornhusker Economics

Economic Impacts of Food Fraud

When you order seafood at a restaurant, do you get what you pay for? Scientists from Oceana, a non-profit marine conservation organization, conducted one of the largest seafood fraud investigations on 1,215 samples from 674 outlets in 21 states of the United States (U.S.) over the period 2010 to 2012. They found that there is, on average, a 33% probability that you do not actually get what you pay for. The share of mislabeled food was (a quite remarkable) 74% for seafood sold in sushi restaurants and 18% of seafood sold in grocery stores with mislabeled “red snapper” and “tuna” accounting for 90% and 55% of the relevant tested products, respectively.

Food fraud became particularly prevalent in the middle ages when many merchants mixed cheap substitutes with expensive imported spices and sold them throughout Europe. During the 18th and 19th centuries, food fraud became widespread in the U.S. The most common types of food fraud include milk being watered down and mixed with chalk, lead being added to coffee, and cheap substitutes mixed into spices. Despite technological advancements that enable the detection of food fraud and consumers ranking authenticity and safety of food top among non-economic issues, food fraud still occurs with approximately 10% of the food on the grocery shelves in the U.S. being adulterated or mislabeled.

Food fraud is also quite prevalent in Europe. In one of the largest food fraud investigations launched by Interpol and Europol in 47 countries during the period December 2014 to January 2015, there were thousands of tons of adulterated

Market Report	Year Ago	4 Wks Ago	4-24-20
<u>Livestock and Products,</u>			
<u>Weekly Average</u>			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight.	*	*	*
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb.	183.34	166.36	160.88
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb.	155.53	139.67	128.00
Choice Boxed Beef, 600-750 lb. Carcass.	233.49	255.07	272.33
Western Corn Belt Base Hog Price Carcass, Negotiated	80.53	*	*
Pork Carcass Cutout, 185 lb. Carcass 51-52% Lean.	84.19	75.76	75.28
Slaughter Lambs, woolled and shorn, 135-165 lb. National.	152.78	162.63	162.25
National Carcass Lamb Cutout FOB.	386.15	433.70	408.60
<u>Crops,</u>			
<u>Daily Spot Prices</u>			
Wheat, No. 1, H.W. Imperial, bu.	3.65	4.44	4.28
Corn, No. 2, Yellow Columbus, bu.	3.44	3.04	2.76
Soybeans, No. 1, Yellow Columbus, bu.	7.52	8.19	7.66
Grain Sorghum, No.2, Yellow Dorchester, cwt.	5.30	5.38	5.64
Oats, No. 2, Heavy Minneapolis, Mn, bu.	3.25	2.96	3.02
<u>Feed</u>			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.	*	*	*
Alfalfa, Large Rounds, Good Platte Valley, ton.	115.00	90.00	90.00
Grass Hay, Large Rounds, Good Nebraska, ton.	87.50	85.00	85.00
Dried Distillers Grains, 10% Moisture Nebraska Average.	123.50	198.00	193.33
Wet Distillers Grains, 65-70% Moisture Nebraska Average.	45.00	54.37	56.65
* No Market			

Food seized, including 31 tons of chemically treated seafood from Italy and 35 tons of counterfeit butter from Egypt.

Food fraud in the form of food adulteration and mislabeling is viewed as a threat to the integrity of the increasingly industrialized agri-food system and is a major concern for consumers, the food industry, and governments around the world. The 2008 Chinese milk scandal demonstrated the consequences of food adulteration on a global scale affecting consumers and industries in multiple countries. The scandal involved selling watered-down milk as high-quality milk, and adding melamine in milk to boost its protein content and pass nutritional tests. Due to this scandal, 290,000 babies around the world were affected by melamine contamination out of which 6 died and 52,000 were hospitalized.

Food fraud is motivated by economic gains and is enabled by the fact that many of the food attributes consumers care about are credence attributes, that is, their true nature is not detectable by consumers through search or experience. Thus, while producers know whether a product is high-quality or not, consumers do not. While the introduction of certification and labeling can solve this information problem and ensure the presence of the high-quality products in the market, it can also create incentives for fraudulent behavior by producers in the form of food adulteration and mislabeling. Such fraudulent behavior is normally enabled by the prevalence of imperfect monitoring and enforcement systems.

Despite the prevalence of food fraud and its sometimes devastating consequences for consumer well-being and the sectors involved, a systematic economic analysis of food fraud is virtually absent. Previous research on food fraud has focused mainly on product mislabeling and its impact on consumers.

A study based on the Ph.D. dissertation of Dr. Imran Meerza in the Department of Agricultural Economics at the University of Nebraska was published recently and analyzes the impacts of food fraud in the form of both food adulteration and mislabeling on all interest groups involved, i.e., consumers, producers, and middlemen (e.g., food processors and retailers). Specifically, the aforementioned study analyzes the system-wide market and welfare effects of food fraud, i.e., the effects of food adulteration and mislabeling on the equilibrium prices and quantities in the relevant food

product markets and the welfare of consumers, producers and middlemen in the relevant supply channels.

To analyze the system-wide economic impacts of food fraud, the study developed an empirically relevant theoretical framework of food markets with heterogeneous consumers and producers (i.e., consumers differing in their preferences and agricultural producers differing in their efficiency/costs of production), and imperfectly competitive middlemen. The explicit consideration of consumer and producer heterogeneity allows the consideration of asymmetries in the probability of fraud detection for low- and high-quality producers; enables the disaggregation of the welfare effects of food fraud (i.e., the determination of the effects of food fraud on different consumers and producers of the products of interest); and reveals the diverse incentives faced by different producer groups engaged in and affected by fraudulent behavior.

Analytical results show that the price of the high (low) quality product decreases (increases) in the presence of food fraud, while the effects of food fraud on equilibrium quantities are case-specific and dependent on the relative magnitude of the demand and supply effects of food adulteration and mislabeling. Moreover, the magnitude of the price effects of food fraud depends on the type of food fraud with the equilibrium price of the high (low) quality food falling (increasing) more under food adulteration than under mislabeling. In most cases, the profits of the high-quality product suppliers fall while the profits of the low-quality product suppliers increase in the presence of food fraud.

The involvement of low-quality producers in fraudulent behavior is case-specific. In particular, low-quality producers will find it optimal to adulterate and/or mislabel their products when the net expected benefit of fraudulent behavior decreases with the efficiency of producers and the supply effect dominates the demand effect of food fraud. *A key insight of this study is that producers of high-quality products can also find it optimal to commit fraud.* In fact, our analysis shows that at least some producers of high quality will always have incentives to commit fraud. The subgroup of high-quality producers that commits fraud was shown

to depend on the social attitudes towards food fraud, the enforcement policy parameters, and the relative magnitude of the demand and supply effects of food fraud.

Explicitly accounting for consumer and producer heterogeneity is critical in understanding the highly asymmetric welfare effects of food fraud across consumers (with different preferences) and producers (with different levels of efficiency). Our results indicate that, in most cases, (many) high-quality producers and all low-quality producers who adulterate or mislabel their product gain the most, followed by low-quality producers who continue to produce the low-quality product but do not commit food fraud. While honest low-quality producers gain, honest high-quality producers always lose in the presence of food fraud. Intriguingly, even though the presence of food fraud has different impacts on honest producers of low- and high-quality products, it is shown to reduce the welfare of *both* high and low-quality product consumers.

A comparison of the consumer welfare losses under food adulteration and mislabeling, indicates that the total consumer welfare loss is higher under food adulteration. While the equilibrium quantity of the high-quality product is higher in the presence of mislabeling, the increased price premia enjoyed by the product marketed as high quality under mislabeling make producers more likely to mislabel than adulterate their products.

Having identified the market and welfare effects of food fraud on all interest groups involved and the groups which are more likely to engage in fraudulent behavior, the analysis can serve as the basis for the determination of the optimal policy response to food fraud, like the optimal level of monitoring and enforcement under different government objectives and weights on the interest groups involved. It can also provide the basis for estimating the effects of food fraud information on consumers' valuation of the affected products and for quantifying the market and welfare impacts of food fraud incidents on the interest groups involved. Since the important market and welfare effects of food fraud were shown to be case/scenario specific, determining the values of the key parameters is critical for identifying the relevant scenario at play and, through this, the market and welfare impacts of fraudulent activity. Interesting exten-

sions of this research also include the disaggregation of middlemen and the consideration of various successive and bilateral monopoly/oligopoly relationships between food manufacturers and retailers, as well as their impact on the causes and consequences of food adulteration and mislabeling.

This article is based on:

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